SHIP OBSERVATIONS TEAM (SOT)
FOURTH SESSION

Geneva, Switzerland, 16-21 April 2007

FINAL REPORT

JCOMM Meeting Report No. 52

WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

SHIP OBSERVATIONS TEAM (SOT)
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N O T E

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C O N T E N T S

GENERAL SUMMARY OF THE WORK OF THE SESSION

SOT-IV, SESSION I (COMMON SESSION 1)

I SOT-IV COMMON SESSION 1

I-1 ORGANIZATION OF THE SESSION

I-1.1 Opening of the session

I-1.1.1 The fourth session of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) Ship Observations Team (SOT) was opened by the chairperson of the Team, Mr Graeme Ball (Australia), at 0930 hours on Monday, 16 April 2007, in Room C of WMO Headquarters, Geneva, Switzerland.

I-1.1.8 On behalf of the Secretary-General of WMO, Mr Michel Jarraud, and the Executive Secretary of Intergovernmental Oceanographic Commission (IOC), Dr Patricio Bernal, Prof Hong Yan welcomed the participants to the session, to Geneva in general and to the WMO in particular. He reported on the activities of the Marine Meteorology and Oceanography Programme (MMOP) which is a component of the Applications of Meteorology Programme, one of the major WMO programmes that is committed to support its Members, particularly by strengthening all the relevant crosscutting issues. The Ocean Affairs Division is responsible for the implementation of the programme, mainly through the work of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), as a far-reaching innovative vision to respond to the evolving needs of users of marine data and products.

I-1.1.9 Prof Hong Yan noted that the work achieved by the Ship Observation Team (SOT) since its establishment by the first session of JCOMM was one of the best examples of the integration process, which succeeded in showing benefit in terms of increased and better observations serving a wider range of meteorological and oceanographic applications. The synergies established between the three components of the SOT and the increasing cooperation between the meteorological and oceanographic institutes running them have resulted in a more cost-effective, and better standardized ship-based observing system.

I-1.1.10 Prof Hong Yan recalled that since the establishment of JCOMM, several events with important implications for the Commission, had taken place. The last several years have been marked by natural disasters with considerable loss of life and socio-economic impacts. Such disasters ranged from the tragic 2004 Tsunami in the Indian Ocean, the most intense tropical cyclone seasons in the Atlantic and Pacific Oceans, to severe flooding in several parts of the Caribbean, Central America and Asia. WMO, through its Global Operating network (GOS/GDPFS/GTS), has facilitated significant capacity in support of the Early Warning Systems of its Members. The JCOMM Expert Team on Wind Waves and Storm surges is exploring synergies with other WMO Programmes and Technical Commissions for better and more effective storm surge forecasts. In addition, the activities undertaken by the SOT and its three components for upper air, surface meteorological, the surface and sub-surface oceanographic observations is of direct importance to the WMO Natural Disaster Prevention and Mitigation Programme (DPM).

I-1.1.11 Prof Hong Yan explained that improving our observations, understanding, modeling and prediction of climate variability and change was no less important or challenging now than it was a decade ago. An important point of collaboration between WMO and IOC could be seen in the context of the interaction between WCRP and JCOMM, especially the JCOMM in situ Observing Platform Support Centre (JCOMMOPS) that provides technical and status monitoring of Argo, the Ship Observations Team (SOT) and the Data Buoy Cooperation Panel (DBCP) programmes. All of which are very important to WCRP and, in particular, the Climate Variability and Predictability (CLIVAR) project.

I-1.1.12 He recalled that the last JCOMM Management Committee, which met in Geneva last October, strongly supported the development of the in situ and satellite based observing systems. It noted the progress of the Observations Programme Area implementation and the priorities expressed for (i) achieving global coverage by the in situ networks, (ii) system wide monitoring and performance reporting, and finally funding to meet the implementation targets. The Management committee also strongly supported the META-T initiative for the collection and exchange of instrumental metadata. The last JCOMM Data Management Coordination Group (DMCG) which met last October at the WMO headquarter has defined a strategy to facilitate the move towards better interoperability of the different data management systems being developed in the oceanographic and meteorological communities, including the WMO Information System (WIS).

I-1.1.13 Prof Hong Yan recalled the ship owners and masters' concerns regarding the availability of VOS ship identification and positions on public websites. The WMO Executive Council addressed the issue at its fifty-eighth session, and decided to conduct a High Level Dialogue with the International Maritime Organization (IMO), the International Chamber of Shipping (ICS), as well as other relevant international organizations and affected Members. The meeting, held in Geneva last February made a number of recommendations, which Prof Hong Yan was inviting the Team to consider when discussing this issue. In particular, the Management Committee recommended seeking a universally accepted global and standardized solution using an agreed international system of masked call signs, yet to be developed. The meeting invited the SOT to draft a recommendation to re-instate the trial ship masking schemes.

I-1.1.14 A new composite observing system is fundamental to meteorology, and necessary in order to meet the demands of sustainable development in the 21st century. The Global Earth Observation System of Systems (GEOSS) will be an opportunity to provide additional benefits to many societal and economic areas worldwide; and with its unique operational system, WMO and IOC have both been very active participants in this process, and are well placed to play leading roles therein.

I-1.1.15 As we look ahead, the WMO Information System (WIS) offers much promise. In this respect, the Intercommission Coordination Group on WIS would serve as a strong, high-level coordination and collaboration mechanism spanning across the technical commissions for achieving the challenging task of developing WIS. WMO is supportive of the efforts of JCOMM to integrate data management activities of the oceanographic and meteorological communities. A good example is the successful development and implementation of the JCOMM prototype in Obninsk, which is part of both the International Oceanographic Data and Information Exchange (IODE) and the WMO Information System (WIS) and will deliver ocean data to both communities in support of many applications, including marine services and operational oceanography.

I-1.1.16 In closing, Prof Hong Yan thanked the participants for their contribution that will help WMO and IOC provide even better service to their Member/Member States in order to face the challenges of improving weather forecasting, climate change detection, disaster prevention and mitigation, and the many weather and marine oceanography related application areas, or "societal benefit areas". In conclusion, he wished the participants a successful meeting and a pleasant stay in Geneva.

I-1.1.17 The SOT chairperson, Mr Graeme Ball provided an overview of the SOT and of the goals for the meeting. He recalled the composition of the SOT with its three sub-Panels – i.e. the Voluntary Observing Ship Panel (VOSP), the Automated Shipboard Aerological Programme (ASAP) Panel (ASAPP), the Ship Of Opportunity Programme (SOOP) Implementation Panel (SOOPIP) –, and the objectives of the SOT, its working arrangements, the outcome from past SOT sessions, presented the SOT Management Team, and the relationship of the SOT with JCOMM. The basic goals of the SOT are (i) to manage, coordinate and wherever possible integrate the VOS Scheme, SOOP and ASAP to support a range of well defined operational and research applications, (ii) to liaise and coordinate with other groups involved in using volunteer ships as environmental observing platforms with a view to their participation in the SOT, and (iii) to improve national coordination between institutions involved in similar or related programs.

I-1.1.18 Mr Graeme Ball recalled that the SOT was overseeing about 5000 ships, 200 of them equipped with AWS, and that the VOSClim had reached it target of 200 ships early this year. The SOOPIP is operating globally about 60 ships and making about 24,000 profiles annually. The ASAP is operating fewer number of vessels and is providing about 5000 aerological profiles yearly.

I-1.1.19 Mr Graeme Ball indicated that major goals for the meeting included:

- Review the reports and recommendations from the Task Teams, ad-hoc groups and expert panels.
- Explore the possible integration into the SOT of other groups using ships as observing platforms.
- Identify issues requiring consideration and support from JCOMM.
- Review issues and form intersessional Task Teams as necessary to consider specific issues.
- Identify areas requiring support from JCOMMOPS.
- Gain knowledge about new or updated systems, methods and technologies.
- Continue to harmonise global methods and practices for observing systems, methods of observation, data processing, data management, quality monitoring, and inspection procedures.
- Foster communication within and between observing programmes.

I-1.1.8 The list of participants in the meeting is in ***Annex I.***

I-1.3 Adoption of the agenda

I-1.3.1 The SOT adopted its agenda for the session based on the provisional agenda with some changes, which are in ***Annex II***.

I-1.4 Working arrangements

I-1.4.1 The meeting agreed its hours of work and other practical arrangements for the session. The Secretariat introduced the documentation.

SOT-IV, SESSION II

II SCIENTIFIC AND TECHNICAL WORKSHOP, NEW DEVELOPMENTS

II-1 The chairperson of the Scientific and Technical Workshop, Mr Krits Koek, opened the Scientific and Technical Workshop.

II-2 In the workshop, new initiatives and/or new developments regarding implementation of specialized shipboard instrumentation, observing practices, marine telecommunication facilities, data management procedures, quality control, and ocean products were introduced and reviewed.

II-3 Members of the Team reported on systems and related technical developments relevant to SOT, either within their own services and operations or with which they have otherwise been directly involved. Manufacturers were invited to inform the Team of developments of new equipment and telecommunication facilities relevant for use by the SOT.

II-4 The following presentations were made during the workshop:

II-4.1 Report on Expendable BathyThermograph (XBT) Recorder Inter-comparisons, presented by Dr Gustavo Goni and Mr Derrick Snowden

- The Panel recommended to provide the results of the study on the SOOPIP web site (**action: SOT TC**)

II-4.2 Devil XBT acquisition system update, presented by Mr Alex Papij

II-4.3 Quality Control (QC) of delayed-mode XBT data using Mquest, presented by Ms Ann Gronell

II-4.4 BlueLINK - Ocean Forecasting Australia, presented by Mr Graeme Ball

II-4.5 Report on VOS Climate Project (VOSClim) data, presented by Ms Elizabeth Kent

- The Panel noted that uncertainty maps and time series of uncertainty would be useful (**action: TT VOSClim**)
- Many VOS ships with many VOS not participating in VOSClim provide good quality data and could in principle relatively easily be included in the VOSClim fleet provided that appropriate metadata are available (**action: VOS Operators**)
- The Panel noted that a password-protected section in the electronic logbooks could be desirable to avoid observers entering metadata without the Port Meteorological Officer's (PMO) permission prior agreement. The Panel noted, however, that the password would have to be shared with all PMOs and may not be appropriate for use by all VOS greeters.

II-4.6 TurboWin electronic logbook enhancement and development, presented by Mr Frits Koek

- The Panel noted that a password-protected section in the electronic logbooks would be to avoid (Sarah to provide Text) was desirable concerning the entering of the ship metadata. This would permit to avoid observers to change the metadata without the PMO's prior agreement. The Panel however agreed that it was delicate to implement because the password had to be shared with all the PMOs.

II-4.7 Demonstration of DWD VOS database of ship and equipment metadata, presented by Mr Volker Weidner

II-4.8 Abstracts of the presentations are given in Annex IX.

SOT-IV, SESSION III

III. NATIONAL REPORTS

III-1 Mrs Yvonne Cook chaired the session. Reports were presented by the following countries summarizing all the relevant activities in that country for all ship-based observations, including: the national objectives, planned and proposed activities, mechanisms for coordination between participating organizations and projects, instrumentation used, new developments, data management arrangements, associated R&D programmes and capacity building. Countries operating a ship-of-opportunity programme (Australia, France, Germany, India, Japan, and USA) provided information regarding the status of sampling on each line.

- Germany, presented by Mr Volker Weidner (VOS), and Dr Birgit Klein (SOOP)
- Italy, presented by Mr Franco Reseghetti (SOOP)

- UK, presented by Ms Sarah North (VOS, ASAP)
- Australia, presented by Mr Graeme Ball (VOS, SOOP)
- New Zealand, presented by Ms Julie Fletcher (VOS)
- France, presented by Ms Daniele Blot (VOS), Mr Gérard Rey (ASAP), and Mr Loic Petit de la Villeon (SOOP, including XBT, pCO_2, and TSG)
- Japan, presented by Mr Toshifumi Fujimoto (VOS, SOOP, ASAP)
- Canada, presented by Ms Yvonne Cook (VOS)
- Sweden, presented by Ms Kerstin Svensson (VOS)
- USA, presented by Mr Robert Luke (VOS), Mr Ed Dlugokencky (greenhouse gas measurements onboard SOOP ships), and Dr Gustavo Goni (SOOP)
- Kenya, presented by Mr Edward Muriuki (VOS)

III-2 The Team noted that the report by India regarding its XBT Programme was planned for being presented under agenda item V-2.5. The report by EUCOS Surface Marine Programme (E-SURFMAR) on its VOS Programmes was planned under agenda item IV-2.2

III-3 The Team agreed that the national reports provided by the Members to the WMO Secretariat as well as the PowerPoint presentations made at this meeting should eventually be published on CD-Rom within the SOT annual report for 2006 (**action: Secretariat**).

SOT-IV, SESSION I (COMMON SESSION 2)

I SOT-IV COMMON SESSION 2

I-2 REPORTS BY THE SECRETARIAT, OPA COORDINATOR, CHAIRPERSON OF SOT AND THE SOT TECHNICAL COORDINATOR

I-2.1 Report by the Secretariat

I-2.1.1 Mr Edgard Cabrera presented a report on recent developments relevant to ship observations within WMO and IOC, particularly in the context of JCOMM. A Joint Secretariat housed at the WMO and IOC serves JCOMM. At the WMO, it is the Ocean Affairs Division, which looks after JCOMM (the Marine Meteorology and Oceanography Programme) and liaison with the IOC. At the IOC, the JCOMM support comes from a team within the Ocean Observations and Services Section, which also supports IODE and Global Ocean Observing System (GOOS).

I-2.1.2 He reminded the Team that JCOMM, divided into three programme areas: Observations, Data Management, and Services; overseen by a Management Committee, has two crosscutting teams on satellite data requirements and capacity-building.

I-2.1.3 The Second Session of JCOMM (JCOMM-II, Halifax, Canada, September 2005) was preceded by a scientific workshop that was a successful tool in promoting dialogue between the scientists and users of the ocean observing system and its implementers. A symbolic launching of Drifting Buoy 1250 took place just off Halifax, reaching the design goal of the surface drifting buoy network. The session itself had 125 participants from 42 Members/Member States. Two outstanding service certificates were issued, to Neville Smith (Australia) and Val Swail (Canada). There was an enhanced level of debate, including participation by smaller countries. Edgard Cabrera thanked Canada, the local hosts, and IOC, the organizing half of the secretariat, and the two outgoing co-presidents, Savi Narayanan (Canada) and Johannes Guddal (Norway).

I-2.1.4 JCOMM-II received scientific input into requirements for observations. Ocean data requirements for numerical weather prediction from the World Weather Watch (WWW), ongoing interactions with GOOS, GCOS, and Ocean Observation Panel for Climate (OOPC) for climate requirements, the development of interactions with other WMO technical commissions, and discussions of a possible role of JCOMM in coastal GOOS implementation in cooperation with the GOOS Regional Alliances (GRAs).

I-2.1.5 JCOMM itself has a number of external and cross-cutting interactions in the WMO and IOC. It is involved in natural disaster prevention and mitigation through its support to Tsunami activities (notably through the GLOSS tide gauge network), potential contributions to ocean-related hazard warning systems, and ongoing interactions with the tsunami Intergovernmental Coordination Groups (ICGs). An *ad hoc* expert meeting on natural disaster prevention and mitigation took place 1-3 February 2006 in Geneva. JCOMM is recognized for its implementation role in GEO/GEOSS. It has growing interactions with the private sector, and recognizes potential two-way benefits from enhanced interaction. A JCOMM-GOOS-Industry Task Team had an informal meeting 3-4 March 2006 in Paris.

I-2.1.6 The Services Programme Area has focused on Maritime Safety Services, Marine Accident Emergency Support, including MPERSS and support to search and rescue operations, developing links to operational ocean forecasting systems, a guide to storm surge forecasting, input to the International Polar Year (IPY), and graphical metocean services. It proposed a resolution to IMO on metocean services similar to A.706(17) for navigational warnings.

I-2.1.7 The Observations Programme Area has symbolically achieved its goal for the surface drifter network, strengthened interactions with Argo, OceanSITES, and ocean carbon observations, achieved integration of ship-based observations through the SOT, operated a successful technical coordination activity through JCOMMOPS, and created a fund for the bulk purchase of consumables.

I-2.1.8 The Data Management Programme Area has worked in close coordination and interaction with WIS and IODE, developed a Data Management strategy for JCOMM, and worked on pilot projects, including one demonstrating end-to-end data management (E2EDM).

I-2.1.9 The JCOMM Management Committee and Secretariat will continue working on the strategic development of JCOMM. They have improved the Strategy Document and initiated development of a JCOMM implementation plans that will address objectives, deliverables, and performance indicators. System-wide monitoring based on the implementation plan is planned, and a JCOMM review will be performed before JCOMM-III in 2009. The Secretariat also plans enhanced communications, and will work on a communications plan and brochure update, has initiated an electronic newsletter and development of an integrated website shared between the WMO and IOC (http://www.jcomm.info).

I-2.1.10 JCOMM priorities through 2009 include the development of operational ocean products and services; disaster prevention and mitigation and ocean-related hazard warning services, full implementation of a sustained ocean observing system, long-term maintenance of the system, including pilots and key ocean satellite missions. These include exploring support for coastal GOOS implementation, implementation of data management pilot projects and interoperability between IODE and WIS. JCOMM adopted a new capacity building strategy, which would involve smaller maritime countries. It plans increased engagement with the private sector. The JCOMM Secretariat faces some serious funding issues, however, as only some 50% of planned work is supported by the WMO and IOC regular budgets. There is a significant need to raise extra-budgetary support.

I-2.1.11 Dr Albert Fischer reminded the SOT that JCOMM was a critical tool in implementing the Global Ocean Observing System (GOOS). The Eighth Session of the IOC-WMO-UNEP Intergovernmental Committee for GOOS, which is to take place on 13-16 June 2007, has established as its goals for this session the publication of a formal benchmark assessment of past

and planned national, regional, and global contributions to the Global Ocean Observing System; and the establishment of substantial new support for the international coordination that is required to integrate these efforts, so that they comprise a sustained system. In support of this effort, the IOC secretariat had prepared a national reporting template (http://www.ioc-goos.org/igoos8reporting), which had been coordinated with the requirements for reporting under JCOMM, and through the Global Climate Observing System (GCOS) to the UN Framework Convention on Climate Change (UNFCCC). The national reports collected for the SOT would be forwarded to the persons responsible for the overall GOOS national reports, but as one of the goals of the national reporting process was to promote intra-country coordination of ocean observations amongst the different agencies and institutions responsible, the members of the SOT were urged to contact their GOOS national representative or IOC national representative, a list of which can be found at http://www.ioc-goos.org/i-goos.

I-2.1.12 Mr Etienne Charpentier reported on results of the recently held JCOMM Data Management Programme Area Expert Team on Marine Climatology (ETMC). The ETMC has focused on modernizing marine climatology schemes. The ETMC-II reviewed and agreed on the terms of reference and membership of the new Task Team on Delayed-Mode VOS (TT-DMVOS). The ETMC defined its working relationships with, the new task team, whose membership will now include selected members of ETMC and SOT. It also defined its Terms of Reference (ToRs), and the SOT was invited to examine them. It was also invited to note and comment on the proposed changes to the IMMT format and Minimum Quality Control Standards (MQCS).

I-2.1.13 The ETMC suggested a new Task Team to compare electronic logbooks, with participation from both SOT and ETMC. **The SOT decided** that the existing Task Team on Instrument Standards and Practices should take on this task **(action: TT/Instruments)**.

I-2.1.14 The ETMC asked the SOT for guidance on the Global Telecommunication System (GTS) distribution in Binary Universal Form for Representation of Meteorological Data (BUFR) code, in particular: (i) whether BUFR is assembled on board or at the local receiving NMSs before being inserted into the GTS, and (ii) if on board, which BUFR template should be used. **(action: TT/Coding, advising ETMC)**

I-2.1.15 The ETMC noted with concern that ship masking had been noticed in collected delayed mode data and that the number of such data was increasing, and that the high level WMO-IMO consultative meeting had not made any specific recommendation to mask delayed mode data. The ETMC noted:

- its concern about the increasing number of masked data appearing in e-logbook data,
- that the ship call sign should not be masked in delayed mode data flows and in the e-logbooks, and
- that a unique report identifier is required for all VOS including VOSClim

I-2.1.16 ETMC is planning a Third CLIMAR workshop in Poland in May 2008, and invited representation from the SOT at the workshop.

I-2.1.17 Prior to the ETMC meeting, the JCOMM Services Programme Area Expert Team on Wind Waves and Storm Surges (ETWS) reviewed the Marine Meteorological Services Monitoring Programme Questionnaire, and recommended some changes. Julie Fletcher noted that these changes were made to make the questionnaire more accessible to non-native English speakers, and that little was changed in the content. **The Team approved** the questionnaire (Annex XXI).

I-2.1.18 Capt Gurpreet Singhota, representing the IMO, noted that the revision of the Maritime Safety Committee (MSC) circular 1017 (one of six substantive actions from the high-level WMO-IMO consultative meeting) should be submitted to MSC-83, taking place 3-12 October 2007 in Copenhagen, via its NAV committee.

I-2.2 Report by the Observations Programme Area Coordinator

I-2.2.1 Mr Mike Johnson, Observations Program Area Coordinator, noted that the work plan for the Observations Program Area is based on the GCOS *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC* (GCOS-92). The ocean domain of GCOS-92 is the ocean baseline of the Global Earth Observation System of Systems (GEOSS). JCOMM is identified within GCOS-92 as the implementing agent for 21 specific actions. The implementation targets are designed for climate but also serve global and coastal ocean prediction, marine transportation, marine hazards warning, marine environmental monitoring, naval applications, and many other non-climate users. It was reported that the global system is presently about 57% complete as measured against the implementation targets identified in GCOS-92 and the JCOMM work plan.

I-2.2.2 He noted that the VOS did not have a clear target or metric under GCOS-92, and suggested that a ship be counted as an active part of the VOS fleet when it reported at least 25 observations per month. Under this metric, there were currently 910 active VOS ships.

I-2.2.3 The SOT is one of six global implementation panels cooperating to implement the global ocean observing system. Three panels are officially part of JCOMM – the SOT, DBCP, and GLOSS GE – and three panels are unofficially affiliated, working cooperatively with JCOMM via the Observations Coordination Group – Argo, OceanSITES, and the International Ocean Carbon Coordination Project (IOCCP). He noted that the DBCP was also working with the international tsunameter network to integrate the climate and tsunami observing networks, and that the IOCCP was working on a rationalized network design to address the global surface flux of ocean carbon. The SOT is central to global ocean system operations not only because of the met-ocean data sets delivered from volunteer observing ships, but also because the volunteer fleet provides the platforms of opportunity necessary for deployment of the drifting arrays, and the platforms of opportunity that support underway carbon dioxide air-sea flux measurements.

I-2.2.4 System-wide progress in the deployment of data buoys, profiling floats, tide gauge stations, and ship-based systems was summarized. The challenge of integrating the developing international tsunami warning systems into the sustained global ocean observing system that is being coordinated through JCOMM was discussed. JCOMM's monitoring of system performance against sampling requirements was also reviewed. Mr. Johnson reminded the Members/Member States of the standard base map projection being used by JCOMM – the equidistant cylindrical projection, 90°N to 90°S, broken at 30°E – and urged all observing system managers to use the standard projection when mapping their contributions to the global ocean observing system.

I-2.3 Report by the Chairperson of SOT

I-2.3.1 The chairperson of SOT, Mr Graeme Ball, reported on his intersessional activities representing the Team. He noted good progress made in many areas. The highlights are presented below.

I-2.3.2 Following the resignation of Mr Etienne Charpentier as the DBCP/SOOP Technical Coordinator, the SOT recruited a new Technical Coordinator, with interviews held in March 2006. Further details regarding the selection and appointment are presented in Agenda Item I-8.2.

I-2.3.3 As Chairperson of the *Task Team on Metadata for WMO No. 47,* the Chairperson of the SOT submitted the VOS metadata requirements and reporting formats that were approved at the SOT-III to the JCOMM-II. In accordance with the submission to the JCOMM-II, the Chairpersons of the SOT, VOSP and ASAPP developed a global VOS route scheme for presentation at the SOT-IV. Further details regarding WMO Publication No. 47, including the proposed VOS route scheme, are presented in Agenda Item I-4.3.

I-2.3.4 The Chairperson of the SOT participated in the activities of the *Task Team on VOS Recruitment and Programme Promotion*, the *Task Team on Instrument Standards* and the *Task*

Team on Coding (of SST). The latter was largely incorporated into a broader scheme established by JCOMM to report SST metadata from all marine platforms as part of the META-T Project. Further details regarding the Task Teams listed above are presented in Agenda Items I-4.1, I-4.6 and I-4.5. Further details regarding the META-T Project are provided in Agenda Item I-6.2.1.

I-2.3.5 The Chairperson of the SOT, Mr Graeme Ball, participated in an *ad hoc* Task Team on BUFR (for the VOS and VOSClim) established at the PMO-III (Hamburg, Germany, 23-24 March 2006) to develop a BUFR template to replace the BBXX. Further details regarding the draft BUFR template for the VOS are presented in Agenda Item I-6.2.2.

I-2.3.6 The Chairperson of the SOT, and the Chairperson of the VOSP, with assistance from selected SOT Members, jointly developed guidance material to enable Port Meteorological Officers (PMOs) and VOS Programme Managers to perform their duties in accordance with common practices and international reporting requirements. The guidance material is available on the VOS website (http://www.bom.gov.au/jcomm/vos/). A foreign-VOS Inspection form to harmonize PMO practices when visiting ships belonging to the VOF of another country is available on the VOS website. Further details are also given in Agenda item I-4.1.

I-2.3.7 Ship security, as was first discussed at the SOT-III, remained an ongoing and at times highly emotive issue. The Chairperson of the SOT provided briefing material to the WMO Secretariat for presentation to the Fifty-seventh Session of the WMO Executive Council (EC-LVII, Geneva, Switzerland, June 2005). The issue remained unresolved, and the Chairperson of the SOT subsequently briefed the Co-president (elect) of the JCOMM so the issue could be discussed at Second Session of the JCOMM (JCOMM-II, Halifax, Nova Scotia, Canada, September 2005). The SOT solution to the issue was strongly supported by JCOMM-II, and was further endorsed as a formal recommendation at Third Session of the Port Meteorological Officers (PMO-III, Hamburg, Germany, March 2006). The Fifty-eighth WMO Executive Council (EC-LVIII, Geneva, Switzerland, July 2006), reconsidered the ship security issue and passed a resolution promoting the use of masked callsigns in lieu of the official ITU callsigns for reporting ship's weather report (BBXX). The impact of this recommendation was far-reaching and culminated in the WMO Secretariat, with extensive input from the Chairpersons of the SOT, VOSP, JCOMM DMPA and the JCOMM ETMC, preparing a document describing the implementation of masked callsigns. Further details about ship security are presented in Agenda Item IV-4.1.

I-2.3.8 The chairperson closed by noting that all the action items he was tasked with at SOT-III (see Annex XXV) had been completed successfully.

I-2.4 Review of Action Items from SOT-III

I-2.4.1 Mr Etienne Charpentier reviewed the list of action items from SOT-III (annotated with completion status in Annex XXV). He noted that more than 80% of the actions had been successfully completed, and that a number of the open action items were addressed in the chairperson's report (agenda item I-2.3) or would be addressed in the upcoming Task Team reports (Section I-4) and individual Panel reports.

I-2.5 Report by the SOT Technical Coordinator

I-2.5.1 The SOT Technical Coordinator, Ms Hester Viola, reported on activities in the intersessional period undertaken by her predecessor, Mr Etienne Charpentier, and herself. She expressed her pleasure at taking on her role and looked forward to working with the SOT.

I-2.5.2 During the intersessional period the Technical Coordinator (TC) of the Ship of Opportunity Programme (SOOP) role was expanded to include the entire Ship Observations Team (SOT). The TC role was vacated by Etienne Charpentier in January 2006 and remained vacant until the arrival of Hester Viola in July 2006. The TC normally spent about one third of the time on SOOPIP matters, about 10% on JCOMM & JCOMMOPS issues and about 3% on JCOMMOPS/Argo. The remainder was spent on DBCP issues.

I-2.5.3 The TC expressed that while the role was nominally 30% SOT and 70% DBCP, in reality the tasks identified as required and flagged as high priority, would call for more than one full time employee (just for SOT and DBCP). This should be considered when discussing the future of JCOMMOPS.

I-2.5.4 The TC listed the missions and visits by her and Mr Etienne Charpentier and noted that a detailed list of activities undertaken for every month is included in SOT-IV/Doc. I-2.5. The priority tasks during the intersessional period were summarised as:

a. SOOP Semestrial Surveys
    i. finalised up to December 2005
    ii. some (unchecked) data for 2006 available on http://wo.jcommops.org/cgi-bin/WebObjects/SOOPIndicators
b. User consultation and meetings (e.g. OSMC, JCOMM II)
c. Monthly reports and Maps (updates and additions)
d. JCOMMOPS information system – metadata loading, reporting
e. Argos related issues, user assistance
f. Metadata Ocean Data Acquisition System (ODAS), Meta-T (SOOP and VOS streams)
g. VOS Quality monitoring mechanisms
h. BUFR templates and Codes
i. Recruitment, documentation for new TC
j. Training and “Catch up” once TC position was filled.

I-2.5.5 The long period of vacancy (1 February 2006 to 30 June 2006) in the TC role had many immediate impacts and will continue to impact on the SOT and the JCOMMOPS information system well into the next intersessional period.

I-2.5.6 The main impacts for the ship observations community have been:

- Delays in uploading data, producing Semestrial surveys and (occasionally) monthly maps. What were routine and well-understood tasks for Etienne Charpentier have proven challenging for the new TC.
- Missing and incorrect information – fixing and catching up - cumulatively negative impact on the manageability of the database and data loading processes
- Limited user assistance and manual quality checking of data
- Development of JCOMMOPS web site was minimal.
- Delays in pursuing longer term aims of the SOT e.g. metadata collection, data quality control and monitoring. Delays in implementing new initiatives.

I-2.5.7 The reporting from JCOMMOPS has continued for the most part after some delays. Static monthly maps have been produced and enhanced to standardise across all JCOMMOPS maps. Dynamic maps are available for SOT as a whole. Web Map Services are available from these, as are the shapefiles via ftp. Two new static maps have been created, one for ASAP and one for VOS, plotting final location of active ships for the month. Feedback is sought from SOT members on the success and usefulness of JCOMMOPS reports.

I-2.5.8 The 2006 SOOP Survey was expected within about 4 weeks of the receipt of the final data necessary, which she was still waiting for from one operator.

I-2.5.9 The TC listed the mailing lists (also in SOT-IV/Doc. I-7.3) currently in use. She commented on the minimal work completed (mostly cosmetic) on SOT related websites.

I-2.5.10 She commented that several actions from the last intersessional period had not yet been completed, but are part of the task list she has prepared to guide her activities.

I-2.5.11 The Team welcomed the new TC.

I-3. REPORTS ON ASSOCIATED PROGRAMMES AND REQUIREMENTS FOR SHIP-BASED OBSERVATIONS

I-3.1 Requirements for ship based observations

I-3.1.1 GCOS-GOOS-WCRP Ocean Observations Panel for Climate

I-3.1.1.1 The Technical Secretariat of the GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), Albert Fischer, gave a report on behalf of the panel's Chairperson, Ed Harrison. The OOPC's purpose is to develop recommendations for a sustained global ocean observing system in support of its sponsors. The sustained global ocean observing system for climate is designed to provide data and information products for climate monitoring and forecasting, climate assessment, and climate research. It is also the foundation for global operational oceanography, including global weather prediction and marine forecasting, and global and coastal ocean prediction.

I-3.1.1.2 The basic recommendations for the global module of GOOS, also the ocean module of GCOS, are written into the ocean chapters of two reports[1] to the UN Framework Convention on Climate Change (UNFCCC), published in 2003 and in late 2004. The ocean chapter of the GCOS Implementation Plan (GCOS-92, the second of the reports referenced above) was adopted by JCOMM-II as the basis for the work plan for the Observations Programme Area. The SOT contribution to this global observing system comes from VOS including the VOSClim program and from the SOOP network of XBT lines.

I-3.1.1.3 While emphasizing the importance of VOS data as a part of the global module of GOOS and ocean module of GCOS, the OOPC and GCOS-92 do not set a specific target for the VOS network. GCOS-92 calls for "Improve[d] meta-data acquisition and management for a selected, expanding subset of VOS (VOSClim) together with improved measurement systems." The VOSClim project called for an initial recruitment of 200 ships, with the idea that the enhancements would eventually be applied to as much of the VOS fleet as possible. Fischer invited the panel to work through VOSClim, the operational oceanography community, and through Numerical Weather Prediction centers (NWP) to understand, better the user requirements for VOS for both climate and operational needs, as an input to OOPC requirements-setting activities.

I-3.1.1.4 Systematic sampling of the global ocean is needed to characterize oceanic climate variability. GCOS-92 calls for the implementation of 45 SOOP XBT/XCTD trans-oceanic sections, and the SOT Technical coordinator reports against these sections. In January 2006, GOOS and CLIVAR published an implementation plan[2] of their joint Indian Ocean Panel, which described the major ocean-related scientific questions for GOOS and CLIVAR in the region, and made specific recommendations for observing networks. It prioritized the recommendations for SOOP in the region, and determined that the high-priority lines were IX01, IX08, IX09N/IX10E, IX12, IX15/IX21, IX22 and PX02 - reducing emphasis on IX06 and IX07.

[1] The Second Adequacy Report and the GCOS Implementation Plan, both available at: http://ioc3.unesco.org/oopc/documents/background.php

[2] http://www.ioc-goos.org/goos-152

I-3.1.1.5 At its last meeting in May 2006, the OOPC considered a sustained observing plan for the Indonesian Throughflow region, and endorsed a network consisting of an ADCP mooring monitoring the Makassar Strait, overview satellite altimetry and tide gauge measurements, and four high-frequency repeat XBT/XCTD lines:

- *Inflow*: Startup of a XBT/XCTD high-frequency (2-week) line extending from Mindanao (Philippines) to northwestern Irian Jaya (Indonesia)
- *Outflow*: Continuation of the IX1 XBT/XCTD high-frequency (2-week) line; as well as shallow pressure gauges in the outflow passages
- *Interior*: Continuation of the IX22/PX11 (north-south) and PX02 (east-west) XBT/XCTD lines across the Indonesian Seas at 2-week frequency

I-3.1.1.6 Details can be found in the OOPC-11 report[3]. The OOPC invites the SOOPIP to consider these enhanced recommendations for the Indonesian Throughflow.

I-3.1.1.7 The OOPC web site on the state of the ocean[4] is gaining visibility and will be used to display new indices as they are developed. It was designed as a tool for basic evaluation of the capabilities of the observing system, by reporting key ocean climate indices and their uncertainty; and as a tool for advocacy about the capabilities of the ocean observing system for climate. The need for interesting indices based on subsurface ocean variability remains high, and is the subject of ongoing dialogue with CLIVAR groups. Subsurface indices draw on all available data, including SOOP XBT lines, Argo profiles, and moored array data. Suggestions for particular indices from the SOT are welcome.

I-3.1.1.8 Future initiatives that the OOPC is involved in that may affect recommendations for SOOP most particularly but for VOS as well are treated in agenda item V-4.1.

I-3.1.2 Use of VOS data in climate products

I-3.1.2.1 Dr Elizabeth Kent presented information on the requirements for VOS data for climate applications, updating information presented to SOT-III. The call by JCOMM-II for all activities of the SOT to take account of the Global Climate Observing System (GCOS) climate monitoring principles was welcomed. It was noted that for climate applications the availability of information identifying the type of ship and instrumentation was essential for the reduction of bias. It was stressed that any solution to the ship security concerns must allow for the availability of this information in near real time (delays of order days) and in the delayed mode.

I-3.1.2.2 The meeting were informed of the outcomes of the Second International Workshop on Advances in the Use of Historical Marine Climate Data (MARCDAT-II), held at the Hadley Centre, Met Office, Exeter, UK, 17-20 October 2005. Users of VOS and historical ship observations were well represented at the meeting and further details can be found on the meeting website (http://icoads.noaa.gov/marcdat2/). The recent decline in the numbers and coverage of meteorological observations from ships was noted with regret. It was realised that the users of marine climate data needed to improve their links to those responsible for setting user requirements and collecting the data.

I-3.1.2.3 Recent years have seen increased efforts to define and refine requirements for GOOS/GCOS and to monitor the performance of the observing networks against these requirements. This approach has had some notable successes, particularly where user requirements were clearly defined and could be expressed simply. Argo has a stated requirement for 3000 floats and the array is expected to be complete this year. The target of 1250 drifting buoys required to provide accurate large-scale SST fields for satellite SST bias correction was met in 2005. It should be noted however that the number of buoys required would be much larger if part of

[3] http://ioc.unesco.org/oopc/oopc-11/

[4] http://ioc.unesco.org/oopc/state_of_the_ocean/

the requirement for *in situ* SST measurement, particularly in the Northern mid-latitudes, was not being met by reports made by the VOS. There is currently no clearly stated user requirement for VOS data, at least partly because of the difficulty of assessing the adequacy of the VOS data. The observing system is made up of many different parts and there are obviously simplifications that have to be made when assessing overall progress toward targets. More focus could be useful on the parts of the observing system that are failing to reach their targets, or for which targets are poorly defined. Refinement of observing requirements is an important element of the assessment of adequacy, because often there is not enough information a priori to define the requirements with confidence.

I-3.1.2.4 JCOMM-II had called for a scientific review of the requirements for both the VOS and VOSClim. The UK Met Office noted this requirement and funded a small project to make a start on the assessment of requirements and for metrics to monitor the adequacy of the VOS observations (http://www.noc.soton.ac.uk/ooc/PROJECTS/ASMOS/). This observational monitoring is only a start, but which it is hoped will lead to an improved specification of user requirements and much-needed research into how better to assess adequacy. Given the large amounts of money required to fund observing programs, it is essential that some priority be given to research into techniques for both the assessment of user requirements and the production of adequacy assessments.

I-3.1.2.5 Historically the marine meteorological climate archives were populated with observations taken from ship's logbooks—evolving nowadays in many cases towards electronic submissions. More recently, the ready availability of observations from the Global Telecommunications System (GTS) has lead to a reliance on these observations and recently it has not been possible to find resources to include the delayed-mode (traditionally the climate mode) observations in the International Comprehensive Ocean-Atmosphere Dataset (ICOADS, http://icoads.noaa.gov/) past 1997. The impacts on the quality and completeness of the climate data stream have not yet been quantified. Outstanding issues include: adequacy of the GTS reports for climate applications; impact of the WMO-mandated transition (by 2012) to table driven formats (i.e., BUFR and/or CREX) for data circulated on the GTS, on data quality and consistency; the additional value of the delayed mode observations to the climate record. These issues will be addressed by the newly formed TT-DMVOS.

I-3.1.2.6 In response to questions from the Team, Kent noted that it was possible to assess data quality for different sensor types. Although not specifically funded she stated that requests from VOS operators for particular investigations into sensor performance were welcomed and that information would be provided whenever possible. She also noted that whilst identification of suitable ships and willing volunteers to participate in the VOS network was a limiting factor on the size of the VOS, increased funding of Port Meteorological Officers would be very important in improving the and extending the network.

I-3.2 Reports by associated programmes

I-3.2.1 International Ocean Carbon Coordination Project (IOCCP)

I-3.2.1.1 Dr Albert Fischer presented a report on behalf of Maria Hood, describing the International Ocean Carbon Coordination Project (IOCCP) and its intersection with the SOT. The IOCCP promotes the development of a global network of ocean carbon observations for research through technical coordination and communication services, international agreements on standards and methods, advocacy, and links to the global observing systems. The IOCCP is co-sponsored by the Intergovernmental Oceanographic Commission of UNESCO and the Scientific Committee on Oceanic Research (SCOR).

I-3.2.1.2 The underway pCO2 programs are, at present, operating on an individual PI basis and/or as part of national or regional (EU) research programs. Development of a common format database is underway, and underway programs have agreed to adhere to this common format to facilitate continuous assimilation into the global database. There are plans to develop basin and

global scale synthesis activities in the near future. The possibility of making temperature and salinity data from the carbon programs available in real-time was discussed with JCOMM SOT in 2006. There are now a few underway carbon programs receiving near real-time diagnostics on the CO_2 systems, which may eventually prove sufficiently useful to justify the costs of real-time data transmission for all data types. The majority of lines, however, do not currently have this facility.

I-3.2.1.3 The intersection between the underway carbon measurements and the SOT lie in the ocean surface temperature, salinity, and marine meteorological variables measured routinely by the system. There is currently little funding available for real-time transmission of data outside of the purposes of the research programs.

I-3.2.1.4 The Team later discussed the value of the salinity data produced by the thermosalinographs associated with the pCO2 measurement systems to satellite calibration and ocean analyses, and formulated an action under agenda item V-5.2.

I-3.2.2 Shipboard Automated Meteorological and Oceanographic System Project (SAMOS)

I-3.2.2.1 Mr Shawn Smith provided a report on the status of the SAMOS Initiative. SAMOS is a research science-driven initiative to improve the accuracy of and access to underway navigational, meteorological, and near-surface oceanographic observations. The present focus is on automated observations from U.S.-sponsored research vessels. SAMOS collaborates with GOSUD, the WCRP Working Group on Surface Fluxes (WGSF) and the Baseline Surface Radiation Network (BSRN), which is associated with GCOS. The SAMOS data center (Florida State University, USA) receives daily e-mail messages containing all one-minute interval reports for the previous calendar day. Files are transmitted in 24/7 broadband soon after 0000 UTC, and represent a small amount of the e-mail traffic from the ship. Data are automatically formatted, blended with metadata, and quality-controlled at FSU. All data are monitored daily and problems reported back to vessels at sea. Currently four vessels are reporting operationally, with six more under recruitment. Data are available (with quality flags) via http://samos.coaps.fsu.edu/.

I-3.2.2.2 The SAMOS Initiative also supports activities to improve data accuracy and technician training. A portable seagoing air-sea flux standard is under development by the National Oceanic and Atmospheric Administration (NOAA) Earth System Research Laboratory (ESRL). The standard will be deployed on vessels participating in SAMOS to evaluate their onboard-automated instrument systems. In late 2006, a "Guide to Making Climate Quality Meteorological and Flux Measurements at Sea"[5] was published by NOAA and available on the SAMOS web site. SOT was invited to review this document in light of currently available best practice guides for VOS and VOSClim.

I-3.2.2.3 SOT was asked to comment on SAMOS activities and provide thoughts on potential collaborations with SAMOS. These include: (1) reconciling metadata requirements, (2) recruitment of research vessels to VOS and VOSClim, and (3) future development of VOS AWS as a potential source of delayed-mode climate data

I-3.2.2.4 The initiative is research-funded now, but after a demonstration period, it was hoped that sustained funding could be identified. Smith noted that the database tracks when instruments were calibrated, but that full information about calibrations was a current weakness in SAMOS metadata.

I-3.2.3 GODAE High Resolution SST Pilot Project (GHRSST)

I-3.2.3.1 Dr Albert Fischer presented a report on behalf of Craig Donlon, Chairperson of the Global Ocean Data Assimilation Experiment (GODAE), High Resolution Sea Surface Temperature (SST) Pilot Project (GHRSST-PP), and Coordinator of the JCOMM Services Programme Area. The

[5] ftp://ftp.etl.noaa.gov/user/cfairall/wcrp_wgsf/flux_handbook/

GODAE High Resolution Sea Surface Temperature Pilot Project (GHRSST-PP) is now providing a new generation of integrated SST data products. The international community has implemented a Regional/Global Task Sharing (R/GTS) international framework for the GHRSST-PP. Over $10M has been invested in the delivery of SST data products and services in real time. The primary aim of the GHRSST-PP is to develop and operate a distributed system that will deliver high-resolution (better than 10 km and ~ 6 hourly) global coverage SST data products operationally in near real time.

I-3.2.3.2 The GHRSST-PP is making extensive use of international satellite SST and *in situ* SST outputs recognises the importance of the rapidly growing operational SST user and producer services that are now provided by agencies all over the world. Operational sea ice concentration, surface solar irradiance, aerosol optical depth, and wind speeds are all operational inputs to the GHRSST-PP and constitute the core data sets for the GHRSST-PP RDAC services.

I-3.2.3.3 SST data products are derived by combining complementary satellite and *in situ* observations in real time. There are obvious synergy benefits to such an approach but their practical realisation is complicated by characteristic differences that exist between measurements of SST obtained from subsurface situ sensors, satellite microwave radiometers and, infrared radiometer systems. Furthermore, diurnal variability of SST within a 24-hour period, manifest as both warm layer and cool skin deviations, introduces additional uncertainty for direct inter-comparison and the implementation of data merging strategies. Suites of on-line satellite SST diagnostic systems are available within the GHRSST-PP to consider these and other issues and a re-analysis project will deliver the first of a series of reanalysis time-series (ultimately covering the period 1983-present) in early 2007.

I-3.2.3.4 All GHRSST-PP products are served to the international user community free of charge through a variety of data transport mechanisms and access points. For a complete and up-to-date review of the GHRSST-PP, see http://www.ghrsst-pp.org.

I-3.2.3.5 Operational agencies are engaging with GHRSST-PP as it now transits to sustained operations. For the future, the GHRSST-PP International Science Team requests that SST user and producer communities consider the GHRSST-PP L2P format and methods as a baseline standard for the present and next generation of satellite SST data products and services which represents the best international scientific consensus opinion on SST data format and quality control procedures. This would allow users to be fully prepared for the application of these data using a standard set of well- documented I/O utilities that are common to all satellite SST data sets with obvious benefits to the application community.

I-3.2.3.6 The in situ ship SST data collected by the SOT are used in the verification and error estimation of single-satellite and analyzed SST fields produced by GHRSST. The GHRSST requirement of SOT is all the SST data available, of the highest quality possible, and with metadata about the depth and method of measurement being quite important. Some GHRSST products could also be useful for QC of SST data, particularly the AATSR satellite product which tends to be more consistent and accurate than the *in situ* observations.

I-3.2.4 Ferrybox Project

I-3.2.4.1 Dr Franciscus Colijn presented a report on the EU FerryBox project. EuroGOOS and other organisations have promoted the use of Ships of Opportunity (SoO). There are many routes for ferryboats and other SoO, which run frequently repeated routes. The "Continuous Plankton Recorder (CPR)" has followed the idea of using scientific equipment on such ships for continuous recording of environmental data. Over the last 60 years, it has produced an impressive data on plankton abundance with time. As a measuring platform ferries or container ships on regular routes offer a cheap and reliable possibility to obtain regular observations on near surface water parameters. Applying such a FerryBox system on ferry boats or ships-of-opportunity has several advantages: (1) the system is protected against harsh environment, e.g. waves and currents, (2) bio-fouling can be more easily prevented (inline sensors), (3) no energy restrictions (in contrast to

buoys), (4) easier maintenance when ferry comes back "to your doorstep", (5) lower running costs since the operation costs of the ship do not need to be calculated, (6) instead of point measurements (buoys) transects yield much more information Since the techniques to apply ferries are quite recent and have not yet been used extensively, an European project called "*FerryBox*" (2003-2005) was been initiated in which water quality monitoring systems on “ships of opportunity” were being tested and applied. Nine ferry routes were used in order to compare different systems and environments. The full details of this project as well as data can be accessed at http://www.ferrybox.org/.

I-3.2.4.2 The *FerryBox* system is a new operational tool using ferryboats and other SoO as carrier platform for automated monitoring equipment, measuring underway near-surface oceanographic parameters. The experiences within the EU project demonstrate that such systems can cost-effectively deliver reliable high frequent data improving conventional monitoring strategies. The results demonstrate the applicability of the *FerryBox* system for better understanding and assessing the ecosystem and the underlying biogeochemical processes in the marine environment. By combination with remote sensing images and together with hydrodynamic transport models the ‘one-dimensional’ view along a transect of the ferry can be enlarged to a more spatial view. Special events like strong short-term algae blooms, which will be detected only occasionally by standard monitoring methods, can be studied in detail and related to variations in influencing factors such as temperature, wind and nutrient load. This information can be used for further development of ecosystem models. Techniques to assimilate *FerryBox* data into numerical models may be used to improve reliable forecasts.

I-3.2.4.3 The Team welcomed this developing operational tool, and suggested cooperation with the GOSUD project for dissemination and archiving of the temperature and salinity underway data collected. Colijn indicated his willingness to make the data available to GOSUD **(action: GOSUD and Colijn/Ferrybox)**.

I-3.2.5 SeaKeepers Society

I-3.2.5.1 No representative of the SeaKeepers Society attended the meeting and no document submitted prior to the meeting.

I-3.2.6 Alliance for Coastal Technologies (ACT)

I-3.2.6.1 The Alliance for Coastal Technologies (ACT) provided a written report to the meeting. The ACT support the mission of NOAA in the U.S. through efforts to promote and transition ocean observing technologies to operational use, identifying new technology needs, and acting as a broker between ocean technology users, providers, and developers. More information can be found at http://www.act-us.info/.

I-3.2.7 Proposed SCOR Panel on Merchant Marine Instrumented Oceanographic Surveys

I-3.2.7.1 Dr Tom Rossby (University of Rhode Island, USA) presented a report on a proposed SCOR Panel on Merchant Marine Instrumented Oceanographic Surveys. The Scientific Committee for Oceanic Research (SCOR) is a body of the International Council for Science (ICSU) focused on promoting international cooperation in planning and conducting oceanographic research, and solving methodological and conceptual problems that hinder research. A proposal has been submitted to SCOR to form a scientific panel with the goal of developing a new paradigm for working with the shipping industry for the systematic and sustained observation of the upper ocean water column such as currents, temperature, and biomass. The overall objective will be to establish and manage a network of ocean observation platforms on selected merchant marine vessels, complementing and adding to the work of the JCOMM SOT and other observing programs based on merchant ships. The partnership between scientists and the shipping industry will be mutually advantageous: observations reported in real time will be used in the short-term to enhance ocean forecasting services for the shipping industry on the one hand, and to improve our understanding of the ocean’s structure and variability for weather and climate studies on the other.

To achieve this it is proposed to establish a SCOR panel to develop i) the procedures to encourage development of merchant marine optimized ocean instrumentation, ii) the links and partnerships with the maritime industry for optimal implementation, and iii) the institutional infrastructure to operate and nurture this ocean interior observing system.

I-3.2.7.2 The panel would bring together experts from science, technology, and the marine industry to develop an entirely new paradigm for working with the merchant marine. Rather than thinking in terms of ships of opportunity, a pro-active or purposeful approach is proposed, namely the development of new technologies and modes of cooperation with the merchant marine. Experience has shown that merchant marine vessel operators are quite receptive to the presence of ocean and atmosphere observing instrumentation onboard their vessels. They only require that the equipment make no demands on their time, people or operations. This is where the analogy with orbiting satellites comes in: satellite-borne instrumentation has been designed, optimized and testing for these platforms before they fly so that they can and will perform without any need for human intervention. The merchant marine has a large presence on the oceans, and can be thought of as ocean satellites ready to observe ocean interior. The panel will identify suitable scientific objectives and translate these into what might be called 'mission' requirements. It should identify mechanisms for stimulating the development of 'mission-proof' instrumentation. It should explore and spell out appropriate communications requirements and develop parameters for selecting vessels to be equipped (vessel type, route, hull shape, etc). In addition, perhaps most important of all, develop a flexible, easy-to-implement international infrastructure for cooperation between the merchant marine and the institutions responsible for the instrumentation.

I-3.2.7.3 Dr Tom Rossby described his vision of the establishment of 'Ocean Space Centers' like ESA and NASA to implement these ideas. These agencies identify the science, they contract with industry and academia to develop the technologies needed to meet the science mission requirements, they coordinate with the 'satellites', and they maintain in-house science to provide the long-term support needed to follow these goals through.

I-3.2.7.4 He asked the SOT to consider sharing their experiences; to identify common goals and areas of potential cooperation; to identify other interested parties; and in outlining common actions based on those identified areas of cooperation. The chairperson of SOOPIP Mr Steve Cook noted an additional and growing challenge to working with the marine industry, the volatility of the ship fleet, which has fewer tendencies to repeat routes. The Team also noted its efforts in the development of a draft standard for ship design incorporating a science room, the need to approach the marine industry with this request, and noted the potential need for government subsidies for the implementation of these designs. Observations that could be made out of a container on a ship might be simpler to implement. An action item in response to this proposal was considered by the Team and adopted in agenda item V-5.2.

I-3.2.8 The Scholar ship programme

I-3.2.8.1 Ms Sarah North gave a presentation on the Scholar Ship program, an ocean-going academic program for international students aboard a passenger ship dedicated to undergraduate and postgraduate education. The Ship will carry 600 students over two voyages each year. Each cruise covers half the globe and lasts for 16 weeks, calling in at seven ports per voyage. Further details are available at: http://www.thescholarship.com/.

I-3.2.8.2 Dr. Ravinder S. Bhatia, Director of The Scholar Ship Research Institute has already held discussions with a number of research institutions and organizations about the opportunities this initiative offers for oceanographic and meteorological observation programmes. In this respect, the UK Met Office has recently agreed to recruit the ship chosen for this venture (the Mona Lisa) to the UK Voluntary Observing Fleet, and is considering its potential for future drifting buoy and Argo float deployments. The UK National Oceanographic Centre would be putting a FerryBox-type suite on board, and it will likely be towing a Continuous Plankton Recorder (CPR). The individual members of the Team were invited to contact Dr Bhatia if they had interest in participating in the program.

I-3.2.8.3 Dr Gustavo Goni noted that NOAA/AOML had been involved in a similar initiative with the Semester at Sea program, who had been helpful at deploying Argo and surface drifters in under-sampled areas. The Team generally noted the positive publicity that such cooperation could generate, and encouraged members to consider participating in such programs.

I-4. REPORTS AND RECOMMENDATIONS BY TASK TEAMS

I-4.1 Task Team on VOS Recruitment and Programme Promotion

I-4.1.1 The Chairperson of the SOT Task Team on VOS Recruitment and Programme Promotion, Ms Julie Fletcher reported on the activities of the Task Team since the last SOT Meeting.

I-4.1.2 She first reported on three action items from SOT-III:

- *I/4.1.6 International Newsletter to be kept under review:* based on limited resources, the team agreed that newsworthy material could be placed on the wiki website hosted by E-SURFMAR, with assistance by contacting Pierre Blouch:

  http://esurfmar.meteo.fr/wikisurf/index.php/Marine_Observing_Articles

- III/ A4.2.4 *Tools developed by the TT (eg flyer, PowerPoint presentation) be used to promote VOS thro shipping companies*: these tools are all available on the VOS website for promotional use:

  http://www.bom.gov.au/jcomm/vos/resources.html#operational4

- III A/4.5.3 *VOSP to provide VOSP Chair with list of improvements to the Marine Meteorological Services monitoring questionnaire to be passed to the Expert Team on Maritime Safety Services (ETMSS) for inclusion in the next questionnaire:* the update of the questionnaire was completed and sent to Henri Savina, Chairperson of ETMSS on 30 August 2006 for consideration at ETMSS-II.

I-4.1.3 Additional tasks in which the TT made progress include:

- *Further, develop the generic pre-installation design standards that will eventually be available to ship builders and classification societies:* Work in progress - WMO sent a letter about ship design to the International Association of Classification Societies (IACS) in February 2007 and the issue was discussed at a high level WMO-IMO consultative meeting in Geneva in February.

- *Promote the use of, and keep under review, the promotional presentation "The Partnership between the Maritime Industry, Marine Forecasting and Science":* the PowerPoint presentation still conveys the right message, but some of the slides need updating to keep it current.

- *Review the questionnaire used for the Marine Meteorological Services Monitoring Programme, and propose amendments, which should be reflected in the questionnaire survey to be conducted in 2008:* Questionnaire review completed and revised questionnaire sent to Chairperson of ETMSS, in August 2006. The questionnaire was discussed and adopted at the Expert Team on Maritime Safety Services (ETMSS-II) in Brazil in January 2007, and will be disseminated for the next monitoring survey in early 2008, after final discussion during the SOT-IV in April 2007.

- The SOT Certificate and Flyer were finalized and put on the VOS web site http://www.bom.gov.au/jcomm/vos/resources.html#operational5 during the 4th quarter (Q4) 2005. These are now in routine use.

- The PMO and VOS FP group mailing lists were established to improve global communication and these are being used: pmo@jcommops.org and vos@jcommops.org
- The Foreign VOS Inspection form was completed in Q2, 2006 and put on the VOS website http://www.bom.gov.au/jcomm/vos/ documents/foreign_vos_inspection_form.doc for PMOs to download. PMOs should use this generic inspection form to record the details of a visit to a foreign VOS ship and then email the completed form to the VOS FP in the country of recruitment.
- VOS Quick Reference Guides for PMOs and National VOS Programme Managers were written by the Chairs of the SOT and VOSP and put on the VOS web site in Q4 2006. http://www.bom.gov.au/jcomm/vos/information.html#info1. These guides are intended to standardize global VOS practices and to provide helpful guidelines for both existing and new PMOs and VOS Programme Managers. As well as providing information about ship recruitment and visiting, the Guides contain links to the VOS Quality Monitoring Tools and details the recommended international reporting requirements for WMO, SOT, and other bodies on the status of National VOS.

I-4.1.4 The SOT noted that ship owners during the high level WMO-IMO consultative meeting were concerned by the costs of the draft standard for ship design. It also noted that some of its requirements may have no cost implications at all, and that the draft specification should have a hierarchy of options with costs clearly outlined. Capt Singhota (IMO) noted that it would be important to approach the Maritime Safety Committee with a joint document from JCOMM (WMO-IOC) and the International Chamber of Shipping (ICS). This will continue to be a live action for the Task Team **(action: TT, Secretariat, in liaison with Dr Rossby)**.

I-4.1.5 The SOT also noted that the high level WMO-IMO consultative meeting highlighted the need for a VOS training video, and that the TT should consider this **(action: TT)**.

I-4.1.6 **The SOT decided** to re-establish the Task Team for the next Intersessional period, with the following membership: Ms Julie Fletcher (TT chairperson), Mr Graeme Ball (Australia), Mr Pierre Blouch (France), Ms Sarah North (United Kingdom), Mr Volker Weidner (Germany), Ms Gerie Lynn Lavigne (Canada), and Dr Tom Rossby (URI, USA, advisor).

I-4.2 Task Team on Satellite Communication System Costs

I-4.2.1 Ms Sarah North, Chairperson of the SOT Task Team on Satellite Communication System Costs, reported on the activities of the Task Team since SOT-III. The TT had followed a large number of issues with satellite communications since the last meeting, involving changes in Inmarsat Land Earth Stations (LES), a level of cost compensation through E-SURFMAR, 'half-compressed' transmissions of manual VOS, compression of automated weather station observations, agreements in EUMETNET ASAP (E-ASAP) to compensate costs, bilateral agreements between Germany, the Netherlands, and the UK, and the closure of the Goonhilly LES. The TT had investigated other communications systems, most notably for automated weather systems, including Iridium, Argos, geostationary meteorological satellites, Globalstar, and broadband/e-mail. The TT had also considered the effect of the masking of ship call signs and migration of code formats on the costs of satellite transmissions. Details of these actions can be found in SOT-IV/Doc. I-4, Appendix B.

I-4.2.2 **The Team noted with concern** the closure of the Goonhilly Inmarsat LES (see also agenda item IV-4.5.1). The Team **recognized** that there was a need to formulate suitable emergency back-up procedures to ensure that data is re-routed to assigned alternative LES in the event of the sudden failure or closure (as in the case of Goonhilly), and further considered the need to clearly assign responsibility for maintaining the list of SAC 41 Land Earth Stations up to date (bearing in mind also the potential for new dedicated SAC procedures). The Team also

encouraged the increased use of e-mail for sending observations and drew attention to the potential use of SMART transmissions.

I-4.2.3 **The SOT noted** the recent developments concerning 'half – compressed' messages and recommended to extend its use on manually reporting VOS; E-SURFMAR offered to make software available (via Pierre Blouch). The Team **encouraged** VOS operators to migrate their fleets to the use of dedicated SAC systems (in parallel with the current Code 41 procedures) as a method of fairly apportioning the Inmarsat cost burden. It invited operators and manufacturers to consider adapting their AWS systems that transmit via Inmarsat to consider using the Data Reporting Service (in conjunction with the data processing software developed by Météo France) as a method of reducing their transmission costs.

I-4.2.4 **The SOT decided** to re-establish the Task Team with a modification to its name: the Task Team on Satellite Communication Systems. The membership was decided to include Ms Sarah North, Mr Frits Koek, Mr Robert Luke, Mr Derrick Snowden, Mr Pierre Blouch, Mr Toshifumi Fujimoto, and Mr Michael Myrsilidis. It decided to include it its activities the proposed SOT Iridium pilot project (see I-5.2.4.4).

I-4.2.5 The SOT **decided** to revise the Task Team's Terms of Reference to include communication systems, other than Inmarsat, that can offer potential cost benefits to VOS operators (e.g. Iridium, Globalstar).

I-4.3 Task Team on Metadata for WMO-No. 47

I-4.3.1 Mr Graeme Ball, Chairperson of the Task Team on Metadata for WMO-No. 47, reported on the activities of the Task Team since the last SOT Meeting, against its five tasks:

Task 1: Submission of proposed changes to WMO-No. 47 to JCOMM-II: these were submitted and approved by the session.

Task 2: Prepare documentation for WMO No. 47 Metadata version 3: the Task Team issued documentation for WMO No. 47 Metadata version 3 on 1 June 2006, to provide National Meteorological Service (NMS) with ample lead-time before the introduction of WMO No. 47 Metadata version 3 on 1 July 2007. The documentation was made available on the JCOMM VOS website, and reference to the new version was included on the Pub. 47 page on the JCOMM via a link to the JCOMM VOS website. The Task Team also developed the XML Schema to be used in conjunction with the XML metadata exchange format.

Task 3: Consolidated list of ship routes: the Task Team, after much deliberation and recognizing that one of the main operational uses of the ship routes is to help identify ships to deploy drifting buoys and profiling floats, developed a global VOS route scheme based on buoy deployment areas (WMO No. 306, Manual on Codes, Code Table 1601). The proposal is given in Annex XXVII. VOS FPs and Port Meteorological Officers will be advised via their respective mailing lists when updated documentation incorporating the global VOS route scheme becomes available on the JCOMM VOS website.

Task 4: Regularly review the Pub. 47 metadata requirements and make recommendations as appropriate: this task is ongoing.

Task 5: Monitor the receipt of regular Pub. 47 updates at WMO from participating VOS members: through its ongoing efforts, the Task Team is pleased to report an increasing number of NMS regularly providing quarterly updates. Significantly, the past twelve months has seen both the USA and Canada commence regular Pub 47 submissions.

I-4.3.2 Despite a number of practical difficulties for some of the members, **the Team approved** the proposed global VOS routes. The Team agreed that the names of the routes should be changed from "Ann" (Area) to "Rnn" (Region), to avoid confusion with schemes ascribing A to only

the Atlantic basin. The Team noted that these should be considered as operating areas instead of VOS routes (Capt Singhota's comment, IMO) but agreed that the name of the corresponding field (i.e. route) did not have to be changed.

I-4.3.3 **The Team thanked** the US, Canada, and Sweden for resuming submitting Pub47 metadata after SOT-III.

I-4.3.4 The Team decided to re-establish the Task Team with the same Terms of Reference and Membership.

I-4.4 Task Team on VOSClim

I-4.4.1 Ms Sarah North, the Chairperson of the SOT Task Team on VOSClim, reported on the activities since the last SOT meeting. While the level of participation and the volume of data collected were somewhat below expectations, the VOSClim project had achieved many of its objectives, and the TT noted one important accomplishment, the recruitment of 218 ships, more than the initial target of 200 participating in the program. The majority of tasks given to the Task Team at SOT-III had been achieved.

I-4.4.2 The Task Team had a large number of issues to bring to the VOS panel, involving the project's needs for contributions by ships and support by PMOs, the real-time transmission of data and the delayed mode data stream, the provision of metadata, monitoring statistics, project promotion, masked call signs, and project databases. These 19 issues are detailed in Annex XI, and discussed during the VOS Panel (Section IV).

I-4.4.2 The Task Team noted that a number of the problems with the project website and timeliness of updates had been recently resolved. It asked VOSClim operators to check the project website (recently updated) to verify ships and call sign changes to make sure that none were missing **(action: VOSClim operators)**.

I-4.4.3 The SOT under agenda item IV-3.7 treated the issues above.

I-4.4.4 **The SOT decided** to re-establish the Task Team on VOSClim, and asked the team to work in cooperation with the ETMC.

I-4.5 Task Team on Coding

I-4.5.1 Mr Etienne Charpentier gave a presentation on behalf of Mr Craig Donlon, Chairperson of the SOT Task Team on Coding.

I-4.5.2 He recalled that SOT-III established a Task Team on Coding, to develop a draft new code table for BUFR, which accommodates new types of SST measurements, to submit the draft proposal to the CBS ET/DRC, and to investigate possible future inclusion of biogeochemical data in BUFR through various interactions with other ship-based observation communities.

I-4.5.3 The Task team conducted all of its work via email communication during the intersessional period. Initially the GHRST-PP definitions were reviewed and a common understating of the issues established. Bob Keeley provided a new BUFR Master Table 10 for consideration by the group, which contained an extensive structure for oceanographic variables and common atmospheric variables. A new set of codes for SST that included reporting the depth of SST measurement were developed and submitted to the Commission for Basic Systems (CBS) by the secretariat. The new BUFR codes also included the GHRSST-PP standard SST definition names SSTskin, SSTsub-skin, SSTz (depth) and SST foundation. The TT urges all operators to report the depth of SST observation and for adequate alphanumeric codes to be developed, especially for use in electronic logbooks.

I-4.5.4 Noting the important role of *in situ* SST observations in the context of satellite observations, the TT urges the SOT to consider that accuracies of better than 0.1K ±0.05K should be the target for SSTz observations. Furthermore, as satellite validation work is often conducted using in situ data matched to within ±0.5 hours, it recommends that sampling of SST should be conducted on a ½ hourly basis or hourly basis. Noting that the smallest satellite SST pixel is 0.5km and assuming a ship speed of 15kt, when using automated sampling systems, the mean SST value obtained over a one-minute sample provides an adequate sampling strategy.

I-4.5.5 The Team urges the utmost care and attention to calibration of *in situ* SST sensors and the proper reporting of the location of sensor relative to ships datum (via WMO Pub. 47) and notes the excellent work conducted by Port Meteorological Officers in this respect. However, the team remains concerned at the falling number of PMOs available to service ships in some countries. Ultimately, poor observing practice, calibration and installation metadata records will lead to reduced quality of SST observations, reduced quality of satellite validation results and incorrect bias correction of satellite data when blending complementary satellite observations.

I-4.5.6 Unfortunately, while the TT completed the major task of upgrading the BUFR definitions of SST, only moderate progress was made under item 3. Master Table 10 requires further review and harmonization with Master Table 1 – especially for the definition and inclusion of 'standard' MetOcean variables, which probably should appear in both tables. The work is urgent as ocean forecast systems require bio-geo-chemical observations (particularly of Chlorophyll-a, nutrients, Oxygen) and partial pressure CO2 observations for both atmosphere and ocean are routinely reported from ships for use in carbon cycle monitoring.

I-4.5.7 The TT recommended revise its terms of reference to focus on the development of BUFR Master Table 10 for use across all of the SOT, ready for operational use as soon as possible, bearing in mind the requirements of operational ocean forecast systems, environmental and climate monitoring requirements and ecosystem modeling. Accordingly, the TT further recommends that the TT on Codes liaise closely with the DMPA TT on Codes (See SOT-IV preparatory document I-6.2.2, "Coding Issues") and merge the TT by PM03 on Codes. The aim of this combined and revised TT is to develop MT10 for operational use and to submit this for approval to CBS.

I-4.5.8 The SOT decided to delay decisions to agenda item I-6.2.2, in order to take into account any other coding requirements that may come up during the meeting.

I-4.6 Task Team on Instrument Standards

I-4.6.1 The Chairperson of the SOT Task Team on Instrument Standards, Mr Robert Luke reported on the activities of the Task Team since the last SOT Meeting.

I-4.6.2 He recalled that SOT-III established the Task Team on Instrument Standards, and tasked to (i) compile information on existing activities, procedures and practices within JCOMM relating to instrument testing, standardization and intercalibration, as well as the standardization of observation practices and procedures, (ii) using guidance contained in existing guides including the WMO Guides on Instruments and Methods of Observation (WMO-No.8), communicate with manufactures regarding new technologies and recognized equipment problems, (iii) prepare a JCOMM Technical Report containing this information, to be made widely available through relevant web sites (JCOMM, JCOMMOPS, VOS, DBCP, SOOP, SOT), (iv) provide guidance on testing and the intercalibration of marine meteorological and oceanographic observing systems, (v) liaise closely with the Commission for Instruments and Methods of Observation (CIMO), both in the compilation of the information and also in assessing what additional work in this area might be required under JCOMM, and (vi) liaise closely with IOC in the preparation of the wider compilation of existing instrumentation and observing practices standards in oceanographic observations in general, with a view to inputting an appropriate contribution from JCOMM.

I-4.6.3 He reported that the Task Team is in the process of collating information about national guidance material and instrument sites, to be posted on the appropriate SOT panel web sites.

I-4.6.4 The compiled guidance available for the VOS is:

(i) WMO

- The WMO Guide To Meteorological Instruments And Methods of Observation (WMO-No. 8)

(ii) National services

- Australia
  - Port Meteorological Agents Guide
  - TurboWin User Guide
  - TurboWin Setup Manual
- UK
  - UK MetOffice O.740
- USA
  - Military Specification MIL-B-17089
  - National Weather Service NWS G101 – SP004
  - National Weather Service NWS G222 – SP002
  - NWS Instruction 10-201
  - AmverSeas Users Manual
  - Observing Handbook No. 1

I-4.6.5 The compiled guidance available for SOOP is:

(i) IOC:

- Guide to Integrated Global Ocean Services System (IGOSS, now JCOMM) Data Archives and Exchange (BATHY and TESAC) - IOC Manual and Guides No.1
- Guide to Operational Procedures for the Collection and Exchange of IGOSS (now JCOMM) Data - IOC Manual and Guides No.3
- IGOSS (now JCOMM) Plan and Implementation Programme - IOC Technical Series No. 43
- Best Guide And Principles Manual For The Ships Of Opportunity Program (SOOP) and Expendable Bathythermograph (XBT) Operations

(ii) National services

- Australia
  - Devil XBT User Manual

I-4.6.6 No compiled guidance was available at this time for ASAP.

I-4.6.7 The SOT noted that the work of the Task Team was not complete, and urged the three panels of the SOT to provide additional feedback to the Task Team.

I-4.6.8 Mr Bruce Sumner, executive secretary of the Association of Hydro-Meteorological Equipment Industry (HMEI), asked to work as an associate member of this Task Team, and offered the services of HMEI in providing guidance on the selection of instruments, intercomparisons, or in building better instruments. The SOT agreed to add him to the Task Team.

I-4.6.9 **The SOT decided** to assign the task suggested by the ETMC, to conduct an intercomparison of e-logbooks, to this TT. It also recommended that the Task Team work with CIMO in updating the WMO-No. 8 section dealing with ship-based observations. It **decided to re-establish** the Task Team with the following additional membership: Mr Shawn Smith (SAMOS), Mr Henry Kleta (DWD), Ms Vinciane Unger (Météo France), and Mr Bruce Sumner, HMEI (associate member), Dr Elizabeth Kent, Dr Gustavo Goni, Mr Scott Woodruff.

SOT-IV, SESSION IV

IV. VOS PANEL, FIFTH SESSION (VOSP-V)

IV-1. PROGRAMME REVIEW

IV-1.1 Report by the Chairperson of the VOSP

IV-1.1.1 The Panel Chairperson, Ms Julie Fletcher, opened the fifth Session of the VOS Panel. She reported on activities undertaken during the intersessional.

IV-1.1.2 She reported that there has been considerable activity during the current intersessional period (April 2005 – April 2007), with an impressive number of tasks being completed. The work has mostly been undertaken by email, but meetings with the Ship Observations Team Chairperson, the WMO Secretariat and some respective Task Team Members to progress the VOS issues, occurred at DBCP meetings and the Third Session of the Port Meteorological Officers (PMO-III, Hamburg, Germany, 23-24 March 2006).

IV-1.1.3 Significant work has been completed in the past two years to improve the monitoring and reporting tools for the VOS, and initiatives have been undertaken with the IMO and ICS to raise the profile of the VOS. The dedicated work of the PMO network underpins the programmes coordinated under the SOT, in particular, the VOS Programme, and a number of measures have been put in place to strengthen and improve the PMO services.

IV-1.1.4 The Chairperson mentioned the organization of the Third International workshop of Port Meteorological Officers (PMO), March 2006, and stressed that such workshops provide a valuable opportunity for the PMOs to discuss issues and express concerns, and this greatly benefits global PMO cooperation. Details are provided under agenda item IV-2.3.2.

IV-1.1.5 She recalled that the major issue overshadowing all VOS activities is the Ship Security issue. This issue is very real, and failure to address it adequately could see VOS numbers fall dramatically. There is also concern that proposed solutions must not compromise data monitoring or the ability to match metadata to real observations.

IV-1.1.6 The Chairperson recalled that another significant issue for the VOSP-V includes the introduction of the new metadata fields for the WMO Pub. 47, which will take effect from 1 July 2007. There is also concern as to whether countries will be ready to collect the new variables and have databases to collate the information.

IV-1.1.7 The ongoing and constant change in the global shipping industry affects the VOS fleet. Frequent changes of ship ownership and charter occur because of shipping company mergers, acquisitions and insolvencies. This results in changes to ship names, routes and crewing and affects the stability of national VOS fleets. For example, MAERSK's recent acquisition of PONL has resulted in a worldwide revision of ships and routes.

IV-1.1.8 She reported on the VOSP activities with regard to its Terms of Reference. She noted that there is a trend towards using automated systems and the uptake of electronic logbook software is increasing. The status of VOS automation and software developments will be reported under agenda item IV-2.1. The TT 'VOS Recruitment and Programme Promotion' is working on the development of 'generic' pre-installation design standards for future issue to ship builders, designers etc.

IV-1.1.9 Support for the VOSClim is ongoing. At the Third Session of the Ship Observations Team (SOT-III, Brest, France, 7-12 March 2005), it was agreed that the management of the

VOSClim Project should be transferred to a Task Team under the VOS Panel of the SOT. The status of VOSClim will therefore be reported under the Task Team reports under agenda item I-4.4.

IV-1.1.10 The Chairperson noted that ship recruitment and promotion, new initiatives such as the SOT Certificate of Appreciation, the VOS Flyer, the 'Partnership Industry with Science' PowerPoint presentation, and efforts by the WMO to interact closely with the IMO, all help to enhance ship recruitment and retention. The group email address for the PMOs and National VOS Focal Points has improved global communication on VOS issues. The Foreign VOS Inspection form and the Table of National Observing Practices were designed to assist the PMOs visiting foreign VOS. The VOS Quick Reference Guides for PMOs and National VOS Programme Managers will help to standardise global VOS practices and provide a useful framework for new PMOs and VOS managers.

IV-1.1.11 The SOT Annual Report format was designed so that data from the National Reports can be collated more easily. The United Kingdom Regional Specialised Meteorological Centre (RSMC) is doing an excellent job in monitoring VOS data quality and quantity. The VOS data is also displayed on global coverage maps produced by the JCOMMOPS.

IV-1.1.12 The Panel noted that for a total of 50 countries that appear to be recruiting ships in the latest version of the WMO Publication No. 47, only about 30 countries do actually operate ships, which are actively reporting through the VOS Scheme. The list comparing the global numbers of VOS Ships by country is provided in Annex VI. The Panel asked the VOSP Chairperson to work with WMO in order to identify active ships and remove the historical records from WMO Pub. 47 for ships, which are not active anymore (**action: VOSP Chairperson and WMO**).

IV-1.1.13 Finally, the Panel Chairperson mentioned the proposal to establish an Iridium Pilot Project for the VOS Programme. The Panel agreed to discuss this issue under agenda item I-5.2.4.

IV-1.1.14 The Panel thanked the Chairperson for her report and agreed that through the work of the VOS Panel and the Task Teams, the global VOS is better coordinated and monitored. The Chairperson thanked the respective SOT Panel Chairpersons, the WMO Secretariat and the Members of the Task Teams for their input, help and direction through the current intersessional period.

IV-1.2 Review of Action Items from the VOSP-IV

IV-1.2.1 The Panel reviewed action items from the VOSP-IV, noted outstanding issues, and agreed that these should be considered in the forthcoming action plan for the next intersessional period. Outstanding action items and their status are provided in Annex XXV.

IV-2. PROGRAMME IMPLEMENTATION

IV-2.1 VOS automation and electronic logbook software

IV-2.1.1 Status of VOS automation

IV-2.1.1.1 the Panel Chairperson collected information on Automated Systems from VOS operators in advance, reported on the present status of VOS Automation, and associated problems.

IV-2.1.1.2 She recalled that the VOSP-III (London, United Kingdom 2003), noted the importance of enhancing the automation of all aspects of shipboard procedures, from observation to message transmission, using readily available software and hardware. The VOS Panel Chairperson, Ms Julie Fletcher, was tasked with collating information on the global VOS automation for presentation at subsequent VOS Panel sessions. The first VOS Automation report was compiled in 2003, based on data as of 31 December 2002. The report has been updated annually since 2004, with details of national VOS automation being extracted from National SOT Annual Reports. This report is based on input from National SOT Annual Reports for 2006.

IV-2.1.1.3 Information on the status of automation by country is presented in two categories reproduced in Annexes VII and VIII:

- Status of the VOS Automated Observing Systems (Annex VII)
- Status of the VOS using Electronic Logbook Software (Annex VIII)

IV-2.1.1.4 Since 2003, there has been a steady increase in the numbers of VOS using electronic logbook software (e.g., TurboWin). The number of fully automated shipboard weather observing systems is increasing slowly, and Australia, Canada, Denmark, France, New Zealand, Norway and United Kingdom have all indicated plans to expand their ship AWS networks in 2007.

IV-2.1.1.5 The Panel noted that challenges with respect to installing automated systems on board VOS ships continue to include the following issues:

- Problems in finding 'long term' ships – the length of charter is often insufficient to justify AWS installation;
- Difficulties in siting equipment for best exposure;
- Volatility of ship routes;
- Lack of warning of withdrawal of ships and potential loss of AWS equipment.

IV-2.1.1.6 As a way to compile information regarding VOS automation, the Panel recommended that Members fill in the VOS automation fields in their submissions of WMO Publication 47 metadata as of 1 July 2007 as the new format that will come into force by then will permit the inclusion of such information (**action: Members**).

IV-2.1.1.7 The Panel again re-iterated its recommendation that Members should increasingly implement automated systems on their fleets while at the same time recognizing the requirements expressed by the ETMC that traditional variables that can only be observed manually should continue to be submitted (**recommendation**). The ETMC also noted the importance of continued observations from ships not equipped with AWS to help provide adequate coverage for climate applications.

IV-2.1.1.8 The Panel invited its Members to review and correct the data in the document presented by the Chairperson and asked them to provide the Chairperson with details of any automated VOS systems that are not included in this report (**action Members**).

IV-2.1.1.9 The Panel noted the Steady increase in the number of e-logbooks (now nearly 2000) and in the operational AWS onboard ships (204 AWS now being used). The Panel agreed that it should continue to work to increase the number of e-logbooks.

IV-2.1.1.10 The Panel noted that information regarding Russian VOS ships was missing from the VOSP Chairperson report. The Panel agreed that Russia should be represented at the meeting at the next SOT Session and asked the Secretariat to liaise with Russia during the next intersessional period in this regard (**action: Secretariat**).

IV-2.1.1.11 The Representative of the Association of Hydro-Meteorological Equipment Industry (HMEI), Mr. Bruce Sumner has offered to help for having the SOT requirements considered by the manufacturing industry (**action: HMEI**).

IV-2.1.2 VOS e-logbook software development

IV-2.1.2.1 Mr Frits Koek presented a report on the latest updates to the electronic logbooks, including TurboWin electronic logbook software.

IV-2.1.2.2 The Panel is encouraging Members operating under the VOS to use electronic logbook (e-Logbooks) software such as TurboWin, OBSJMA or SEAS or other types developed nationally. During recent years, development of these types of software has come under great pressure with respect to the demands of the JCOMM (i.e., codes, TDCF), PMO's (integration and usability), managements (financially), observers (simplicity, user-friendliness), changing computer environments (e.g., Windows Vista) and changing communication techniques.

IV-2.1.2.3 The Panel recognized that the development from one version to the next release of these e-Logbooks takes time. The implementation of a new release, replacing the previous one onto the VOS-fleet (for those ships that use e-Logbooks) also takes a considerable amount of time. Although request for changes and/or amendments to e-Logbooks come from different directions, it is essential to coordinate these and try to approach a common release strategy. The Panel noted that the following releases were available:

- OBSJMA for Win (2004);
- AMVER/SEAS 5.3 (2007);
- TurboWin 4.0 (January 2007).

IV-2.1.2.4 The Panel agreed that important issues for the e-Logbooks that will become necessary to consider in the near future were as follows:

- Reduction of the transmission costs;
- Migration to BUFR;
- Provision for the masked call sign (VOS ID);
- Meta data collection.

IV-2.1.2.5 The Panel agreed that it was essential that amendments on codes and formats be carefully coordinated and accommodated in timely fashion in the e-Logbooks.

IV-2.1.2.6 The Panel stressed that e-logbooks had to be properly documented by the way of installation guides and user guides. At the same time, indication of the software versions must be clearly documented on the web sites where the e-logbook software can be downloaded (**recommendation**). The Panel noted that in some occasions, the Port Meteorological Officer(s) offer additional information on how to install and use the software on a few sheets of paper. Some countries have made their own installation and user manuals and furnished them together with the e-Logbook software. Since most of the VOS ships will, once equipped with an e-Logbook, stick to the same type (depending mostly on the recruiting country) the officers are used to a certain approach. However, many ships download the software from a website, install it on their ship's computer, and often begin to use it without additional help or directions. This may lead to unwanted results (e.g., ships being tagged as VOSClim while not being recruited as one). Since the e-Logbook software is becoming more complex with each new release, the Panel agreed that it would be useful for both the observers and the PMO's to have a training tool that guides them through the installation procedures and provides background information on how to use said software. The Panel recommended that Panel Members offering e-logbook software also provide these kinds of tools online on their websites, but more important, they should be available offline on board either via electronic or paper formats (**recommendation**).

IV-2.1.2.7 Present status of e-logbook is documented in Annex VII.

IV-2.1.2.8 The Panel noted with concern the increasing number of ships recording the observational data in the electronic logbooks and using SHIP masking for the callsign. It recommended always to record the callsigns and/or the VOS ID as assigned by the national meteorological service (**recommendation**).

IV-2.1.2.9 The Panel noted with interest the development by KNMI of a web based version of electronic logbook. It was noted that the number of fields was still limited (call sign, VOS ID, data time, lat/lon, etc.) as the system was still under development. Observation is sent through the web to a server, and then from the server onto the GTS. The Panel suggested that a useful feature to add to the system would be to permit the client web browser to remember the ship's call sign between observations and (e.g. thanks to web cookies). KNMI reported that the full web based version was still under trial and that the missing fields were to be added but that it was foreseen to have the operational version available within two months. While noting that broadband Internet connection was needed onboard the ship for using the web-based e-logbook, the Panel agreed that this was a useful and viable system on certain ships.

IV-2.1.2.10 The Panel agreed that e-logbooks were the front-end of the observations and that new requirements should be well thought over and planned. The Panel recommended a better coordination for addressing all the new requirements for IMMT, BUFR, satellite data communications, VOS ID, and metadata and asked its respective Task Teams to enhance cross cutting activities in this regard (**action: relevant TT**).

IV-2.2 Report on the E-SURFMAR VOS Technical Advisory Group (VOS-TAG)

IV-2.2.1 Mr Pierre Blouch reported on the activities by the Surface Marine Observation Programme (E-SURFMAR), an optional programme of the Network of European Meteorological Services (EUMETNET) Composite Observing System (EUCOS) and in particular on its VOS Technical Advisory Group (VOS-TAG) and noted with interest a number of developments under E-SURFMAR such as the following:

- AWS developments (e.g. BAROS station using Iridium SBD) as it is recognized that the quality of AWS observations is generally better than the quality of manned observations.
- Unique Identification Number masking scheme (MASK) (TTTCCnn, TTT=equipment type, CC=country or else). E-SURFMAR, is proposing that JCOMMOPS holds the cross reference list of masked call signs versus IMO numbers in its database.

IV-2.2.2 Regarding ship masking, Mr Pierre Blouch reported that E-SURMFAR supported more secured methods for such as the encoding solution using the BUFR code as proposed under agenda item IV-4.1.2.

IV-2.2.3 Regarding metadata submissions, Mr Blouch explained that the most recent metadata were absolutely required for daily monitoring, performance evaluation, calculation of financial compensation to E-SURFMAR Members. E-SURFMAR was therefore planning to develop a simple metadata database for the management of Pub. 47 fields that will be available to ship operators via the web. The Database will be able to manage Version 3 of the Pub 47 format, including XML (import/export). He explained that the database could be used at a later stage to build the BUFR reports from the raw VOS data. The Panel welcomed these developments and encouraged SOT Members to use that system for submitting their Pub. 47 metadata to the WMO in case they do not already have their own databases and tools (**action: Members**).

IV-2.2.4 The Panel noted with interest the efficient and cost-effective use of half-compressed data transmission with Turbowin (v4). It was noted that the cost appears 60% cheaper than through SAC 41 and that six ships had already tested it successfully. E-SURFMAR was offering the software to those interested Members. The Panel invited interested Members to contact Pierre Blouch directly (**action: Members**).

IV-2.2.5 The Panel also noted that full data compression for AWS permitted to reduce the cost per observation to about 0.17 Euro. 34 BATOS system are now operating with full data compression.

IV-2.2.6 Full data compression using Iridium permits a further reduction of the cost to a level of about 0.08 Euro per report. Two BAROS systems using the technology are currently under development.

IV-2.2.7 Mr Pierre Blouch reported that a couple of E-SURFMAR Members were using the DCP system (Germany, Ireland). While the data telecommunication costs are free for European meteorological services, the cost of the transmitters remains relatively high compared to other systems. An amortization of the hardware cost over 10 years leads to a cost per observation of about 0.17 Euro.

IV-2.2.8 The Panel agreed that the E-SURFMAR approach to VOS observations could be an example to follow in other regions as the systems showed efficiency and cost effectiveness.

IV-2.2.9 Full report of the VOS-TAG is provided in Annex XIV.

IV-2.3 Port Meteorological Officers (PMO)

IV-2.3.1 Review of Port Meteorological Officers role and responsibilities

IV-2.3.1.1 Mr Graeme Ball presented a report on the role and responsibilities of the Port Meteorological Officer (PMO).

IV-2.3.1.2 The Panel again reinforced the view that Port Meteorological Officers play an important role in all of the observing programs of the SOT. In terms of the VOS Scheme, they are vital to maintaining the strength of the VOS Scheme as well as contributing to the volume and frequency of accurate observations.

IV-2.3.1.3 The functions of the PMO are broadly described in various WMO publications and, in some cases, are more specifically defined in national publications. The Panel reviewed and agreed on the full range of responsibilities described in Annex V and on the VOS website < www.bom.gov.au/jcomm/vos/ >. Of increasing importance is the role of the PMO in the training of personnel at merchant marine colleges.

IV-2.3.2 Report and recommendations from the third international workshop of Port Meteorological Officers (PMO-III)

IV-2.3.2.1 Mr Volker Weidner reported on the outcome of the Third International Port Meteorological Officers Workshop (PMO-III) which was held in Hamburg, Germany, from 23 to 24 March 2006 at the Bundesamt für Seeschiffahrt und Hydrographie (BSH) and officially co-sponsored by the WMO and the Deutscher Wetterdienst (DWD). The major goals of the workshop were to convey important recent developments (e.g., regarding WMO Publication No. 47, *Enhanced PMO Communications*), as well as promoting global standards of service.

IV-2.3.2.2 The Panel noted that thirty-nine delegates from twenty-four countries attended the Workshop. As a result of the discussions, twenty-four recommendations were adopted, and an additional two sets of recommendations regarding ship security and transition to table driven code forms. The workshop made a number of recommendations dealing with (i) ship security, (ii), migration to table driven code forms, (iii) updating procedures for WMO Publication No. 47 (e.g. deleting inactive ships, consolidated ship routes, web based system proposed by USA, copyright issues for pictures), (iv) proposed actions to recruit more ships, (v) education and outreach, (vi) improvement of VOSClim data submission, (vii) proper installation of instruments on ships, (viii) updating the list of Inmarsat Land Earth Stations (LES) that accept Special Access Code 41, (ix) ship inspection form for foreign VOS visits, (x) reporting of observing practices, (xi) monitoring, quality information, and feedback, (xii) web tools (e.g. map showing PMO network and contact details), and (xii) requirements for national reports.

IV-2.3.2.3 The Panel endorsed all of the workshop's recommendations with the exception of the one to reclassify VOS data since new developments regarding the ship security issue happened after PMO-III (agenda item IV-4.1). The Panel also agreed with the workshop's recommendations to ensure the continuity of PMO Workshops to be held every 3 to 4 years. The Panel thanked USA for its tentative offer to host the next International PMO Workshop (PMO-IV).

IV-2.3.2.4 The Panel noted that all of the PMO-III recommendations were to be considered by the Panel or the SOT under appropriate Agenda items.

IV-2.3.2.5 The Panel agreed that a Fourth International PMO Workshop should be organized in 2009. The Panel noted the kind offer by USA to host the workshop in USA and agreed with the proposal. It asked the Secretariat to liaise with USA in this regard (**action: WMO and USA**).

IV-2.3.3 Enhancement of the global PMO network

IV-2.3.31 While noting the good work of the PMO network in recent years, and that 34 countries now had VOS National Focal Points listed; the Panel noted with concerns the gaps in the PMO network and the decreasing of the number of PMOs in certain regions. Brazil, Central America, Spain, Italy, China, Western Africa, are not well represented in the PMO network. The Panel was encouraging concerned countries to take steps to enhance their PMO activities (**recommendation**).

IV-2.3.3.2 The Panel also noted that the possible reduction of the Voluntary Observing Fleet in certain countries could also potentially lead to a reduction of the support these countries are providing to the PMO network. Further discussion in this issue is planned to take place under agenda item IV-4.6.

IV-2.3.3.3 The Panel agreed that training for the PMOs was needed to meet the required standards. It further agreed that the SOT should pursue the development of a syllabus to ensure a minimum standard of training and documentation is available to new staff. For example, the Panel stressed the need to have nautical colleges up to date with the latest meteorological developments, in particular those relating to electronic logbooks. In this regard, the Panel suggested that the SOT should engage with the IMO to ensure that the training syllabus for ship officers (e.g. the Standard of Training and Certification for Watchkeepers (STCW) convention) ensures adequate training in the modern observational practices (**action: SOT**).

IV-2.4 Ship monitoring

IV-2.4.1 VOS Quality Monitoring Tools

IV-2.4.1.1 The meeting reviewed the quality monitoring tools available for the VOS Programme Managers and Port Meteorological Officers (PMOs) to use to monitor VOS data.

IV-2.4.1.2 The Paned agreed that the set of web-based tools to monitor the quality, quantity and timeliness of VOS data was now appropriate. It agreed that routine use of the Monitoring Tools and timely feedback to ships to correct problems would improve the quality and quantity of observations provided by VOS ships.

IV-2.4.1.3 The tools, which were developed by Météo-France, provide near real-time monitoring, whilst the output from the United Kingdom Regional Specialised Meteorological Centre (RSMC) provides monthly and bi-annual monitoring statistics. The VOS Monitoring section of the VOS Scheme website provides for link to access monitoring tools provided by WMO Members (e.g. Météo France), RSMC, Exeter, and JCOMMOPS: http://www.bom.gov.au/jcomm/vos/resources.html#operational6.

IV-2.4.1.4 The JCOMMOPS monthly VOS status map displays the quantity and global coverage of all ship observations that reported in a month, and the total number of BBXX messages

disseminated on the GTS. The VOS operators are encouraged to use this map to identify the data sparse areas and prioritize the recruitment of any ships that sail in these waters.

http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/map?type=GTSM_VOS

IV-2.4.1.5 The Quality Information Relay mechanism based at the JCOMMOPS enables monitoring centres and NMSs to send VOS Focal Points advisory messages about suspect ship data so corrective action can be taken if necessary. It is accessible via: http://wo.jcommops.org/cgi-bin/WebObjects/QCRelay

IV-2.4.1.6 The Panel recommended that RSMC, Exeter, and other quality monitoring centres routinely use the JCOMMOPS QC relay tool for reporting on systematic errors (**recommendation**). The Panel urged the VOS Programme Managers and PMOs to make use of the available tools to monitor the quality of the VOS data and to provide feedback to ships on how to improve bad data, and to use the monthly VOS status maps to identify data sparse areas where more ship observations are required (**action: Members and PMOs**). In return, the Panel encouraged the VOS Programme Managers to advise the VOSClim Real Time Monitoring Center (RTMC) (email to obsmon@metoffice.gov.uk) of investigations undertaken into the causes of bad data identified on the VOSClim Suspect List and to report on the corrective actions taken (**recommendation**). However, the Panel agreed that National programmes were monitoring the data and that it was not necessarily the responsibility of the PMOs to monitor the data. This would have to be decided at the national level. The Panel recommended providing a summary of corrective actions by email to the VOSClim RTMC (**action: PMOs and VOS Focal Points**).

IV-2.4.1.7 The Panel also recognized that one of the advantages of the electronic logbook software (e.g., TurboWin), is that it contains many error-checking routines to recognize an incorrect value and prompt the observer to amend the entry. This is a useful feature as it allows the PMO(s) to discuss the coding of the most recent observations with the duty officers and provide training on any elements, with which they are having difficulty. The Panel also noted that from TurboWin Version 3.6 there was the ability for the PMO to view the Observation on screen in the traditional logbook coded format whilst on board the ship. The IMMT data are not easily readable, but new option allows PMO to view the Observation for monitoring purposes.

IV-2.4.1.8 The Panel stressed again that it was important that the NMS provide feedback on observation quality and quantity to its national VOF. Real-time feedback via a PMO visit, email, or phone call is the most effective as these targets the current observer(s). Feedback on problems should be given in a manner that encourages and assists the observer. Most ships view feedback, whether good or bad, as positive as it demonstrates their observations are being used and are valued. When providing corrective feedback on the coding of a particular element, always include some thanks and encouragement in the message.

IV-2.4.1.9 Considering the number of quality monitoring tools now available, the Panel recommended that JCOMMOPS should act as a portal for quality information feedback and requested the SOT Coordinator to provide for a web page summarizing them and providing appropriate links (**action: SOT TC**).

IV-2.4.2 Dirkzwager vessel tracking tool

IV-2.4.2.1 Mr Frits Koek reported on the Dirkzwager Vessel tracking tool that is currently being developed for KNMI, DWD and the United Kingdom MetOffice. This tool is intended to give the cooperating PMO's from the Netherlands, Germany and the United Kingdom more accurate information about for example the whereabouts of their respective VOS and foreign VOS, but also each other's VOS fleet.

IV-2.4.2.2 Mr Frits Koek reported that Royal Dirkzwager, a Dutch company was a maritime information and service provider, which has developed several tools to furnish a variety of information regarding any ship that is available in their database (presently over 125,000 vessels).

ShipReporting is a tool that combines a European network of pre-selected information providers with communication technologies. The comprehensive content enhanced with additional information like vessel characteristics enables ***ShipReporting*** to communicate validated information on a tailor-made basis. As a result, many users in the Rotterdam Port Community use the Royal Dirkzwager's database.

IV-2.4.2.3 Mr Frits Koek reported that ***ShipMovements*** was an AIS application that can be used to display a variety of position poll information on a map. Position polls from either the AIS transponders, GPS/GSM, GPS/Inmarsat C/D or others can be read, logged and displayed. This results in a real-time, graphical overview of a certain area.

IV-2.4.2.4 The Panel noted that KNMI, in collaboration with the DWD and United Kingdom Met Office, inquired about possible extensions to the existing Dirkzwager tools. They investigated the possibilities of adding PMO visit reports to the database. Eventually, this led to a new application named ***Ship2Report***. The additional VOS database will contain all respective IMO numbers of the Dutch, German and British VOS ships. Combining the existing tools and databases, this application gives access to all known characteristics of these ships, including date/time of arrival and departure, as well as berthing information. Additionally, the PMO can add comments to the database for each vessel, as appropriate and/or when needed.

IV-2.4.2.5 The Panel noted that the ***Ship2Report*** tool was still under development, but that recently a contract had been signed to continue with its development. Together with Germany and the United Kingdom, the KNMI has compiled a set of requirements that are being built at present.

IV-2.4.2.6 The Panel noted these developments with interest and encouraged E-SURMFAR to continue the developments and report on their effectiveness at the next SOT Session (**action: E-SURFMAR**).

IV-3. MONITORING AND DATA MANAGEMENT

IV-3.1 VOS monitoring report of the Regional Specialized Meteorological Centre (RSMC), Exeter

IV-3.1.1 Ms Sarah North reported on the activities of the Regional Specialized Meteorological Centre (RSMC), Exeter, acting as CBS Lead Centre for monitoring the quality of surface marine observations, and routinely producing a biannual report on such quality as well as providing essential feedback to VOS operators regarding the quality of the data delivered by VOS ships. The MetOffice quality monitoring activities for VOS data are made on real time as well as delayed mode data. It provides for an independent source of quality information regarding ships operated by other countries.

IV-3.1.2 Ms Sarah North reported on the quality and timeliness of VOS observations. The Panel noted with interest that timeliness information for VOS reports received at the Met Office was now also being made available from the RSMC, Exeter web site at:
http://www.metoffice.gov.uk/research/nwp/observations/monitoring/marine/TOR/index.html,

IV-3.1.3 The Panel considered the information given in the RSMC, Exeter report and agreed with the proposed levels of the monitoring criteria for air pressure, wind speed, wind direction, sea surface temperature, air temperature and relative humidity.

IV-3.1.4 The Panel acknowledged that increasing the frequency of the metadata submissions to WMO Pub. 47 could enhance the overall efficiency of the RSMC quality monitoring activities. The Panel discussed the possibility to propose monthly or even real-time submissions of the metadata and considered implications. The Panel finally agreed that simple monthly submissions of call sign/country information to the RTMC could be useful, but that it was not practicable for some operators or WMO to supply the complete Pub47 on a monthly basis...

IV-3.1.5 The Panel agreed that it was important to keep the mailing lists and the VOS National Focal Points as well as the PMO Contact Points lists up to date. WMO agreed to keep the lists of VOS National Focal Points as well as the list of PMOs contact Points up to date based on the submissions it receives from the Members for the SOT Annual Report or as advised (**action: WMO**). The Panel in turn asked the SOT Technical Coordinator to make sure that the mailing lists maintained at JCOMMOPS are consistent with the lists provided on the WMO web site (**action: SOT TC**).

IV-3.1.6 Ms Sarah North explained that currently the Met Office's role as CBS Lead Centre for monitoring marine data could not be properly fulfilled. She explained that the generic SHIP masking scheme implemented by the Japan Meteorological Agency (JMA) was causing concerns to the RSMC, Exeter because of practical implications on its data processing system (e.g. setting up special collection of the original data from JMA's FTP server, once it is available; SHIP option requires additional work to block the duplicates (SHIP); and download the original data with 10 minutes delay) and because of the cost implications in terms of necessary developments. She explained that the RSMC was supporting the unique masking scheme and considered it as the preferred approach. The Panel recognized that there was the risk of other countries proposing similar schemes and if this happens, it would complicate the system further.

IV-3.1.7 The full report by the RSMC, Exeter, is provided in Annex X.

IV-3.2 Monitoring report of the Real Time Monitoring Centre (RTMC) for the VOSClim Project

IV-3.2.1 Ms Sarah North reported on the activities of the Real-Time Monitoring Centre (RTMC) for the VOSClim project, which is operated by the MetOffice, United Kingdom. She reported to the meeting on the present status of its observation monitoring activities.

IV-3.2.2 The meeting considered that the monitoring criteria remained acceptable.

IV-3.2.3 Ms Sarah North reported on the transfer of observation datasets and associated model field values to the VOSClim Data Assembly Centre, in accordance with its Terms of Reference.

IV-3.2.4 The Panel agreed with the changes made by the RTMC and documented in Annex XII relating to the continued inclusion in statistics of ship reports made at model land points and the removal of 'candidate' ship statistics.

IV-3.2.5 The Panel noted that based on almost 5 years of monitoring, the RTMC considered that most of the criteria for the real time monitoring had been set at approximately the correct levels. The exception may be the bias limit for relative humidity, which seems to be slightly low. The meeting agreed that a slightly higher limit of 12% was appropriate (**action: RTMC**).

IV-3.2.6 The Panel noted that at previous VOSClim meetings it was suggested that details of any remedial action taken by the PMOs in response to the monitoring information should be sent to the DAC via national focal points. The information could then be made available through the project web-site in order to avoid duplication of effort by PMOs in other countries who may be intending to visit a suspect project ship. Unfortunately, due possibly to pressures on PMO workloads, this does not appear to have been happening. By recording such actions, it should be easier to pre-empt such problems from recurring in the future, whilst at the same time allowing an analysis of the type of problems being encountered to be made. The Panel again recommended that details of remedial actions taken should be made available to the DAC and suggested that PMOs provide the information by email (**action: PMOs**).

IV-3.2.7 The meeting agreed that VOSClim elements had been considered in the BUFR templates but that the issue might have again to be revisited. Further discussion on the issue is planned under agenda item I-6.2.2.

IV-3.2.8 The meeting recalled that access to the ship's identification was required for monitoring activities and quality information feedback. The meeting again agreed that a clear uniform strategy for ship call sign masking was required.

IV-3.2.4 Full report by the RTMC VOSClim is provided in Annex XII.

IV-3.3 Global Collecting Centres (GCC) report on the VOS & VOSClim

IV-3.3.1 Ms Elanor Gowland presented a summary of the 2006 Global Collecting Centre (GCC) annual report, highlighting the general improvement in the VOS data received, but noting the lack of delayed-mode data received, particularly for VOSClim data. In addition, the problems of the current Marine Climatological Summaries Scheme (MCSS) set up and masked callsigns were discussed, and the formation of TT-DMVOS and TT-MOCS were mentioned (described further by Scott Woodruff under agenda item IV-3.5). The need for the GCCs to be more proactive and the need to streamline the VOS data flow (as the VOSClim is) with a single centralised data store was welcomed by the SOT group. The SOT agreed that the SOT Chairperson, Mr Graeme Ball, and the VOSP Chairperson, Ms Julie Fletcher should take part in the TT-DMVOS (Annex IV).

IV-3.3.3 The SOT noted that the IMMT-3 format and MQCS-V were ratified at JCOMM-II (in September 2005) for implementation in January 2007. The software package created by the GCCs to help contributing members (MQCforCM) was developed during 2006, and distributed to all members who had requested a copy of previous versions of the software. Version 3 allows the IMMT-3 format to be used, and checks data using MQCS-V. It also includes the option to separate duplicate observations into a separate dataset if required.

IV-3.3.4 Ms Elanor Gowland reported that problems with duplicate data and on-land positions have been decreasing with only 282 & 194 observations respectively received in 2006 (making up a very small percentage of 958 thousand obs). The majority of data is also from the recent past, 55% of obs in 2006 were from past two years (2005 & 2006) though data were received from as far back as 1993.

IV-3.3.5 The GCC report included a status report on the volume and frequency of delayed mode data being forwarded to the VOSClim Project Data Assembly Centre. Although initially VOSClim data was slow to reach the GCCs, observations from the VOSClim project have been increasing over the past three years and nine CMs now have recruited ships. In 2006 the GCCs received around 84 thousand observations from VOSClim recruited ships, this made up 9% of the total number of observations received (2005:4%, 2004:4%, 2003:1%). However, the SOT noted with concern that not all observations from VOSClim recruited ships are being submitted with the extra VOSClim elements, and some VOSClim data is being received from ships not registered with the VOSClim project. Most observations are now received in IMMT-3 format (64% of observations in 2006), and VOSClim observations have proved to be of better quality with significantly less duplicated obs and all obs received with flags attached.

IV-3.3.6 The question was asked regarding the further developments of character formats within the MCSS. Mr Scott Woodruff, chairperson of the ETMC explained that the BUFR format was not appropriate as an archive format for marine climatology. Mr Graeme Ball representing Australia expressed concerns regarding too frequent changes to the IMMT format as this had practical and cost implications for the National programme.

IV-3.3.7 The Panel recommended that more submissions were needed to the GCCs for VOS and VOSClim data.

IV-3.3.8 The Panel again expressed concerns regarding the increasing number of ship reports where the ship's call sign is masked using the generic SHIP letters. It urged VOS operators to avoid masking the delayed mode data using SHIP (**recommendation**).

IV-3.4 VOSClim Data Assembly Centre (DAC) report

IV-3.4.1 Mr Alan Hall reported on the activities of the National Climatic Data Center for the VOSClim Data Assembly Centre (DAC).

IV-3.4.2 Mr Hall reported on the status of the project web site, including the collection and provision of real time and delayed mode observation data, metadata, ship listings and other project information.

IV-3.4.3 The Panel noted with appreciation that the BUFR, GCC (IMMT), and GTS (FM-13) reports were being provided on line via the VOSClim DAC ftp site. Suspect observations are also provided on line by the DAC.

IV-3.4.4 The meeting considered the display and availability of project data on the website and agreed on the following (**action: DAC**):

- There is a need for maintaining the list of VOSClim ships up to date
- The notification of the recruitment to the DAC must be the date of notification
- A link to VOS web site should be added on the VOSClim web site
- The DAC should keep track of call sign changes (e.g. beginning/ending dates for call signs)

IV-3.4.5 The DAC expressed concerns regarding the use of generic SHIP masking as the call sign information was necessary to link the data with the metadata.

IV-3.4.6 The full report of the VOSClim DAC is provided in Annex XIII.

IV-3.5 Review of the Marine Climatological Summaries Scheme (MCSS)

IV-3.5.1 Mr Scott Woodruff, Chairperson of the JCOMM Expert Team on Marine Climatology reported on the recent developments with regard to the MCSS, and other results of primary interest to SOT from the ETMC Second Session (26-27 March 2007). The Panel noted that JCOMM-II, Halifax, Canada, September 2005, adopted a new IMMT-III format as well as a new MQCS-V format, mainly to deal with new VOSClim requirements. As a backdrop to this report, two underlying questions were introduced: (a.) the role of the delayed-mode (DM) VOS data, especially for climate-quality products, and in view of increasingly complex problems (e.g., industry concerns) largely impacting real-time data; and (b.) the potential for enhanced linkages with the International Comprehensive Ocean-Atmosphere Data Set (ICOADS).

IV-3.5.2 The SOT noted that the DMCG-II agreed that maintaining the delayed-mode VOS data flow utilizing the International Maritime Meteorological Tape (IMMT) format was important, but also that management of the MCSS—including the two separate functions of VOS data handling and MCSS Summaries—needed to be modernized. As an initial step, it recommended establishment of a new self funded Task Team on Delayed-Mode Voluntary Observing Ship data (TT-DMVOS), to focus exclusively on the first function. The TT-DMVOS was tasked amongst other things to manage the Global Collecting Centres (GCCs), establish requirements for the IMMT format and the Minimum Quality Control Standards (MQCS), reconcile the IMMT and the International Maritime Meteorological Archive (IMMA) formats, revise relevant WMO technical publications as needed, and establish a web site to share relevant information.

IV-3.5.3 The Panel noted that ETMC-II reviewed and agreed on the terms of reference and membership of the TT-DMVOS and agreed that they should also be reviewed by the SOT at its fourth session and then by the DMCG. The ETMC defined its working relationships with the new task team, whose membership was proposed to include selected members of ETMC and SOT.

IV-3.5.4 The VOS Panel reviewed the Terms of Reference and membership for the Task Team. The Panel agreed that Mr Shawn Smith, Henry Kleta, and Bruce Sumner (associate Member) should be included in the Task Team. The Panel also agreed that the VOSClim issues should be part of the new Terms of Reference for the TT-DMVOS. The new proposed Terms of Reference and Membership are provided in Annex IV.

IV-3.5.5 The SOT noted that the ETMC-II agreed with the proposed reporting mechanisms i.e. (i) producing a project plan to guide operations for the next three years (the plan should explain the linkages to other components of the JCOMM, including the SOT and other pertinent programs), (ii) establishing an annual reporting mechanism to the Expert Team on Marine Climatology (ET-MC) and the SOT, and (iii) reporting to the ET-MC and the SOT at their regular meetings.

IV-3.5.6 The SOT noted that, as agreed by ETMC-II, the Chairpersons of the TT-DMVOS should produce the project plan by August 2007 (**action TT-DMVOS**).

IV-3.5.7 The panel agreed that intercomparisons as proposed by ETMC-II of algorithms used in e-logbooks, including documenting the calculation methods of dew point (for historical purposes). should be conducted by its Task Team on Instrument Standards (**action: TT Instrument Standards**) and that there was no need to establish a new Task Team for this exercise provided the appropriate membership was assembled within that TT.

IV-3.5.8 The Panel again recalled the importance of visual observations for climate studies and stressed that such observations should continue to be made whenever possible via e-logbooks recording when AWS are being used onboard ships.

IV-3.5.9 The Panel noted the requirements from the ETMC to access the original data and the call sign in particular (for accessing the metadata) and stressed again that the delayed mode data should not be masked (**recommendation**).

IV-3.5.10 Regarding Table Driven Codes and BUFR, Mr Scott Woodruff conveyed the views of ETMC that there was a need for certified encoders and decoders. Access to the originally reported data was critical (e.g. NOAA National Centers for Environmental Prediction (NCEP) practice is to attach FM 13 (FM 18) to BUFR), non-SI units were required for consistency (e.g., wind speed in kts and cloud cover in oktas), and that there was a need to establish unique “tracking” identifiers for VOS reports, and that BUFR reports needed to be more carefully validated. He reiterated that BUFR was not appropriate for marine climatology and related archiving purposes but that convergence between IMMA and BUFR features was needed.

IV-3.5.11 The Panel noted the planned organization of the third JCOMM Workshop on Advances in Marine Climatology (CLIMAR-III), Gdansk/Sopot/Gdynia, Poland, 6-9 May 2008, and that it was planned to have special sessions on climate indices, sea ice and sea state matters. The SOT recommended that its Members consider attending the workshop (**action: Members**).

IV-3.6 Implementing a VOS Database for tracking ship and equipment metadata

IV-3.6.1 Ms Julie Fletcher reported on the recent developments with regard to the VOS Database of ship metadata. She recalled that the Version 3 of the WMO Publication number 47 was planned for implementation as of 1 July 2007.

IV-3.6.2 Members reported on their requirements for the database and on its national implementation.

IV-3.6.3 The Panel recognized that the VOS Programme Managers generally maintained a national database to collect and report the metadata required for Pub 47. The type and function of these databases are known to vary from very basic to extremely sophisticated and interactive.

IV-3.6.4 The Panel noted that Pub 47 currently requires the mandatory collection of 109 metadata elements. In addition to collecting the required metadata, many countries also use their respective VOS databases to record details about ship visits, instrument serial numbers, instrument calibration dates, and ship contact details. The National databases are also configured to output various reports and lists (e.g., lists of VOS by name, callsign, automation type, lists of VOSClim, Ship address lists for mailouts, list of instruments types, etc.).

IV-3.6.5 The Panel recalled that the new version of Pub 47, metadata Version 3.0, requires the mandatory collection of 119 metadata elements, and introduces XML as an alternative metadata exchange format to the customary semi-colon delimited exchange format. Some National Meteorological Services (NMSs) plan to upgrade their existing databases to accommodate the additional metadata elements and to report using the XML metadata exchange format. Other countries however are less certain how to proceed and have indicated they might manually record and report the extra metadata until a better solution can be found. In addition, the Panel noted that the DWD was developing a new web-based VOS database for E-SURFMAR. This is a regional initiative to collect and store the metadata for all VOS ships participating under E-SURFMAR.

IV-3.6.6 Whilst some countries and E-SURFMAR are likely to be able to provide Pub 47 metadata in Version 3.0 after 1 July 2007, the Panel recognized that some countries do not have a database capable of outputting the required version 3 format. The Panel noted with appreciation the kind offer by E-SURFMAR to make its web based database currently under development available to other countries not participating in the E-SURFMAR. The Panel agreed that the use of this database could assist countries without a VOS database and would offer a common VOS database solution for the entry of the required Pub 47 metadata fields. It invited those countries to contact Mr Pierre Blouch for details (**action: interested Members**). Countries may still however need to maintain independent records of additional details for their own national purposes.

IV-3.7 VOSClim issues

IV-3.7.1 The Panel reviewed the 19 key discussion issues it had identified and agreed that many of them had been resolved. The Panel agreed that self-recruiting was not anymore an important issue. Remaining issues included.

- Target size of the VOSClim: The Panel agreed that the new target should be 250 ships by the fifth SOT Session (SOT-V) but that efforts should also be made to increase the number of observations and the number of VOS ships recording the additional parameters (**action: Members**). The Panel asked the Task Team on VOSClim to consider how many observations are needed from the VOSClim yearly (**action: TT VOSClim**).
- VOSClim photographs: The Panel asked the WMO to investigate whether the VOSClim photographs could be stored with Pub47 Metadata (**action: WMO**)
- Frequency of metadata submissions: The long-term aim was for monthly metadata submissions but for the short term, countries could submit metadata directly to the RSMC (**action: Members**).
- Metadata modules in e-logbooks: USA offered to investigate the possibility of including a metadata module in the Shipboard Environmental Data Acquisition System (SEAS) possibly based on the stand-alone TurboWin input module (**action: USA**).
- VOSClim brochure: The Panel agreed that the revision of the brochure was not an urgent task but considering the changing target (i.e. 250 ships by SOT-V) the Panel agreed that the brochure should eventually be revised (**action: TT VOSClim**). In the meantime, the e-brochure is available on the VOS web site and from within the Turbowin software.
- Ships not listed in the VOSClim: The Principle of all VOSClim data going to one central repository (DAC) could be extended to be used for all VOS data. The Panel agreed that if the data end up in the DAC archives, there should be a way to discriminate between VOSClim and non-VOSClim ships (**action: DAC**).

IV-3.7.2 The Panel agreed that the VOSClim TT should work closely with the TT-DMVOS.

IV-3.7.3 Regarding the status of the VOSClim Project (i.e. project or programme)the Panel agreed that it should remain a project until all the data stream issues are fixed decided that the SOT-V should again consider this issue with perhaps the goal of making the VOSClim Project evolve as a special project under the VOS.

IV-4. ISSUES FOR THE VOS

IV-4.1 Industry concerns regarding the transmission of meteorological data from ships

IV-4.1.1 Report from the fifty-eighth session of the WMO Executive Council

IV-4.1.1.2 The WMO Secretariat reported that following discussions at SOT-III and the third International PMO workshop, recommendations were made to the WMO Executive Council for its fifty-eighth session, June 2006. The council discussed the issues and adopted Resolution 7 (EC-LVIII) which is reproduced in Annex XVII.

IV-4.1.1.2 As requested by the EC LVIII, a high level WMO-IMO consultative meeting was held in Geneva, 12-13 February 2007. Five WMO Members were represented (Australia, France, Japan, UK, and USA), three WMO Technical Commissions (CBS, JCOMM, CCl) as well as IMO, ICS, INTERCARGO, and INTERTANKO, the latter three organizations representing the shipping industry. The meeting mainly addressed the concerns of the shipping industry concerning VOS data exchange and the availability of VOS positions and identification on public web sites while considering the requirements for VOS observations for operational applications (NWP, marine safety) and for climate applications. The WMO presented the VOS scheme and its usefulness for maritime safety, search and rescue, and for ship routing to the shipping industry representatives. Ship and Port Facility Security Code (ISPS Code) was discussed as well as Long-range identification and tracking of ships (LRIT) requirements.

IV-4.1.1.3 From the WMO-IMO consultative meeting discussion, it became apparent that (i) there are not only security concerns for the shipping industry but also commercial activities concerns, and (ii) there are different approaches and concerns within the WMO Members. A number of principles were agreed upon by the WMO-IMO meeting and a number of actions proposed for the coming months. These are summarized in Annex XVI. It was particularly recommended that the SOT in liaison with the WMO Secretariat draft a report to EC-LIX proposing to maintain Resolution 7 (EC LVIII) in force and to continue the ships call sign masking trials for another year, based on the recommendations from the SOT regarding a unified approach to call sign masking. Regarding cooperation with IMO, the meeting recommended to consider proposing a Resolution to the IMO on met-ocean services similar to A.706 (17) for navigational warnings and to present the first proposal to the appropriate IMO Sub-committee(s) for endorsement.

IV-4.1.1.4 The IMO representative, Capt Singhota explained that the issue had been raised by WMO at the 82nd session of the Maritime Safety Committee (MSC-82), Istanbul, December 2006 who took note of the WMO considerations. At the WMO-IMO consultative meeting, it was proposed that the WMO would submit information to the Navigation sub-committee and to MSC-83. He explained that the WMO Community would eventually benefit from the IMO and ICS advices. In addition, he recalled that the IMO was managing unique IMO numbers for ships that were assigned during the whole lifetime of the ship.

IV-4.1.2 Implementation of masked callsigns

IV-4.1.2.1 Mr Graeme Ball reported on recent developments with regard to the “Ship Security” issue, on the technical implications of the WMO Resolution 7 (EC-LVIII), and the implementation of ship masking schemes by a few Members. He recalled that the WMO Executive Council at its fifty eighth-session (EC-LVIII) reconsidered the issue of ship security that was first raised at SOT-III.

The solution proposed by the SOT to reclassify BBXX data as *non-essential,* despite strong support from JCOMM-II and PMO-III, was not adopted by EC-LVIII.

IV-4.1.2.2 The Panel noted that Resolution 7 (EC-LVIII) only partially addressed the primary problem, and the proposed solution complicates the management of the ship metadata for real-time data quality monitoring and feedback, as well as for climate studies.

IV-4.1.2.3 The WMO Secretariat was subsequently tasked to progress the use of masked callsigns. In this regard, and with extensive input from the Chairs of the SOT, VOSP, DMPA and ETMC, the WMO Secretariat prepared a document describing the technical implications associated with implementing masked callsigns. The document prepared by the Secretariat makes a number of recommendations regarding the options considered, and was discussed by the SOT.

IV-4.1.2.4 The Panel noted that whilst the issued was initially focusing the VOS Scheme, it is equally applicable to other ship-based observing programmes such the Ship of Opportunity Programme (SOOP) and the Automated Shipboard Aerological Programme (ASAP). On the assumption that most ships participating in the SOOP or ASAP are also members of a national Voluntary Observing Fleet (VOF), it logically follows that whatever masking solution is adopted for the national VOF would translate to the other programmes.

IV-4.1.2.5 For the purpose of clarity, the callsign masking schemes considered by the Panel is defined as follows:

Label	Description
REAL	Official ITU callsign of the ship.
SHIP	Non-unique identifier. The callsign is unilaterally replaced by the letters SHIP.
MASK	Unique, repeating identifier. The masking identifier is assigned by the NMS that recruited the ship.
ENCODE	Unique, non-repeating identifier. The identifier is derived from encrypting elements in the message, e.g. callsign + latitude + longitude.

IV-4.1.2.6 Mr Toshifumi Fujimoto presented the JMA perspective on the issue. He recalled that the JMA ship masking solution was the outcome of a discussion between the Japan Ship owners, JMA, the Japan Coast Guards, and the Japanese Maritime Bureau. He reported that this national discussion concluded that the MASK solution provided an easier solution to track vessels and that the Japan authorities had therefore decided to implement the SHIP option for ship security reasons. He reported on the improved SHIP scheme, which is now proposing to reduce the delay to 10 minutes for the provision of the original data through a secured HTTP server. Only authorized organizations will be able to access the original data provided an application form is signed by the Director of the Organization willing to access the data. Technically, the format, and file naming convention follows the procedures explained in the manual on the GTS.

IV-4.1.2.7 Mr Robert Luke reported on the US perspective on the issue. He explained that USA was proposing a masking scheme detailed in the final report of the WMO-IMO consultative meeting's final report, which is similar to some extent to the scheme proposed by Japan. In order to facilitate the work of the monitoring centres accessing the original data via a secured server, the USA offered to deliver the original data to JMA first who would then be responsible to deliver them through its own secured system. That way, the authorized users would access both US and Japan original data through a single access point. Mr Luke informed the Panel that some of the web sites making ship positions and identification available on their web sites were agreeable to delay the availability of the data in certain regions to be defined (**action: USA**)

IV-4.1.2.8 The representatives of countries implementing SHIP explained that they were ready to work cooperatively with the SOT towards the tentative goal of implementing the ENCODE solution and to define the related encryption strategy. They also informed the Panel that they agreed to investigate releasing the delayed mode data using REAL after a period to be defined (**action: countries implementing SHIP**).

IV-4.1.2.9 The Panel noted that due to the ongoing implementation of ship security schemes, the GTS data stream now contained both masked (e.g. BATFR01) and non-unique (e.g. SHIP) identifiers. Historically climate databases such as the International Comprehensive Ocean-Atmosphere Data Set (ICOADS) have relied on the GTS for near real time data to in order to construct freely available datasets for a wide range of climate and other research applications. The lack of availability of REAL call sign information compromises the ability to produce climate-quality data products. For example, REAL call signs are required to associate platform and instrumental metadata with reports and apply bias adjustments to the data. Mechanisms therefore need to be put in place to ensure the timely public availability of as much data as possible with REAL call signs for climate and research applications. For those data, which cannot be released in a timely fashion, another requirement will be for the development of mechanisms and agreed timescales for the eventual open release of data including REAL call signs. It is recognized that a small subset of data may never be released with unique identifiers, for example some data from military sources.

IV-4.1.2.10 The Panel recognized that the comparison by unauthorized users of the delayed mode REAL reports (made available to the public e.g. via ICOADS) with the original GTS MASK reports (also made available to the public). This could in principle, permit to cross reference REAL call signs versus MASK and could therefore potentially still cause concerns to ship owners and masters unless the MASK identification numbers are often changed.

IV-4.1.2.11 The panel agreed that for ship reports that could not be released with unique identifiers (MASK or REAL), real time and climatological analysis could be significantly impacted. A possible solution could be to associate a subset of Pub. 47 metadata to each report in the climate archive within a secure environment and —for the small minority of ships that it would not be possible to uniquely identify in delayed mode— those observations could then be publicly released with the SHIP identifier together with the associated metadata required for climate applications.

IV-4.1.2.12 The Panel also agreed that it would be essential to store an historical record of all call sign substitutions. It is also necessary to collect and store information on any substitutions made prior to the implementation of a universally accepted solution.

IV-4.1.2.13 The Panel considered advantages and drawbacks of all the options above and noted that none of the solutions considered would fully eliminate vessel tracking. After discussion, the Panel agreed on the following:

- **SHIP** satisfies the requirement for ship anonymity and largely eliminates vessel tracking.
- **SHIP** without additional measures to assist with QM is not recommended for the VOS.
- **SHIP** with additional measures to assist QM is recommended for the VOS until a universally accepted solution is agreed.
- **MASK** satisfies the requirements for ship anonymity and quality monitoring, and it eliminates data loss when **REAL** changes during a voyage.
- **MASK** is recommended for the VOS until a universally accepted solution is agreed.
- **ENCODE** satisfies the need for ship anonymity and quality monitoring, plus it largely eliminates vessel tracking.
- **ENCODE** is recommended as the long-term solution for the VOS.

IV-4.1.2.14 The Panel made the following recommendations:

- **ENCODE** to be promoted as the preferred long-term SOT solution with a recommendation to EC-LIX requesting that all NMSs and monitoring centres eventually incorporate SOT approved encoding and decoding routines in their message recognition and switching centres.

- For **SHIP** to meet all user requirements, it is proposed that countries implementing this scheme at the NMS level:
  - » Collect the raw (non-masked) BBXX in a secured database and provide these data to the monitoring centres or NMSs as required;
  - » If these data are not provided in real-time then perform the real-time Quality Monitoring (QM) on ships that it masks and provide feedback to the appropriate VOS FP;
  - » Delayed-mode data must use **REAL** unless expressed otherwise by ship owners and master; and
  - » Technical solutions to supply the raw data to be developed in collaboration with the receiving centres to ensure there is one agreed delivery method.

- For **MASK** to meet all user requirements, it is proposed:
  - » That JCOMMOPS hosts the centralised **MASK** v **REAL** database;
  - » The database shall be historical and password protected from unauthorised access; and
  - » Countries implementing **MASK** to supply:
    - » Quarterly VOF list of **MASK** v **REAL**, and
    - » Monthly update of significant changes to its list of **MASK** v **REAL**.

- VOS Programme Manager to be the national focal point for callsign masking of all national ship-based observing programmes, e.g. SOOP and ASAP.

- The ad-hoc team responsible for considering the callsign masking options, currently comprising the Chairs of the SOT, VOSP and ETMC, is re-established as the *Task Team on Callsign Masking and Encoding*. The Terms of Reference and Membership for the Task Team are detailed in Annex III.

IV-4.1.2.15 The SOT reviewed and updated a draft Resolution for EC-LIX to reinstate the trial period for another year while recommending that Members seek a universally acceptable solution for the longer term. The draft resolution also recommends continuing the high-level dialogue with IMO, the shipping industry, affected WMO Members, and appropriate Technical Commissions. The draft resolution is provided in Annex XVIII.

IV-4.2 Impact of national regulations on VOS operations

IV-4.2.1 Ms Julie Fletcher recalled that the International Ship and Port Facility Security Code (ISPS Code) was a comprehensive set of measures to enhance the security of ships and port facilities, which was developed in response to the perceived threats to ships and port facilities in the wake of the 9/11 attacks in the United States. The purpose of the Code is to provide a standardised, consistent framework for evaluating risk, enabling Governments to offset changes in threat with changes in vulnerability for ships and port facilities through the determination of appropriate security levels and corresponding security measures.

IV-4.2.2 The Panel noted that because each ship and each port facility is subject to different threats, National Administrations determine and approve the method by which they will meet the specific requirements of the ISPS Code.

IV-4.2.3 To comply with the ISPS Code, all PMOs and NMS staff visiting ports for SOT business requires accredited identification cards. These ID cards may be issued by port companies or by state or national authorities. Unfortunately, the requirements can differ from port to port, so security clearance and a relevant ID pass must be obtained for each port a PMO visits. In addition to having the correct identification, most ports now require prior notification of the intention to visit a ship before entry to the port is allowed. The PMOs must register with ships' agents to get their names on the Ship's 'Visitor's List'.

IV-4.2.4 All meteorological and scientific equipment issued to, or retrieved from ships undertaking SOT programmes may be inspected before port entry is approved. The same equipment may also be subject to Customs regulations and some national Customs Agencies may require Export or Import Entries to be logged.

IV-4.2.5 The requirement for documentation may impact on SOT activities, for example, the issue of meteorological instruments to newly recruited ships, the replacement of faulty instruments, the retrieval of instruments when a ship is decommissioned, the loading of floats, and buoys or XBT probes.

IV-4.2.6 The Panel reminded the National Meteorological Services and Port Meteorological Officers about the need to keep up to date on national compliance regulations and comply, as required. The Panel recognized that failure to comply with National Regulations might result in personnel or equipment being denied entry to a port or ship. In addition, the Panel recommended including ISPS compliance when planning any SOT/VOS ship visit activities.

IV-4.2.7 The Panel noted that it had included references to such requirements in VOS Quick Reference Guide - Port Meteorological Officers –, which is available on the VOS web site.

IV-4.2.8 In order to facilitate the SOT activities, the Panel made a number of recommendations, which are listed in Annex XIX.

IV-4.3 Multiple ship recruitment

IV-4.3.1 Mr Pierre Blouch reported on the implications and problems due to the recruitment of ships by more than one country. He recalled that during the Third Session of the Ship Observations Team (SOT-III, Brest, France, 7-12 March 2005), the Meeting agreed that it was strongly desirable that each respective VOS has only one responsible country. This would prevent duplication of quality monitoring ensuring that only one set of metadata per vessel is prepared for the WMO Publication 47.

IV-4.3.2 Mr Pierre Blouch reported that since E-SURFMAR was also concerned by the multiple ship recruitment problems, Météo-France had proposed to publish a list of multi-recruited ships on a website. One month later, an application was developed to automatically update such a list according to WMO Pub. 47(1). The list identifies the VOS ships, which appear as 'recruited' on more than one National VOS list. This list can be found on the following web pages:

- http://www.meteo.shom.fr/vos-monitoring/multi-recruit.html and
- http://www.wmo.ch/web/www/ois/pub47/pub47-home.htm.

IV-4.3.3 The Panel noted that the list was only updated when changes or updates to the WMO Publication 47 had been made. By the end of February 2007, both lists were dated 30 June 2006, and 75 VOS were declared as being recruited by at least two countries (68 of the 75 ships were from the USA, which have subsequently being reduced to 6 by SOT-IV).

IV-4.3.4 The Panel Members were invited to routinely check the multiple recruited ship list available from the Universal Resource Locator (URL) above (**action: Members**). The Panel invited

the VOS operators to attempt to reach an agreement to determine which country should be assigned future responsibility for the indicated ships on the 'multiple recruitment' list.

IV-4.4 European Union's restriction on the use and transportation of Mercury

IV-4.4.1 Ms Sarah North reported that with a view to reducing the health risks of exposure to Mercury, the European Commission has proposed legislation to ban all European Union exports of mercury from 2011. In order to reduce the industrial demand for mercury and to speed up its substitution, the European Commission has also proposed a ban on the marketing of mercury in new fever thermometers, room thermometers and barometers. The Panel noted that these proposals by the EU are part of a global effort to reduce the global supply and demand for mercury. The United Nations Environment Programme (UNEP) is also developing international programmes and frameworks for reducing the use, release, trade and risks related to mercury. Inevitably, such initiatives will increasingly affect NMSs and VOS operators, and some European VOS operators have already ceased the supply of mercury thermometry to their ships.

IV-4.4.2 Ms Sarah North reported that examination of the latest metadata given in WMO Publication Number 47 suggests that over 3200 VOS may be equipped with mercury thermometers. It is recognised that some entries in Pub 47 have not been updated by the VOS operators for a considerable time and, at the time of writing (data available at http://www.wmo.ch/web/www/ois/pub47/pub47-home.htm) has not been updated since June 2006).

IV-4.4.3 The Panel noted with concern that in the coming years, the proposed restrictions on mercury are therefore likely present a growing problem for operators of manually reporting VOS. For instance, in the United Kingdom, wet/dry mercury thermometers fitted in marine screens are used on all manually reporting VOS. Alternative whirling psychrometers with alcohol spirit thermometers may have to be used instead. However, alcohol thermometers have larger expansion coefficients than those of mercury, and are subject to other effects such as adhesion to glass, and slow changes in liquid volume due to impurities or dyes. Therefore, they tend to be less accurate than mercury thermometers of similar cost.

IV-4.4.4 Ms Sarah North explained that in order to comply with Health and Safety obligations in the United Kingdom, arrangements were made to put in place two years ago to roll out simple foam- pad mercury collectors to all UK VOS. More sophisticated spillage kits, together with flowers of sulphur, are also provided for dealing with potential mercury spillages in the Port Meteorological Offices, where larger numbers of mercury thermometers are likely to be stored.

IV-4.4.5 The Panel agreed that disposal of old or broken thermometers collected from VOS was another issue that had to be addressed by VOS operators, as are the costs involved in arranging for the safe disposal of toxic residues that are hazardous to health can now be considerable. However, whilst developed countries many have procedures in place for dealing with the safe disposal of mercury, the same may not be true for less developed countries where ships often end up going for scrap.

IV-4.4.6 The Panel considered the implications of the above restrictions on the use of mercury, and Members based outside the European Union advised whether similar restrictions applied in their countries.

IV-4.4.7 The Panel recommended that VOS operators aim at phasing out the future supply of mercury thermometers to observing ships (**recommendation**).

IV-4.4.8 The Panel also considered how mercury spillage kits could be provided on ships where mercury remains in use in order to mitigate risks associated to health and safety for the ships, the observing officers and ship's staff, and for the PMOs (**recommendation**).

IV-4.4.9 The Panel considered alternatives and cost implications (e.g. electronic devices are more expensive). The HMEI Representative, Mr. Bruce Sumner explained that manufacturers were

aware of such requirements, but that the SOT needed to articulate its specific requirements. HMEI offered to act as a liaison with the manufacturing industry (**action: HMEI**).

IV-4.4.10 The Panel noted that KNMI and DWD had tested other types of thermometers and invited interested Members to contact the Netherland and Germany for details.

IV-4.4.11 The Panel recommended that the Panel Members conduct Intercomparisons between the old mercury thermometers and proposed new technology and that the results are passed to the TT on Instrument Standards for documentation purposes (**action: TT**)

IV-4.5 VOS communication problems and errors

IV-4.5.1 Ms Sarah North reported on VOS communication problems and errors. She reported that the overwhelming majority of ship observations sent via Goonhilly Land Earth Station (LES) to the Met Office from manually reporting VOS were transmitted in the correct SHIP Code format. These observations are then ingested into the Met Office's Meteorological Database, and routed to other National Meteorological Services (NMSs) via the GTS, without any problems.

IV-4.5.2 However, the Panel noted with concern that each month there are a substantial number of ship observations received via Goonhilly LES that are rejected by the UK MetOffice observation handler software (about 300 messages each month), for a wide variety of reasons. Occasionally, it is possible to manually amend these observations and re-insert them on the GTS, but this depends on the type of transmission or coding error that has caused the observation to be rejected, and on the available resources in the Data Traffic Team. The Panel noted that the rejected observations cost a total of about 3600 Euros/year. In addition to this wasted expenditure, one must also consider the loss of potentially valuable meteorological and climatological data.

IV-4.5.3 The Panel noted that the most common causes of data rejection involved formatting problems (e.g. BBXX or call sign not included in message, empty transmissions with no data, using 4 figure dew point groups, using /'s between groups, late date/time groups, use of O instead of 0, etc.). Unfortunately the MetOffice Observations Handler software (which was introduced in 2005), is not currently able to deal with all these errors. Any changes to the software need to be outsourced though a private company, and consequently incur a cost.

IV-4.5.4 The Panel suspected that other NMS that host Inmarsat LES might also be rejecting similar numbers of observations. The Panel therefore, invited the SOT Members to advise the extent of data rejections in their countries in order that a clearer assessment of the extent of the problem can be determined and to report to the VOSP Chairperson (**action: VOSP Members**).

IV-4.5.5 The Panel agreed that the increased use of electronic logbook software such as TurboWin, and ship borne Automatic Weather Station software, should help to reduce the number of observations being rejected in the coming years. However, in the interim, it appears that the extent of the problem may warrant a system to relay the rejected observation information back to the National VOS Focal Points and PMOs in order that they can advise the ships concerned and rectify and persistent problems. The Panel invited the VOS Operators to make use of the JCOMMOPS quality information relay web page or mailing lists to inform the VOS operators about persistent problems (**action: VOSP Members**). Alternatively, the Panel encouraged VOSP Members to set up the data processing software routines to, automatically relay rejected messages back to the VOS recruiting country focal points (**action: VOSP Members**).

IV-4.5.6 The Panel discussed VOS data collection and data telecommunication issues and agreed on the following in order to fix the problems and to reduce the number of telecommunications errors:

- Implement appropriate quality control checks in e-logbooks (**action: Members**).

- Errors found by the Members and the monitoring centres should be provided to JCOMMOPS and the mailing lists. Then PMOs and NFP can take action with the ships where the errors are originating. The UK MetOffice Representative indicated that RSMC, Exeter will make efforts to provide such information via JCOMMOPS (**action: RSMC, Exeter**).
- The Panel noted similarity of the issue with the Regional Basic Synoptic Networks of surface and upper-air stations of the Global Observing System. It was noted that the editing of training materials such as CD-ROMs as well as the organization of training workshops had helped in improving the results. The Panel asked its Task Team on VOS Recruitment and Programme Promotion to consider such action(**action: TT RPP**)

IV-4.6 Reduction of the National VOF

IV-4.6.1 The Panel expressed concerns regarding the possible reduction of the Voluntary Observing Fleet at the National Level and noted that the justification for such reduction was not always obvious. At the same time, the Panel noted that while the NWP and marine forecasters were still relying on VOS observations especially in data sparse regions there has in fact been an increasing demand for VOS observations by users for a number of applications, and especially for climate studies where the consistency of historical time series is paramount, for the GHRSST-PP which is assimilating both satellite and in situ products, for independent intercomparisons between the different observing systems including buoys and OceanSITES.

IV-4.6.2 The Panel noted that VOS ships were a primary source of air temperature and humidity data in the open ocean and that these variables could not be derived from remote sensing but could help in validating future satellite products.

IV-4.6.3 The Panel agreed that in case some national programmes were actually reducing their VOS activities and their support to the PMO networks, there was a risk of contagion to other national programmes and that this could eventually substantially affect the whole VOF. The Panel agreed that in the present context where the programme was already being weakened because of the ship owners and masters concerns with regard to the VOS data exchange, there was a need to better document the requirements for VOS data. While noting the support already being expressed by the Chairperson of the OOPC and the JCOMM Co-President, Peter Dexter in this regard, the Panel therefore asked its Task Team on VOS Recruitment and Programme Promotion to investigate the conduction of an impact assessment study in liaison with other appropriate bodies and to report at the next SOT Session (**action: TT VRPP**).

IV-5. FUTURE WORK PROGRAMME AND IMPLEMENTATION ISSUES

IV-5.1 Partnerships and the integration of other programmes with the VOS

IV-5.1.1 Ms Julie Fletcher introduced a number of ship-based observations initiatives not formally part of the SOT where the partnership with the SOT could be enhanced. These included the Shipboard Automated Meteorological and Oceanographic System (SAMOS), the FerryBox Project, the SeaKeepers Society, and the Alliance for Coastal Technologies (ACT). All of these had received a report on their respective activities under agenda item I-3.2 (report by Associated Programmes).

IV-5.1.2 The Panel and the programme representatives considered whether it would be relevant to invite any of these programmes to be formally integrated in the SOT at some point.

IV-5.1.3 Regarding the Shipboard Automated Meteorological and Oceanographic System (SAMOS), the Panel invited SAMOS to share its experience and expertise with the VOS operators. The VOS in turn can help on data management and coding issues. The Panel invited SAMOS and the US VOS programme to investigate whether SAMOS could become a participant of the US VOS

(**action: R. Luke, SAMOS**). In addition, the Panel asked the Panel Members to provide comments on the Guide to making climate quality meteorological and flux measurements at sea to Shawn Smith (**action: Members**).

IV-5.1.4 Regarding the GHRSST-PP, the Panel noted that GHRSST was substantially relying on VOS data and that GHRSST-PP could provide tools to monitor the quality of SST data. It invited the VOS Operators to consider making more SST observations while recording appropriate metadata including measurement type and the depth of the instrument (**action: VOS Operators**).

IV-5.1.5 Regarding the IOCCP, and the FerryBox, the Panel agreed that the issue had to be addressed by the SOOPIP.

IV-5.1.6 Regarding the Scholarship programme, the Panel agreed that this was an opportunity to raise the profile of the VOS Scheme and noted that the UK was already working with the programme including for the deployment of Argo floats and/or drifters.

IV-5.2 Action items

IV-5.2.1 The VOS Panel noted that the action items arising from the Panel discussion would be reviewed under agenda item I-10. These are provided in the SOT action list in *Annex XXVI.*

IV-5.2.2 The Meeting recalled the recommendations from the WMO-IMO consultative meeting regarding the update of the MSC circular 1017 which ought to include ship owners and masters concerns regarding VOS data exchange and be submitted to the IMO MSC at its 83rd session and asked to VOSP chairperson to liaise with the WMO Secretariat in this matter (**action: VOSP Chairperson, WMO**).

IV-6. ORGANIZATIONAL MATTERS

IV-6.1 Review the Terms of Reference of the VOSP

IV-6.1.1 The panel reviewed its Terms of Reference (TOR) and agreed that they continued to be appropriate and that no changes were therefore required. These are provided in Annex XXIV.

SOT-IV, SESSION V (SOOP IMPLEMENTATION PANEL)

V. SEVENTH SESSION OF THE SOOPIP (SOOPIP-VII)

V-1. PROGRAMME REVIEW

V-1.1 Report by the Chairperson of the SOOPIP

V-1.1.1 The Panel Chairperson, Mr Steve Cook, opened the Seventh Session of the SOOP Implementation Panel (SOOPIP). He thanked the Secretariat and other chairs of SOT panels, as well as his colleagues from NOAA/AOML for their support during the past intersessional period.
He recalled the Terms of Reference (ToRs) of the Panel, which are to review, recommend, and coordinate the implementation of ship of opportunity observations as well as the exchange of technical information and surveys new developments. These ToRs direct the Panel to monitor the distribution of resources to ships, transmission of data, and to analyze line activity through the Technical Coordinator.

V-1.1.2 Between 2004 and 2006 there has been a gradual decrease in the annual number of XBT observations transmitted in real-time to the national data centers, from just over 25,000 in 2004 to about 18,000 in 2006. This gradual decline is not unexpected, due to the successful implementation of the Argo profiling float program, which supplanted a significant portion of the Low Density XBT (LDX) network. SOT-III agreed that some LDX SOOP resources be reallocated

to Frequently Sampled (FRX) and High Density (HDX) lines. Argo now samples some areas that were traditionally difficult to sample by the SOOP (Southern Ocean, Gulf of Guinea and western South American Bight). The countries that were active in the previous intersessional period were Australia, Canada, France, Germany, India, Japan, Italy, the UK, and the USA.

V-1.1.3 Significant progress has been made in the continuing goals of SOOPIP: to improve the quality of the XBT observations, the real-time transmission of those XBT observations, as well as develop plans to migrate the XBT observations to FRX and HDX modes. The quality of the XBT observations has improved with the increased use of automated systems (i.e., CSIRO – Devil and NOAA AMVER/SEAS Systems), as well as improved software Quality Control procedures before data transmission. NOAA/AOML has also implemented improved procedures for reviewing and the correct insertion into the GTS after XBT data transmission.

V-1.1.4 During the intersession the SOOPIP also held a very successful XBT training workshop, sponsored by IOGOOS and JCOMM, and hosted by the National Institute of Oceanography (NIO) of India (Dona Paula, Goa). See further discussion under item V-2.5.

V-1.2 Review of Action Items from the SOOPIP-VI

V-1.2.1 The Panel reviewed the action items from the sixth SOOPIP Session, which are shown along with their status in Annex XXV. The Chairperson reviewed some the outstanding items. He noted that the action relating to possible changes in the fall rate equation of XBTs (IV/1.1.5) would be addressed under item V-2.4.1.

V-2 PROGRAMME IMPLEMENTATION

V-2.1 Status of the current sampling programme

V-2.1.1 The 45 FRX and HDX lines that are the goals of the SOOP program were defined by the Upper Ocean Thermal Review presented to the Ocean Observations for Climate conference (OceanObs99, San Rafael, France, 1999). In 2005, 11 of the 45 FRX and HDX routes (or 24%) were not sampled, and 15 of the 45 (or 33%) were under sampled.

V-2.2 JCOMM XBT Probe Pool

V-2.2.1 JCOMM-II decided to establish a common fund for ship consumables, to provide a mechanism to Member States to increase resources committed to supplying expendables for ship observations in support of international implementation plans. While the Trust Fund would initially focus on XBTs, other expendables could be added in time. The Fifth Session of the JCOMM Management Committee (MAN-V, Geneva, Switzerland, 5-7 October 2006) agreed that an official letter from the Chairperson of the SOT to the WMO should authorize proposed expenditures.
Currently no contributions have been received by the trust fund. The Panel agreed to work in the intersession to set priorities and a workplan for the XBTs that could be purchased by the Trust Fund, should donations be received **(action: SOOPIP)**. **The SOT urged** countries to contribute.

V-2.3 Review of the XBT line responsibilities

V-2.3.1 The last SOOPIP meeting reviewed and discussed line responsibilities assigned to participating agencies or countries. The Chairperson reminded the Panel that showing progress in implementing the lines was important in maintaining funding for the programmes. Line responsibility implies investigating ship opportunities for the line, and coordinating the logistics, training, and negotiations with shipping companies and ships.
The Panel reviewed the line responsibilities, noting in particular the lines with no sampling in 2005 or 2006. The following lines were not sampled in 2005.

Line Number	Route
AX-15	Europe - Cape of Good Hope

AX-25	Cape of Good Hope - Antarctica
IX-06	La Réunion / Mauritius - Malacca Straits
IX-07	Cape of Good Hope - Persian Gulf
IX-08	Bombay - Mauritius
IX-09S	Fremantle - Sri Lanka
PX-11	Flores Sea - Japan
PX-21	California - Chile
PX-35	Melbourne - Dunedin
PX-36	Christchurch - McMurdo
PX-81	Honolulu - Coronel (Chile)

V-2.3.2 The line PX-11 was partially sampled by Australia in 2006, and their plan is to reinstate that line. The Panel also took note of the CLIVAR-GOOS Indian Ocean Panel implementation plan (presented under I-3.1.1), which reduced emphasis on IX-06 and IX-07 as priorities. India initiated sampling on IX-08 in 2006. These routes are shown in grey above.

V-2.3.3 The Panel discussed the remaining lines individually:

Line Number	**Notes**
AX-15 Europe - Cape of Good Hope	Goni noted that a Spanish university was running a TSG on a ship on this route, and that he would contact them to see if XBT sampling was possible **(action: Dr Goni, with report back to SOOPIP Chairperson)**
AX-25 Cape of Good Hope - Antarctica	This line was is being done twice per year by the University of Cape Town in collaboration with NOAA/AOML (December and Feb/March), biased in summer, but meeting the requirement of the Upper-Ocean Thermal review (UOT)
IX-09S Fremantle - Sri Lanka	The Panel noted a difficulty identifying any ship traffic on this line. This route is currently impossible as designed.
PX-21 California - Chile	The Panel noted that due to changes in regulation of tanker traffic into the Prince William Sound in Alaska (USA), this route was not reliably serviced by offshore routes, but rather by ships stopping frequently in port, which did not allow for good offshore sampling. This route is currently impossible as designed.
PX-35 Melbourne - Dunedin	The Panel noted a difficulty identifying any ship traffic on this line. This route is currently impossible as designed.
PX-36 Christchurch - McMurdo	The Panel noted that the *Palmer* plied this route occasionally, and Pezzoli agreed to contact the Palmer to see if they were willing to perform XBT sampling in the Southern Ocean **(action: G. Pezzoli, with report back to SOOPIP Chairperson)**
PX-81 Honolulu - Coronel (Chile)	Pezzoli noted that the ships on this line had ceased calling in Hawaii. Pezzoli and Fujimoto agreed to search for a ship that did the Japan to western coast of S. America route nonstop **(action: G. Pezzoli and T. Fujimoto, with report back to SOOPIP Chairperson).** The Secretariat agreed to contact the Chilean IOC focal point to identify a correspondent in the shipping industry, to also help in the search for an appropriate ship **(action: Secretariat, with report back to SOOPIP Chairperson).**

V-2.3.4 The Panel further noted that all XBT measurements in the Southern Ocean were identified as a priority in the 1999 Upper Ocean Thermal review, and that the 2007-2009 International Polar Year (IPY) provided additional impetus to improve sampling in the Southern Ocean. The polar research ships could be a resource, and Klein agreed to contact the German research vessel the *Polar Stern*, to see if they would be willing to perform complementary high-

resolution XBT sampling in the Southern Ocean on their Conductivity-Temperature-Depth probe (CTD) sections between Antarctica and Cape Town **(action: Dr Klein, with report back to SOOPIP Chairperson)**. The OOPC Secretariat (**action: Dr Fischer**) would bring feedback on the actions decided to the CLIVAR basin panels.

V-2.4 Operational XBT Systems and development

V-2.4.1 XBT fall rate equation evaluation

V-2.4.1.1 Mr Derrick Snowden presented a report on one experiment carried out to evaluate the XBT fall rate equation off California. Side by side, XBT/CTD temperature profiles were collected in the eastern subtropical Pacific Ocean and used to investigate temperature and depth errors in XBT temperatures. The large depth errors indicated a need to estimate a new fall rate equation for Sippican Deep Blue probes. The new fall rate equation coefficients differ appreciably from the currently used fall rate equation, coefficients for this probe type. This experiment was not designed to identify fall rate errors so these calculations should be considered preliminary analysis. At this time Snowden and his collaborators were not prepared to recommend that the Ship Observations Team consider adopting a new fall rate equation. Snowden will conduct a follow up experiment designed to identify fall rate errors more accurately planned for May 2007. NOAA/AOML is receptive to collaboration with other members of the SOOPIP interested in understanding the XBT fall rate error.

V-2.4.1.2 Mr Franco Reseghetti gave a presentation on an evaluation of the performance of Sippican T4 and DB probes, using contemporaneous and co-located CTD and XBT temperature profiles from the Western Mediterranean Sea, compared within Mediterranean Forecasting System projects. Full details of this work have been published in 2007[6]. Some of the results presented by Mr Reseghetti are:

1. The reliability of the extended data acquisition for XBT probes was verified: successful acquisition time values increased by about 20% without significant variation of the quality of recorded temperatures. In addition, DB and T7 probes dropped from ships moving faster than nominal maximum speed had good quality of recorded values throughout the whole profile. In some cases, a large variability of the weight of each probe component and of the linear density of the copper wire was detected, which could produce differences up to 35 m in wire length. The calibration of the XBT probes and the data acquisition system at NURC Laboratories (La Spezia, Italy) indicates that the probes always report higher than real temperatures, and the results show slightly greater differences with smaller variability than in earlier calibrations done at NURC. The range of the obtained differences is 0.04-0.08 ° C, the probe-to-probe variability is 0.01-0.03 ° C, and a linear function can fit the data.

2. A significant part of the temperature difference occurring in the near surface layer has been explained in terms of the response time of the acquisition system. The upper thermal structure is better reproduced by computing an empirical value of the response time (0.3 s) and eliminating the first three recorded values. This shifts a profile up by 2 m.

3. The use of fall rate equation with IGOSS coefficients produces some non-negligible depth difference at the bottom, more evident for T4 probes. Therefore, new fall rate coefficients have been computed in a new way, because of difficulties in applying the method proposed by Hanawa et al. (1994; 1995) due to the high temperature homogeneity in Mediterranean seawater. T4 profiles show a better agreement with CTD profiles only if the A coefficient is reduced. On the contrary, DB probes present smaller discrepancies in the depth of thermal structures. The calculated B coefficients are within the range of variability allowed by the IGOSS Report for each specific type.

[6] Reseghetti, F., M. Borghini, G. M. R. Manzella, 2007. Factors affecting the quality of XBT data - results of analyses on profiles from the Western Mediterranean Sea, *Ocean Sci.,* **3**, p. 59-75, http://www.ocean-sci.net/3/59/2007/

4. These new fall rate coefficients for T4/T6 and T7/DB probes could be useful for XBTs dropped in the Western Mediterranean Sea and in neighbouring areas, having similar temperature and salinity values, and recorded temperatures are reliable down to about 550 m depth for T4 and about 920 m depth for DB probes.

5. The analysis of the temperature difference profiles for T4 and DB probes has shown a residual component, whose value below 100 m depth can be well reproduced by a linear function of depth. The temperature correction allows a description of most of the residual temperature error and other unknown and probe-specific unpredictable effects. The mean temperature difference between XBT and CTD measurements becomes symmetric and decreases. The identification of this bias (recorded values always warmer than real) indicates that a great caution is required in the analysis of old XBT data.

6. Finally, the estimate of the depth error has been obtained and the uncertainty in temperature values, which depends both on the depth and on the thermal characteristics of the profile. Reseghetti suggested a requirement for further comparisons in order to better identify the influence of different recording systems, of weight and different mechanical dimensions of the probes, and to check T5 probes properties.

V-2.4.1.3 **The Panel agreed** that it should form a “XBT Hardware Evaluation and Design” subgroup of the Task Team on Instrument Standards to address two tasks. The first task would be to propose and conduct additional experiments to review the fall rate equation of various XBT types, targeting publication of the results in time to be included in a new Upper Ocean Review. This would require contacts with Sippican as well as with the scientific research community, to identify opportunities for adding concurrent XBT measurements to research cruises. The second task would be to explore the possibilities of designing a standard XBT auto-launcher. The Panel agreed that the Commonwealth Scientific and Industrial Research Organization (CSIRO), Scripps, AOML, Italy, and Japan should be approached for appropriate representatives for each of the two tasks of this group. **(Actions, Secretariat to approach institutions for appropriate representatives, for appropriate members of the group in the intersession to perform their two tasks**).

V-2.4.1.4 **The Panel also recommended** that the launch system type, the probe type, the serial number, and the date of manufacture of the XBT be recorded in the metadata, to help if a future determination of the fall rate equation is found to depend on one of these variables **(action: all SOOP operators)**.

V-2.4.2 The High-Resolution XBT Network

V-2.4.2.1 Mr Glenn Pezzoli gave a report on the network of Indian Ocean and Pacific Ocean High Resolution XBT (HRX) lines maintained by the Scripps Institution of Oceanography (SIO, La Jolla CA, USA), with cooperation from Australia, France, Japan, and New Zealand. The global HRX network is implemented in cooperation between SIO, NOAA/AOML (USA), CSIRO (Australia), and Tohoku University (Japan). SIO receives logistical and ship rider support on lines under its responsibility from CSIRO, NIWA (New Zealand) and SHOA (Chile).

V-2.4.2.2 The lines are maintained quarterly, with eddy-revolving boundary-to-boundary sampling. A dedicated ship rider (technician/scientist) deploys the XBTs on most lines, and data are transmitted using SEAS software to GTS for immediate availability. The ship rider enables technical support for a variety of measurements, as well as enhanced communication with the shipboard personnel. These additional measurements include the deployment of Argo floats and surface drifters, the installation of improved meteorological sensors, thermosalinographs, unattended broad scale XBTs, and the collection of water and/or air samples.

V-2.4.2.3 The HRX time series are now 15-20 years long on several routes, providing a uniquely valuable dataset for studying inter-annual to decadal subsurface ocean variability. The global HRX network is made possible by strong national and international collaborations for sampling and

logistics. Commercial shipping presents unique opportunities and difficult challenges for climate-relevant research. Future work will focus on optimizing the network for long-term sampling, improving data quality, and scientific analyses of the long time series lines and applications in data assimilation.

V-2.4.2.4 The Chairperson noted that both SIO and AOML had manuals for high-density XBT equipment set up and operation. He asked that these manuals be put on the SOOPIP web site's publication section **(action: TC, seeking manuals from SIO and AOML)**.

V-2.5 Report on IOGOOS-JCOMM Western Indian Ocean XBT Training Workshop

V-2.5.1 Dr V Gopalakrishna gave a report on the IOGOOS-JCOMM Western Indian Ocean XBT Training Workshop. This workshop was initiated and organized by the National Institute of Oceanography (NIO) Goa, India. The workshop was held in the Marriot Resort Goa from 4-7 October 2005. The main objective of the workshop was to build capacity for XBT observations in the western Indian Ocean. Indian Ocean rim country participants were trained in the usage of SEAS.

V-2.5.2 50 participants from 10 countries included customs officers, shipping personnel, technical personnel, research students and government officials. IOC supported the workshop through their regional office in Perth, Australia. Sidney Thurston (NOAA) inaugurated the workshop. Participating country representatives presented scientific results from XBT temperature measurements in the Indian Ocean along various shipping transects. Steven Cook demonstrated SEAS to the technical staff and the research students at NIO.

V-2.5.3 In the concluding session of the workshop, a draft 'Goa Plan of Action 2005' was prepared and presented by Dr Thurston. This plan of action outlined specific milestones essential to achieve the main goal of the workshop, which was to re-establish the IX-08 XBT line. All the workshop participants were taken to the NIO for a visit, followed by a seminar by Dr Gary Meyers (CSIRO).

V-2.5.4 Dr Gopalakrishna then presented a report on the resumption of the IX-08 line from Mumbai, India to Mauritius. This is a recommended line from the UOT review panel, and its priority was reiterated in the CLIVAR-GOOS Indian Ocean Panel implementation plane (GOOS No. 152). After difficulties in finding a ship, the line was resumed in March 2007 on ship of the Reederei Alnwick Harmstorf & Co. line based in Hamburg, Germany. 80 XBTs and 150 water samples were taken during the transect. Dr Gopalakrishna thanked the shipping company, the IOC and NOAA for SEAS equipment and training, and IOC for travel support to this meeting.

V-2.5.5 **The Panel congratulated** Dr Gopalakrishna for the resumption of this line, and decided to send a certificate of appreciation to the ship **(action: SOOPIP Chairperson)**. This line will be maintained twice a year provided Dr Gopalakrishna has XBTs in his inventory. Data will be transmitted to NOAA/AOML for transmission into the GTS immediately after the vessel reaches port **(action: Dr Gopalakrishna and Dr Goni, to insert the data from IX08 into the GTS)**.

V-2.6 Report on Argo

V-2.6.1 The International Argo Project submitted a written report. At the date of the meeting, the Argo profiling float network had 2851 active floats, 95% of its target of 3000 floats. The floats were quite evenly distributed globally in the world's ice-free oceans. Twenty-four countries operate (or have operated) floats in the Argo array and share their data. Float reliability has improved and lifetimes have been extended, and more than 90% of profiles are delivered on the GTS within 24 hours. Real-time and delayed-mode quality control systems have been established, and Argo has developed a large user community. The Argo Information Centre (AIC), operating within the JCOMMOPS, monitors the array and provides support to operators. Argo has experimented with new communications technologies and oxygen sensors on some floats as a pilot project.

V-2.6.2 The major challenge for Argo will be maintaining the globally distributed array of about 3000 floats. The 'sustained maintenance phase' will be considered complete when Argo has been maintained at a level of 3000±250 floats for five years, with uniform global coverage (no northern hemisphere bias), stable technical capabilities and survival rates, and a completed evaluation has been made of the array's design and benefits to users.

V-2.6.3 The Argo project is interested in learning more about the quality of XBT data and their processing, which is a crucial complement to Argo in calculating ocean heat storage. It relies on the SOT for help with deployment opportunities, and welcomed stronger cooperation and sharing of SOT status and planning.

V-2.6.4 The Chairperson presented a report on experiences deploying Argo floats over the stern ('burial at sea' method), and noted that it could be too time consuming for a crew to perform, that it might require a ship rider. The Panel discussed several alternate methods for deployment from ships of opportunity.

V-2.6.5 The discussion of Argo real-time QC procedures led to a discussion of similar procedures for XBTs. **The Panel agreed** on the need for a homogeneous standard for automated real-time QC of XBT profiles before insertion on GTS, and will consider adopting and improving Argo QC procedures **(action: CSIRO, AOML)**. JCOMMOPS would host documentation once the standards are defined **(action: JCOMMOPS)**.

V-3. MONITORING AND DATA MANAGEMENT

V-3.1 JCOMM in situ Observing Platform Support Centre (JCOMMOPS) report

V-3.1.1 The SOT Technical Coordinator presented the status and proposals for JCOMMOPS support for the SOOPIP. The developments within JCOMMOPS were outlined including improved website reliability, new Argo information centre website (new maps for density and future deployment plans) and a web form to display BUFR templates and descriptors (which the TC noted should become increasingly important as the SOOPIP continues to develop its BUFR templates).

V-3.1.2 The TC outlined the reports routinely produced. Reporting included monthly maps with the JCOMMOPS standard presentation and the finalised 2005 SOOP Sampling report (finished in January 2007). Metadata was provided by panels members from Australia (BOM and CSIRO), USA (SEAS/AOML and SIO), Germany, Japan, Italy/Mediterranean, and France (IRD Brest and Noumea). Some data is also available for 2006 and the SOOP Survey for 2006 is in progress. Most metadata has been provided by panels members from Australia (BOM and CSIRO), India, USA (SEAS/AOML and SIO), Germany, Japan, Italy/Mediterranean, France (Institut de Recherche pour le Développement (IRD), Brest). Some initial results were presented. Feedback was sought from panel members on the reporting requirements for the international SOOPIP programme.

V-3.1.3 The TC proposed that the SOOP Sampling survey was to be conducted annually instead of biannually in future and that a draft report would be provided around April of the following year. Metadata would still need to be reported at the latest by 31st of March for the previous year, though those operators reporting monthly or biannually would still be encouraged to do so. This annual report would include two maps summarising the sampling success for Upper Ocean Thermal review lines and also for all SOOPIP lines.

V-3.1.4 The TC asked the panel if she should look into improving the efficiency of the SOOP Survey and possibly producing a shorter final report.

V-3.1.5 The Panel and the Observations Programme Area Coordinator **agreed** that an annual report was adequate for their purposes. They **asked** the TC to investigate the possibility of streamlining the report with increasing web links **(action: TC)**, and also agreed to provide ongoing feedback to the TC on the usefulness of the report **(action: SOOPIP)**. Mr Etienne Charpentier, in his role as the previous TC, noted the amount of positive feedback he received when the SOOP

monitoring tools were put in place, and recommended that the Panel seek advice from the OOPC and the CLIVAR basin panels on the usefulness of its reports **(action: TC)**.

V-3.3 Monitoring Centre reports

V-3.3.1 Global Temperature and Salinity Profile Program (GTSPP)

V-3.3.1.1 Dr Charles Sun gave a presentation on the Global Temperature Salinity Profile Program (GTSPP). The project began in 1990, with the goal of collecting and archiving all profile data from the oceans and providing the highest quality and resolution to users as soon as possible after collection. The last annual report prepared was for 2004. Since then, other work pressures of the current Chairperson (Bob Keeley) have prevented completion of the report for 2005 and 2006.

V-3.3.1.2 The number of BATHYs reported in 2005 was 32,533 and nearly at the end of 2006, it was 27,063. The number of TESACS is steadily increasing. In 2005, more than 868,000 were received, and more than 968,000 to nearly the end of 2006. Much of this increase is due to Argo exceeding the 90% level compared to the target of 3,000 floats and some moored platforms reporting profiles hourly. Delayed-mode data continued to be added to the archive, which now accounts for more than 3 million profiles and a significant number exist in real-time form (the delayed-mode versions have not yet arrived), particularly for data from the most recent years. The timeliness of real-time data delivery continues to improve. Nearly 80% of ship observations are processed within three days of receipt, and by the end of 2006 Argo was providing almost 90% of its observations to the GTS within 24 hours of collection.

V-3.3.1.3 The GTSPP collaborates with a number of international programmes. In particular, it is the main support for the SOT/SOOP programme of the JCOMM. Additionally, the monitoring that is done to the real-time GTS data is an important contribution to Argo. The GTSPP also offers the advantage of combining Argo profiles with all of profile data collected in a common data structure and with common processing. The GTSPP is currently collaborating with the Argo project along with colleagues from Coriolis and the GODAE Data Server in Monterey.

V-3.3.1.4 The GTSPP has collaborated with the JCOMM OPA to develop an easy to understand metric of data collection for temperature and salinity profile sampling. These are updated quarterly, and are available at the following web address: http://www.jcommops.org/network_status.

V-3.3.1.5 A strategy for attaching a single unique identifier to both the real-time and delayed-mode versions of XBT data has been under development at the GTSPP, and implemented by the US SEAS programme on a trial basis. Preliminary results are very positive. The GTSPP will continue to monitor these results to test how well the unique identification scheme performs. Both France and Australia have expressed interest in implementing the same scheme for data originating from their platforms but thus far, there is no action to report.

V-3.3.1.6 The GTSPP has developed a data dictionary to help identify different data and metadata identification schemes. The Integrated Science Data Management (ISDM, formerly Marine Environmental Data Service (MEDS)) hosts it, and is available at http://www.meds-sdmm.dfo-mpo.gc.ca/meds/About_MEDS/standards/login_e.asp.

V-3.3.1.7 The GTSPP is moving forward in a number of directions. It has developed software to read and write BUFR messages. This is confined at present to the templates that support Argo, but as this is a replacement for TESAC code form, the use is broader than for Argo alone. Project participants intend to regularly reconcile with the National Oceanographic Data Centre (NODC) and Coriolis databases, to: (i) provide Argo participants profile data in an Argo GDAC-like format, (ii) provide a hard copy source (DVD) of GTSPP data, (iii) continue work on the unique data identifier between real-time and delayed-mode data, (iv) extend the data dictionary, and (v) continue collaboration with the GODAE. The GTSPP is seeking assistance from the Argo Data Assembly Centres to fix the confusion of some profiling floats reporting pressure as depth in the TESAC code form on the GTS. The GTSPP is also cooperating with the National Institute for

Fisheries Research and Development of Argentina and the International Pacific Research Center (IPRC) to exchange the GTSPP QC software, which was developed by Dr Norman Hall at the NODC.

V-3.3.1.8 The most serious setback of GTSPP operations has been the withdrawal of centres from performing scientific quality assessments of the data. The project has been discussing with possible alternative organizations, but no final commitments have been made thus far. On 9 August 2005, Dr Charles Sun of the NODC met with Dr Peter Hacker of the International Pacific Research Center (IPRC) and invited the IPRC to participate in the GTSPP as a Pacific Regional Science Center for QC of the pacific data. Dr Hacker accepted the invitation and agreed to continue the QC editing until December 2007. The IPRC has Science QC'd the Pacific Ocean data for year 2000.

V-3.3.1.9 The Chairperson of the GTSPP is currently looking for a successor. Part of the reason for the delay in the production of annual reports has been the increased workload associated with developments in both Canada and commitments to the JCOMM. This has reduced his attention to the GTSPP, and the project has suffered. Interested participants are invited to notify the Chairperson accordingly.

V-3.3.1.10 The Web usage statistics of the Global Temperature-Salinity Profile Program (GTSPP) data transferred for 2006 increased to 415 GB from 74 GB in 2005, a 558% increase, while the number of file size downloaded over the GTSPP FTP server increased from 152 GB in 2005 to 381 GB. The following figure shows an increasing trend of the GTSPP data usage from 2004 to 2006.

V-3.3.1.11 **The Panel agreed** on the need for a unified definition of scientific QC for the delayed-mode data stream **(action: all SOOPIP members involved in GTSPP)**.
Sun reported that Mr Bob Keeley would step down as Chairperson of GOSUD. **The Panel agreed** to endorse Dr Charles Sun (NOAA/NODC) as Chairperson of the GTSPP, with support from Ann Gronell Thresher (CSIRO). Dr Goni reported that he, Dr Sun, and anyone else interested would participate in the writing of a proposal to restart the GTSPP based at NOAA/NODC. They will investigate submitting a proposal to NOAA's Data Stewardship Program **(action: Dr Goni, Dr Sun)**.

V-3.3.2 Global Ocean Surface Underway Data Pilot Project (GOSUD)

V-3.3.2.1 Dr Loic Petit de la Villeon gave a presentation from the Global Ocean Surface Underway Data (GOSUD) Project, which has been focused largely at Institut Francais de Recherché pour l`Exploitation de la Mer (IFREMER), which operates the Global Data Assembly Centre (GDAC) for the Project (see http://www.ifremer.fr/gosud/). The GOSUD Project is focused on acquiring data directly from data collectors rather than using the GTS TRACKOB (Code for reporting marine surface observations along a ship's track) messages as a primary source of real-time data. There were a couple of reasons for using these means. The first was, that although some data were being placed routinely on the GTS, this was not broadly so. Secondly, the GOSUD is interested in acquiring a five-minute data average to allow for the description of high spatial scale variability. Some vessels already do high frequency sampling, and in 2004 and 2005, some were reported on the GTS. However, the data volume is high and operators appeared to choose to stop reporting such high sampled data to the GTS in 2006. However, the number of ships reporting directly has not changed substantially.

V-3.3.2.2 After some delays, it appears that at least some of the data being collected by the SeaKeepers organization are at least making it to the GTS. These vessels mask their call signs, but all use a consistent prefix on their call signs. There have been no direct data submissions to the GDAC so far. The GOSUD needs to further pursue this collaboration and improve the quantity of data coming directly to the GDAC and to the GTS.

V-3.3.2.3 In 2006, the GOSUD held a joint meeting with the Shipboard Automated Meteorological and Oceanographic System (SAMOS) Project in Boulder, Colorado, USA. The SAMOS Project has

similar goals to the GOSUD, but in this case, it deals with meteorological data. It is common for both oceanographic and meteorological underway data to be collected at the same time, and thus collaboration with the SAMOS is logical endeavor. The Boulder meeting was the first for members of each Project to meet each other and to understand objectives. The meeting consisted of three sessions, separate sessions for the GOSUD, and for SAMOS and then a plenary where issues of common interest were discussed. A number of actions were identified, and these will contribute to the work of the GOSUD. The report is available through the SAMOS website at the following address:
http://www.coaps.fsu.edu/RVSMDC/marine_workshop3/docs/report_final.pdf.

V-3.3.2.4 JCOMM is currently taking up the task of changing real-time data reporting on the GTS from character-based codes to BUFR. For the GOSUD, this means changing from the TRACKOB code form to BUFR. The work is being lead by the Data Management Programme Area (DMPA). Currently, a draft BUFR template has been produced and is under discussion. The DMPA has formed a working group (lead by Mr Robert Keeley at present) to look at templates from TRACKOB, as well as other code forms, to look for opportunities to consolidate how information is reported. This is being done in cooperation with the META-T group of the JCOMM, who looking at how to report SST and associated information on how the observations were made.

V-3.3.2.5 NOAA/AOML will start testing real-time transmission of TSG data in BUFR format in 2007, and will report results on their experience and recommendations to GOSUD.

V-3.3.2.5 Although no formal meeting of the GOSUD is planned at this point-in-time, some members will be present at the upcoming Fourth Session of the JCOMM Ship Observations Team (SOT-IV, Geneva, Switzerland, 16-21 April 2007). It is expected that informal discussions will take place to refine what will be done during this year and into the future.

V-3.3.2.6 Mr Thierry Delcroix, one of the original Co-chairpersons of the GOSUD has recently resigned. It is been recommended by the other Co-chairperson, Mr Robert Keeley, that Mr Loic Petit de la Villeon be confirmed as a Co-chairperson. Mr Petit de la Villeon works at the IFREMER and a member of the GOSUD since its inception. He is well versed in the issues, is working at the GDAC location, and thus is able to influence its operations. It is also important for the IODE to begin looking for a replacement for Mr Robert Keeley, as the other Co-chairperson for the GOSUD, as his workload both at home and internationally has increased such that he is no longer able to find proper time required to devote to this project. Mr Keeley will remain as a Co-chairperson for another year, but then regrettably must withdraw from the position.

V-3.3.2.7 **The Panel agreed** to endorse Loic Petit de la Villeon as Chairperson of GOSUD.

V-4. ISSUES FOR THE SOOP

V-4.1 Future global requirements

V-4.1.1 Dr Albert Fischer provided a report on upcoming actions involving the OOPC that would have potential impacts on the recommendations for the SOOP panel. There have been a number of changes since the Upper Ocean Thermal Review of 1999, including most notably the build-up of the Argo array, which is likely to reach its target of 3000 floats in 2007 and is achieving a near-global distribution and coverage. There has also been evolution of pressing science questions and evolution of new observing technologies.

V-4.1.2 The OOPC has been asked in the past few years to consider updating requirements for SOOP repeat lines through a new Upper Ocean Thermal Review. However, at its May 2006 meeting (OOPC-11) it decided, in accordance with the GCOS Climate Monitoring Principles, “that the right time frame would be in about 2008, to allow for a period of overlap between systems. Such a review should evaluate all volunteer measurements (not just temperature), and account for the value in having a shipboard observer for the breadth of observations that made possible. It should also involve the use of Observing System Experiments (OSE) and Observing System

Simulation Experiments (OSSE), although taking into account their limitations in answering only the question asked, while composite networks were designed to answer multiple questions and observing requirements."[7] A first step in this process will come at the November 2007 GODAE-OOPC meeting on OSE and Observing System Simulation Experiments (OSSEs) noted under I-3.1.1.

V-4.1.3 The OOPC has considered, encouraged by the GCOS Steering Committee and the GOOS Scientific Steering Committee, to plan with other interested groups a new conference focused on global ocean observations, in about 2009, ten years after San Rafael. The goals of this conference would be to take stock in progress and in major advances in scientific knowledge from the observing system, and to focus on challenges and opportunities, including new technologies, and new opportunities for global measurements of biogeochemical and ecosystem variables. This meeting would also address some of the evolutions necessary in the recommendations for the global module of GOOS focused on the physics of the ocean, including plans for deep ocean observations (sub-Argo), improved monitoring of critical transports, and sustained polar ocean observations.

V-4.1.4 One potential activity associated with such a conference would be a new Upper Ocean Review. This could focus on: a) the major scientific questions in climate variability and change on both short and long time scales requiring observations of the upper ocean, b) the achievements and status of current observing networks in the upper ocean, c) new observing technologies and trends, and d) making recommendations on a rationalized upper ocean observing system relying on both ongoing observing networks and new observing networks. For example, as glider-observing technology develops and increasingly used in research programs, it may in the future be complementary to or potentially replace some XBT lines. Because of the importance of maintaining continuity and quality in climate observations, such a transition would have to be carefully managed.

V-4.1.5 The OOPC will invite SOOP members to provide input for an Upper Ocean Review, which may take place either as a preparatory event or as part of the proposed 2009 ocean observations conference, and would welcome any input from the Panel on its proposed focus and during planning stages.

V-4.1.6 Another activity leading up to the Ocean Observations conference is a "Symposium on Multi-disciplinary Sensors and Systems for Autonomous Observations of the Global Ocean" (OceanObs08) which will potentially take place in spring 2008 hosted by the IO-Warnemünde (Rostock, Germany). Groups currently participating in its planning are OOPC, OceanSITES, IOCCP, ORION, and the US NSF. The head of the organizing committee is Ralf Prien (IO-Warnemünde). The objectives of the symposium would be to create a forum for exchange of information between ocean scientists (users) and developers of ocean sensors and platforms, bringing in scientists and engineers developing new sensing technologies (space, automotive, industrial etc) not focused on oceans, and representatives of funding agencies. The symposium will strive to assess observing system and research goals and specifications for ocean observing technologies to meet these goals, and initiate development of a web catalog and portal for ocean instruments.

V-4.1.7 The input of SOOP and the SOT more generally will be sought in all of these activities. Dr Gustavo Goni agreed to serve on an organizing committee for an Upper Ocean Review **(action: Dr Goni)**.

V-4.2 Observing other ocean variables

V-4.2.1 Dr Gustavo Goni presented a report on NOAA/AOML thermosalinograph (TSG) operations. Sea surface salinity and temperature along ship tracks can be monitored using (TSGs). These observations complement those from profiling float observations since they provide data

[7] GOOS report No. 154, available at http://ioc.unesco.org/oopc/oopc-11/

with better spatial resolution, able to identify frontal regions, are carried along repeated tracks and can be linked to concurrent observations of other parameters, such as for example pCO2 and chlorophyll. NOAA/AOML currently maintains TSGs in two cargo ships (*Skogafoss* and *Oleander*) and in one cruise ship (Explorer of the Seas, in collaboration with the University of Miami). Real-time data from the Explorer of the Seas is transmitted in real-time to the GTS. Plans are underway to place the TSG real-time data from the two cargo ships into the GTS during 2007. Two additional installations with real-time transmission capabilities will be done during the summer 2007 in one cargo ship (*Albert Rickmers*) in the Pacific Ocean and one cruise ship (Semester At Sea's *Explorer*) that sails around the world twice a year. Real- and delayed-time quality control procedures are done following GOSUD recommendations. Additional steps were added to include comparisons with NCEP weekly analysis, and with XBT, CTD, profiling floats observations. Work is underway to transmit quality controlled delayed-time data to Coriolis and NOAA/NODC.

V-4.2.2 Dr Tom Rossby presented work he has done at the University of Rhode Island Graduate School of Oceanography (GSO), in collaboration with several NOAA laboratories, to sample the Gulf Stream in the Atlantic Ocean using a ship of opportunity. This project referred to as the Oleander Project (http://www.po.gso.uri.edu/rafos/research/ole/index.html) implements an Acoustic Doppler Current Profiler, which samples upper ocean currents on board the *Oleander*. Currents are important because they tell you not only about the state of the ocean at the present time, but can be used as predictors of future states. This project has been ongoing since 1992, and has allowed study of the stability of the Gulf Stream in time. Other than some small variations, which may be related to sampling of warm and cold rings, the Gulf Stream has been quite steady since 1992. However, in the Slope Sea and in the Sargasso Sea there is substantial time variability in the currents. Despite the high speed of the ship, the many repeat transects allow a detection of the Ekman spiral in the mean currents.

V-4.2.3 In addition to the ADCP, the M/V *Oleander* has a Continuous Plankton Recorder operated by the NOAA National Marine Fisheries Service (NMFS) lab in Narragansett, Rhode Island, USA, a thermosalinograph and XBT system operated by the NOAA/AOML and a partial CO_2 system operated jointly by the NOAA/AOML and the Bermuda Biological Station for Research. The NMFS takes XBT data from near-shore to the Gulf Stream but not beyond to Bermuda, and Dr Rossby invited the SOOP to help him complete the line.

V-5. FUTURE WORK PROGRAMME AND IMPLEMENTATION ISSUES

V-5.1 Partnerships and the integration of other programmes with the SOOP

V-5.1.1 The Chairperson presented partnerships of the SOOP panels, which Partnership programs in the past have ranged from relatively simple such as the deployment of Drifting Buoys to the more complex, such as the collection of sea surface partial CO_2 measurements.

V-5.1.2 Examples of current cooperative programs are: collection of sea surface meteorological observations; deployment of Drifting Buoys; deployment of Argo Floats; collection of Thermosalinograph (TSG) data; collection of Continuous Plankton Recorder (CPR) data; collection of atmospheric CO_2 data; collection of sea surface partial CO_2 data; collection of automated climate quality meteorological observations (AutoImet); and deployment of specialized expendable probes such as XCTDs.

V-5.1.3 The collection of so many different data sets and the specialized programs they support make it almost impossible for any one vessel to do all. Improved communications between the SOOPIP, VOS and ASAP Programs are critical to the successful execution of all these programs. One also must be very careful not to interfere with other programs, which may already be established on a particular vessel. In addition, one has to be careful of not overloading the ship with too many different programs.

V-5.2 Action items

V-5.2.1 The SOOP Implementation Panel reviewed the action items arising from the Panel discussion. These are provided in the SOT action list in Annex XXVI.

V-5.2.2 In addition, some discussion of matters brought up in previous agenda items took place, and the following additional actions were formulated.

V-5.2.3 Regarding the value of temperature and salinity data collected by partial CO2 systems and coordinated by IOCCP (agenda item I-3.2.1), **the Panel agreed** that near-real-time salinity data from TSGs run for pCO_2 observations were valuable for satellite calibration and ocean analyses and forecasts, as were timely availability of delayed mode data. NOAA/AOML agreed to insert such data on the GTS if communications from the ship were possible. The Panel asked IOCCP and AOML to coordinate procedures for near-real-time insertion of salinity data on GTS (**Action IOCCP and AOML**), and the SOOPIP Chairperson to urge IOCCP to release salinity data to data archives in a timely manner (**action: SOOPIP Chairperson**).

V-5.2.4 Regarding cooperation with the Ferrybox project (agenda item I-3.2.4) AOML had agreed to work with the Ferrybox project to allow for near real-time insertion of data onto the GTS **(action: AOML and Colijn)**.

V-5.2.5 Regarding cooperation with the proposed SCOR Panel on Merchant Marine Oceanographic Surveys (agenda item I-3.2.7), **the SOT endorsed** the proposed panel, **agreed** to provide input to the panel through SOOPIP, and **agreed** to coordinate its contacts with the merchant marine industry regarding support for science infrastructure on merchant marine ships.

V-6. ORGANIZATIONAL MATTERS

V-6.1 Review the Terms of Reference of the SOOPIP

V-6.1.1 The Panel reviewed its Terms of Reference (ToR), and agreed to modify references to the SOT Coordinator to make them gender-neutral. The Panel agreed that its ToRs continued to be appropriate and that no further changes were required.

V-6.2 Review the membership of the SOOPIP

V-6.2.1 The Panel reviewed the currently active countries in the programme, represented at the panel meeting, namely: Australia, Canada, France, Germany, India, Italy, Japan, the UK, and the USA. It noted that China and the Russian Federation had not been active in 2005 or 2006. Brazil and South Africa, in cooperation with the USA, are active in the maintenance of XBT lines, and their representation at future meetings of the panel would be sought **(action: Secretariat, contacts are Dr Maricio Mata (FURG, Brazil) and Dr Isabelle Ansorge (UCT, South Africa))**.

SOT-IV, SESSION VI (ASAP PANEL)

VI. SIXTEENTH SESSION OF THE ASAP PANEL (ASAPP-XVI)

VI-1. PROGRAMME REVIEW

VI-1.1 Report by the Chairperson of the ASAP Panel (ASAPP)

VI-1.1.1 Ms Sarah North, the interim Chairperson of the ASAPPI, summarized the activities since the last session of the Ship Observations Team (SOT-III, Brest, France, 7-12 March 2005) and the current level of participation. She identified a number of overarching issues that currently affect ASAP operations.

VI-1.1.2 Ms Sarah North reported that during the last intersessional period, she had been assisting with arrangements for recovery of the sounding/launching equipment from the WRAP ship. Return of the sounding computer to NOAA, and concluding financial arrangements for WRAP consumables and maintenance. The Interim Chairperson attended the first E-ASAP Technical Advisory Group (TAG) meeting held in Hamburg, Germany, from 9 to 10 November 2005, and chaired the second E-ASAP TAG meeting held in Hamburg, Germany on 19 March 2006. The Panel noted that a further meeting of the TAG was scheduled to take place in Geneva, Switzerland on 19 April 2006 during this SOT-IV Session. Ms North has also been providing input into the SOT Annual Report, the ASAP brochure and the ASAP pages on the JCOMMOPS website.

VI-1.1.3 The Panel noted with concern the discontinuation the Worldwide Recurring ASAP Project (WRAP) shortly after the last ASAP Panel meeting. Discussion on the issue is planned under agenda item VI-2.2.

VI-1.1.4 Ms Sarah North reported that the main developments during the intersessional period since the SOT-III have come from the Eumetnet ASAP Project (E-ASAP) as it progressively aims to integrate the ASAP ships contributed by its participating members into a cooperative European programme. The Panel agreed that the E-ASAP model of integrating units on a regional basis in order to obtain economies of scale, and aiming to harmonise operations under a central management team, is perhaps one that could be considered in other areas of the globe where vertical profiles of the atmospheric structure are needed for regional short to medium-range Numerical Weather Prediction. Although the E-ASAP recruited ships primarily operate in the North Atlantic and Mediterranean, the programme nevertheless aims to contribute to the wider World Weather Watch by providing up to 10% of its soundings outside its direct area of interest (e.g., in the Southern Oceans). This is being achieved by upper air ascents performed by the German research ship ***FS Meteor***. In addition, the E-ASAP programme also funds radiosonde operations from the North Sea platform ***Ekofisk***, and contributes funding for consumables used by the Norwegian Ocean Weather Ship ***MIKE***. Details about the E-ASAP Project will be discussed under agenda item VI-2.1.

VI-1.1.5 The Panel noted that while the main concentration of the ASAP operations therefore continues to be over the Northern Atlantic, an important contribution is also made by Japanese research ships operating primarily in the North Western Pacific areas and seas adjacent to Japan (although the research ship ***Mirai*** also occasionally operates in the Atlantic and Indian Oceans). The number of soundings reported from the Japanese has also increased significantly since 2005 (from 582 in 2005 to 938 launches in 2006). The percentage of Japanese reports getting onto the GTS continues to be generally high when compared to that of E-ASAP ships. Whilst a total of 4238 soundings messages from E-ASAP ships were inserted on the GTS in 2005 the loss rate (due to loss of sonde at launch, operator error or transmission problems) continued at unacceptably high levels. As a consequence, the initial objectives of the E-ASAP program have had to be readjusted to more realistic levels (a detailed report on the E-ASAP programme will be given under Agenda Item IV-2.1),

VI-1.1.6 The Panel also noted with appreciation that during the intersessional period, radiosonde soundings were also started by South African research ship ***SA Agulhas***. Although operations were temporarily interrupted by theft of the sounding equipment from this ship, it is understood that they will resume in the near future. Research ships operated by other countries may also be performing occasional soundings for particular projects, although because these do not contribute directly to the ASAP programme details are not known to the Chairperson. Nevertheless, it is suggested that the Panel needs closer links with research institutions in future so that all upper air soundings at sea are captured and are available for consideration.

VI-1.1.7 The Panel noted with concern that the transfer of Goonhilly Inmarsat-C LES operations to Burum LES in November 2006 had a major impact on E-ASAP data transmission, resulting initially in the loss of data and subsequently to major timeliness problems. This issued is being discussed under agenda item VI-4.2.

VI-1.1.8 The Panel also noted with concern that the cost of upper air TEMP code data transmission via Inmarsat was a limiting factor for the ASAP Programme, and that transmission of ASAP data in BUFR might have data telecommunications cost implications. Further discussion on the matter is planned under agenda item VI-4.5.

VI-1.1.9 The Panel noted that the possible need for a dedicated ASAP metadata database had been discussed at previous sessions of the Expert Team on Marine Climatology (ETMC) and also at the SOT-III Session, although no definite actions were agreed. Following the SOT-III, some further consideration of the possibility of extracting the information contained in Members' annual ASAP reports was considered by the SOT Chairperson in liaison with the ASAPP Chairperson. If such a repository for ASAP metadata were to be formally developed, it would bring into question the need to maintain data in the ASAP section of the SOT Annual Report. However, it would allow the metadata to be easily interrogated. Assuming there is a user requirement for the collection of ASAP metadata, the Paned suggested that the JCOMMOPS might be considered a suitable host for maintaining an online ASAP metadata database and asked the SOT Coordinator to investigate the issue (**action: SOT Coordinator**). It is futher recognized that some metadata fields related to ASAPs, and are already included in the WMO Pub. 47 metadata for the VOS (which it is also being proposed should be hosted by the JCOMMOPS.

VI-1.1.10 The Panel noted that the extent to which delayed-mode high-resolution data (usually collected by visiting Port Meteorological Officers (PMOs)) is being evaluated for quality is not clear, although it is known that this is not currently happening for the E-ASAP high-resolution data due to resource issues. The need to do QEv of this high-resolution data was evidenced when problems with the DigiCORA III software arose in early 2005. The problem was identified by Vaisala, and was caused by the inclusion of the ships velocity vector in the winds calculated for data from RS80 or RS90 radiosondes (as ships can be moving in the region of 10 m/s during the flight this represented a serious problem). Although the onboard software for affected ships was corrected relatively quickly for affected ships, there was also the need to correct the archive datasets, through a correction program.

VI-1.1.11 Ms Sarah North reported on other issues of concern for the Panel including, (i) the risks of damage, or injury to third parties, caused by radiosondes falling over land, (ii) the dynamic nature of the shipping and the merger between the shipping companies resulting in significant changes to the trading patterns of many of the container ships involved, (iii) the problem of trying to source potential new ASAP ships as modern container ships are designed with a minimum of superstructure or deck space where an ASAP container can be sighted. The Panel noted that E-ASAP had decided to limit the launch of the balloons within 75 miles of the costs. At the same time, the Panel noted that the use of parachutes was not practicable. These issues will be discussed further under agenda item VI-4.

VI-1.1.12 To conclude her presentation, Ms Sarah North explained that the Global ASAP performance has been slightly disappointing since the SOT-III and, following the loss of the WRAP ship; operations are now primarily focused on the North Atlantic and Western Pacific. The capital costs involved in establishing an ASAP unit, and the ongoing costs of consumables, are extremely high when compared to other marine observing networks and are difficult to justify, especially given the high radiosonde failure rates. Although the ASAP data has been shown to be of comparable quality to that from land radiosonde stations, increased satellite and AMDAR data over oceans will also place a question mark over future plans to enhance the ASAP operations. Whilst more targeted observations in sensitive areas where storms are originating should be encouraged, this is always likely to be hampered by the variable nature of shipping movements.

VI-1.1.13 The Panel agreed that the ASAP nevertheless continued to be an important component of the World Weather Watch, and it is hoped that other countries can be persuaded to initiate, or resume, their ASAP activities.

VI-1.1.14 The Panel discussed whether there was a need to identify target for ASAP operations and agreed that it was lacking input from the data users at this point and from the NWP users in

particular. The Panel asked the European Centre for Medium-Range Weather Forecasts(ECMWF) to provide guidance in this regard and to suggest specific areas that should be targeted in order to improve the quality of the global NWP model forecasts (**action: ECMWF**).

VI-1.2 Review of Action Items from the ASAPP-XV

VI-1.2.1 The panel reviewed the action items from the fifteenth ASAPP Session. Outstanding action items and their status are listed below.

- JCOMMOPS to prepare simple ASAP web pages: The Panel noted with appreciation that JCOMMOPS had prepared such web pages.
- ASAP brochure: Rudolf Krockauer and Sarah North have started working on this. Funds are needed to produce a revised brochure. The Panel will further discuss the issue under agenda item VI-6.4.
- Storing the high-resolution data. The Panel noted that the data were being stored but were not being evaluated.

VI-2. PROGRAMME IMPLEMENTATION

VI-2.1 Report on the EUMETNET ASAP (E-ASAP)

VI-2.1.1 Mr Rudolf Krockauer presented a report on the status of the EUMETNET ASAP project. He recalled that reducing the gap between the number of launches on board of the ships and the number of timely received messages on the GTS remained a key issue of the programme. Basically, the received data are of good quality and important for the forecast models. However, the high loss rate of >20% results both in missing data at the Met Services and higher operational costs. Reducing the loss rate is an issue of training the operators on board and improving the data transmission to the receiving Met Service (before transmitting to the GTS).

VI-2.1.2 Mr Rudolf Krockauer reported that the efficiency (Messages on the GTS / Launches) differed from ship to ship and from crew to crew. The loss rates are usually not consistent over the year, but are related to individual cases. This is partially due to the lack of skill of the operators on board. The combination of sounding and transmission system is complex. The operators did not detect several internal errors in time.

VI-2.1.3 In addition, the Panel noted that the transmission from the ship to the GTS was also unstable. This does not only include the satellite transmission from the ship to the receiving Land Earth Station, but also the forwarding and processing to and at the relevant Met Service. Different requirements regarding the data format (e.g., GTS header or no header) led to delays or denials of data at the automatic processing systems before transmitting to the GTS. Particularly the closing of Goonhilly demonstrated the vulnerability of satellite communication.

VI-2.1.4 Mr Rudolf Krockauer explained that experience showed that excellent transmission performance is achieved on those ships, where the crew sends the data manually via the ships e-mail system. However, most crews are reluctant to return to manual transmission, as they are used to finish the work after successfully launching the balloon. Improving the transmission from the ship to the GTS remains a key parameter to increase the efficiency and reduce the costs of the ASAP soundings.

VI-2.1.5 The Panel noted the following plans of the E-ASAP for the future:

- Establishing a wider network of supporting PMOs
- Improving the satellite communication by decoupling sounding and transmission systems, direct e-mail transmission to the responsible NMHS and forwarding to GTS.

- Supporting the International Polar Year (IPY) by providing additional soundings for GFDex campaign (19 February to 10 March 2008?), and further support, if requested;
- Supporting the EURORISK by providing facilities for position tracking for targeted soundings.
- Assessing options for high resolution BUFR data (Upper-level temperature, humidity and wind report from a sea station (TEMP-SHIP) reports of 2 KB versus edited 5sek BUFR reports of 65 KB)

VI-2.1.6 The Panel noted with interest the following E-ASAP achievement:

- 16 units delivered 4300 sounding data (5153 launches) in 2006
- Average timeliness is better than 60 minutes
- Average burst height is better than 50 hPa
- The decoupling of transmission and sounding
- Changeover to e-mail transmission instead of SAC 41

VI-2.1.7 The full report by E-ASAP is provided in Annex XV.

VI-2.2 Report on the Worldwide Recurring ASAP Project (WRAP)

VI-2.2.1 The Panel noted that the WRAP (World Re-occurring ASAP Programme) was officially terminated in April 2005 because of the difficulties in maintaining a viable and cost effective service. The Panel recalled that the concept of an ASAP operating on round-the-world merchant vessels in the Southern Hemisphere was first discussed between the WMO, the Australian Bureau of Meteorology, Met Service New Zealand and the South African Weather Service (formerly the South African Weather Bureau) during the Second Regional PMO Workshop for the WMO RAs II and V, Melbourne, Australia, 1999. The Worldwide Recurring ASAP Project (WRAP) as it was to become known, evolved from that meeting and commenced in the first half of 2001, with support from the UK Met Office, NOAA and the Bureau of Meteorology.

VI-2.2.2 The Panel also recalled that the first WRAP vessel, M.V. *P&O Nedlloyd Palliser Bay*, completed four voyages between early 2001 and mid 2002. An assessment of the WRAP-I data by the Bureau of Meteorology Research Centre (BMRC) was presented at the SOT-I, Goa, India, 2002, which concluded that the WRAP data generally had a greater impact on the upper-air analyses than any individual mainland Australian upper-air station. After much effort, the M.V. *MSC Corinna* was recruited early in 2004 as the second WRAP vessel, but was not declared operational until late in 2004, due to a number of problems with the equipment. The ship successfully completed four test flights from Australia to Europe late in 2004. Routine upper-air flights started early in 2005, however, soon after leaving Melbourne, Australia, having just completed its maiden WRAP voyage, the vessel was directed to immediately begin trading on a different route. With assistance from the MSC, the equipment and consumables eventually landed in Singapore and subsequently returned to the United Kingdom.

VI-2.2.3 The Panel noted that despite the undeniable impact that ASAP data had on the upper-air analyses, the seven 0000 UTC flights per one hundred days crossing the Indian Ocean, did not justify the enormous expense for consumables (radiosondes and gas) or the time required to manage the project, install the equipment, train the crew or service the ships.

VI-2.2.4 Mr Graeme Ball explained that it was with regret that the Bureau of Meteorology (BOM) formally withdrew from WRAP in a letter dated 25 May 2005 to the interim Chairperson of the ASAPP. At the same time, the BOM recognized that the concept of WRAP was sound and that the cooperation between the participating agencies and the WRAP Coordinator was very effective and efficient.

VI-2.2.5 The Panel agreed that the project had provided good quality upper-air data over a period of almost four years and had required close collaboration between the National Met Services involved (i.e., the Australian Bureau of Meteorology, the United Kingdom Met Office and NOAA). Had other Met services also been able to justify financially contributing to the project, then it might have been possible to enhance it and to establish it as an ongoing programme. Nevertheless, the Panel agreed that the validity of the WRAP concept has been proven in the operational sense and should therefore be kept under review by the Panel, in case suitable opportunities arise again in the future (the new round the world Scholar Ship might for instance offer such an opportunity). However, if the project were to be resurrected then it would be essential to establish ongoing financial commitments from a greater number of participants at the outset.

VI-2.2.6 The Panel agreed that the low volume of data can only be addressed by increasing the size of the fleet and at the same time implementing a programme of 0000 and 1200 UTC radiosondes, all of which will increases the cost.

VI-2.2.7 At the same time, the Panel recognized that one of the concerns facing VOS Operators in the Southern Hemisphere was the uncertainty in the shipping industry. It is not uncommon for ships to begin service on a desirable route and disappear just as quickly. Until such time that there is stability in the industry, the Panel agreed that it was hard to recommend a revival of the WRAP in the near future.

VI-3. MONITORING AND DATA MANAGEMENT

The Panel reviewed the programme monitoring activities to estimate the overall performance, both operationally and in respect of the quality of the ASAP system data processing.

VI-3.1 Monitoring reports

VI-3.1.1 Monitoring activities of ECMWF in support of the ASAP

VI-3.1.1.1 The ECMWF representative, Mr Antonio Garcia-Mendez reported on the monitoring activities by ECMWF for the ASAP. The ASAP data monitoring at ECMWF is carried out at two different levels, (i) the daily monitoring which is done by the Met Analyst on duty in the MetOps room and (ii) the monthly and longer term monitoring. A number of tools have been developed to help the Met Analysts to have an easy access to the current status of the observations performance. Once a day a number of products are updated and displayed in the ECMWF web pages. The number of ASAP reports are made available via the web. The rest of the daily products are in ECMWF internal web pages for monitoring purposes as time series also. Two interesting products are the time series for temperature, humidity and wind both for data usage and statistics. The data usage and statistics are offered at three atmospheric layers (below 700 hPa, 700 to 400 hPa and above 400 hPa) both for all data and for used data in the assimilation.

VI-3.1.1.2 Mr Antonio Garcia-Mendez explained that the number of ASAP reports received at ECMWF showed a positive trend since 2005. In 2006 the percentage of ASAP soundings reaching 100 hPa has dropped to figures between 85 and 90% compared to values between 90 and 95% in 2005. A few problems have been detected mainly related to wrong reported positions (almost every month in 2006). Corrupted callsigns have been received from time to time. In most of the cases, the reports were rejected by the model QC but in a few occasions passed though the model quality control. This problem has not been detected in any of the Japanese ASAP. However, Mr Garcia-Mendez reported that in general, the ASAP statistics have continued to show a good performance.

VI-3.1.1.3 Mr Antonio Garcia Mendez explained that high quality radio sondes are needed in particular in the oceans. The Panel noted that observation of the tropospheric component of the atmosphere was needed for NWP and that radiosondes generally provided better high vertical

resolution information than the aircraft data (AMDAR) over the oceans. Radiosondes data are particularly needed for the calibration of the satellite products. Mr Garcia-Mendez agreed to investigate availability of materials showing the need for radiosonde data in the Southern Hesmisphere and in the North Pacific for satellite calibration (**action: ECMWF**).

VI-3.1.1.4 ECMWF expressed concerns with regard to ASAP position errors while the profile itself was of good quality. Wrong positions are received every month in 2006. The Panel however noted that such errors did not appear in the JMA soundings. The Panel agreed that E-ASAP errors should be notified to Rudolf Krockauer for investigation and tentative correction of the problems (**action: ECMWF**).

VI-3.1.1.5 The Panel also noted that a few ASAP reports have been appearing with corrupted call signs.

VI-3.1.2 Report by the ASAP Monitoring Centre

VI-3.1.2.1 The representative of Météo France, Mr Gérard Rey, reported on the status and operation of the ASAP monitoring centre.

VI-3.1.2.2 The ASAP monitoring centre was established by Météo France, as agreed at the Seventh Session of the ASAP Co-ordination Committee in 1995 (the ACC is the ancestor of the ASAP Panel). Since that time, Météo France has been routinely providing annual monitoring report on behalf of the ASAP.

VI-3.1.2.3 Mr Gérard Rey explained that due to modifications in the localisation of the upper air observation department which moved from Trappes to Toulouse at the end of 2004, the change of people in charge of it in 2005 and 2006, and the new organization of the data processing department, Météo-France was not able to provide the ASAP monitoring report in 2006 and 2007. New software must be developed, as the tools previously used for that purpose are no longer available due to the deployment of new treatment of the data.
VI-3.1.2.4 Mr Gérard Rey therefore presented a proposal to enhance the functions of the ASAP Monitoring Centre by regularly producing an end-to-end report of the ASAP data dissemination performance.

VI-3.1.2.5 In the proposal, the report will contain the name of the country operating the ship, the ship's call sign. As some ships are changing call signs during the year, the new call sign for all the year will be used in order to avoid circulating a table of correspondence. In addition, the report will contain a table with the GTS originating centres of the messages Temp-SHIP.

VI-3.1.2.6 Météo France proposes to produce global monthly tables of the syntactic message checks following the GTS origin on one hand, and the ship’s call sign on the other hand. Such tables will include information on the number of messages received, the number of NIL messages, the number of messages with errors and their percentage, and the number and percentage of messages with operator action. The report will also include figures showing the monthly variation of the percentage of correct messages received in Toulouse (LFPW), and the mean time before the integration of the message in the GTS in Toulouse. Such figures could be produced for each call sign if needed. Based on these products, Météo France proposes to analyze the data and possible report on specific problems. Another possible activity would be to compare the number of received messages with the number of observations realized. In addition, Mr Gérard Rey explained that it could be very useful to compare the real ships observation lists with the message received at Toulouse.

VI-3.1.2.7 Météo France also offered to make special studies on the dissemination of the TEMPSHIPS in case of specific event. For example, the recent problems with the Inmarsat Land Earth Station of Goonhilly (LES 102 AOR-E) and the route via the station of Aussaguel (LES 121 AOR-E) of some messages. Some transmission procedures between Aussaguel and Météo-France had to be changed (as the provider wanted to stop the Telex mode to switch to another

means not yet approved, for example, email). It would be relevant to examine the results of the backup procedure and we will propose a feedback in due course. The Panel agreed that such a study would be useful and asked Météo France to investigate feasibility and to produce the proposed study (**action: Météo France**).

VI-3.1.2.8 Mr Gérard Rey explained that an annual report did not permit a good reactivity to improve the performance of the network, so Météo France was offering to provide a quarterly short mid-range report and a complete annual report.

VI-3.1.2.9 The ASAP Panel reviewed the proposal and agreed that the proposed developments would be very useful for the monitoring of ASAP and would help in enhancing the quality of the data. The Panel thanked Météo France for its offer of modernization and asked them to go ahead with the required developments and routine production of the report (**action: Météo France**).

VI-3.1.2.10 The Panel addressed of issue of TEST ASAP reports for testing soundings and agreed that standardization was necessary to identify the originator of the messages (**recommendation**). It asked the ASAP Task Team (see agenda item VI-6.1 regarding establishment of the Task Team) to investigate this issue and to make proposals (**action: ASAP TT**).

VI-4. ISSUES FOR THE ASAP

VI-4.1 Ship recruitment

VI-4.1.1 The Panel discussed the requirement to promote ASAP programme with ship companies. The Panel recognized that rrecruitment of a merchant ship to host a new ASAP unit required significant financial and human resources. Following recruitment the ongoing cost of ASAP consumables (helium, radio-sondes and balloons), and of ASAP data transmission, is extremely high when compared to the cost of surface marine observing networks. Specialist technical skills are also needed to maintain the ASAP system when in service, and to ensure the quality of the upper air data

VI-4.1.2 The Paned noted that container ships were the most common ships recruited to host ASAP units because they were engaged on established trans-ocean liner trade routes. However, choice of a suitable host ship can also be a high-risk decision, as the nature of shipping is highly dynamic and ships can change their routes, their crews, their owners or their managers with very little prior notice. Furthermore, as modern container ships are increasingly designed to maximise cargo space this usually results in there being very little available superstructure or deck space for housing ASAP containers and equipment. This highlights the need to establish close links with the major container shipping companies, and to encourage new ships to be designed and classed with possible future weather observing capacity in mind. It also suggests that the time is right to start reconsidering the design of ASAP units and launching systems, so that they can be more easily accommodated onboard and transferred to other ships when necessary.

VI-4.1.3 Ms Sarah North presented a list of basic factors that need to be taken into consideration when recruiting a new ASAP ship. The Panel agreed that the list should be included in the ASAP web pages at JCOMMOPS (**action: SOT Coordinator**).

VI-4.1.4 The Panel noted that since the SOT-III, there have been some major mergers between the shipping companies used for hosting ASAP systems. Although this has resulted in significant changes to the trading patterns of many of the container ships involved it has, fortunately, not greatly affected the ships that host ASAP units. However, as new ships come on stream, this often results in older ships transferring to different routes or being sold on to other companies and this could easily happen at any time, without any real warning. Therefore, it is almost impossible for programmes such as the E-ASAP to predict when such changes are likely to occur, and there are inevitable delays involved in sourcing new host ships and transferring the ASAP equipment. Furthermore, it is extremely difficult for the ASAP operators to have the flexibility to respond to

such changes, as ASAP observations are specialised in nature and not all Port Meteorological Officers will have the necessary skills to service them. Therefore, it is suggested that there is a need to extend the training of PMO's in major container ports to encompass routine ASAP operations.

VI-4.1.5 The Panel recognized that for the above reasons it was often difficult for National Met. Services to justify the risks involved in recruiting and establishing a new ASAP unit. Recruitment of ships under financially integrated ASAP regional programmes, such as that established by E-ASAP, will therefore help to mitigate such risks. It may also be possible to collaborate on a global basis as was originally intended with the WRAP project or by contributing to international initiative such as the ScholarShip. However if such regional or global initiatives are to work then it is essential to establish ongoing financial commitments from participants at the outset.

VI-4.1.6 Research ships perform occasional soundings for particular scientific projects, but their activities are not always reported to the ASAP Panel, because they do not contribute to and established ASAP programme. Although research cruise routes can vary greatly it is nevertheless suggested that closer links with research institutions may offer an opportunity to make use of existing sounding equipment and installations, and to provide soundings in more data sparse areas.

VI-4.1.7 The Panel agreed that it would be useful to investigate the development of the programme in the North Pacific and the Indian Ocean. However, it was noted that it was difficult to recruit ships, especially in the Indian Ocean.

VI-4.1.8 Mr Shawn Smith raised the Panel's attention to the possibility for having Research Vessels taking part in the activities of the ASAP. The Panel noted that research container systems could easily be accommodated onboard these vessels and agreed that this could be valuable in having them making ASAP soundings provided that some regularity in this exercise can eventually be achieved. Such an activity could also be regarded as a backup to the regular ASAP soundings. The Panel agreed that it was also necessary to be able to, easily identify where the Research Vessels will be sailing and noted that POGO had initiated the development of a database to track Research Vessels for planning purposes (deployments, etc.). The Panel invited its new ASAP Task Team to contact POGO and investigate the issue further (**action: ASAP TT**).

VI-4.2 Satellite transmission difficulties

VI-4.2.1 Usual practise for the transmission of upper air soundings from the ships under E-ASAP management is the transmission via Inmarsat-C. All units are equipped with their own transceiver and do not use the ships Inmarsat system. Trials to implement Globalstar as cheaper system have not proved satisfactory because the communication procedures differ between the East and West Atlantic. Further, the coverage of Globalstar is not 100% in the relevant area. Basically, Globalstar is still an option in combination with Inmarsat-C as backup system, but further tests have been postponed.

VI-4.2.2 Inmarsat-C is a very reliable sat com system. Nonetheless, there are only two geostationary satellites, which can be used in the EUCOS area over the North Atlantic and Mediterranean. This requires an optimum position of the antenna to ensure proper communication with the satellite. Interference with the ships communication systems must be avoided. Therefore, most antennas are mounted on or near the launcher. On several ships, the antenna is relocated from starboard to portside, depending on the east- or westward crossing.

VI-4.2.3 In some cases, successful soundings were not transmitted due to configuration errors in the interface between the sounding software and the transmission software. The combination of these two softwares is difficult to oversee by non-skilled operators like the nautical officers on board.

VI-4.2.4 The data messages are transmitted using Special Access Code 41. In Europe only the UK Met Office and Meteo France, accept TEMP messages using code 41. Therefore, only the

Land Earth Stations Goonhilly and Aussaguel can be used. The processing steps are different at the Met Office and at Meteo France, but both rely on telex lines for the transmission from the LES to the Met Service. To avoid problems (e.g. due to different headers) Goonhilly (LES 002 AOR-W and LES 102 AOR-E) was chosen as default station for all E-ASAP units.

VI-4.2.5 In November 2006, Goonhilly was closed without further notice. All transmissions were planned to be seamlessly re-routed to the station Burum (Netherlands). However, the provider did not expect the following massive loss or delay of data from all ships transmitting to Goonhilly. All crews on the E-ASAP ships were advised to change the configuration from Goonhilly to Aussaguel. Nonetheless, the timeliness of the data suffered from this change. The reason is unknown because all messages are processed manually at Meteo France. Possible reason is that TEMP messages are only accepted from LES 121 (Aussaguel, AOR-E), thus reducing the available satellites from two to one. Discussions have taken place with Stratos (operators of Burum and Goonhilly), and it is hoped that it will be possible to switch from out-dated telex links to email links in the near future.

VI-4.2.6 Following the closing of Goonhilly the issue was discussed between the E-ASAP management and KNMI regarding transmissions to Burum. Since E-ASAP and the ASAP operating countries pay all transmissions, KNMI is open to implement modern communication procedures to accept TEMP messages from ships and to insert them onto the GTS.

VI-4.2.7 The transition from TEMP to BUFR is an ongoing issue at the WMO. Purpose is to have high-resolution data. TEMP files are of approx. 2-3 KByte and cost approx. 8-10 € per transmission (including confirmation) via Inmarsat-C. Therefore, high-resolution BUFR data would be extremely expensive to transmit. As long as there is no agreed template for ASAP radiosounding data of practicable file size the ASAP units should continue to transmit TEMP files. These files can be decoded to BUFR at the receiving Met Service and transmitted to the GTS in BUFR format. Further benefit of alphanumeric files is the option to transmit the data manually by e-mail, if required.

VI-4.3 Improvement of data quality

VI-4.3.1 Mr Rudolf Krockauer reported on the improvement of data quality. The quality targets for E-ASAP consist of timeliness and burst heights. He provided an overview of the development of the quality since 2003, including all European ASAP units (10 E-ASAP units and 6 national ASAP units). For example, the percentage of soundings achieving 100 hPa remained at a level of about 85% (target 90%) since 2003. The percentage of those achieving 50 hPa reached a level of 78% in 2006 (target 75%), and the percentage of those received within two hours reached 95% (target 85%).

VI-4.3.2 The Panel noted that achieving the targets for the burst heights depends mainly on the balloons. All units use Totex balloons. The size differs between 200g and 350g. Since all balloons are properly stored before usage on board there are no measures possible to improve the quality. Using 350g balloons instead in 200g launchers to achieve better burst heights is also not possible. Launching a half filled balloon would result in higher crash rates at start due to the higher sensitivity to turbulences.

VI-4.3.3 The Panel noted with interest that improvements were made regarding the timeliness of the soundings. In 2003, only 84% of the soundings were received within HH+120. In the following years, the target was fully achieved and the percentage of timely received soundings increased to 95%. This was achieved by following:
Launching time is set to HH-85. This gives sufficient time for launches and re-launches.
Optimization of transmission configuration regarding LES's and repeat times.
Transmitting all bulletins (part A to D) in a single file. This procedure helps to speed up re-transmissions if the first attempt failed.

VI-4.3.4 In 2006, the most reliable transmission technique proofed to be the manual transmission by the crew via the ship's e-mail system. However, this is not recommended as

general solution. Most crews would be reluctant to return to manual transmission, since they are used to finish the work after successfully launching the balloon.

VI-4.3.5 The Panel noted that the ships' crews performed all soundings. Operational errors or damages to the sensor can be reduced by simplifying the work as much as possible. The Panel agreed that it was preferable to accept small amounts of faulty radiosondes instead of performing ground checks before each launch. Obvious sensor errors are usually detected during initialisation of the sonde. No negative impact was reported so far.

VI-4.4 ASAP routes

VI-4.4.1 The Panel reviewed existing ASAP routes and the requirements for establishing new ones. ASAP ship routes continue to be predominantly focused on two geographical areas of operation – the North Atlantic and the Western Pacific – although research ships are also contributing occasional upper air soundings in the Southern and Indian Oceans.

VI-4.4.2 The Panel noted that ASAP routes were highly dependant upon the type of ship chosen to host the ASAP units. Liner trade container ships remain the primary type of merchant ship used by the E-ASAP programme as they are engaged on regular repeat trading routes crossing the EUCOS area of interest. However, because the nature of container shipping can be highly variable, routes, ownership and crews can often change with little prior notice. Research ships, such as those used by Japan and South Africa, are the only other type of vessel known to be currently engaged in routine ASAP operations. However, their areas of operation can vary depending on the scientific research cruises they have been engaged to undertake.

VI-4.4.3 When WRAP operations ceased the opportunity to extend upper air data on a more global basis, and to fill some of the climatologically sensitive or data sparse areas, was unfortunately greatly reduced. However a potential new opportunity to resurrect the WRAP principle, in the form of the round the world Scholar Ship, has recently arisen. Whilst the cruise ship chosen for this initiative would apparently have sufficient deck space to house an ASAP container and the research staff on board may be able to assist in launches, the cost of equipment, transmissions and consumables would still have to be found by the national meteorological services.

VI-4.4.4 The Panel agreed that the need to establish new ASAP routes would inevitably be driven by modeling centre requirements and the need to target areas that are considered sensitive for NWP. Such requirements will act as the driver for investing in future upper air sounding routes at sea, whether on a global or regional basis

VI-4.4.5 The Panel noted that the ECMWF recently issued a Technical Memorandum [8] examining the effect of removing all types of observations from most of the Pacific and Atlantic in order to interpret the impact of targeted observations. These data denial studies (which covered a total period of six months) showed that Pacific oceanic data is more important in terms of 2 day forecast impact over North America than the Atlantic oceanic data in terms of 2 day forecast impact over Europe, although both denial experiments showed degradation downstream. This appears to suggest that there may be a case for targeted ASAP observations in the North Pacific.

VI-4.4.6 The Panel agreed that the SOT members will need clear guidance from the modelers for other oceanic areas (including, in particular, those in the southern hemisphere) where upper air observations are likely to have the greatest impact, before they can justify the large expenditure required to establish and maintain new ASAP programmes and routes.

VI-4.5 Costs

8 *The value of targeted observations Part 1: Data denial experiments for the Atlantic and the Pacific – February 2007 – Graeme Kelly, Jean-Noel Thepaut, Roberto Buizza and Carla Cardinali.*

VI-4.5.1 The Panel has been attempting to increase the global coverage of ASAP ships but recognized that it has had difficulty doing so due, mainly, to the high cost associated with operating such systems. The Panel discussed the programme cost-effectiveness, and particularly considered the impact of ASAP soundings on Numerical Weather Prediction (NWP). The Paned reviewed both the capital cost and the operating cost of ASAP units.

VI-4.5.2 Mr Rudolf Krockauer reported on the costs of ASAP operations composed of operational and maintenance costs. Operational costs include consumables, operator fees, satellite communication, etc., while maintenance costs cover support and repair. The Panel noted that maintenance is estimated at 5,000 to 12,000 EUR per unit per year, if no major refurbishment is required. More than 50% of the operational costs of a launch are caused by the radiosonde. The price per sonde depends mainly on the windfinding method (Loran-C or the Global Positioning System (GPS) and is approx. 100-160 EUR. According to the information received from the European ASAP operating countries, the total operational costs range from 200 to 300 EUR per launch.

VI-4.5.3 The table below gives an 'average example' of the costs per launch of an E-ASAP unit.

Example of average costs per launch (in 2006)

Item	Description	Costs (EUR)
1	GPS Radiosonde	150
2	Helium (2 m³), rental of cylinders, loading/unloading by crane	35
3	Operator fee	35
4	Balloon (350 g)	15
5	Satellite transmission	10
6	Small parts	5
7	Ship agent fee	5
	Total	**255**

VI-4.5.4 The Panel noted that these costs are the costs per launch, not per timely received sounding data on the GTS. Considering a loss rate of 20%, the costs per sounding on the GTS amount to approx. 250 to 375 EUR.

VI-4.5.5 The Panel noted that the radiosondes were usually equipped with a pressure sensor while some manufacturers use the GPS receiver to convert the height to pressure. Since GPS is the dominant windfinding method, it is likely that future radiosonde types will have no pressure sensor at all. It remains to be seen whether the price for radiosondes will decrease rather than increase.

VI-4.5.6 The Panel noted with concern that the cost of upper air TEMP code data transmission via Inmarsat, was extremely high compared to a standard SHIP code transmission from VOS (often amounting to over €450/month/ship). The National Meteorological Services (NMSs) that hosts the LES to which the data is transmitted traditionally paid these costs. In Europe, this data was primarily sent to Goonhilly LES and accordingly the United Kingdom Met Office, was faced with an annual cost in the order of €30,000/year. To alleviate this cost burden, an agreement was reached within the EUCOS that the Met Office should be reimbursed for cost incurred by E-ASAP Operators. This system has operated well to date, but will need to be reconsidered in the light of the recent Goonhilly problems. In addition, the E-ASAP has been testing the use of Globalstar and an alternative to Inmarsat communications, as a means of reducing transmission costs.

VI-4.5.7 The Panel noted that BUFR code templates to match the vertical frequency of the alphanumeric TEMP code have been developed within the WMO, and a further template to facilitate the collection of high-resolution data in real-time is being progressed within the EUCOS. However, the costs involved in transmitting BUFR data via satellite is a determining factor in deciding the level of data (and metadata) that can be sent. Furthermore, manufacturers of

sounding equipment will need to ensure that their systems can accept the high-resolution BUFR template.

VI-4.5.8 The Panel agreed that it would be useful to encourage competition amongst ASAP equipment manufacturers in order to reduce the costs. As far as the cost of radiosondes, the Panel noted the large variability between the manufacturers but agreed that it was difficult to take advantage of the situation in terms of competition between the manufacturers because one had usually to purchase the radiosondes and the remaining equipment from the same manufacturer.

VI-4.5.9 The Panel noted that the cost also depended on the volume of ASAP systems being purchased from one given manufacturer.

VI-4.6 Radiosondes falling over land

VI-4.6.1 The Panel considered the risks of damage, or injury to third parties, caused by radiosondes falling over land has been considered in the E-ASAP TAG, following concerns expressed over ascents performed while transiting the St. Lawrence seaway in Canada. The Panel noted that this risk can be reduced by using integrated parachutes for balloons >500g, while smaller 350g balloons would need the purchase and attachment of a separate parachute when doing ascents in coastal waters or when doing test launches in port. The Panel noted with concern that insurance premium to cover for such risks are extremely high, particularly in North America, and consequently, the E-ASAP launches are no longer performed by participating ships when sailing close to land (< 75 nm) unless they are willing to accept the insurance risk. The Panel invited its Members to carefully check the liability insurances and to avoid launching radiosondes when the ship is sailing closer to 75 nm from the coasts (**recommendation**).

VI-5 FUTURE WORK PROGRAMME

VI-5.1 Action items

VI-5.1.1 The ASAP Panel reviewed the action items arising from the Panel discussion. These are provided in the SOT action list in *Annex XXVI.*

VI-6. ORGANIZATIONAL MATTERS

VI-6.1 Future of the ASAPP

VI-6.1.1 The Panel noted that the fourth meeting of the CBS Implementation/Coordination Team for Integrated Observing Systems, Geneva, 11-15 September 2006, agreed that ASAP should be regarded as complementary to the AMDAR programme as it can potentially provide for in situ atmospheric soundings from data sparse area where aircrafts are not flying or not providing ascents or descents. The CBS ICT/IOS meeting agreed that cooperation between JCOMM and CBS was required in this regard and invited Member Countries to participate in the ASAP for providing in situ aerological profiles from ocean data sparse areas.

VI-6.1.2 Considering the efforts required to run the ASAP, the Panel also agreed that it would be more effective if it would operate as a Task Team under the SOT. The Task Team would eventually replace the ASAP Panel. The ASAP would then operate in a similar way as the VOSClim.

VI-6.2 Review the Terms of Reference of the ASAPP

VI-6.2.1 The panel reviewed its Terms of Reference (TOR) and agreed that they continued to be appropriate and that no changes were therefore required.

VI-6.2.2 Considering the outcome of the discussion under agenda item VI-6.1 above, the Panel requested the SOT to review (and advise, if appropriate) the terms of reference of the SOT taking

into consideration that meeting agreed that the ASAP Panel should eventually become a Task Team within the SOT with initial Membership from Australia (Mr Graeme Ball), E-ASAP (Mr Rudolf Krockauer), Japan (Mr Toshifumi Fujimoto), and South Africa (Mr Sidney Marais), and any other country making ASAP soundings. Mr Rudolf Krockauer agreed to Chairperson the Task Team. The Panel agreed that HMEI would be an associated Member of the ASAP Task Team and suggested to investigate the possibility for having the POGO participating as well.

VI-6.2.3 The Panel noted that the ASAP Panel would still formally exist until decided otherwise by JCOMM and until JCOMM-III in 2009 at the earliest. However, the Panel agreed that the new task team could be the effective mechanism for running the ASAP Programme until a decision is made by JCOMM.

VI-6.2.4 The issue will be further discussed under agenda item I-8.6.

VI-6.3 Review the membership of the ASAPP

VI-6.3.1 The panel reviewed its current membership and examined possibilities and procedures for adding new members.

VI-6.3.2 Following the resignation of Ms Sarah North as interim Chairperson for the Panel, the meeting elected Mr Rudolf Krockauer its new Chairperson to further progress the aims of the ASAP Panel.

VI-6.4 ASAP Trust Fund

VI-6.4.1 As agreed at the seventh Session of the ASAP Coordination Committee (ACC-VII, June 1995) and at the request of the Chairperson of the ACC, the WMO Secretariat is maintaining a Trust Fund on behalf of the ACC, and its successor the Automated Ship Aerological Programme Panel (ASAPP). As agreed at Fourteenth Session of the ASAP Panel (ASAPP-XIV, SOT-II, London, United Kingdom, 2003), this Trust Fund was used to support the WRAP Project, including the contract for project leader.

VI-6.6.2 The meeting reviewed and accepted the final statement of account for the ASAP Trust the statements of account for this Trust Fund for the period 1 January 2004 to 31 December 2005, and for the period 1 January 2006 to 31 December 2006. These statements are given in ***Annex XXIII***.

VI-6.6.3 The Panel agreed that no additional contributions were needed at this point.

VI-6.6.4 Considering the substantial contribution by Australia for the WRAP and the fact that the corresponding funds could not be spent due to the termination of the WRAP, the Panel agreed that the Bureau of Meteorology, Australia, should eventually be reimbursed of the corresponding unspent funds. The Panel asked the WMO Secretariat and Australia to discuss the details and practicalities of the reimbursement (**action: Secretariat and Australia**).

VI-6.6.5 Assuming there will be some money left in the trust fund after the reimbursement of the funds to Australia, the Panel agreed to use the residual money for the design, editing, printing, and distribution of the new ASAP brochure. The Panel agreed that the funds remaining in the trust fund after the expenditures for the new ASAP Brochure could be spent as possibly recommended by the Chairperson of the new ASAP Task Team.

SOT-IV, SESSION I (COMMON SESSION 3)

I. SOT-IV COMMON SESSION 3

The SOT Chairperson, Mr Graeme Ball, chaired the Session.

I-5. SUPPORT INFRASTRUCTURE

I-5.1 JCOMM *in-situ* Observing Platform Support Centre (JCOMMOPS)

I-5.1.1 JCOMM OCG round-table review of the future JCOMMOPS

I-5.1.1.1 Mr Mike Johnson, Observations Programme Area Coordinator, reported on the recent discussions that took place between representatives of the various observing programmes (those already involved in JCOMMOPS plus those that might benefit from future involvement) in order to evaluate possible options regarding the future of JCOMMOPS. An informal roundtable discussion was organize from on 9 May 2006 in Silver Spring, USA, to discuss their programme's requirements and future needs for an observing program support centre. The roundtable explored advantages and disadvantages of having a consolidated JCOMMOPS to service all ocean systems. Informal proposals from potential hosts were reviewed.

I-5.1.1.2 Mr Mike Johnson reported that the roundtable participants generally agreed on the following points

- There is value in an operational centre, although there was some disagreement on the definition of "operational".
- JCOMMOPS should be further developed to extend its responsibilities for other observing programmes beyond DBCP, SOT and Argo, including e.g., OceanSITES, IOCCP, GLOSS, and the POGO research cruise database.
- The level of services provided by JCOMMOPS should be proportional to the level of commitments made by each programme/panel, with JCOMMOPS perhaps acting as a "black box" with two or more Technical Coordinators (TCs) providing services to multiple programmes/panels. For example, a TC could work half time for Argo and half time for one or more other panels (e.g., SOT, OceanSITES), provided adequate contribution was received from each programme.

I-5.1.1.3 Each programme representative presented estimated requirements for an implementation support centre, and estimated future needs for fully sustained observing system support at JCOMMOPS. It is essential that these requirements be refined and documented as part of the next steps in this process. .

I-5.1.1.4 Mr Mike Johnson reported that the roundtable agreed that a process should be started to thoroughly evaluate and enumerate the requirements for a JCOMMOPS that can respond to the evolving needs for a sustained global ocean-observing programme, as well as for potential host institutions. The requirements should be as specific as possible.

I-5.1.1.5 Mr Mike Johnson explained that the roundtable discussion had expressed concerns that moving JCOMMOPS would have associated costs, both financial and in diverting the TC's attention from their normal day-to-day coordination work. It would be essential to allow for a sufficient transition period, probably two years from the decision point, to ensure adequate continuity. Another concern regarded the four-year UNESCO contract limit (terminating 06/2010) under which the current TC for DBCP and SOT is employed.

I-5.1.1.6 At the same time, in terms of funding, the roundtable noted that a dedicated trust fund for JCOMMOPS might be highly desirable, and a proposal for it might be included in the next steps.

I-5.1.1.7 The SOT noted that the idea of evolving JCOMMOPS into a global observing program support center was discussed at the October 2006 JCOMM Management Committee meeting, and was endorsed. At the 23-25 April 2007 Observations Coordination Group (OCG) meeting, the OCG

will consider a requirements specification and a solicitation for proposals from interested host centres.

I-5.1.1.8 The SOT endorsed the roundtable approach and recommendations.

I-5.1.2 JCOMMOPS Portal for WMO Publication No. 47

I-5.1.2.1 The SOT recalled that the WMO No. 47 was originally provided to NMSs once every year as a book. Not surprisingly, the details it contained quickly became outdated. Since about 1999, WMO No. 47 has been available electronically on the WMO website. Initially the electronic version was updated infrequently, much to the frustration of VOS operators and was a topic for discussion at both VOSClim-IV and SOT-II (London, 2003). At the same time, users also complained that in its current displayed form, WMO No. 47 was not user friendly and requested an improved web interface with a search facility. These concerns and complaints were noted by WMO. Thankfully, the updates became more regular, however the improved user interface failed to materialise.

I-5.1.2.2 The Team recalled that the primary requirement of VOS operators was the timely availability of up-to-date Pub 47 metadata in a usable form. The research community has a requirement for a digital archive of historical metadata that can be used with climate datasets to allow the identification and correction of spurious climate signals that may result from changes in VOS instrumentation. It is also important to note the increasing demand for up-to-date metadata to support the monthly global monitoring statistics produced by the RSMC, as well as support the QCRelay System for the VOS at JCOMMOPS.

I-5.1.2.3 The Team also recognized that the imminent introduction of WMO No. 47 Metadata version 3, combined with concerns about ship security, has raised a number of important issues in areas such as access, usability, availability, archiving and hosting.

I-5.1.2.4 The SOT considered all aspects of the WMO No. 47 use, as well as the data access policy associated to it. The Team recalled that the increasing concerns about ship security heightened by the open availability on the WMO website of callsign and matching ship name, has caused some members of the SOT to question the unrestricted data access policy regarding the WMO No. 47. The meeting agreed that the electronic version provided on the WMO website was useful but that it was not user friendly to use as it was lacking the possibility to query the database online and to present the returned data in an easily readable form.

I-5.1.2.5 The SOT again expressed concerns regarding the availability of the most up to date version of the Publication. The lack of updates made available on the WMO website severely impacts on the operational requirements of VOS Operators, the RSMC and JCOMMOPS. The lack of updates is also very frustrating to the Task Team on Metadata for WMO No. 47, which has been successful in getting more countries to submit their quarterly metadata for WMO No. 47.

I-5.1.2.6 Also, the Team agreed that it was vitally important that all past metadata contained in WMO No. 47 be retained for future reference and for use in climate studies.

I-5.1.2.7 The WMO Secretariat explained that WMO had taken steps to provide an updated version of the database to accept national submissions in WMO 47 metadata version 3 as of 1 July 2007 and had already started the necessary software developments, including the consideration of inputs provided in XML. The Team thanked WMO for its commitments in this regard.

I-5.1.2.8 The Team recalled that JCOMMOPS has a requirement for up-to-date metadata for its VOS QCRelay. JCOMMOPS is also proposed to host the centralized database of **MASK** v **REAL** callsigns as part of the implementation of masked callsigns (doc. IV-4.1.2). The Team agreed that the current and planned activities at JCOMMOPS required up-to-date ship's metadata in its database, and recognized that JCOMMOPS was the operational support centre for the marine programmes in JCOMM. The Team asked JCOMMOPS to make sure that its own database will

remain consistent with the formal version of the Publication, which resides at WMO (**action: JCOMMOPS**).

I-5.1.2.9 The SOT agreed that (i) access to the WMO No. 47 should be restricted to authorized users or agencies, (ii) the WMO No. 47 should be presented as a searchable database on the web, (iii) the compiled list of national WMO No. 47 submissions should be available within one month of the due date for quarterly national submissions, (iv) past metadata contained in WMO No. 47 must continue to be archived and be easily available to authorized users.

I-5.1.2.10 The SOT considered that it was not appropriate at this point, that JCOMMOPS becomes the designated host centre of the WMO No. 47. The Team invited WMO to investigate providing additional on-line tools to query the database and to investigate whether it would be possible and under what condition to restricting access to the Publication (**action: WMO, by end of 2007**). The Team asked the WMO to make every effort to make the compiled submissions routinely available within one month of the due date for the quarterly national submissions (**action: WMO**).

I-5.2 Telecommunication facilities

I-5.2.1 Inmarsat

I-5.2.1.1 Mr Brian Mullan, Inmarsat, presented a written report to the Secretariat. The report provided answers by the INMARSAT to specific questions raised by the Chairperson of the JCOMM Ships Observation Team, Mr Graeme Ball and the Chairperson of the JCOMM Task Team on the VOSClim Project, Ms Sarah North, and the VOSP Chairperson, Ms Julie Fletcher.

I-5.2.1.2 The full report in provided in Annex XX.

I-5.2.1.3 The Team considered that further clarifications were required and asked the Secretariat to relay additional questions from the Members of the Task Team on Satellite Communication Systems to Inmarsat and to provide the SOT Chairperson with the answers (**action: TT SCS, Secretariat**).

I-5.2.1.4 The Team encouraged SOT Members to provide the Secretariat with additional questions to ask Inmarsat if needed (**action: SOT Members**).

I-5.2.1.5 The SOT asked its Task Team on Satellite Communication Systems to write to the Inmarsat LES operators on a regular basis to check that the list of LES is correct and to provide the information to the WMO for inclusion in the dedicated WMO web page (**action: TT SCS**).

I-5.2.1.6 Ms Sarah North emphasized the need for SOT to be involved in the specifications being developed by the IMO for the LRIT (which is due to come into force in 2008). This initiative may have the potential for transmitting limited meteorological information from the deep ocean area. In coastal areas, the observing community had failed to realize the potential for using AIS for transmitting observational data, and it would be unfortunate if the opportunities offered by LRIT were also missed. Mr Robert Luke recalled that the AIS systems were now being evaluated on moored buoys in order to extend the effective range and for transmitting meteorological data. He undertook to keep the SOT informed on any developments (**action: R. Luke**).

I-5.2.2 EUMETSAT

I-5.2.2.1 No report was provided to the Team regarding the status of European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) monitoring activity and of the geostationary meteorological satellites in general.

I-5.2.3 Argos

I-5.2.3.1 Mr Christian Ortega from Collect Localisation Satellites (CLS) gave a presentation on the Argos data collection system and related services. As per today, the system runs with a constellation of 7 polar orbiting satellites (6 NOAA 12 to18, and MetOp1). It collects in-situ data from some 17,000 platforms each month of which 11,100 are dedicated to science and operational applications worldwide (mainly data buoys, ARGO floats and wildlife tags).

I-5.2.3.2 CLS operates two redundant global processing centers, in Toulouse, France and Washington, USA, which process the messages of all platforms, QC and disseminate observations onto the GTS as well as directly to all the PIs and users, through automatic distribution via Ftp and email, telnet and ArgosWeb site.

I-5.2.3.3 Mr Christian Ortega informed the SOT that MetOp 1, launched in October 2006, embarks an Argos-3 generation Data Collection System (DCS) which includes two-way capability, enabling the remote command of the in-situ platforms, and a 4.8 kbps high data rate channel, which increases by a factor of 10 the data volume that can be relayed. CLS is pleased to invite SOT members to test these new capabilities through pilot operations.

I-5.2.3.4 The processing facilities have been upgraded to accommodate the new system capabilities and to enhance data service flexibility. The new system is able to apply multiple processing, handle multiplexed messages, concatenate them and apply several decoding formats, validate the data using compression techniques and checksum. Data are available either or both as raw data messages or QC observations. New distribution formats have been developed in addition to the existing GTS Buoy, Tesac, BUFR, such as netcdf and XML.

I-5.2.3.5 Since early 2007 CLS has become a Value Added Reseller (VAR) for Iridium providing service and hardware to those who wish, in the Oceanographic Community who wish. CLS will deal both with SBD and RUDICS services. Data relayed by Iridium will be integrated in the Argos database enabling all existing data processing and dissemination capabilities.

I-5.2.4 Review of other satellite data telecommunication systems

I-5.2.4.1 The meeting then received a report from Mr David Meldrum, Chairperson of the Data Buoy Cooperation Panel (DBCP), on alternative satellite communications systems that might meet the needs of the SOT community. As part of its mission to evaluate new technologies, the DBCP maintained a catalogue of such systems, and collected operational experience with a number of them. The overview is also available from the JCOMMOPS web site (http://www.jcommops.org/ under Implementation, then Sat-Comm).

I-5.2.4.2 In common with many other observing system communities, the DBCP had a particular interest in the Iridium system because of its potential to allow the economical and timely collection of large volumes of data from anywhere on the global oceans. In addition to the potential technical benefits of the system and its relatively secure future, Iridium was now more actively engaging with the earth observing communities through resellers such as CLS, which should help minimise any difficulties associated with data reformatting, gross quality control, dissemination and archiving.

I-5.2.4.3 The meeting noted with interest the DBCP Iridium Pilot Project, which was in the process of evaluating up to 50 Iridium-equipped drifting buoys, with particular reference to quantifying their data throughput performance under severe weather conditions. These activities were of considerable interest to SOT, many of whose members were also considering the use of Iridium, and it thanked the DBCP for its invitation to participate in the DBCP Iridium Pilot Project (mailing list at http://listes.cls.fr/wws/info/iridium-pp).

I-5.2.4.4 The Team agreed that it was appropriate to engage in a similar activity as the testing of the Iridium satellite data telecommunication system for the transmission of ship-based observations. The Team therefore decided to establish an SOT Iridium Task Team, Chaired by Ms Yvonne Cook, and with additional Membership from Ms Sarah North, Mr Pierre Blouch, and Mr Derrick Snowden. The Task Team will share its findings with the DBCP Iridium Pilot Project.

Canada offered one ship to participate in the tests, UK offered one, and Meteo France two AWS. It was noted that the three countries were also participating in the DBCP Iridium Pilot Project.

I-5.3 WMO Information System (WIS) and the Global Telecommunication System (GTS)

I-5.3.1 The WMO Secretariat representative presented an overview of the WMO Information System. He explained that the present GTS was efficient in interconnecting National Meteorological Hubs but that international programmes did not necessarily have easy access to the GTS for data submission or data access. The WIS concept, which had been endorsed by the WMO Congress, was to build an overarching system based not only on the GTS but also on new facilities that would permit other international programmes such as GOOS or GCOS to access the system. WIS was designed as an inter-disciplinary system that would provide common information exchange standards, metadata catalogues based on ISO standards (e.g. ISO 19100 series, geographical information standard), and other industry standards. Its functional structure was based on (i) National Centres (data generation and collection in the particular country; national portal to the WIS), (ii) Data Collection and Production Centres (DCPC, collecting and distributing data of interest for a larger community and data meant for international exchange; can be programme related, and provide for push and pull data access mechanisms and maintain metadata catalogues), (iii) Global Information System Centres (GISC, key global centres synchronising the data with each other; receive information from the NCs, and the DCPCs, and provide for global pull mechanism for data access; generate and maintain catalogues of data and metadata, that are fully operational), and (iv) data telecommunication networks.

I-5.3.2 It was noted that WIS concerned only information exchange and data information. Interoperability was a key to WIS and active involvement from all of the Technical Commissions, including JCOMM was required. The WMO Core Metadata profile had been developed for data discovery, but needed further refinement. The WIS was intended to provide various types of services to meet different requirements, and the following fundamental types of service had been identified:

(i) Routine collection and dissemination service for time-critical and operation-critical data and products (push, multicast and broadcast, smooth evolution from the GTS, IGDDS);

(ii) Data Discovery, Access and Retrieval (DAR) service (pull), and (iii) Timely delivery service for data and products (push).

I-5.3.3 Two implementation phases were planned. Phase A would improve the GTS and provide support to other programmes than the WWW. Phase B would be an extension of the Information System through flexible data discovery, access, and retrieval. IGDDS, which was providing for space based observational data and products, would be further developed under both phases A and B.

I-5.3.4 A number of Pilot Projects had already started, including in particular the JCOMM E2EDM Pilot Project, which would provide a DCPC function. Dr Nick Miklhailov, Chairperson of the ETDMP, made a life demonstration of the prototype at the TECO-WIS meeting in Seoul, Republic of Korea, 6-8 November 2006.

I-6. PROGRAMME OPERATIONS AND DEVELOPMENT

I-6.1 Data standards

I-6.1.1 The SOT noted that at its second session, Geneva, 10-12 October 2006, the JCOMM Data Management Coordination Group (DMCG) had reviewed and updated a draft of the JCOMM Data Management strategy. The strategy has then been discussed through a wider audience. The Strategy was finalized at the Nineteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE-XIX), Trieste, Italy, 12-16 March 2007. The Team noted that the strategy included guidelines regarding the maintenance and development of

observational data standards for the JCOMM community. The Team agreed that any developments with regard to observational data standards should eventually be consistent with the Strategy, which is encouraging JCOMM to develop a formal mechanism to ensure regular exchanges of information and ideas on how data are managed between the groups in OPA, SPA, and DMPA.

I-6.1.2 The strategy recognizes that JCOMM will need a process to adopt, adapt or create its standard practices. There is no such process now, though there are examples of similar activities such as within the WMO domain in such committees as the ETDRC (Expert Team on Data Representation and Codes) and elsewhere. Because JCOMM should only, as a last resort, create its own standards, it does not require the same process as in ISO or OGC. Instead, JCOMM requires a process that can recognize where standards are required, identify candidates to be considered, evaluate candidate practices and then recommend their use across JCOMM. The accreditation process for standards will require both a group to coordinate this activity and assistance by JCOMM members to take part in the evaluation process.

I-6.1.3 The Team noted that according to the strategy, as a standard is adopted, this information must get out to JCOMM members and they will need to take steps to implement it. Therefore, there will be a role for communications and a repository for the documentation of the standards used by JCOMM. This could well be served by JCOMMOPS, or some other suitable and widely visible agency. Members will have varying abilities to respond to adopting recommended standards. It is unlikely that a standard will be implemented across all JCOMM members simultaneously. Indeed, if this is a requirement for a standard to be effective, JCOMM will need to ensure an appropriate implementation procedure is in place. The speed of implementation of standards may be enhanced by an appropriate use of capacity building activities.

1.4 The Team agreed that the SOT should consider the recommendations of the JCOMM Data Management strategy when developing or making recommendations for developing new standards or updating existing ones. The Team agreed to work closely with the Data Management Coordination Group in this regard.

I-6.2 Data management

I-6.2.1 <u>META-T Pilot Project</u>

I-6.2.1.1 Ms Elanor Gowland, Chairperson of metadata Pilot Project META-T concerned particularly with water temperature presented a report on the present status and future plans of the Project. She recalled that the Pilot Project and its Steering Team was established by the JCOMM/OCG Workshop for Establishing a Pilot Project to Collect in Real-time Metadata Regarding Sea Surface Temperature and Water Temperature Profile Data that was held in Reading, United Kingdom, 28-29 March 2006.

I-6.2.1.2 Ms Elanor Gowland presented the status of the Pilot Project developments, the current categorization of the metadata, and the implications for designing BUFR templates for ship data as well as WMO Publication number 47. The Team agreed that VOS metadata, and the WMO Publication No. 47 in particular, consisted of a substantial part of the metadata to be considered by the Pilot Project. The Team invited its Members to assist the META-T in achieving its aims and particularly in facilitating distribution of the metadata to the pilot project data centres (**action: SOT Members**). The Team asked its Task Team on Codes to liaise with the META-T in order to take the META-T requirements for category 1 metadata into account when defining BUFR templates for ship data (**action: TT Codes and TT Instrument Standards and META-T**).

I-6.2.1.3 The SOT requested that all of its members should liaise with the META-T team over the issues discussed above in order to help META-T deliver its aim “to investigate and recommend the use of metadata to improve the quality and usefulness of ocean temperature information, particularly in real-time. The SOT agreed to investigate and recommend data transmission codes

and content, storage and distribution of data, for project data streams specific to ship observations (**action SOT Members and TT Codes**).

I-6.2.1.4 The Team recommended that the META-T work with the TT-DMVOS to update the delayed mode exchange format (**action: META-T**).

I-6.2.2 Coding issues: BUFR templates for VOS/VOSClim, XBT/XCTD, META-T

I-6.2.2.1 The Team considered GTS table driven coding requirement and agreed that the following ones had to be considered:

- Requirements for the GODAE High Resolution SST Pilot Project (GHRSST).
- VOSClim requirements (metadata and quality information flags)
- META-T Pilot Project (metadata of category 1 required for real-time exchange)
- XBT/XCTD requirements
- GTSPP, SOOPIP, Tropical Moored Buoy Implementation Panel (TIP), and Argo requirements: Consistency between templates XBT/XCTD and Argo templates (both providing sub-surface temperature profiles)
- GOSUD requirements: Consistency between VOS and TRACKOB
- Consistency between all ship templates as far as metadata
- Requirements for high resolution upper air soundings (ASAP)
- Requirements for ocean current profiles (ADCP)
- Requirements for marine climatology (ETMC-II recommendations)
- Consideration of SOT requirements in both Master Table 0 (MT0, meteorological data) and Master Table 10 (MT10, oceanographic data).
- Consideration of Seakeepers requirements by mean of MT10.

I-6.2.2.2 The Team noted that its Task Team on codes was up to now tasked to deal specifically with the GHRSST requirements. In addition, the third International PMO workshop (Hamburg, 23-24 March 2006) had established a small Task Team to address table driven code forms issues for the VOS and VOSClim. The Team recognized that it was not in a position to make a comprehensive proposal at the forthcoming CBS ET/DRC meeting, Darmstadt, Germany, 23-27 April 2007.

I-6.2.2.3 The Team agreed that all these requirements should be discussed in the most integrated way as possible and agreed to re-instate its Task Team on Codes with broader terms of reference in order for the above requirements to be considered and submitted to the newly established JCOMM DMPA Table Driven Codes Task Team (TT/TDC). New Terms of Reference and Membership for the Task Team are provided in Annex III. The Team recommended that the Task Team on Codes liaise closely with the TT/TDC for consideration. The DMPA TT/TDC will in turn eventually submit any required changes to BUFR tables and templates to the CBS Expert Team on Data Representation and Codes (**action: TT Codes**).

I-6.2.2.4 The Team noted with appreciation the proposal by AOML to develop and test the encoding of XBT and TSG data and associated metadata in BUFR using trial BUFR templates (**action: AOML**). The Team thanked AOML for these developments and invited other SOOPIP Members to initiate work for eventually transmitting XBT data on GTS in BUFR format and to liaise with AOML in order to benefit from its experience in this regard (**action: SOOPIP Members**). The Team noted that consistency was needed between the Argo and XBT templates. For example, the Argo BUFR template includes GTSPP flags for each profile level while the BUFR Template for

XBT/XCTD only included global GTSPP flags. The Team asked the Task Team on Codes to make recommendations in this regard to the DMPA TT on TDC (**action: TT on Codes**).

I-6.3 Quality Management and Best Practices

I-6.3.1 The Team considered possible overall solutions for improving existing quality control procedures, and best practices. It considered how the various documentation and publications that exist (including on web sites) could be integrated within existing or new JCOMM Technical Documents.

I-6.3.2 The Team noted that JCOMM-II had recalled that the primary objective of the VOSClim Project was to provide, high quality ship based marine meteorological data and associated metadata to serve as a reference data set to support global climate studies. The VOSClim Project was developing best practices, which should be adopted more widely within the Voluntary Observing Fleet. JCOMM-II supported the approach adopted by the SOT, and requested that the study being undertaken by the SOT Task Team on Instrument Standards should be completed as soon as possible, with the results published as a JCOMM Technical Report, as proposed. The Team noted that its Task Team on Instrument Standards was in the process of collating information about national guidance material and instrument types that will be available for posting on the specific SOT panel web sites. The Team requested its Task Team to continue the efforts in this regard with the goal of publishing the JCOMM Technical Report during the next intersessional period (**action: TT Instrument Standards**).

I-6.3.3 The Team recalled that the fifth Session of the JCOMM Management Committee, Geneva, Switzerland, 5-7 October 2006 (MAN-V) agreed that the OOPC primary requirements involving JCOMM included in particular promoting standards and best practices for both real-time and delayed mode quality control. The Committee also agreed that specific Panel or Programme web sites could for example include information on existing, future products and services, requirements, standards and best practices, pilot projects, description of the data systems, which are in place and how to access data. However, duplication of information should be avoided, and links to the web sites where the best practices information is being maintained provided.

I-6.3.4 The Team again stressed that for climate monitoring and research, observing activities should adhere to the GCOS Climate Monitoring Principles, which provide on best practices for the planning, operation and management of observing networks to ensure high quality climate data.

I-6.3.5 The Team recalled that in the context of the WMO Quality Management Framework, JCOMM was maintaining and updating the list of Publications that the commission considered essential for the on-going sustainability of the WMO QMF, to ensure effective planning, operation and control of processes related to marine data, products and services. The SOT reviewed the list of publications where the SOT or the OCG listed as the group responsible and recommends steps for updating them as required or appropriate. The SOT Chairperson as well as the Chairpersons of the respective SOT Panels (**action: SOT Chairperson and Panel Chairpersons**) should review the list.

I-6.3.6 The Team agreed that the study by the SOT Task Team on standards should eventually be published as a JCOMM Publication (**action: TT Instrument Standards and Secretariat**);

I-6.3.7 The Team agreed to change the Terms of references of the specific Task Teams to include the reviewing the relevant documentation (**action: Secretariat and Task Teams**). The Task Team on Instrument Standards was asked to investigate how the different publications or technical documents dealing with best practices could be better integrated into less number of documents or into existing ones (**action: TT Instrument Standards**). In particular, the Team agreed that it would be useful to consider adopting VOSClim best practices more generally under the VOS scheme and asked the VOSClim Task Team to work in that direction (**action: TT VOSClim**).

I-7. PROGRAMME PROMOTION, CAPACITY BUILDING AND INFORMATION EXCHANGE

I-7.1 SOT Annual Report

I-7.1.1 SOT Annual report for 2005 was compiled by the WMO Secretariat and published on CD-Rom as JCOMM Technical Publication No. 32 (WMO/TD-No. 1346). It is also available via the web at:

http://www.wmo.int/pages/prog/amp/mmop/documents/Jcomm-TR/J-TR-32-SOT-ANN-2005/index.html

I-7.1.2 The annual report contains the list of national reports that have been submitted to the Secretariat, as well as the annual report itself. The annual report for 2006 is about to be compiled, although the Secretariat is still waiting for a number of national reports.

I-7.2 Websites

I-7.2.1 The SOT-associated websites and web mapping applications are:

JCOMMOPS	http://www.jcommops.org/
SOT	http://www.jcommops.org/sot
SOOPIP	http://www.jcommops.org/soopip/
SOOPIP Line Sampling Indicators Application	http://wo.jcommops.org/cgi-bin/WebObjects/SOOPIndicators
VOS	http://www.bom.gov.au/jcomm/vos/
VOSClim	http://www.ncdc.noaa.gov/oa/climate/vosclim/vosclim.html
E-SURFMAR	http://surfmar.meteo.fr/
ASAPP (draft)	http://www.jcommops.org/sot/asapp/
SOT Monthly (draft)	http://w4.jcommops.org/WebSite/SOTM/
SOOPIP Monthly	http://w4.jcommops.org/WebSite/SOOPM/
SOOPIP Annual Survey	http://w4.jcommops.org/WebSite/SOOP/
GOOS/JCOMM monitoring map	http://w4.jcommops.org/WebSite/GOOS

I-7.2.2 Mr Graeme Ball presented improvements made to the JCOMM VOS website http://www.bom.gov.au/jcomm/vos/ in the intersessional period. A future development would be a clickable map with links to PMOs.

I-7.2.3 The Team noted that some additional information about the climate uses of the VOS would be helpful, given growing public interest in the issue. Ball welcomed any input on content.

I-7.3 Focal Point mailing lists

I-7.3.1 The Team learned that mailing lists for the SOT, VOS, VOSClim, PMO, and SOOPIP were based on the SOT national reports, on attendance at meetings, and on investigations by the Secretariat into non-working addresses or longstanding non-participation in meetings.

I-7.4 Certificates to ships participating in SOT

I-7.4.1 The Team noted the existing templates of certificates, which are used to encourage participation of ships in SOT, noting that a particular ship may receive multiple certificates for participation in multiple programs of the SOT.

I-7.5 Publications and brochures

I-7.5.1 The Team took note of the range of material available on the VOS website.

I-7.6 Capacity Building

I-7.6.1 Mr Edgard Cabrera presented a report on JCOMM Capacity Building and its relation to the SOT. The session recalled that JCOMM assists countries to enhance their capacities in marine data collection, data management and provision of marine meteorological and oceanographic services. In structural terms, since the second session of the JCOMM (JCOMM-II, Halifax, Canada, September 2005), the JCOMM Capacity Building activity is supported by and delivered through three Capacity Building Rapporteurs, attached to each of the three Programme Areas, and reporting to the Management Committee through a single designated representative. The session noted that the Fifth Session of the Management Committee (MAN-V, Geneva, Switzerland, October 2006) established an *ad hoc* Working Group to identify and setup a mechanism for raising CB resources. A rigorous CB strategic plan would be developed for MAN's review. This would provide a coherent framework for all future JCOMM capacity building projects, compatible with similar work under other programmes of WMO and IOC.

I-7.6.2 The session noted that since JCOMM-II, three workshop closely related with SOT activities were convened: 1) International "IOGOOS/JCOMM Western Indian Ocean Expendable Bathythermograph (XBT) Training Workshop" (Goa, India, October 2005); 2) third International Port meteorological Officers workshop (PMO-III, Hamburg, Germany, March 2006); and 3) Training and capacity Building Workshop for the Eastern Indian Ocean (Bali, Indonesia, June 2006).

I-7.6.3 The session noted with interest the PANGEA concept – Partnerships for New GEOSS Applications. The session noted that PANGEA provides multiple benefits by: (i) Providing expert applications training to users and decision-makers in the region; (ii) Demonstrating the practical socio-economic importance of ocean information to administrative budget and policy officials; and (iii) Increasing regional in-situ ocean observations for numerous crosscutting applications that affect the region. A more sustainable capacity for the region can be achieved through the increases in both near real-time in-situ ocean observational data and information as well as the more effective applications of existing and new data. PANGEA builds on and complements other existing capacity building programs by promoting the use of ocean observations to ensure regional socio-economic sustainability through:

- Annual and repeatable training workshops conducted in exchange for annual sea days aboard PANGEA partner's ships for deployments and routine maintenance of ocean observations;
- In-country practical applications training of ocean data provided to large and diverse groups of regional participants, rather than a few selected individuals traveling to a workshop far away. This approach maximizes the retention time of the information, versus potentially losing the expertise as trained employees shift to different positions or organizations;
- New sources of ocean observational data are established by deploying new instruments;
- Required resources such as ship time and training are shared between Partners;
- Applications training of ocean data can be tailored to specific socio-economic sectors required by individual Nations and Regions;

- Developing maritime Nations are empowered to effectively contribute to the Global Earth Observing System of Systems (GEOSS) by offering their oftentimes underutilized ships to deploy observational equipment provided by their PANGEA partners;
- Provides opportunities for training of ship crews in the deployment of moorings and instrumentation and the on-site evaluation of data;
- Government Officials responsible for making policy and setting budgets are invited to participate in PANGEA workshops and receive demonstrations on the importance and effectiveness of ocean data on their region's socio-economic development and sustainability. This approach ensures ocean observations are viewed not only as important for science, but also for economic prosperity, and are therefore deemed a high priority for fiscal decisions;
- Customs Officials are invited to PANGEA workshops to learn about the science, applications and plans for ocean observations in the region; this has proved effective in facilitating the shipments of ocean instruments into the region.

I-8. ORGANIZATIONAL MATTERS

I-8.1 Review of the SOT Management Team

I-8.1.1 The SOT **noted with great appreciation** the service of the outgoing SOOPIP Chairperson, Mr Steve Cook, who is retiring, and welcomed the incoming SOOPIP Chairperson, Dr Gustavo Goni.

I-8.2 Selection process of new DBCP/SOT Technical Coordinator

I-8.2.1 Mr David Meldrum, Chairperson of the DBCP, presented a report on the recruitment of the new DBCP/SOT Technical Coordinator (TC). The former TC, Mr Etienne Charpentier, had resigned on 1 February 2006, but had kindly indicated his intentions well in advance in order to allow his replacement process to be initiated in good time. Accordingly, WMO and IOC had circulated a joint call for applications in early December 2005 and performed an initial sift of the 46 candidates in February 2006. The resulting interim list of 11 applicants had then been circulated to a wide cross section of DBCP/SOT stakeholders for grading. The resulting scores had shown a high degree of unanimity, and it was at once clear that a strong short list of five candidates existed, all of whom were subsequently invited to interview at ECMWF in March 2006. The interview panel, consisting of the OPA coordinator, the DBCP and SOT chairs and the joint secretariat, then faced the difficult task of selecting from this strong field, any of whom would have made an excellent technical coordinator. Nonetheless, the panel was unanimous in selecting Ms Hester Viola, at that time employed by the Australian Bureau of Meteorology. Her employment, as a P2 under a UNESCO Appointment of Limited Duration, began on 1 July 2006. These employment arrangements were felt to best suit the flexibilities that might be required by the likely developments within JCOMMOPS, while still offering a reasonably stable contractual arrangement for the new appointee. He noted that the DBCP had plans to maintain a Technical Coordinator in the long term, even if the current contract was of fixed maximum duration.

I-8.3 Review the role of the SOT Technical Coordinator

I-8.3.1 Taking the ongoing discussion on JCOMMOPS development into consideration (agenda item I-5.1); the Team reviewed and considered the current working priorities of the Technical Coordinator, and arrangement of overall supervision and guidance.

I-8.3.2 The SOT recognized the valuable coordination and support service the TC provided to the component programs of the SOT. More specifically the SOT TC:

- Maintains liaison with current VOS, SOOP and ASAP Operators;

- Provides a focus for contact by other international programmes and new programme operators;
- Provides problem resolution, in particular for problems related to GTS traffic;
- Facilitates information exchange, in particular through the JCOMMOPS website;
- Maintains quality control systems, in particular the VOS QCRelay;
- Provides network monitoring, in particular the XBT SOOP; and
- Provides network review, in particular the XBT SOOP.

I-8.3.3 The Team **agreed** that the role of the TC was to provide ongoing support to meet the operational requirements of the component panels of the SOT, such as: liaison and international focus, problem resolution, information exchange, quality monitoring, network monitoring and network review.

I-8.3.4 The Team **noted** that long-term future requirements for JCOMMOPS might include:

1. The development of the WMO No. 47 database (doc I-5.1.2);
2. The development of a front-end data entry facility for WMO No. 47 (doc IV-3.6);
3. MASK v REAL callsign lookup table to support callsign masking (doc IV-4.1.2); and
4. Distribution of XBT probes from the JCOMM XBT Probe Pool (doc V-2.2)

I-8.3.5 Following the development of the new requirement listed in 3 above, regular maintenance will be required of the MASK v REAL callsign lookup table, such as: (1) quarterly updates, and (2) monthly changes affecting MASK v REAL callsigns. The maintenance will lead to a small, but not, an insignificant increase in total time provided to the SOT.

I-8.4 Review the funding of the SOT Technical Coordinator

I-8.4.1 The Team reviewed the funding mechanisms for the SOT Technical Coordinator's position SOT Members will be invited to make contributions to the trust fund to support the position (see also agenda item V-6.3) for further developing the services provided to the VOS, ASAP, SOOP, or the SOT as a whole.

- Canada: $20000 in 2006 in support of JCOMMOPS as a whole
- Germany: $5000 in 2006 in support of SOOPIP
- USA: $12500 in 2006 in support of SOOPIP

I-8.4.2 The Panel was presented with the financial statements and budget for the employment of the coordinator, funded through voluntary contributions by DBCP and SOOPIP member institutions. The Panel accepted the WMO and IOC statements of account for the trust fund for 2006/2007, agreed the SOOPIP components of the expenditure and income estimates for 2006/2007, and endorsed the SOOPIP contributions for 2006/2007 (see ***Annex XXII***).

I-8.5 Ship Consumables Trust Fund

I-8.5.1 Countries were **urged** by the Team to consider contributing to the Ship Consumables Trust Fund administered by the WMO.

I-8.6 Review the Terms of Reference of the SOT

I-8.6.1 The small modifications to the Terms of Reference of the SOOPIP, as well as the proposed change of the ASAP Panel to become a Task Team of the SOT (shown in Annex III) will have to be approved by JCOMM-III, and so these changes in the functioning of the Team and its Panels are to be considered interim. The Team **requested** the Secretariat to submit the proposed revised version of TORs to JCOMM-III for consideration and approval (Annex XXIV). (**Action**: Secretariat).

I-9. NEXT SESSION OF THE SOT

I-9.1 The Team noted the kind offer from Mr Michael Myrsildis to host the next SOT meeting in Athens, Greece, in April or May 2009. It recalled that it should keep in mind the timing of the Upper Ocean Review and of the JCOMM-III session and deadlines for substantive input when scheduling the dates of its next meeting.

I-10. REVIEW OF THE SOT-IV SESSION REPORT, ACTION ITEMS AND RECOMMENDATIONS

I-10.1 The participants reviewed and approved the final report of the session, including action items and recommendations. Action items, including those noted in preceding paragraphs, are included in the SOT action list in *Annex XXVI.*

I-11. CLOSURE

I-11.1 The Chairperson congratulated the Team on achieving the bulk of its goals. He thanked the participants of the meeting, his co-chairs, and the Secretariat for their support. Edgard Cabrera, representing the Joint Secretariat, thanked the Chairperson and the participants of the meeting for their hard work, for their input into the upcoming WMO Executive Council, and pledged his support to the work of the SOT during the intersession. The OPA Coordinator noted the growth of coordination within the panel, and congratulated the participants for their growing level of organization and productivity. The Fourth Session of the Ship Observations Team closed at 12:00pm on Saturday 21 April 2007.

Annex I

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Annex II

AGENDA

Session I – SOT-IV Common Session 1

I. SOT-IV

1. ORGANIZATION OF THE SESSION

1.1 Opening of the Session
1.2 Adoption of the Agenda
1.3 Working Arrangements

Session II – Scientific and Technical Workshop

II. SOT-IV Scientific and Technical Workshop, New Developments

1. Report on VOS Climate Project (VOSClim) data
2. Devil XBT Acquisition System update
3. Report on XBT Recorder Inter-comparisons
4. Quality Control (QC) of delayed-mode XBT data using MQuest
5. TurboWin electronic logbook enhancement and development
6. Demonstration of NOAA/NWS VOS database of ship and equipment metadata
7. Demonstration of DWD VOS database of ship and equipment metadata
8. BlueLINK - Ocean Forecasting Australia

Session III – National Reports

III. National Reports

Session I – SOT-IV Common Session 2

I. SOT-IV (Common Session 2)

2. REPORTS BY THE SECRETARIAT, OPA COORDINATOR, CHAIRPERSON OF SOT AND THE SOT TECHNICAL COORDINATOR

2.1 Report by the Secretariat
2.2 Report by the Observations Programme Area Coordinator
2.3 Report by the Chairperson of SOT
2.4 Review of Action Items from SOT-III
2.5 Report by the SOT Technical Coordinator

3. REPORTS ON ASSOCIATED PROGRAMMES AND REQUIREMENTS FOR SHIP-BASED OBSERVATIONS

3.1 Requirements for ship-based observations
- 3.1.1 GCOS/GOOS/WCRP Ocean Observing Panel for Climate (OOPC)
- 3.1.2 Use of VOS data in climate products

3.2 Reports by associated programmes
- 3.2.1 International Ocean Carbon Coordination Project (IOCCP)
- 3.2.2 Shipboard Automated Meteorological and Oceanographic System Project (SAMOS)
- 3.2.3 GODAE High Resolution SST Pilot Project (GHRSST)
- 3.2.4 Ferrybox Project
- 3.2.5 SeaKeepers Society
- 3.2.6 Alliance for Coastal Technologies (ACT)
- 3.2.7 Proposed SCOR Panel on Merchant Marine Instrumented Oceanographic Surveys
- 3.2.8 The Scholar ship programme

4. REPORTS AND RECOMMENDATIONS BY TASK TEAMS

4.1 Task Team on VOS Recruitment and Programme Promotion
4.2 Task Team on Satellite Communication System Costs
4.3 Task Team on Metadata for WMO-No. 47.
4.4 Task Team on VOSClim
4.5 Task Team on Coding
4.6 Task Team on Instrument Standards

Session IV – VOS Panel

IV. VOSP-V

1. PROGRAMME REVIEW

1.1 Report by the Chairperson of the VOSP
1.2 Review of Action Items from the VOSP-IV

2. PROGRAMME IMPLEMENTATION

2.1 VOS automation and electronic logbook software
  2.1.1 Status of VOS automation
  2.1.2 VOS E-logbook software development
2.2 Report on the E-SURFMAR VOS Technical Advisory Group (VOS-TAG)
2.3 Port Meteorological Officers (PMO)
  2.3.1 Review of Port Meteorological Officers role and responsibilities
  2.3.2 Report and recommendations from PMO-III
  2.3.3 Enhancement of the global PMO network
2.4 Ship monitoring
  2.4.1 VOS quality monitoring tools
  2.4.2 Dirkzwager vessel tracking tool

3. MONITORING AND DATA MANAGEMENT

3.1 Regional Specialized Meteorological Centre (RSMC), Exeter, VOS monitoring report
3.2 Real-Time Monitoring Centre (RTMC) for the VOSClim project monitoring report
3.3 Global Collecting Centres (GCC) report on the VOS & VOSClim
3.4 VOSClim Data Assembly Centre (DAC) report
3.5 Review of the Marine Climatological Summaries Scheme (MCSS)
3.6 Implementing a VOS Database for tracking ship and equipment metadata
3.7 VOSClim issues

4. ISSUES FOR THE VOS

4.1 Industry concerns regarding the transmission of meteorological data from ships
  4.1.1 Report from the fifty-eighth session of the WMO Executive Council
  4.1.2 Implementation of masked call signs
4.2 Impact of national regulations on VOS operations
4.3 Multiple ship recruitment
4.4 European Union's restriction on the use and transportation of Mercury
4.5 VOS communication problems and errors
4.6 Reduction of national Voluntary Observing Fleet

5. FUTURE WORK PROGRAMME AND IMPLEMENTATION ISSUES

5.1 Partnerships and the integration of other programmes with the VOS
5.2 Action items

6. ORGANIZATIONAL MATTERS

6.1 Review the Terms of Reference of the VOSP

Session V – SOOP Implementation Panel

V. SOOPIP-VII

1. PROGRAMME REVIEW

1.1 Report by the Chairperson of the SOOPIP
1.2 Review of Action Items from the SOOPIP-VI

2. PROGRAMME IMPLEMENTATION

2.1 Status of the current sampling programme
2.2 JCOMM/SOT pool of XBT probes
2.3 Review of the XBT line responsibilities
2.4 Operational XBT systems and development
2.5 Report on IOGOOS/JCOMM Western Indian Ocean XBT Training Workshop
2.6 Report on the Argo Pilot Project

3. MONITORING AND DATA MANAGEMENT

3.1 JCOMM *in situ* Observing Platform Support Centre (JCOMMOPS) report
  3.1.1 Review of the 2006 Semestrial Survey
  3.1.2 Timely submission of data for SOOP Semestrial Reports
  3.1.3 Improving the ease of upload to JCOMMOPS database
3.2 SOOP database of ship and equipment metadata
3.3 Monitoring Centre reports
  3.3.1 Global Temperature and Salinity Profile Programme (GTSPP)
  3.3.2 Global Ocean Surface Underway Data Pilot Project (GOSUD)

4. ISSUES FOR THE SOOP

4.1 Future global requirements
4.2 Observing other ocean variables

5. FUTURE WORK PROGRAMME AND IMPLEMENTATION ISSUES

5.1 Partnerships and the integration of other programmes with the SOOP
5.2 Action items

6. ORGANIZATIONAL MATTERS

6.1 Review the Terms of Reference of the SOOPIP
6.2 Review the membership of the SOOPIP

Session VI – ASAP Panel

VI. ASAPP-XVI

1. PROGRAMME REVIEW

1.1 Report by the Chairperson of the ASAPP
1.2 Review of Action Items from the ASAPP-XV

2. PROGRAMME IMPLEMENTATION

2.1 Report on the EUMETNET ASAP (E-ASAP)
2.2 Report on the Worldwide Recurring ASAP Project (WRAP)

3. MONITORING AND DATA MANAGEMENT

3.1 Monitoring reports
  3.1.1 Monitoring activities of ECMWF in support of the ASAP
  3.1.2 Report by the ASAP Monitoring Centre

4. ISSUES FOR THE ASAP

4.1 Ship recruitment
4.2 Satellite transmission difficulties
4.3 Improvement of data quality
4.4 ASAP routes
4.5 Costs

5. FUTURE WORK PROGRAMME

5.1 Action items

6. ORGANIZATIONAL MATTERS

6.1 Future of the ASAPP
6.2 Review the Terms of Reference of the ASAPP
6.3 Review the membership of the ASAPP
6.4 ASAP Trust Fund

Session I – SOT-IV Common Session 3

I. SOT-IV (Common Session 3)

5. SUPPORT INFRASTRUCTURE

5.1 JCOMM in-situ Observing Platform Support Centre (JCOMMOPS)
  5.1.1 JCOMM OCG round-table review of the future of JCOMMOPS
  5.1.2 JCOMMOPS portal for WMO Publication No. 47
5.2 Telecommunication facilities
  5.2.1 Inmarsat
  5.2.2 EUMETSAT
  5.2.3 Argos
  5.2.4 Review of other satellite data telecommunication systems
5.3 WMO Information System (WIS) and GTS issues

6. PROGRAMME OPERATIONS AND DEVELOPMENT

6.1 Data standards
6.2 Data management
  6.2.1 META-T Pilot Project
  6.2.2 Coding issues: BUFR templates for VOS/VOSClim, XBT/XCTD, META-T
6.3 Quality Management and Best Practices

7. PROGRAMME PROMOTION, CAPACITY BUILDING AND INFORMATION EXCHANGE

7.1 SOT Annual Report
7.2 Websites
7.3 Focal Point mailing lists
7.4 Certificates to ships participating in SOT
7.5 Publications and brochures
7.6 Capacity Building

8. ORGANIZATIONAL MATTERS

8.1 Review of the SOT Management Team
8.2 Selection process of new DBCP/SOT Technical Coordinator
8.3 Review the role of the SOT Technical Coordinator
8.4 Review the funding of the SOT Technical Coordinator
8.5 Ship Consumables Trust Fund
8.6 Review the Terms of Reference of the SOT

9. NEXT SESSION OF THE SOT

10. REVIEW OF THE SOT-IV SESSION REPORT, ACTION ITEMS AND RECOMMENDATIONS

11. CLOSURE

Annex III

TERMS OF REFERENCE OF THE SOT TASK TEAMS

Task Team on Coding

Tasks:

1. Compile table driven coding requirements for ship based observations, for all relevant applications, and submit them in a consolidated way to the DMPA Task Team on Table Driven Codes;

2. In collaboration with ocean forecasting system operators (GODAE) including ecosystem modelers, and other appropriate user communities, establish a core set of ship based bio-geo-chemical variable definitions for the BUFR Master Table No. 10 (MT10);

3. Review and revise the draft MT10 BUFR code table;

4. Review all relevant JCOMM Publications to make sure they are kept up to date and comply with Quality Management terminology;

5. Report to SOT-V.

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Frits Koek (the Netherlands)
Elizabeth Kent (United Kingdom)
Etienne Charpentier (WMO)
Joachim Trinanes (USA)
Gustavo Goni (USA)
Hester Viola (DBCP/SOT TC)
Elanor Gowland (United Kingdom)
Charles Sun (USA)

Task Team on Metadata for WMO-No. 47 (Pub. 47)

Tasks:

1. Prepare a submission to JCOMM-II regarding the proposed changes to WMO-No. 47 (Pub. 47) metadata based on the recommendations from SOT-III.

2. Prepare a consolidated list of ship routes in accordance with the submission to JCOMM-II for presentation at SOT-IV.

3. Regularly review the Pub. 47 metadata requirements and make recommendations as appropriate.

4. Monitor the receipt of regular Pub. 47 updates at WMO from participating VOS members.

5. Review all relevant JCOMM Publications to ensure they are up to date and comply with Quality Management terminology.

Members:

Graeme Ball (TT chairperson, Australia)
Pierre Blouch (France)
Yvonne Cook (Canada)
Julie Fletcher (New Zealand)
Elizabeth Kent (United Kingdom)
Robert Luke (USA)
Sarah North (United Kingdom)

Task Team on Satellite Communications System

Tasks:

1. Evaluate the operational and cost-effective use of satellite data telecommunication systems for the real-time collection of VOS data in support of the World Weather Watch, GOOS, and GCOS;

2. Work closely with the Task Team on SOT Iridium and the DBCP Iridium Pilot Project;

3. Continue to monitor the cost implications of Inmarsat satellite communications sent by Code 41;

4. Review all relevant JCOMM Publications to make sure they are kept up to date and comply with Quality Management terminology;

5. Report to the next SOT Session on any relevant issues/proposals.

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Robert Luke (USA)
Derrick Snowden (USA)
Pierre Blouch (France and E-SURFMAR)
Toshifumi Fujimoto (Japan)
Michael Myrsilidis (Greece)
Representatives of countries where LES accepting Code 41 are located
A representative of RA III

Task Team on SOT Iridium

The Task Team, in close cooperation with the Task Team on Satellite Communications System, will guide the SOT Iridium Pilot Project in achieving the tasks described below.

The Pilot Project will evaluate and demonstrate the operational use of Iridium Satellite data telecommunication technology for the real-time collection of VOS and SOOP data in support of the WWW, GOOS, GCOS, and Natural Disaster Prevention and Mitigation applications.

The Pilot Project will run for an initial two-year period as of November 2006 and will report to the DBCP on progress at its annual sessions.

The Pilot Project will seek to evaluate the feasibility of Iridium technology on ship in terms of:

1) Operating a global observing system
2) Network reliability and survivability;
3) Data throughput in terms of quantity and timeliness;
4) Data management, especially data formatting and insertion on the GTS;
5) Collaboration with manufacturers to promote free availability of Iridium modems
6) Overall cost effectiveness (manufacturing, transmission, data processing, life-time);

The Steering Team, through its Chairperson, will report on the progress of the SOT Iridium Pilot Project at sessions of the DBCP and to the DBCP Evaluation Group as necessary.

The Task Team is initially comprised of the following individuals:

Yvonne Cook (Chairperson, Canada)
Sarah North (United Kingdon)
Pierre Blouch (France and E-SURFMAR)
Derrick Snowden (USA)

Task Team on VOS Recruitment and Programme Promotion

Tasks:

1. Further, develop the generic pre-installation design standards that will eventually be available to ship builders and classification societies;

2. Review existing promotional aids (flyer, certificate) and recommend new promotional aids;

3. Promote the use of, and keep under review, the promotional presentation "The Partnership between the Maritime Industry, Marine Forecasting and Science";

4. Establish a store of newsworthy articles for use in a SOT or VOSClim Newsletter or in national newsletters;

5. Review the questionnaire used for the Marine Meteorological Services Monitoring Programme, and propose amendments, which should be reflected in the questionnaire survey to be conducted in 2008;

6. Review all relevant JCOMM Publications to ensure they are up to date and comply with Quality Management terminology.

Members:

Julie Fletcher (TT chairperson, New Zealand)
Graeme Ball (Australia)
Pierre Blouch (France)
Sarah North (United Kingdom)
Volker Weidner (Germany)
Gerie Lynn Lavigne (Canada)
Tom Rossby (URI, USA, advisor).

Task Team on Instrument Standards

Tasks:

1. Compile information on existing activities, procedures and practices within JCOMM relating to instrument testing, standardization and intercalibration, as well as the standardization of observation practices and procedures,

2. Using guidance contained in existing guides including the WMO Guides on Instruments and Methods of Observation (WMO-No.8) communicate with manufactures regarding new technologies and recognized equipment problems.

3. Prepare a JCOMM Technical Report containing this information, to be made widely available through relevant web sites (JCOMM, JCOMMOPS, VOS, DBCP, SOOP, SOT),

4. Provide guidance on testing and the intercalibration of marine meteorological and oceanographic observing systems.

5. Liaise closely with WMO/CIMO, both in the compilation of the information and in assessing what additional work in this area might be required under JCOMM.

6. Liaise closely with IOC in the preparation of the wider compilation of existing instrumentation and observing practices standards in oceanographic observations in general, with a view to inputting an appropriate contribution from JCOMM.

7. Conduct an intercomparison study of electronic logbooks;

8. Review all relevant JCOMM Publications to make sure they are kept up to date and comply with Quality Management terminology;

9. Work with the WMO Commission on Instruments and Methods of Observations for updating the WMO Guide No. 8 section dealing with ship-based observations.

Members:

Robert Luke (TT chairperson, USA)
Graeme Ball (chairperson of SOT)
Pierre Blouch (E-SURFMAR project manager)
Yvonne Cook (Canada)
Julie Fletcher (chairperson of VOSP)
Rudolf Krockauer (E-ASAP Programme Manager)
Sarah North (chairperson of TT on the VOS Climate Project)
Derrick Snowden (USA)
Shawn Smith (SAMOS, USA)
Henry Kleta (Germany)
Vinciane Unger (France)
Elizabeth Kent (United Kingdom)
Gustavo Goni (USA)
Scott Woodruff (USA)
Bruce Sumner (associated Member, HMEI)

Task Team on the VOS Climate Project

Tasks (in close cooperation with the ETMC):

1. Coordinate, maintain, promote and enhance the VOS Climate project, monitor its performance, and encourage increased participation.

2. Revise the VOS Climate project document to reflect the current procedures and to clarify and revise where necessary the responsibilities of the VOSClim data centres;

3. Review all relevant JCOMM Publications to make sure they are kept up to date and comply with Quality Management terminology;

4. Prepare a report to SOT-IV on, inter-alia, the following over-arching VOSClim issues

    a. Should VOSClim be continued as a project, or developed into a separate long-term operational programme? If so, what form should this programme take?
    b. Is the high-quality dataset a valuable resource? If so, how should it be updated operationally?
    c. How can the lessons of VOSClim be used to improve data quality in the wider VOS?

Members:

Sarah North (TT chairperson, United Kingdom)
Julie Fletcher (VOSP chairperson, New Zealand)
Representatives of participating countries (VOSClim focal points)
Representative of the Real Time Monitoring Centre
Representative of DAC
Representatives of the GCCs
Scientific advisers

Task Team on Callsign Masking and Encoding

Tasks:

1. Oversee the implementation of **MASK** and **ENCODE** and develop guidelines as necessary;

2. Review and approve national **MASK** schemes to ensure they remain unique and do not impinge on (1) the ITU callsign series allocated to a country, or (2) any other marine or oceanographic identification scheme used by WMO, e.g. buoy identification numbers;

3. Ensure the **MASK** v **REAL** database is kept up-to-date by NMSs implementing **MASK**;

4. Develop the **ENCODE** encryption strategy, as well as develop the encoding and decoding keys.

Members:

Graeme Ball (SOT Chairperson, Australia)
Julie Fletcher (VOSP Chairperson, New Zealand)
Scott Woodruff (ETMC Chairperson, USA)
Hester Viola (DBCP/SOT Technical Coordinator, France)
Colin Parret (United Kingdom)
Robert Luke (USA)
WMO Secretariat representative

Task Team on the ASAP

Tasks:

1. Coordinate the overall implementation of the ASAP, including recommending routes and monitoring the overall performance of the programme, both operationally and in respect of the quality of the ASAP system data processing;

2. As may be required by some members, arrange for and use funds and contributions in kind needed for the procurement, implementation and operation of ASAP systems and for the promotion and expansion of the programme;

3. Coordinate the exchange of technical information on relevant meteorological equipment and expendables, development, functionality, reliability and accuracy, and survey new developments in instrumentation technology and recommended practices;

4. Review all relevant JCOMM Publications to make sure they are kept up to date and comply with Quality Management terminology;

5. Prepare annually a report on the status of ASAP operations, data availability and data quality

Initial Membership:

Rudolf Krockauer (E-ASAP, Chairperson)
Graeme Ball (Australia)
Toshifumi Fujimoto (Japan)
Sidney Marais (South Africa)
Any other country making ASAP soundings
Bruce Sumner (HMEI, associated Member)
Possible participation by POGO

Annex IV

PROPOSED NEW TERMS OF REFERENCE (TOR) OF THE JCOMM DMPA TASK TEAM ON DELAYED-MODE VOLUNTARY OBSERVING SHIP DATA (TT-DMVOS)
(Revised version proposed by ETMC-II and SOT-IV)

Background: The Marine Climatological Summaries Scheme (MCSS), established in 1963 (Resolution 35, Cg-IV), has as its primary objective the international exchange, quality control and archival of delayed-mode marine climatological data, in support of global climate studies and the provision of a range of marine climatological services. Eight countries (Germany, Hong Kong, China, India, Japan, Netherlands, Russian Federation; United Kingdom and USA) were designated as Responsible Members (RMs) to gather and process the data, including also data from other Contributing Members (CMs) worldwide; and regularly publish Marine Climatological Summaries (MCS) for representative areas, in chart and/or tabular forms. Two Global Data Collecting Centres (GCCs) were established in 1993 in Germany and the United Kingdom to facilitate and enhance the flow and quality control of the data. Eventually all data are to be archived in the appropriate archives, including ICOADS.

Scope: In practice, the delayed-mode marine climatological data, handled under the MCSS, and published in the MCS, have generally been limited to Voluntary Observing Ship (VOS) data (i.e., excluding buoy or other non-ship data), in accordance with the original intent of the MCSS. The Task Team will focus primarily on modernizing the management and quality control of the delayed-mode VOS data, while at the same time exploring possible connections with the management of real-time VOS and other ship-based data (e.g., Shipboard Automated Meteorological and Oceanographic System (SAMOS) and GOSUD). To develop a clearer separation between data processing, and the preparation of climatological summaries, the team's scope will be limited to data management. Because the RMs and the GCCs have primary involvement in the data processing, they will be invited to contribute to the work. The review and modernization of the MCS is clearly also an important task, which will be considered separately by the ET-MC, and to which the RMs will be invited to contribute. In addition, as part of the collective modernization of the data management and the MCS, it is anticipated, in due course, that the "MCSS" terminology will be replaced by a new and more up-to-date terminology reflecting a separation between the two functions.

The self-funded Task Team will primarily work via email and shall:

(i.) Examine current delayed-mode VOS data management practices, including those of the GCCs, and streamline them as possible to reduce redundancies (if any), standardize operations, and exploit appropriate modern technologies;
(ii.) Examine possibilities for commonality of the data management of the delayed-mode data, with real-time VOS data;
(iii.) Keep under review the International Maritime Meteorological Tape (IMMT) format, and suggest changes if necessary;
(iv.) Keep under review the Minimum Quality Control Standards (MQCS), and suggest changes if necessary;
(v.) Submit proposals to the JCOMM via the ET-MC for revising technical publications, in particular the WMO *Manual* (No. 558) and *Guide* (No. 471) *on Marine Meteorological Services*, to incorporate possible changes in the IMMT and the MQCS, and to reinvent the MCSS terminology;
(vi.) Review the International Maritime Meteorological Archive (IMMA) format, and suggest ways to reconcile the IMMT and IMMA formats;
(vii.) Establish and maintain a website to share relevant information;
(viii.) Collaborate and liaise with VOSClim and other groups (e.g., SAMOS and GOSUD), as needed, both to ensure access to expertise and appropriate coordination.

Membership from ETMC; including both GCCs as Co-chairs, and all RMs presently represented on the ET-MC):

Elanor Gowland (Co-chairperson, Germany)
Reinhard Zöllner (Co-chairperson, Germany)
Elizabeth C. Kent (United Kingdom)
Frits B. Koek (the Netherlands)
Alexander Vorontsov (Russia)
Wing-tak Wong (China)
Takashi Yoshida (Japan)
Scott D. Woodruff (USA)

Membership from the SOT:

Graeme Ball (Chairperson of the OPA/SOT, Australia)
Julie Fletcher (Chairperson of the OPA/SOT/VOS Panel, New Zealand)
Shawn Smith (USA)
Henry Kleta (Germany)
Bruce Sumner (HMEI, associate Member)
A representative from US/NOAA/NCDC

Reporting mechanisms*:*

(a.) The Team will produce a project plan to guide operations for the next three years. The plan should explain the linkages to other components of the JCOMM, including the SOT and other pertinent programs.
(b.) The Team will establish an annual reporting mechanism to the ET-MC and the SOT.
(c.) The Team will report to the ET-MC and the SOT at their regular meetings.

Annex V

PMO ROLE AND RESPONSIBILITIES

Background

Port Meteorological Officers (PMOs) play a vital role in maintaining national Voluntary Observing Fleets (VOF) as part of the JCOMM Voluntary Observing Ship (VOS) Scheme. In recent years, the role has increased in many countries to provide support to other marine meteorological or oceanographic observing programmes.

The VOS Panel, particularly through the Task Teams dealing with VOS issues, is endeavouring to harmonize the functions and practices of Port Meteorological Officers. Harmonising how PMOs deal with ships is becoming increasingly important as ships trade worldwide, and are likely to be visited by more than just their respective home PMO.

Role

A Port Meteorological Officer (PMO):

1. Is a representative of the National Meteorological Service (NMS), and the primary contact point with local maritime authorities and the marine community at large; and

2. Directly contributes to the success and viability of the JCOMM VOS Scheme by helping to maintain:

    a. The size of the international VOF (VOS Fleet); and

    b. The quality and frequency of ships' weather reports.

Responsibilities

The responsibilities of the Port Meteorological Officer(s) are broadly defined in numerous WMO publications, including:

1. WMO Technical Regulations (WMO-No. 49);

2. *Guide to Marine Meteorological Services* (WMO-No. 471); and

3. *Manual on Marine Meteorological Services* (WMO-No. 558).

Specific functions

At the national level, many NMS will specifically define the responsibilities of its respective PMO(s) in national guides, manuals and instructions. These responsibilities are often dependent on the specific port being serviced, and the type and volume of marine traffic visiting the port, and will include some or all of the following functions:

1. Recruit ships of any nationality into and maintain the national VOF.

2. Maintain accurate records of the ships recruited into the national VOF, including:

    a. Full ship details, as required for WMO Publication Number 47;
    b. All supplied and recovered instrumentation; and
    c. All instrument checks and calibrations dates.

3. Regularly visit ships recruited to the national VOF to:

    a. Maintain contact with the Observers;
    b. Provide ongoing training to Observers;
    c. Maintain and inspect the meteorological and selected oceanographic instruments;
    d. Check the presence and condition of supplied handbooks, meteorological tables and charts;
    e. Maintain the ship's supply of logbooks, autographic charts, muslin, wicks and other mandatory consumables; and
    f. Recover and inspect completed logbooks, autographic charts and electronic logbook data.

4. To provide the following services to a VOS, regardless of the ship’s nationality and country of recruitment:

    a. Perform a barometer check;
    b. Check meteorological code tables;
    c. Check instructions for Observers;
    d. Provide advice on bulletins, including a list of areas for which forecasts are issued and update relevant facsimile broadcast schedules.

5. At the request of the Master of a VOS, regardless of its country of recruitment, perform the following services:

    a. Check other meteorological and selected oceanographic instruments; and
    b. Provide advice or assistance on meteorological matters.

6. Promote and maintain relationships with:

    a. Other intra-national PMOs and the NMS;
    b. Harbour authorities and shipping companies;
    c. Merchant marine schools and yacht clubs; and
    d. International PMOs, as necessary.

7. To enquire with the ship's officers regarding any problems that may be experienced with regards to:

    a. The transmission of meteorological and oceanographic observations to a Land Earth Stations (LESs) or other facility;
    b. The reception and adequacy of forecasts, bulletins and facsimile broadcasts, and bring this information to the attention of the national meteorological service.

8. Support complementary national, international and regional marine meteorological and oceanographic programmes, such as:

    a. The deployment of drifting buoys and profiling floats; and
    b. The SOOP and ASAP.

Annex VI

COMPARISON OF GLOBAL NUMBERS OF VOS SHIPS

Country Name	Country Code	Eucos Y/N	No. of VOS listed in Dec 2006 Pub47	No. of VOS stated in 2006 National SOT reports	Ship Count from Pierre's Obs counters
Argentina	AR		6		1
Australia	AU		78	79	72
Azerbaijan	AZ		3		
Bangladesh	BD		3		
Belgium	BE				
Brazil	BR		345		
Bulgaria	BG		34		
Canada	CA		94	96	99
Chile	CL		2		
China	CN		47		
Croatia	HR		41	47	
Cuba	CU		5		
Denmark	DK	Y	43	45	32
Ecuador	EC		1	2	
Finland	FI		13		
France	FR	Y	65	67	93
Germany	DE	Y	824	820	620
Great Britain	GB	Y	381	381	275
Greece	GR	Y	9	9	5
Hong Kong	HK		35	36	21
Iceland	IS	Y	12		8
India	IN		165	185	42
Indonesia	ID		31		
Ireland	IE	Y	15		6
Israel	IL		38		3
Italy	IT		13		
Jamaica	JM		1		
Japan	JP		432	431	68
Kenya	KE		14		
Korea (Dem.People's Rep.)	KP		13		
Korea (Rep)	KR		22		
Latvia	LV		35		
Lithuania	LT		26		
Malaysia	MY		105	93	7
New Zealand	NZ		48	48	25
Norway	NO	Y	17	17	6
Pakistan	PK		16		
Philippines	PH		49		
Poland	PL		61		1
Portugal	PT		15		

Russian Federation	RU		291		177
Saudi Arabia	SA		101		1
Serbia & Montenegro	CS				
Singapore	SG		48	15	1
South Africa	ZA		34		2
Spain	ES	Y	1	1	1
Sri Lanka	LK		7		
Sweden	SE	Y	31	32	34
Switzerland	CH		1		
Tanzania	TZ		21	0	
Thailand	TH		2		
The Netherlands	NL	Y	192	195	210
USA	US		1038	1079	354
Yugoslavia	YU		125		
unknown Ships					941
TOTALS			**5049**	**3678**	**3105**

Annex VII

PRESENT STATUS OF THE E-LOGBOOKS

- **OBSJMA**

  Latest release is OBSJMA for Win (2004). A revised version of the manual was published in December 2005, and distributed amongst the user fleet until the end of 2006. In 2006, a total of forty VOS used the OBSJMA, of which twenty used a dummy call sign. The Japan Meteorological Agency (JMA) currently has no plan to modify the OBSJMA.

- **AMVER/SEAS**

  It is unclear what the most recent version of the AMVER/SEAS software is to date. On the NOAA-VOS website (www.vos.noaa.gov/amver_seas.shtml), release of Version 5.22 is mentioned, while on the AMVER/SEAS homepage (seas.amverseas.noaa.gov/seas/) it mentions release of Version 4.54 to be the most recent version.

  Strong points of the AMVER/SEAS program are as follows:
  The combination with AMVER (Automated Manual-Assistance Vessel Reporting System);
  The option to use the program with Expendable Bathythermographs (XBT's).

- **TurboWin**

In January 2007, TurboWin 4.0 was released. This latest version of TurboWin can be downloaded from the following website: www.knmi.nl/turbowin. To extend the service to the mariners, TurboWin incorporates, next to the data entry module, a variety of other modules. Add-ons like MeteoClassify give the observer the possibility to increase their knowledge in the field of cloud and sea-ice determination, as well as learning the various sea states and their accompanying wind forces. The add-on MetPub47 is used to collect metadata from the ship and to store that in the correct format. The PMO can collect this information when visiting the ship. Further, wave and climatic atlases are appended, as well as pilot charts for several oceans.

The most important new parts in this version are:

- Redesign air pressure input page(s); new method computing height of barometer above sea level, introduced by the BoM Australia;
- Option to compile observation as semi-compressed message (semi-compression module supplied by Météo-France). Availability depending on recruiting country;
- Metpub47 (ship metadata collecting program) add-on;
- Copyrights assignment phenomena observations (all recruiting countries);
- Copyright assignment meteorological observations (United Kingdom only);
- DEP (Data Execution Prevention) Windows XP aware (also on processors with DEP hardware support);
- AVRI Inmarsat-C LES advice only if in India's coastal waters; skipped Jeddah Inmarsat-C LES for obs;
- New Zealand, Australia and UK '*does the reading indicate pressure at MSL*' preset to '*no*';
- Added option to print E-mail settings;
- Added option to print station data settings;
- Extra warning message before downloading log files;
- Extra pop-up message after changing call sign;
- Extra pop-up messages after changing 'special projects participant';
- More combination checks on ship maintenance data;
- IMMT-3 storage;

- AMOS MAIL new line aware;
- Option to zip and attach log files.
- Option to insert VOS ID for security reasons;
- Added support downloading log files by e-mail;
- Added log files backup (logs automatically backed up after download);
- Status bar displays the progress of the (FM 13-X) coded observation.

Due to several constraints, the promised manual on installation and use of TurboWin has not yet been published. As soon as this manual becomes available, it will be announced through the several mailing lists and will be available for download from the web.

Considering the BUFR developments, experimenting with these developments has already started. TurboWin 4.0 is in principal capable of compiling BUFR messages. Nevertheless, guidance is needed from the steering bodies to indicate the following issues:

1. Whether the BUFR is going to be assembled on board or at the local receiving NMSs before being inserted into the GTS?
2. If on board, which BUFR template should be used?
3. If on board, which NMSs are ready for receiving ship BUFR observations?
4. If not on board, which NMSs are ready to convert alphanumeric ship observations to BUFR observations?

Regarding the development of new transmission systems, the TurboWin 4.0 is capable to compile half-compressed messages, which reduces the transmission costs. The use of broadband Internet is relatively new and in use by only a few (mainly passenger) ship companies. The possibility to send observations by email was already implemented in TurboWin. A web-based online entry of an observation may be the next logical step. Although the transmission costs are still very high and (web entry) security risks are not clear, a feasibility study is currently under consideration.

With respect to ships' security, the TurboWin 4.0 has implemented an option to use the proposed VOS ID. Nevertheless, a uniform guidance has not yet been given.

Annex VIII

STATUS OF AUTOMATED SYSTEMS

Table 1: Status of VOS Automated Observing Systems

Country	Type of AWS (as at 31/12/2006)	Method of Comms	Manual Entry Facility	Number of Ships with AWS at 31/12/2002	Number of Ships with AWS at 31/12/2004	Number of Ships with AWS at 31/12/2005	Number of Ships with AWS at 31/12/2006	Plans for 2007
Australia	Vaisala Milos 500 AWS	Inmarsat C	Yes	9	11	10	8	4 new AWS
Canada	AVOS – AXYS Technologies	Inmarsat C	Yes	13	14	14	39	12 AVOS with VOSClim
Denmark	BATOS	Inmarsat	Yes	-	-	-	2	2 BATOS
France	BATOS Mini BATOS MINOS	Inmarsat C Inmarsat C Argos	Yes No No	19	30 1 6	39 2 7	45 3 8	8 BATOS
Germany	Vaisala Milos 500 AWS	Meteosat	No	23	21	21	17	Replacements only
Ireland	Vaisala Milos AWS	Meteosat	No	1	1	1	1 **	
Japan	Koshin Denki Kogyo Co., Ltd (9) Ogasawara Keiki Seisakusho Co. Ltd (3) Nippon Electric Instrument Inc. (4) Brookhaven National Laboratory (1)	Inmarsat Inmarsat Inmarsat C Inmarsat C	Some No Some Yes	13	12	13	17	
New Zealand	AWS based on Sutron 9000RTU	MTSAT	Yes	1	1	1	1	2 coastal ship AWS
Norway	AWS	-	some	-	-	17	17	1 new Research ship
Russian Federation	GM6	Inmarsat C	Yes	-	38	38 *	38 *	
South Africa	Vaisala Milos 520	Inmarsat C	Yes	-	-	1	1 **	
Spain	Vaisala Milos	Inmarsat C	Yes	1	1	1 *	1	
United Kingdom	Automet MINOS –GP BATOS AVOS	Inmarsat Argos Inmarsat Inmarsat	No No Yes Yes	1 - - -	1 - - -	1 1 1 -	1 2 2 1	9 MINOS (2 with GPW) & 1 MILOS to be evaluated. 2 more BATOS planned, 1 AVOS installed but not operational.
United States	SEAS-AutoImet	Inmarsat C	Yes	-	3	3 *	0	
TOTALS				**81**	**140**	**171**	**204**	**42 AWS for 2007**

Table 2: Status of VOS using Electronic Logbook Software

Country	Electronic Logbook type	**Number of Ships at 31/12/2002**	**Number of Ships at 31/12/2004**	**Number of Ships at 31/12/2005**	**Number of Ships at 31/12/2006**
Australia	TurboWin	33	41	50	51
Canada	1.23.14 Bridge PC 1.15 AVOS	8	14	14	39
Croatia	TurboWin	3	4	3	7
Denmark	TurboWin	-	-	-	32
France	BATOS TurboWin	- -	30 7	39 6	45 7
Germany	TurboWin	315	412	556	600
Greece	TurboWin	2	0	0	0
Hong Kong	TurboWin	-	-	1	2
India	TurboWin	-	21	28	33
Japan	OBSJMA1.01	-	49	61	70
Netherlands	TurboWin	200	259	198	195
New Zealand	TurboWin	0	12	15	22
Singapore	TurboWin	-	-	2	2*
South Africa	TurboWin	5	5	8	8*
United Kingdom	TurboWin	82	104	147	241
United States	SEAS	353	439	447	622
TOTALS		**1001**	**1397**	**1575**	**1976**

Annex IX

SCIENTIFIC AND TECHNICAL WORKSHOP, ABSTRACTS OF PRESENTATIONS
SOT-IV, 16 April, 2007

1) Report on XBT Recorder Inter-comparisons

Mr Gustavo Goni and Mr Derrick Snowden
NOAA Atlantic Oceanographic and Meteorological Laboratory (AOML)
Miami, USA

Abstract

An intercomparison of XBT Data Acquisition Systems has been performed with participation from NOAA/AOML, SIO, and the CSIRO. The goal was to assess the impact of changing two elements of the standard XBT data collection system by comparing the results from six distinct systems with each other and with a higher accuracy Conductivity Temperature Depth (CTD) system. Different controller softwares (AOML/DOS, Scripps/DOS, SEAS2000, CSIRO Devil), digitizer recorders (MK12, MK21, CSIRO Devil) and launchers (AOML Autolauncher, Scripps Autolauncher, Sippican LM3A Hand launcher) were used. XBT differs from the CTD due to inaccurate depth measurements and inaccurate temperature measurements. The magnitude of expected errors is 0.1 deg C for temperature measurements and 2% of the total depth for depth measurements.

The study concluded that temperature error was within the manufacturer specifications for all instruments. There is a detectable bias that is in part due to fall rate error. Correcting the fall rate equation reduces the mean differences well below the manufacturer specifications and published results in all cases. Two instruments (aomlauto, and devilhand) had mean offsets that were appreciably lower than the other four instruments.

2) Devil XBT acquisition system update

Alex Papij
CSIRO Marine and Atmospheric Research
Hobart, Australia

Abstract

In 2000 the Commonwealth Scientific and Industrial Research Organisation (CSIRO) commenced a project to develop a new XBT data acquisition system. The Australian Bureau of Meteorology (BOM) assisted the project. The result is the Devil XBT System.

Devil includes software with a global geographic atlas, a global climatology, graphical displays, QC checking, levels of password protection, interfaces for GPS positioning and Argos/Iridium communications and an operator interface suitable for Ship Of Opportunity Program (SOOP) operation. The Devil hardware is a small acquisition box with USB connection to a Windows XP computer. The Devil is 100% compatible with Sippican launchers and probes.

Devil development has been completed. Since December 2004 there have been more than 20 trials on more than 11 ships. A gradual roll out and deployment is underway with Devils being installed on research ships and container ships (SOOP vessels). A maintenance and upgrade regime is in place.

Thirty early production units were delivered to users. CSIRO has licenced a company to handle the manufacture and supply of Devil XBT Systems so users can now easily acquire them.

3) Quality Control (QC) of delayed-mode XBT data using Mquest

Ms Ann Gronell
Australian Commonwealth Scientific and Research Organization (CSIRO)
Hobart, Australia

Abstract

Mquest – the new quality control software package developed by CSIRO

Mquest is a Matlab based, gui driven software package for Quality Control of upper ocean temperature data. CSIRO developed this software package to replace a FORTRAN package that was outdated and restricted in the platforms on which it would run. The new package is platform independent, more flexible, more informative and easier to use.

Mquest is driven using keystrokes for most common procedures. It allows you to customize the way in which you subset and view the data and handles large datasets easily, depending on the RAM of the machine running the code. Movement from profile to profile is simple and flexible.

Display of buddy profiles (profiles nearby in space and/or time) is an invaluable ability of Mquest. Buddy databases can be easily added and buddy profiles are color coded so you can see where the buddy profile is relative to the main profile, both in time and space.

QC is quick – a well-trained operator can view and QC 300-400 SOOP XBT profiles per hour.

4) BlueLINK - Ocean Forecasting Australia

Mr Graeme Ball
Bureau of Meteorology
Melbourne, Australia

Abstract

The Australian Government, through the Commonwealth Bureau of Meteorology, Royal Australian Navy and CSIRO has initiated BLUElink Ocean forecasting Australia, a project to deliver ocean forecasts for the Australian region.

The BLUElink forecasts will provide information on coastal and ocean currents and eddies, surface and subsurface ocean properties, that impact and are linked to maritime and commercial operations, defence applications, safety-at-sea, ecological sustainability, regional and global climate.

5) Report on VOS Climate Project (VOSClim) data

Elizabeth Kent and David Berry
National Oceanography Centre, Southampton, United Kingdom

Abstract

Climate quality data and datasets from VOS and VOSClim

Meteorological observations from Voluntary Observing Ships (VOS) transmitted in real time on the Global Telecommunications System (GTS) are essential for weather forecasting. These same reports, supplemented by data reported in delayed mode from paper and electronic logbooks, form the major part of the climate archive that is used in climate assessments, for example the recent assessment by the Intergovernmental Panel on Climate Change. These data have other uses, for satellite bias adjustment and calibration/validation, for the development of datasets of surface fluxes, for numerical weather prediction validation and for assimilation into long-term model reanalyses.

Given the wide range of uses of the data, and the inevitable pressure to justify expenditure, it is essential that we get the best out of the VOS, both in real time and for climate applications. The VOS Climate Project (VOSClim) was set up with the goal of understanding and improving the VOS observations and to produce a high-quality dataset of observations for a range of applications. The method chosen to do this was to recruit to the project a subset of VOS (initially 200). These ships would be monitored for quality, their reports archived with co-located model output, report additional parameters in delayed mode to help assess data quality and provide additional information about the ship and the locations of the sensors using digital photographs. The project got off to a slow start for a variety of reasons, but now all the parts of the project are in place and the number of ships recruited is close to the initial target.

This presentation will introduce the user requirements for data from VOS and discuss the methodology for assessing whether or not the data collected are adequate. Uncertainty estimates will be presented for air temperature and the contribution of random, bias and sampling errors demonstrated. The impact on monthly mean gridded fields of an improvement in data quality similar to that seen in the VOSClim subset will be shown along with some examples of data quality for the VOS and VOSClim ships for different countries.

VOSClim is shown to provide data, which is typically more consistent from ship to ship than for the VOS as a whole. There are also smaller, but still important, improvements to the consistency of data for individual ships. It is shown that there are many ships providing good quality data that do not participate in VOSClim.

It is now feasible for all ships using electronic logbooks to report the additional parameters logged by the VOSClim ships. These parameters will be useful for improving data quality for all ships, especially for winds and air temperatures. It is therefore recommended that all VOS start logging these parameters and reporting them in delayed mode.

6) TurboWin electronic logbook enhancement and development

Mr Frits Koek
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Abstract

In the beginning of 2007, KNMI released the latest version of TurboWin: 4.0. The suite of software that TurboWin 4.0 offers was developed at KNMI, but not without substantial help from other countries.

Apart from several layout improvements and inserting several appropriate warning messages, new in version 4 are the redesign of the SLP input, the WMO pub no. 47 module, the option to send compressed messages and to use a secure VOS-ID. Also included are NOAA pilot charts and the ERA-40 climate atlas. The on board storage of the records is now in IMMT-3 format.

The warning messages appear when the observers change certain tick-boxes for special projects. E.g. if a ship was recruited as a VOSClim vessel, and the observer unchecks the VOSClim tick-box, a warning pops up asking the observer if that was correct. If yes, he is also requested to inform his PMO about this action. Other warnings are inserted in relation to closing TurboWin without saving, downloading log files and changing the call sign.

The new well-structured SLP design should prevent errors like double height corrections. The WMO pub no. 47 module give the PMO is an opportunity to upload pub 47 information to the TurboWin program or to download new pub 47 information from it. Both XML and delimited formats are supported.

TurboWin tries to keep up with the latest technologies and methods. All input from the observers or other people that are involved, will be given serious attention and if it will improve the program, it certainly will be implemented.

7) Demonstration of DWD VOS database of ship and equipment metadata

Mr Volker Weidner
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Hamburg, Germany

Abstract

The aim of the short presentation is to explain the basic functions and database interactions and to give an impression of its complexity.

Starting in the year 2000, DWD established an Oracle relational database for PMO purposes to organize and manage the metadata of the German VOS fleet as well as the meteorological instruments and other equipment installed on the ships.
In the course of years, this database developed to a multifunctional and complex tool which serves the various management requirements, e.g. for observers, awards, stocks, supplies, software, WMO47 and much more.
The PMO database is not a stand-alone package. It is embedded into the central DWD database called MIRAKEL and shares with other data tables, e.g. land station equipment and more. Until the end of 2005, the database was a client-server version and local licence software was required. In 2006, it was upgraded and migrated to DWD Intranet access.

Annex X

RSMC EXETER MONITORING REPORT

Monitoring the quality and timeliness of VOS observations

1. The Met Office (RSMC Exeter), as WMO-designated lead centre for monitoring the quality of surface marine meteorological data (observations from ships, buoys and other *in situ* marine platforms), compares observations from individual platforms with the Met Office's global model background 6-hour forecast fields for each variable. Platforms for which the observed values differ from the background by a significant amount are flagged as suspect.

2 Monthly lists of suspect platforms are sent to the WMO Secretariat (a recent suspect list for ships, fixed buoys and platforms, dated December 2006, is attached at **Appendix A** for information). These lists are also exchanged among the 4 lead monitoring centres (Met Office, JMA, NCEP and ECMWF), and other centres, for comparison. Generally, there is considerable agreement between the different centres, both in terms of suspect platforms and mean and standard deviation of differences from the background field. Since SOT-III, these monthly lists aremade available via the Met Office web site at:

http://www.metoffice.gov.uk/research/nwp/observations/monitoring/index.html

Examples of the website contents together with an extract from the suspect monitoring list for December 2006 are attached at **Appendix B**. It will be noted that each suspect ship can now be linked to a QC plot covering the previous month, showing time-series of observation-background values. Two examples are shown: the first plot shows a temporary bias in pressure and the second shows a more persistent but variable bias in relative humidity. (N.B. The plots of pressure currently show the values after any corrections have been applied at the Met Office.)

3 Initially only mean sea level pressure was monitored, but wind speed, wind direction, sea surface temperature, air temperature and relative humidity have also been added to the information being exchanged on a monthly basis. The current monitoring criteria for the six variables are shown in **Appendix A**. The meeting is invited to confirm that the monitoring criteria continue to be set at the correct levels.

4 The Met Office also produces monthly lists of monitoring statistics for the VOS fleets recruited by certain countries. To maintain up to date lists of the VOS fleets for each country concerned, the Met Office now uses WMO Pub 47, which should currently be updated quarterly. However, to ensure that recently recruited VOS vessels are also included, the Met Office also receives monthly fleet updates from a number of countries. These national lists would not be needed if the Pub 47 list could be updated monthly in the future. The Team is therefore invited to consider whether the frequency of Pub 47 procedures should be revised to allow countries to make monthly metadata submissions. This would help to ensure that observational problems could be dealt with in a more prompt manner. (N.B. At the time of writing, the Pub47 list has not been updated for 9 months, between June 2006 and March 2007.)

5 National focal points are now notified when the latest VOS monthly monitoring reports and suspect lists become available on the Met Office website by means of an email sent by the Met Office to the SOT, VOS and PMO mailing lists, which are maintained by JCOMMOPS. It is important therefore that focal points wishing to receive this monitoring information check that their JCOMMOPS mailing list information is kept up to date. However, the monthly monitoring statistics continue to be emailed directly to major VOS operating countries, and as mentioned in reports to previous SOT meetings, any other national focal points who may wish to receive directly emailed copies of the monthly monitoring lists or 'suspect' ship lists should advise the Met Office of their email address.

6 Detailed monitoring reports for all platforms, are produced every six months and made available to the WMO Secretariat via the Met Office web site. The statistics relating to suspect VOS operated by specific members are extracted from the report and distributed by the Secretariat to national focal points for the members concerned, under a covering letter requesting that remedial action be taken to

correct the problems. The Met Office also circulates paper copies of the 6-month report, but they no longer contain the individual time-series plots for each suspect platform, which made the report very bulky; the general overview and statistics are deemed more useful on this time-scale, although the time-series are still available from the Met Office web site.

7 Timeliness information for VOS reports received at the Met Office is now also being made available from our web site at

http://www.metoffice.gov.uk/research/nwp/observations/monitoring/marine/TOR/index.html,

where there is a table summarising the data timeliness for each country as well as graphs showing the timeliness of all VOS ships and for the main VOS operating countries. A graphical example for December 2006 data is shown in **Appendix C**, where it can be seen from the upper graph that the majority of ship reports were received promptly, with over 40% received within 30 minutes and 90% within 90 minutes of the observation time. The cut-off time for operational NWP global data assimilation is typically 90-150 minutes after the analysis times of 00, 06, 12 and 18 UTC, so at least 90% of global VOS data should be received in time to be assimilated. Timeliness information for individual callsigns on the Pub47 list is also available from the website.

8 Currently, the Met Office's role as CBS Lead Centre for monitoring marine data cannot be properly fulfilled, because Japanese ships cannot be monitored individually due to their unilateral adoption of a ‘SHIP’ masking scheme. For the Met Office to be able to resume monitoring of the Japanese ships will require work to set up special collection of the original data from JMA’s FTP server, once it is available. In addition to the costs this will incur, it will introduce extra complexity into the system and has implications for the timeliness of the data being made available.

9 Consequently, to ensure that VOS can continue to be monitored efficiently, Met Office (RSMC Exeter) would prefer that all countries adopt a masking method with a unique masked identifier for each ship. The impact of ship masking on monitoring activities was discussed at the Joint WMO-IMO Consultative Meeting in Geneva in February 2007 and the views of the Met Office are repeated here in **Appendix D**.

APPENDIX A TO ANNEX X

EXAMPLE AND EXCERPT OF MONTHLY SUSPECT LIST

MONITORING OF MARINE SURFACE OBSERVATIONS
MONTHLY SUSPECT LIST - SHIPS, FIXED BUOYS AND PLATFORMS
MONITORING CENTRE: EXETER
MONTH: DECEMBER 2006

Monitoring procedures

Period :One calendar month.
Data monitored :Reports from each unique identifier for ships, fixed buoys and platforms.
Standard of comparison :Background field from Exeter global model.
Observation times :All hours
Elements monitored :Mean sea level pressure (hPa).
:Wind speed (ms^{-1}).
:Wind direction (degrees).
:Air temperature (^oC).
:Relative Humidity (%).
:Sea surface temperature (^oC).

Parameters monitored

NOBS :Number of observations received, excluding duplicates.
%GE :Percentage of observations with gross errors.
%REJ :Percentage of observations flagged, excluding those with gross errors.
SD :SD of difference of observations from background values, excluding those with gross errors.
BIAS :Mean difference of observations from background values, excluding those with gross errors (N.B. a positive bias indicates the wind observation is veered to the background).
RMS :Root Mean Square difference of observations from background values, excluding those with gross errors.

GROSS ERROR LIMIT :15 hPa (pressure)
:25 ms^{-1} (vector wind)
:15 ^oC (air temperature)
:50% (relative humidity)
:10 ^oC (sea surface temperature)

SELECTION CRITERIA :NOBS >= 20 , and one or more of the following:

1.Bias	>=	4 hPa	(pressure)
	>=	5 ms^{-1}	(wind speed)
	>=	30 degrees	(direction)
	>=	4 ^oC	(air temperature)
	>=	15%	(relative humidity)
	>=	3 ^oC	(SST)
2.SD	>=	6 hPa	(pressure)
	>=	80 degrees	(direction)
	>=	6 ^oC	(air temperature)
	>=	25%	(relative humidity)
	>=	5 ^oC	(SST)
3.PGE	>=	25	

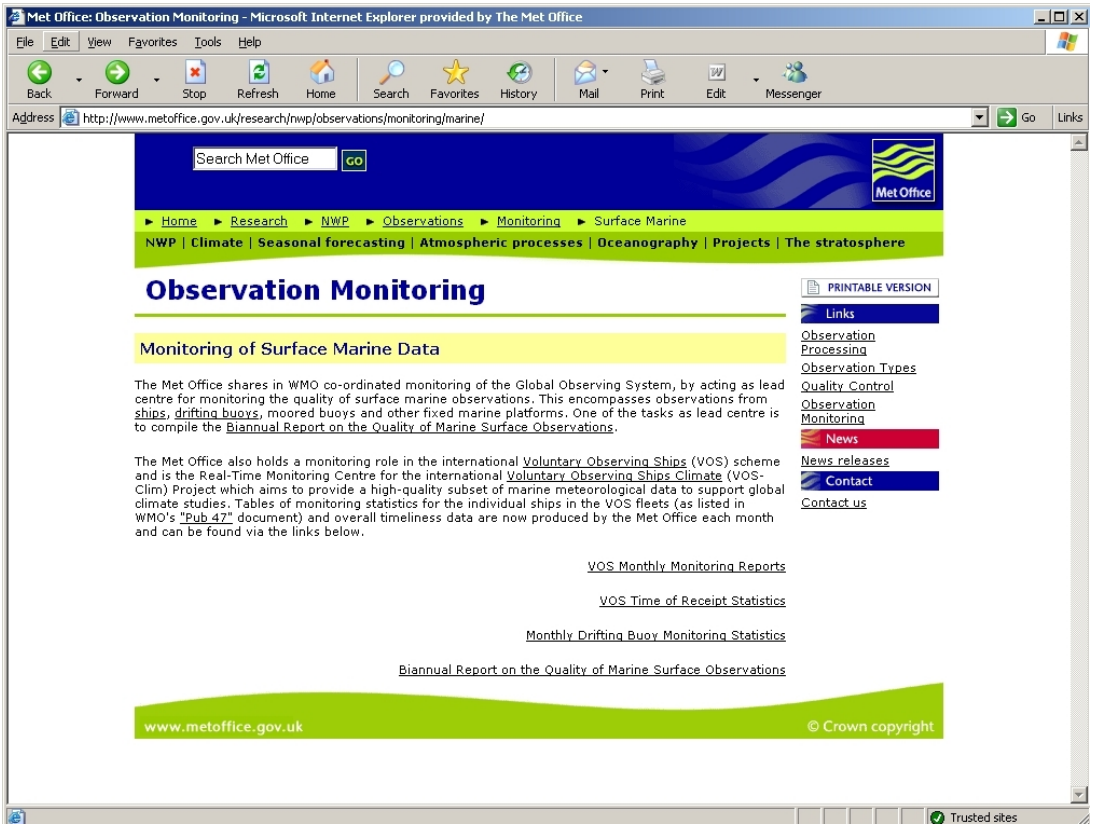
N.B. Observations of wind direction are only included in the wind direction statistics if the observed OR background wind speed > 5 ms^{-1}

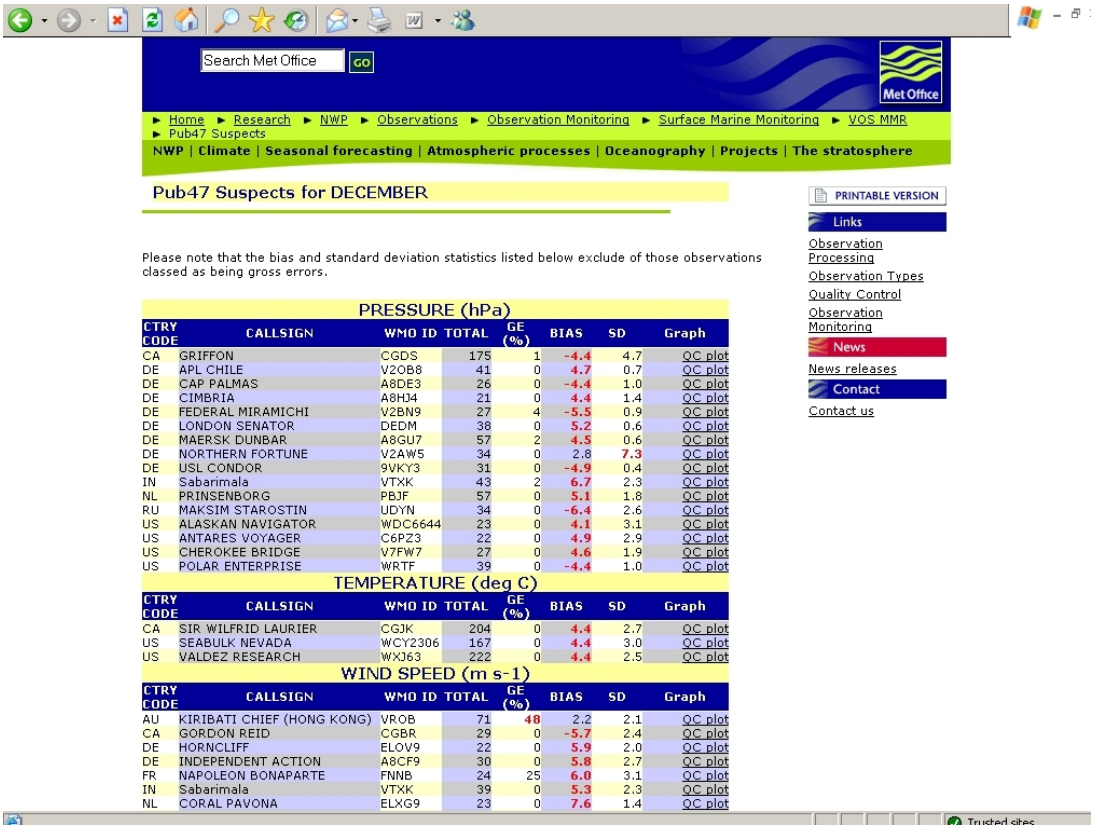
IDENTIFIER	ELEM	NOBS	%GE	%REJ	SD	BIAS	RMS
62147	P	60	0	93	1.7	-4.6	4.9
9VKY3	P	31	0	52	0.7	-5.1	5.2
A8DE3	P	26	0	100	1.4	-4.5	4.7
A8GU7	P	58	2	2	0.7	4.4	4.4
A8HJ4	P	21	0	76	1.7	4.5	4.8
C6FZ6	P	33	0	0	1.2	8.6	8.7
C6PZ3	P	22	0	18	3.5	4.8	6.0
CGDS	P	175	1	100	3.8	-5.1	6.3
DEDM	P	38	0	66	0.6	4.9	4.9
KS049	P	219	0	0	1.1	-4.2	4.4
LADC2	P	28	36	86	7.2	-6.4	9.6
MLTH5	P	27	0	70	3.4	-4.7	5.8
PBJF	P	57	0	65	2.1	4.9	5.3
TEST	P	218	100	100			
TESTCA7	P	131	0	100	0.7	-11.7	11.7
UCFT	P	50	2	12	2.3	-4.3	4.9
UDYN	P	34	0	85	2.7	-6.4	7.0
UGOU	P	57	0	47	2.9	-4.7	5.5
UICO	P	30	20	53	6.1	3.0	6.8
V2AW5	P	34	0	79	9.8	2.4	10.1
V2BN9	P	27	4	4	1.1	-5.7	5.8
V2OB8	P	41	0	41	0.9	4.3	4.4
V7BX3	P	20	0	20	2.2	4.2	4.7
V7FW7	P	27	0	44	2.7	4.3	5.0
VTXK	P	43	2	84	2.7	6.6	7.1
WMLG	P	28	0	100	6.0	3.1	6.8
WRTF	P	39	0	49	1.1	-4.6	4.7

...

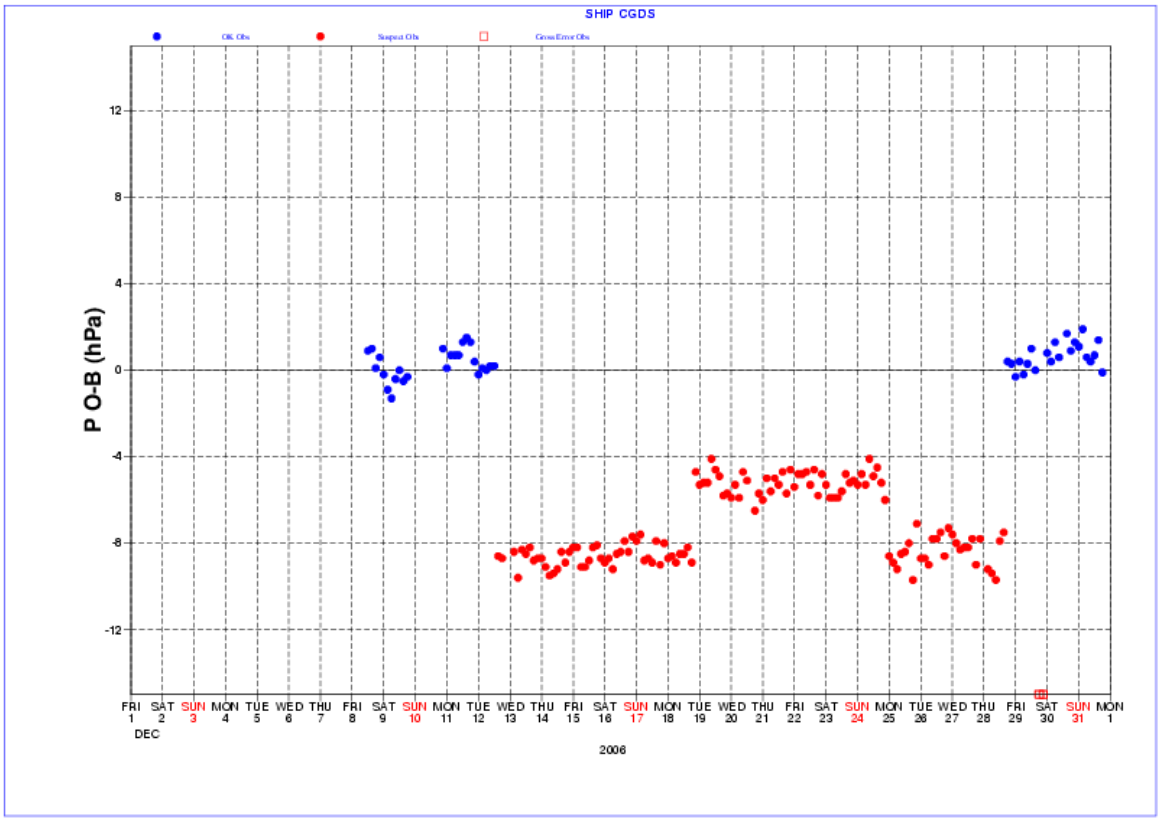
APPENDIX B TO ANNEX X

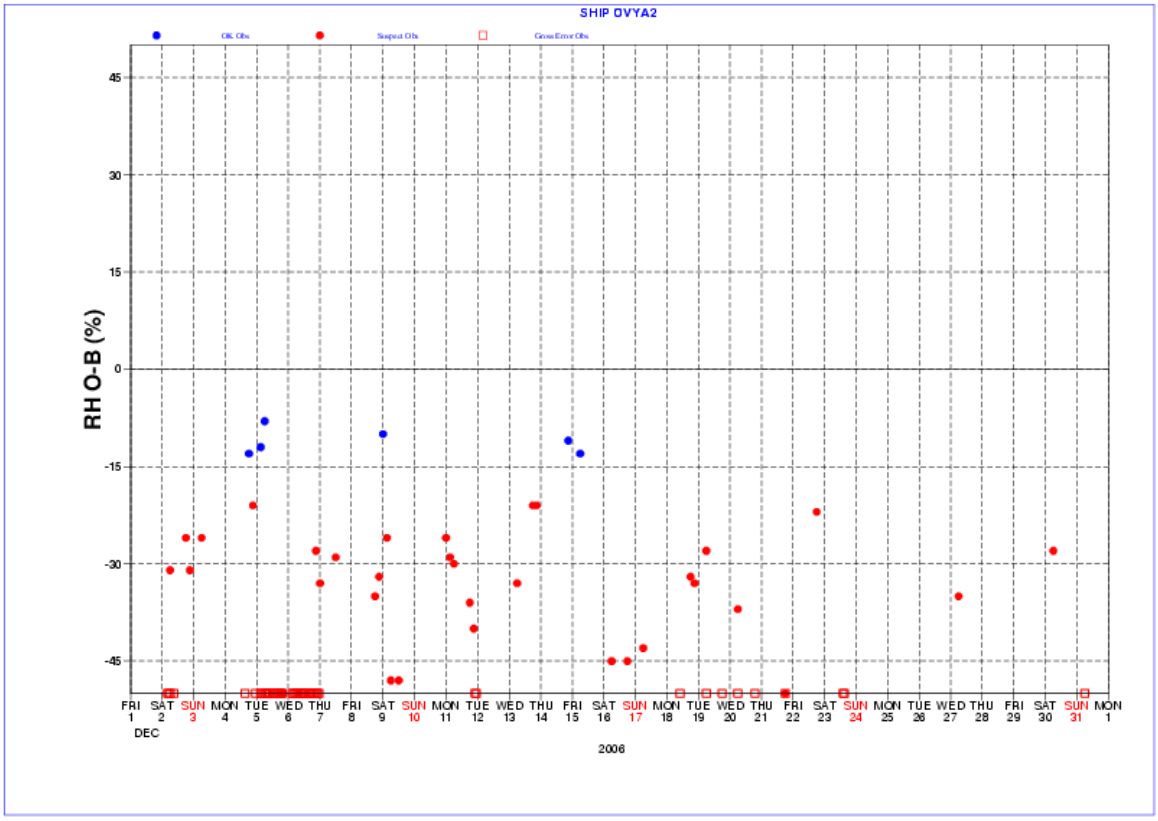
EXAMPLES OF CONTENT OF MET OFFICE OBSERVATION MONITORING WEB PAGES





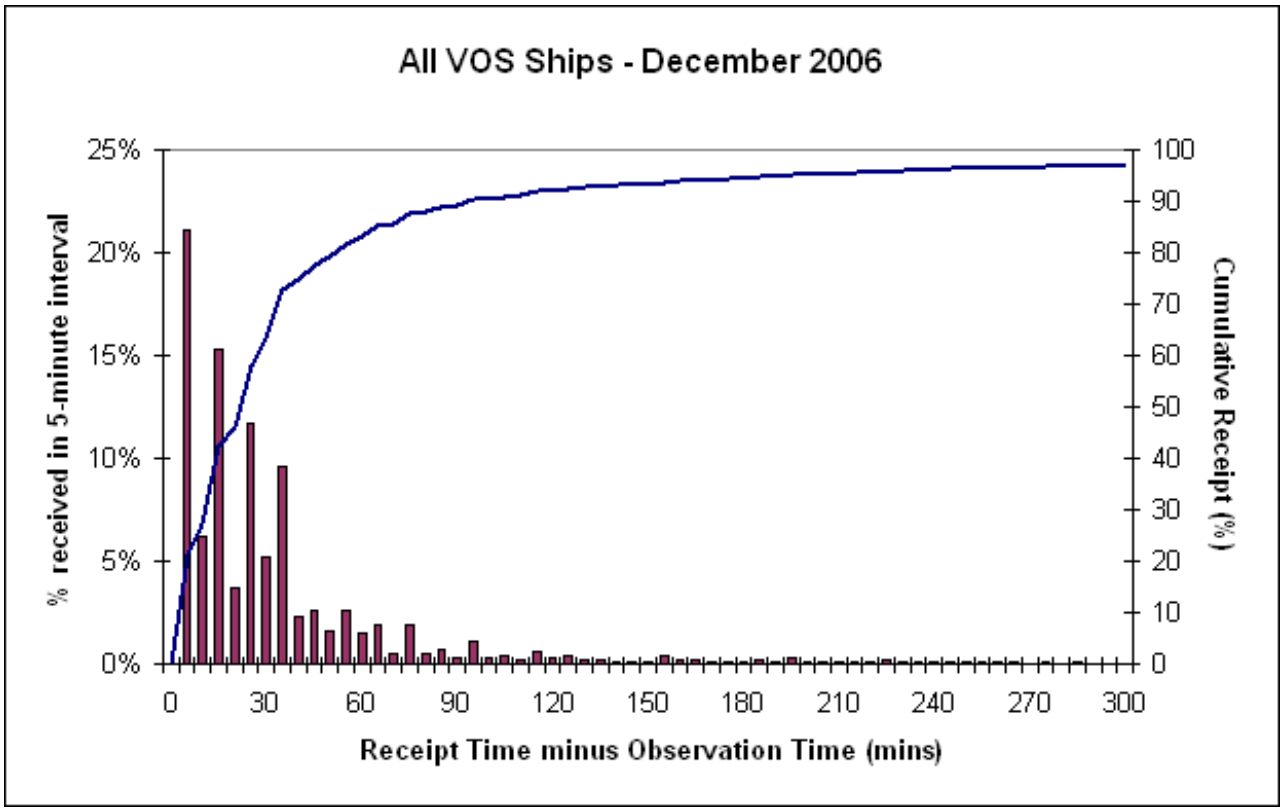
Examples of QC Plots – for Pressure (top) and Humidity (below)

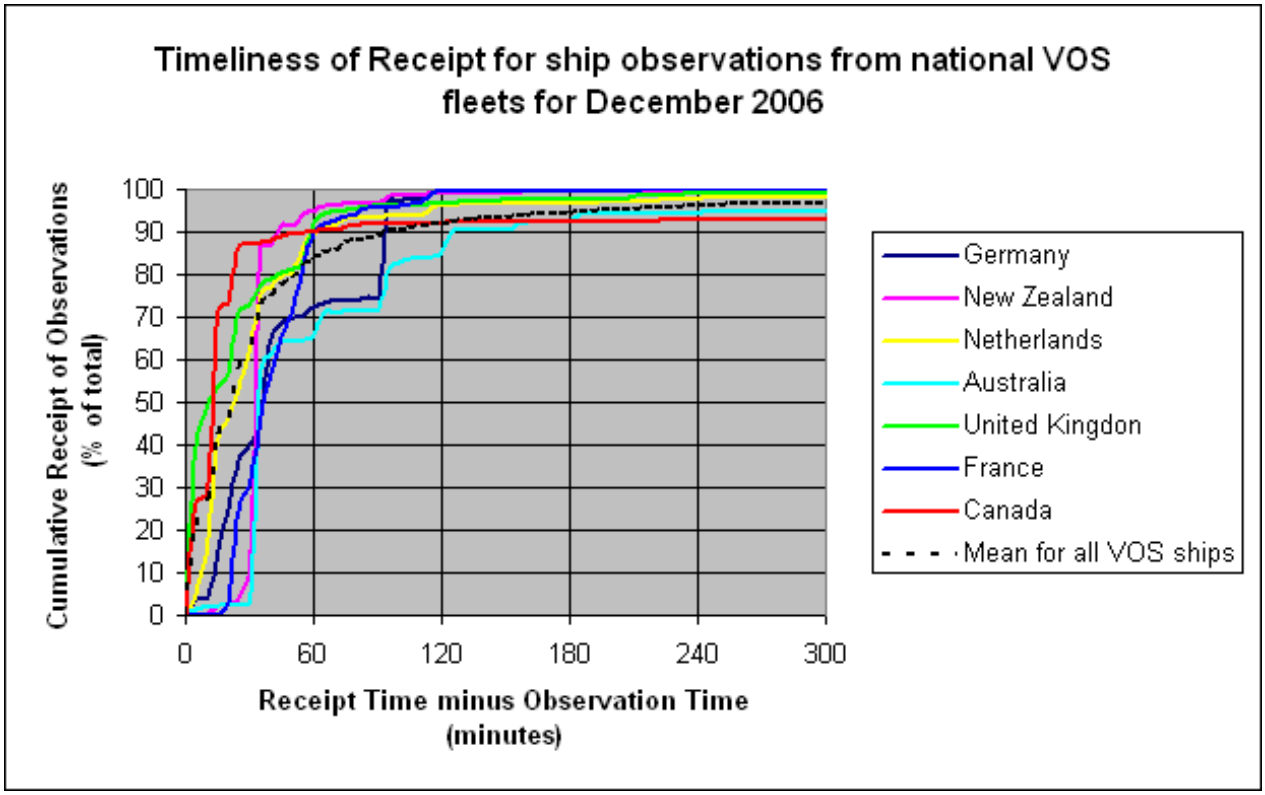


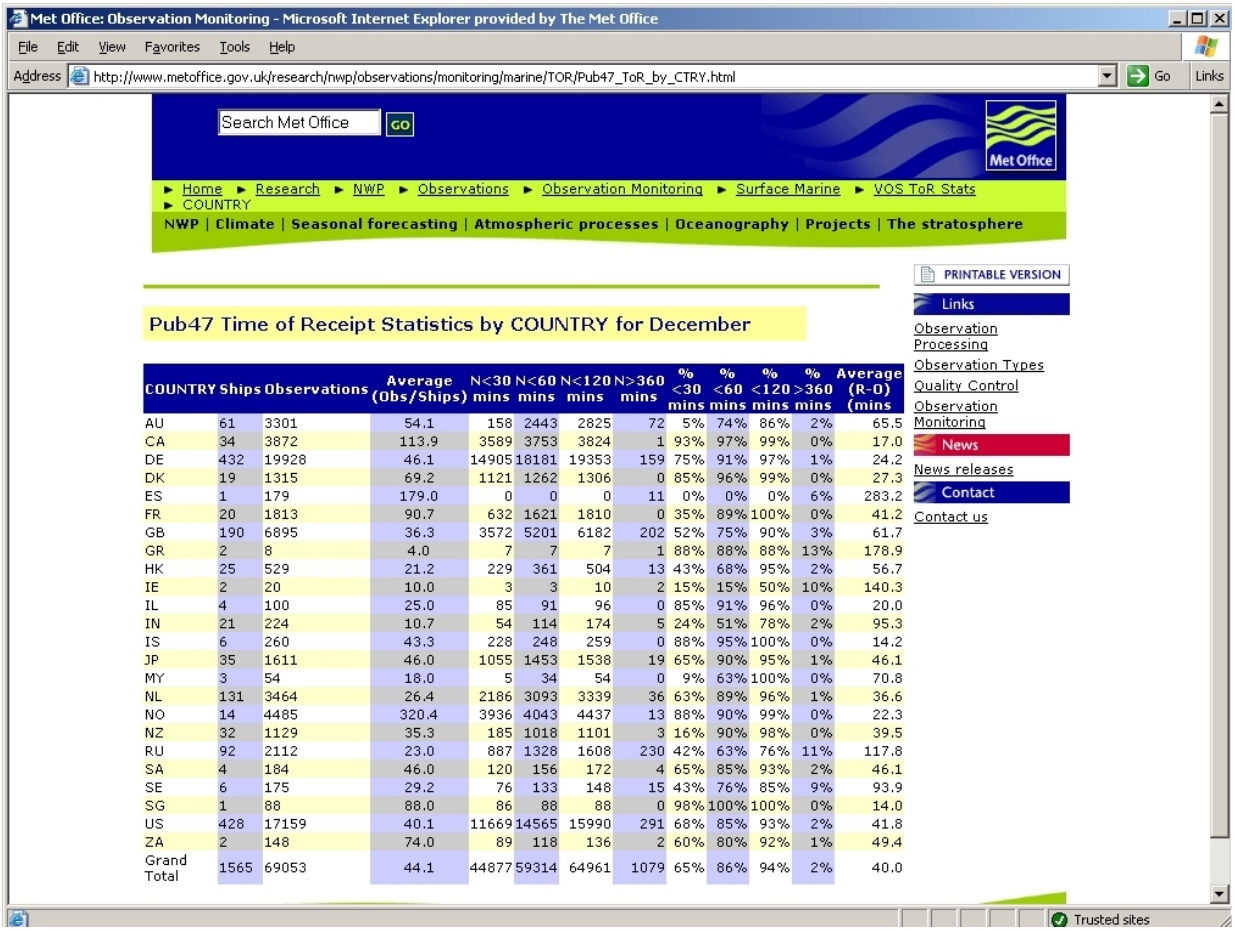


APPENDIX C TO ANNEX X

TIMELINESS OF VOS OBSERVATIONS RECEIVED AT THE MET OFFICE (UK)
DEC 2006







Pub47 Time of Receipt Statistics by COUNTRY for December

COUNTRY	Ships	Observations	Average (Obs/Ships)	N<30 mins	N<60 mins	N<120 mins	N>360 mins	% <30 mins	% <60 mins	% <120 mins	% >360 mins	Average (R-O) (mins
AU	61	3301	54.1	158	2443	2825	72	5%	74%	86%	2%	65.5
CA	34	3872	113.9	3589	3753	3824	1	93%	97%	99%	0%	17.0
DE	432	19928	46.1	14905	18181	19353	159	75%	91%	97%	1%	24.2
DK	19	1315	69.2	1121	1262	1306	0	85%	96%	99%	0%	27.3
ES	1	179	179.0	0	0	0	11	0%	0%	0%	6%	283.2
FR	20	1813	90.7	632	1621	1810	0	35%	89%	100%	0%	41.2
GB	190	6895	36.3	3572	5201	6182	202	52%	75%	90%	3%	61.7
GR	2	8	4.0	7	7	7	1	88%	88%	88%	13%	178.9
HK	25	529	21.2	229	361	504	13	43%	68%	95%	2%	56.7
IE	2	20	10.0	3	3	10	2	15%	15%	50%	10%	140.3
IL	4	100	25.0	85	91	96	0	85%	91%	96%	0%	20.0
IN	21	224	10.7	54	114	174	5	24%	51%	78%	2%	95.3
IS	6	260	43.3	228	248	259	0	88%	95%	100%	0%	14.2
JP	35	1611	46.0	1055	1453	1538	19	65%	90%	95%	1%	46.1
MY	3	54	18.0	5	34	54	0	9%	63%	100%	0%	70.8
NL	131	3464	26.4	2186	3093	3339	36	63%	89%	96%	1%	36.6
NO	14	4485	320.4	3936	4043	4437	13	88%	90%	99%	0%	22.3
NZ	32	1129	35.3	185	1018	1101	3	16%	90%	98%	0%	39.5
RU	92	2112	23.0	887	1328	1608	230	42%	63%	76%	11%	117.8
SA	4	184	46.0	120	156	172	4	65%	85%	93%	2%	46.1
SE	6	175	29.2	76	133	148	15	43%	76%	85%	9%	93.9
SG	1	88	88.0	86	88	88	0	98%	100%	100%	0%	14.0
US	428	17159	40.1	11669	14565	15990	291	68%	85%	93%	2%	41.8
ZA	2	148	74.0	89	118	136	2	60%	80%	92%	1%	49.4
Grand Total	1565	69053	44.1	44877	59314	64961	1079	65%	86%	94%	2%	40.0

APPENDIX D TO ANNEX X

QUALITY MONITORING ISSUES RELATED TO MASKING OF SHIP CALL SIGNS

1. During 2006 several ship call-sign masking systems have been set up, in order to help stop the withdrawal of ships from the VOS fleet over security concerns in having their positions displayed on the internet. However, masking ship identities in meteorological reports can potentially cause problems with the important activity of quality monitoring of individual ships' weather reports.

2. For European ship reports participating in the E-SURFMAR programme a scheme, using unique masked call signs has been proposed and is already being used for some ships. Similarly, Australia is proposing the use of masked call signs based on a different scheme (built from Australian identification numbers). From a data-monitoring viewpoint, it will always be preferable to have unique call signs, even if different masking schemes are being used in different parts of the world. The use of the same call sign within two different schemes should therefore be avoided, e.g. there should be no possibility of a clash of call signs between the Australian and E-SURFMAR schemes. In addition, monitoring centres will need to have access to a global database of masked call signs located in a single secure repository.

3. Japan has set up a non-unique masking system. Ship reports with real call signs are received at their Inmarsat Land Earth Station, where they replace the call sign by the letters 'SHIP' and insert the data onto the GTS. Thus, GTS users see only the masked 'SHIP' reports. JMA is planning to make the original ship data available in near real time on a secure server, from where it can be downloaded via FTP by monitoring centres, who can then discard the GTS 'SHIP' data. However, this approach relies on the monitoring centres having the necessary infrastructure within their observation processing systems to be able to set this up. The Message Switching Team at the Met Office will need to set up a system to obtain the data from JMA's server and route it into our meteorological database (MetDB) instead of JMA's 'SHIP' data (RJTD bulletins). The MetDB Team will then need to set up a system to accept and decode the server data and ingest it into the MetDB.

4. There is also the risk that other countries may decide to adopt similar schemes to the JMA, and similarly put their data onto dedicated servers. Therefore, if such schemes were adopted more generally, it would be better to have a single secure central server (possibly at JCOMMOPS?) where all countries could place their data and/or their call sign lists.

5. In summary, the Met Office (RSMC Exeter) considers that the generic 'SHIP' masking solution proposed by JMA will require all monitoring centres to set up special solutions for just the Japanese data (plus more work if other countries adopt similar solutions), which will delay the resumption of the monitoring of the Japanese ship data. In addition to the costs this will incur, it will introduce extra complexity into the system and may have implications for the timeliness of the data being made available. Consequently, the Met Office, as the CBS Lead Centre for the quality monitoring of marine data, would prefer that all countries adopt a masking method similar to that of either E-SURFMAR or Australia, with a unique masked identifier for each ship. Best practice would be to set up an agreed international system of masked call signs.

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Annex XI

REPORT BY THE TASK TEAM ON VOSCLIM PROJECT
(report provided by Ms Sarah North, Task Team Chairperson)

1. VOSClim Project Status

Although further progress has been made since SOT-III in March 2005 the levels of participation, and the volume of project data collected, continue to be slightly disappointing. Nevertheless it is considered that the project has achieved many of it is initial objectives and the procedures established for the project should gradually help to improve the quality of all VOS data and increase the contribution of the VOS/VOSClim to the Global Climate Observing System (GCOS).

At SOT-III, it was agreed that the project should progress from an 'implementation phase' into an 'evaluation phase' aimed at determining the added value of the VOSClim datasets. It was further decided that the VOSClim project should in future operate as a Task Team under the VOS Panel (VOSP) of SOT. An overview of the project status is at **Appendix A** while developments since SOT-III are detailed in the following paragraphs, together with issues that remain to be addressed

1.1 VOSClim Project Participation

At SOT-III (March 2005) the number of ships recruited to participate in the project stood at 113, whilst at the close of 2004 the number of ships recorded on the project website stood at 169 which is still short of the target figure of a minimum of 200 ships established at the start of the project. Details of participating ships are available on the project website at http://lwf.ncdc.noaa.gov/oa/documentlibrary/vosclim/vosclimshiplist.xls.

However, there have been delays between the notification of recruited ships to the Data Assembly Centre (DAC, based at the National Climatic Data Center (NCDC), Asheville NC, USA) and their listing on the project website (which at the time of writing this report was last updated six months ago, in September 2006). In recent months, there has been some additional recruitment of ships equipped with Automatic Weather Stations (AWS). France, in particular, has increased its level of participation to 21 ships, all equipped with BATOS AWS systems capable of collecting delayed mode project data in the required IMMT-3 format. Similarly, it is understood that that number of Canadian project ships equipped with AVOS AWS systems has been increased. Levels of manually reporting VOSClim ships have also increased since SOT III with the UK, Germany, the Netherlands and Australia having contributed additional ships. Details of the Netherlands recruits, including ship photos, are also now available on the KNMI website at http://www.knmi.nl/vos/vosclim/

Accordingly, it is anticipated that, by the time of the SOT-IV meeting, the target of 200 ships should be almost achieved. The levels of national participation drawn from the project website, together with details of the actual numbers anticipated by the time of SOT-IV and details of the number of ships that are actually reporting, are given in Table 1. An update on the current status will be given at SOT-IV

Country	Number of VOSClim ships at end 2004 (reported to SOT-III)	Number of VOSClim ships recorded on project website (updated 28 Sep. 2006)	Anticipated number of VOSClim ships by SOT IV (to be updated at meeting)	Number of VOSClim ships reporting (number of reports) Feb. 2007	Target number of ships to participate (notified at previous VOSClim meetings)
Australia	10	12	12	8 (140)	20+
Canada	14	14	[26]	20 (2469)	75
France	6	6	21	2 (257)	8
Germany	11	20	[22]	17 (446)	14
India	21	229	22	4 (113)	-
Japan	5	5	5	5 (1761)	5
Netherlands	1	18	23	14 (383)	-
UK	33	60	63	31 (862)	30+
USA	12	12	12	9 (221)	[~ 50]
TOTALS	**113**	**169**	**~200**		

Table 1: Contribution of ships to VOSClim by country

One of the reasons for the slow rate of recruitment to the project has been the increasing resource limitations faced by VOS operators, which in some cases has led to reduced PMO numbers (as noted at JCOMM-II) and less frequent ship inspections. It is however encouraging to see that despite these resource limitations the level of participation continues to increase.

Issue 1: *To ensure that the project data can be correctly monitored, and the datasets maintained up to date, it is essential that new recruitments and withdrawals are notified promptly to the DAC and that the ship list is maintained up to date on the project website. It is also important that full details of any call sign changes are notified to the DAC at the earliest opportunity. The VOS Quick Reference Guide for VOS Programme Managers (http://www.bom.gov.au/jcomm/vos/information.html#info1) indicates that both the DAC and the RTMC should be informed of any changes. However, it is apparent that this procedure is not operating efficiently. The meeting is therefore invited to consider how this procedure could be improved.*

Issue 2: *Although the number of ships is now reaching the target level, the volume of project data being collected is less than had originally been expected. The inclusion of a Pub 47 metadata module in the latest version of TurboWin should make recruitment of project ships a simpler process offering the opportunity to widen the current participation. The meeting is invited to consider strategies for increasing participation, whilst at the same time ensuring that data quality is not diluted.*

Issue 3: *Whilst the majority of manually reporting VOSClim ships are equipped with TurboWin electronic logbooks, a significant number are equipped with SEAS or OBSJMA software. Similarly, there are a growing number of different AWS software systems in use on both VOS and VOSClim ships nowadays. No comparison of the algorithms associated with these different software systems has yet been undertaken (although this issue has been raised at previous VOSClim project*

9 Indian VOSClim ships do not report the additional parameters

meetings). Bearing in mind changes made to the 10-metre reference height for wind speeds in TurboWin software the meeting is invited to consider whether there is a need to initiate an analysis of the different software systems now in use, and to document their different capabilities

Issue 4: *It has been noted since SOT-III that there are a growing number of ships 'self-recruiting' to the project i.e. some ships are ticking the VOSClim check box in the TurboWin program to participate in the project despite the fact that they have not been formally recruited by a Port Met. Officer. One way in which this might be avoided could be through incorporating a PMO password protected area in the TurboWin software. However, participation in VOSClim is actually triggered by the National VOSClim focal point advising of recruitment to the DAC & RTMC. Consequently, it could be argued that all ships using suitable electronic logbooks should be allowed to report the additional delayed mode IMMT-3 parameters, as this additional data from all ships would be extremely useful for quality assurance and bias correction. To some extent, this is already being done with some AWS systems, which automatically store the additional IMMT-3 data. This subset of data with the additional parameters would not be confused with the higher quality data from VOSClim ships (which are reported separately to the DAC and the RTMC). The meeting is therefore invited to consider:*

a) whether all ships using appropriate electronic logbooks or AWS logging software should record the additional 'VOSClim parameter's whether or not they formally participate in the project, and consequently,

b) whether any changes are needed to electronic logbooks, such as TurboWin

1.2 **Real Time Data**

The transmission of VOSClim ship observations from the RTMC to the project DAC continues to operate in accordance with the project requirements. The project ships (normally via Inmarsat C) in WMO Ship Code transmit reports, in the same manner as for normal VOS. The RTMC thereafter appends the six prime model parameters from the forecast model – pressure, relative humidity, air temperature, sea temperature, wind speed and wind direction – to the ship report. These data have been transferred to the DAC since July 2002, and data up to and including August 2006 are available from the project website. Although these data are transferred via the GTS to the DAC in BUFR Code, it is now planned to make back-up copies of the data available via the Met Office's external FTP server. A more detailed RTMC report will be submitted under agenda item IV-3.4.

1.3 **Delayed Mode Data**

The delayed mode observations from VOSClim ships (including the additional project code groups) are recorded on the electronic logbooks used by project ships and are subsequently downloaded by visiting Port Meteorological Officers, on a recommended three monthly basis. Minimum quality control procedures are applied to the collected delayed mode datasets before they are sent to the two Global Collecting Centres (located in Hamburg and Edinburgh). Having checked the data quality flags, and clarified any problems bilaterally, the GCC's then send the delayed mode data to the DAC for insertion on the project website. This has been done on a quarterly basis since March 2003. Unfortunately, it is not currently possible to access the delayed mode data from the DAC website

In September 2006, the IMMT-3 format formally came into use and permitted QC flags to be applied to additional project elements. It replaced the previous IMMT-2 format that allowed the collection of additional project elements and introduced in 2003. Unfortunately not all participating countries are submitting the necessary delayed mode data and the quantity of data submitted has been disappointing with only a quarter of the observations from project ships containing the additional delayed mode elements in 2005. A separate GCC report including information on the processing of delayed mode VOSClim data will be submitted under VOSP agenda item IV-3.3.

Issue 5: There is a pressing need to encourage all project participants to collect and to submit their ships delayed mode IMMT data to the GCC's on a regular quarterly basis. It has become

apparent that some countries were not fully aware of the procedures for IMMT submissions, while others were not able to apply the required MQCS procedures prior to submission to the GCC's, or had insufficient resources to do so (including possible resource contention with existing national QC procedures). Although this situation is gradually improving, the meeting is requested to encourage all project countries to review their procedures and to arrange for the routine submission of quality controlled delayed mode data in the current IMMT-3 format—with the highest priority on submission of the IMMT-3 data, even if MQCS is not yet practical. Although not currently within their remit, it is further suggested that the GCC's should be requested to take a more proactive stance with respect to the collection of delayed mode data from both VOSClim (and VOS) ships.

Issue 6: One of the key features of the VOSClim project was the concept that all relevant datasets (i.e. real time data and associated model data, delayed mode data, and metadata) should be available via a single location on the project website and readily available to climate researchers. Failure by the DAC to make the delayed mode data readily accessible via the project website, along with discrepancies between data streams and the often delayed availability of metadata, has therefore hindered the evaluation of the data by the scientific advisers to the project. The meeting is invited to discuss this issue and to provide guidance how this issue can best be resolved.

1.4 Metadata

VOSClim metadata is now collected in the same WMO Publication No. 47 format as used for normal VOS, although PMO's are expected to take additional digital images showing the location and exposure of instruments and to make schematic drawings of the ships arrangements. At the last session, it was agreed that these should be submitted to the DAC for archive only, as it was considered that inclusion of such digital imagery on the website could require considerable manual intervention.

The collected metadata is supposed to be made available quarterly via the WMO website [http://www.wmo.int/web/www/ois/pub47/pub47-home.htm] that is linked from the VOSClim website. Unfortunately, at the time of writing the most recent metadata available is for June 2006 (i.e. 2 quarters behind schedule). A new format for the WMO Pub. 47 metadata will be implemented in July 2007 and will be addressed under agenda item I-4.3.This new format includes recruitment/withdrawal dates for VOSClim ships and may therefore, in due course, simplify the process of listing VOSClim participating ships on the project website. VOSClim participants are therefore requested to start collecting metadata in the new format at the earliest opportunity

Issue 7: The storage and availability of Pub 47 metadata has been an ongoing problem throughout the life of the project. This issue will be considered under agenda items I-5.1.2 and IV3.6.

Issue 8: Although some photographic metadata for project ships has been inserted on the project website, this information is limited. As digital imagery is now also a requirement for standard VOS, the meeting is invited consider whether a more appropriate method of storing digital information is needed.

Issue 9; For those countries using TurboWin electronic logbooks the inclusion of a new metadata module in the latest version of the software (V 4.0) should, with time, simplify the collection of metadata by PMO's. As this metadata is maintained in electronic format at source, it would be relatively simple for this data to be transmitted back to VOS operators on a regular, say monthly, basis. It may also be possible to program the TurboWin software, which is linked to computer time, to request observers to make submissions at the required intervals. Monthly submissions would also assist the RTMC in preparing its monthly monitoring statistics. The meeting is invited to discuss this proposal and advise as necessary. The value of inclusion of similar features in other electronic logbook software should also be considered.
Issue 10; Because the new metadata module in TurboWin V4.0 is not password protected it is possible for ships observing officers to amend the recorded metadata themselves on board ship. Although some observers can be trusted with this responsibility, it nevertheless introduces the

possibility of increased metadata errors. Whilst the responsibility for the collection of metadata from ships should primarily rest with the PMO it could perhaps be helpful for observers to help with this task in certain cases e.g. when ships don't return to a homeport and inspections can be years apart. It would also help with keeping track of call sign changes for monitoring purposes. In such cases, it would however still be the responsibility of the recruiting NMS to vet the metadata before entering it into their databases and before making submissions to WMO Pub 47. The meeting is invited to consider whether metadata in electronic logbooks should be password protected

Issue 11: The collection of metadata in electronic format at source also brings into question the need for VOSClim-specific hardcopy recruitment/update forms to be completed for participating ships. One of the reasons why some PMO's may have been reluctant to recruit new ships is the complexity of the hardcopy form, which, together with the associated instructions, was originally intended to be a means to collect the required metadata. The meeting is therefore invited to consider whether the requirement to complete a hardcopy VOSClim recruitment form should be discontinued for ships equipped with the latest version of TurboWin. National practices for recording inspection would be unaffected.

1.5 Monitoring Statistics

Monthly monitoring statistics for the real time observed data continue to be produced by the RTMC on a monthly basis together with monthly listings of ships whose observations have been flagged as 'suspect'. These statistics are now made available to the DAC via the Met Office external FTP server. VOSClim focal points and PMO's are encouraged to take early remedial action to resolve any monitoring problems.

*Issue 12: Unfortunately, there have been ongoing problems with the availability of the monitoring statistics on the Project website [**http://www.ncdc.noaa.gov/oa/climate/vosclim/vosclim-stats.html**]. Although statistics are available up to and including November 2005, error messages are received when trying to access more recent statistics. This issue had been raised with the DAC but at the time of writing this report, the problem has not been resolved. (It is understood that additional resources may be made available at the NCDC to resolve such issues in the not too distant future).*

1.6 Project Website

The project website [http://www.ncdc.noaa.gov/oa/climate/vosclim/vosclim.html] is maintained by the DAC, and is intended to act as the main focal point for the project, providing users with easy access to the necessary data. In liaison with members of the Task Team, significant improvements were made by NCDC to the website design and layout in 2006. Although these improvements will help to promote the project, it is regretted that the problems of access to the underlying data, referred to in other sections of this report, have still to be resolved. A separate report by the DAC will be submitted under VOSP agenda item IV-3.4.

1.7 Project promotion – Project Brochure

Copies of the brochure were published at the outset of the project and can be downloaded for printing from the website. The brochure is also available in pdf format within the TurboWin program.

Issue 13: It is understood that printed copies of the VOSClim brochure are now in short supply amongst VOS operators. Printed copies of the brochure have been useful in encouraging new ships and masters to participate in the project, and look more professional than printing of hardcopies locally from electronic pdf files. The meeting is invited to consider whether the content of the brochure needs revision and whether electronic availability is sufficient. If a reprint is considered necessary, the meeting is invited to consider how it should be funded.

1.8 Project promotion – Project Newsletter

The first issue of the VOSClim project newsletter was issued in October 2003 and was made available for download via the project website. The newsletter was originally intended as a means for exchanging information and for keeping all those involved in the project – both ashore

and at sea – aware of the latest developments. Although resource limitations have prevented further copies of the newsletter from being issued, articles on the progress of the project have been included in publications such as the Mariners Weather Log, the Ocean Views, and the KMNI Marine Information Bulletin

1.9 Project promotion – Certification

The formats of the VOSClim Certificate of Appreciation (for presentation, unsigned, to ships observers) and the Certificate of Participation (for presentation, signed, to participating ships) were finalised in made available to participants in 2002, with copies are available for pdf download from the project website. Several participants are issuing framed Certificates of Participation to ships although it is unclear whether Certificates of Appreciation are being issued to observers

Issue 14: There are now varieties of different types of certificate being issued to observing ships (e.g. SOT participation certificates, AMVER certificates, national award certificates etc). The meeting is therefore invited to consider whether the certificate of appreciation should be discontinued

1.10 Masked Call signs

The masking of ship call signs in response to security concerns will be addressed separately under agenda item IV-4.1.2 and its implications for observation monitoring will be considered in the RSMC report under agenda item IV-3.1. This issue clearly has implications for the success of the VOSClim Project, especially if national met services adopt non-unique masked 'SHIP' solutions. Although Japan has already adopted such a scheme for its ships that send observations via Yamaguchi LES, it is understood that this will not apply to the Japanese research ships, which have been recruited to the project. Unique masked call signs such as those proposed by the E-SURFMAR programme will also have implications for the project, as a secure look up table, accessible by FTP server, will be needed to correctly identify the masked ships that have submitted data

Issue 15: Details of the masked project ships will need to be made known to the RTMC to enable observation monitoring to continue, and to enable project ship data to be correctly identified by the DAC. This will inevitably require changes to the data traffic systems in the RTMC, which will incur costs and may take some time to implement. A uniform international approach to this problem is therefore needed to avoid the RTMC having to develop different systems for individual national met service requirements. This will be discussed under agenda item IV4.1.2.

2. VOSClim Project Datasets

2.1 Dataset Construction

Because there have been a variety of issues with the availability of VOSClim data in recent years, attempts have had to be made to construct a version of the data from the following alternative sources;

- All surface marine observations (VOS, moored buoys and drifting buoys) from the Global Telecommunications System (GTS), along with co-located Numerical Weather Prediction (NWP) model output have had to be provided to the National Oceanography Centre, Southampton by the Met Office. The data are being updated in near real time (typically with a 2 day delay).
- The International Comprehensive Ocean-Atmosphere Dataset (ICOADS, http://icoads.noaa.gov/).

These data, along with Pub. 47 metadata (as available), and are now being used to construct a dataset of VOS reports, with associated model output and metadata. It is hoped to extend this using the delayed mode VOSClim parameters from the DAC when made available (or the GCCs if necessary) but it has not proved possible to do this yet. VOSClim data within the dataset are identified using a flag. Some results of the VOSClim analysis will be reported in the SOT-IV Technical Workshop.

Issue 16: Several differences between the contents of the different data streams have been identified. Around 10% of reports are available from only one stream, there are differences between the content of the records due to the different procedures, and adjustments applied at the different data centres. The JCOMM Expert Team on Marine Climatology will consider these differences at their 2nd Session in March 2007.

2.1 GTS data exchange and BUFR format

From 2012 all GTS international data exchange between National Met Services will be required to use either BUFR or CREX table driven formats. However, the use of existing BUFR templates for data exchange has its drawbacks and their use for VOSClim data exchange has implications for the consistency of the data

Issue 17: Although amendments to the VOS BUFR templates to include the additional VOSClim parameters have been developed for consideration by CBS working groups, the suitability and necessity of BUFR for VOSClim data exchange remains in question. The meeting is invited to consider this question and to consider the current status of the VOS BUFR template (which includes the VOSClim parameters), which will be discussed under agenda item I6.2.2.

Issue 18: Bearing in mind that it is planned to make a backup of the project BUFR data available to the DAC via the Met Office's external FTP server, the meeting is invited to consider whether the GTS remains the preferred system for the exchange of VOSClim data between the RTMC and the DAC or whether a move to FTP is desirable.

3 VOSClim 'Project' or 'Programme'

One of the original objectives of the VOSClim project, outlined in the Project Document, is the intention that it should eventually transform into a long-term operational programme. Although there have been some problems with data availability on the project website, the data delivery process is now effectively in place, and the target number of ships has almost been achieved. It is recognised that there remain a number of issues to resolve, such as those identified above, but these are now mostly matters of detail rather than substance.

Issue 19: Given the current state of progress of VOSClim given in this report, the meeting is therefore invited to consider whether it should remain as a 'project', or whether the time is now approaching when it should be established as a fully integrated component of the VOS Programme. If so how best, can this be achieved? e.g. should it continue as VOS Climate subset within the VOS Scheme? Alternatively, should a decision be made to progressively aim to upgrade all suitable VOS to higher quality VOSClim standards?

APPENDIX A TO ANNEX XI

Overview of VOSClim Project Status

Element of VOSClim Project	Implemented?	Status
Recruitment	Yes - but more needed	Initial target of 200 ships almost met.
Real time data exchange	Mostly	Data after July 2006 not available from DAC website. Backup FTP transfer to be implemented BUFR template not ideal for exchange.
Metadata availability	Partly	Metadata often only available with significant delay. Availability of digital imagery not fully resolved
Delayed mode data exchange	Mostly	IMMT-3 approved by JCOMM-II. MQCS-V being implemented by participating countries. Data not available from DAC website.
Monitoring	Mostly	Monthly statistics for full range of variables being produced by RTMC. Monitoring information available up to November 2006 from DAC website. Mechanisms for logging monitoring follow up not fully resolved
Project Promotion	Yes	Brochure available. Newsletter and articles issued Certification being issued
VOSClim website	Partly	Website updated in 2006 Not all data streams available on website. Recent monitoring information not available.
VOSClim Dataset	Partly	Assembled from a variety of sources (still need update for recent metadata and delayed mode data). No mechanism for regular updating.
Scientific Analysis	Partly	Exploitation of dataset delayed by past lack of availability of data streams. Scientific journal paper published using VOSClim dataset. Some comparison of VOS and VOSClim reports (SOT-IV Scientific and Technical Workshop). No wide engagement from scientific community (interest expressed but suitable datasets not yet available).
Review	Starting	Review of requirements for both VOS and VOSClim requested by JCOMM-II.

Review of Status of action items from SOT-III

III-B/1.3.2	DAC to link to the latest version of Pub. 47 on the WMO web site and the JCOMM VOS web site, and the tools for metadata display and interrogation on the JCOMMOPS website.	DAC	Done

III-B/1.3.2	Scientific Advisers to be responsible for the association of metadata with individual VOSClim reports. A mechanism for the provision and storage of VOSClim digital images to be investigated.	Scientific Advisers and DAC	Part done
III-B/1.3.3	Increased recruitment of VOSClim ships.	VOSClim operators, VOS operators who have yet to contribute	Ongoing/ done
III-B/2.1.2	RMTC to take appropriate actions so that only reports received in ocean areas (model surface type 'ocean') would be included in the monitoring statistics.	RTMC	Done
III-B/2.1.2	Operators who had responded to the monitoring statistics to provide feedback on remedial actions.	VOSClim operators	Part done
III-B/2.1.2	Once the VOS monitoring feedback system is established, using JCOMMOPS facility, mechanism to be extended to VOSClim project.	RTMC, JCOMMOPS Coordinator, VOSClim operators	Not done
III-B/2.1.2	An up-to-date list of the project focal points to be maintained on the web site.	VOSClim operators	Done
III-B/2.1.2	Modifications to the list of participating ships to be sent to the RTMC and VOSClim Data Assembly Centre	VOSClim operators	Part done
III-B/2.2.1	DAC and RTMC to take actions to recover data from the Met Office to fill the gap in the BUFR data stream between the end of April and the end of August 2003 due to the transition from e-mail to GTS transmission of the BUFR data stream.	DAC and RTMC	Done
III-B/2.2.2	DAC and the RTMC to agree on improved mechanisms, which will be put in place to avoid RTMC BUFR data loss.	DAC and RTMC	In hand
III-B/2.2.2	Mechanisms for simplifying data delivery between RTMC and the DAC, such as ftp, to be considered	DAC and RTMC	In hand
III-B/2.2.2	DAC to simplify data delivers to users using ftp site.	DAC	Part done
III-B/2.2.2	RTMC to investigate whether the monthly statistics and suspect lists can be transferred to the DAC by ftp rather than e-mail.	RTMC	Done
III-B/2.3	VOSClim operators to ensure implementation of the latest version of IMMT.	VOSClim operators	Ongoing/ Part done
III-B/2.3.2	All contributing members of the VOSClim project to review their delayed mode data submission processes to the GCCs in IMMT-2 or IMMT-3, and ensure or work toward their processes and submissions being up-to-date	VOSClim operators	Ongoing
III-B/2.3.3	France to attempt to revise the BATOS system.	France	Done
III-B/3.1.1	Since the lack of delayed mode data for the VOSClim project is a problem, as an interim measure VOSClim operators to provide raw data from the data entry software direct to the Scientific Advisers.	VOSClim operators	Not done
III-B/3.1.2	Scientific Advisers to convene an informal 'Scientific Users Group' to widen expertise inform the development of the high-quality dataset and guide the assessment and exploitation of the value of VOSClim datasets.	Scientific Advisers	Part done
III-B/3.1.2	A strategy for the future production and maintenance of a high-quality dataset to be developed and agreed based on results of assessment of value of VOSClim datasets. The strategy to include a determination of how many ships and observations will be needed to ensure the quality of the dataset.	Scientific Advisers	In hand
III-B/3.1.3	JCOMMOPS to set up and maintain a VOSClim Task Team mailing list.	JCOMMOPS	Done
III-B/3.1.4	New Task Team on VOSClim to prepare a report to SOT-IV on, inter-alia, overarching VOSClim issues.	Task Team on VOSClim	This report
III-B/3.1.5	Scientific Advisers to produce a VOSClim dataset for presentation at SOT-IV. Mechanisms for the maintenance of the dataset to be developed.	Scientific Advisers	Part done
III-B/3.1.5	VOSClim operators who are currently not providing delayed mode data in IMMT-2 and IMMT-3 formats to the GCC to contact the Scientific Advisers (eck@noc.soton.ac.uk) to arrange delivery of delayed mode data as a temporary measure to allow scientific assessment to proceed.	VOSClim ship operators	Not done

III-B/3.2.2	As an alternative to issuing a VOSClim Newsletter, Robert Luke (USA) to include an updated VOSClim article in a coming edition of the US Mariner Weather Log. NMS encouraged to take similar actions.	Robert Luke, NMS	Done
III-B/3.2.3	DAC to review the front page of the VOSClim web site and make revisions as appropriate. The Task Team on VOSClim to advise the DAC regarding any web site enhancement.	DAC and Task Team on VOSClim	Done

Annex XII

REPORT OF THE REAL TIME MONITORING CENTRE OF THE VOSCLIM

1 The Met Office agreed to act as the Real Time Monitoring Centre (RTMC) for the project at the second meeting of the VOS Climate Project (VOSClim-II).

2 In accordance with the Terms of Reference agreed for the RTMC, the observed project variables (i.e. pressure, air temperature, relative humidity, sea surface temperature, wind speed and wind direction) are extracted from the GTS for each project ship and co-located with the associated model field values prior to transfer to the Data Assembly Centre (DAC). In addition, ship-monitoring statistics are produced by the RTMC and provided to the DAC on a monthly basis, with statistics for 'suspect' ships being sent to the national focal points.

3 Further information and details of progress made by the RTMC since the last project meeting are given below.

Monitoring Statistics

4 At the last project meeting (SOT-III/VOSClim-V) it was agreed to keep the values for the real time monitoring of the observed variables at the levels given in **Appendix A** to this report.

5 Since the SOT-III/VOSClim-V meeting:

- The RTMC has continued to update its list of project ships, following notification of changes to the list of project ships maintained on the VOSClim website.

- In accordance with the agreement at SOT-III (III-B/2.1.2), the RTMC has modified its software to only include those ship reports made over model sea points in the statistics used for deciding whether a ship is 'suspect'. However, the complete monthly statistics sent to the DAC still include all ship reports, including those from model land points (otherwise some ships that regularly report close to land would not appear in the list of statistics). The meeting is invited to comment on whether they wish the RTMC to modify its monthly statistics supplied to the DAC to exclude ship reports made at model land points.

- The RTMC has replaced the sending of the monthly statistics and suspect lists to the DAC by e-mail with placement on the Met Office's external FTP server, ready for the DAC to download.

- The RTMC has recently stopped producing monthly statistics for the list of prospective (or candidate) ships held on the project web-site. This has been done because the list has not changed in two years and appears to be of little use in recruiting new ships. As the project is now nearing its initial target of 200 ships, it is suggested that there is no longer a need to monitor these candidate ships and suggested that the list can now be deleted from the VOSClim website.

- Due to major changes in the software used in the monitoring of data at the Met Office, the RTMC has had to modify its monitoring statistics. The normalised standard deviation and the 'true bias' can no longer be calculated and have been removed from the 4 variables for which they were previously produced. This has had the side effect of simplifying the system and should reduce confusion among PMOs about the different criteria.

6 The RTMC now produces the following monitoring statistics for project ships:

- **Monthly Ship Statistics** – As mentioned above, a list of monitoring statistics for all participating project ships is put on to the Met Office external FTP server on a monthly

basis, ready for the DAC to retrieve for inclusion on the project web-site. A recent example of these statistics, for January 2007, is given in **Appendix B** (pressure only, to save space).

- **Monthly 'Suspect' List** - A list of monitoring statistics for project ships identified as having submitted 'suspect' observations, is sent to the project focal point in each participating National Met. Service (NMS) on a monthly basis. A copy of the list is put on to the Met Office external FTP server, ready for the DAC to retrieve for inclusion on the project web-site. The suspect lists are based upon the criteria established for the six observed variables (in **Appendix A**). The lists should enable VOSCLim Focal Points and their associated PMO networks to resolve any quality problems. A recent example of the suspect list, for January 2007, is given in **Appendix C.**

7 In order to ensure that the monitoring process operates effectively it is essential that:

- National focal points to whom the monitoring statistics are to be disseminated are clearly identified, with e-mail addresses kept up to date on the project web-site.

- The call signs of ships participating in the project are maintained up to date on the project web-site, as this list is used as the basis for generating monitoring statistics. It would be helpful if updates to this list could also be copied to the RTMC.

8 On the basis of almost 5 years of monitoring, the RTMC considers that most of the criteria for the real time monitoring (in **Appendix A**) have been set at approximately the correct levels. The exception may be the bias limit for relative humidity, which seems to be slightly low. The meeting is asked to consider whether a slightly higher limit of 12% or 15% may be more appropriate (the RTMC favours 12%).

9 At previous VOSClim meetings it was suggested that details of any remedial action taken by the PMOs in response to the monitoring information should be sent to the DAC via national focal points. The information could then be made available through the project web-site in order to avoid duplication of effort by PMOs in other countries who may be intending to visit a suspect project ship. Unfortunately, due possibly to pressures on PMO workloads, this does not appear to have been happening. By recording such actions, it should be easier to pre-empt such problems from recurring in the future, whilst at the same time allowing an analysis of the type of problems being encountered to be made. The meeting is therefore invited to further consider whether details of remedial actions taken should be made available and how this could best be achieved.

Data Transfer

10 The RTMC is also responsible for ensuring the transfer of project ships' observations, and the associated co-located model data, to the DAC.

11 From April 2003 the Met Office has produced the VOSClim BUFR data on a daily basis and transmitted it to Washington via the GTS, from where it is sent on to the DAC.

12 Work has begun on putting a backup copy of the daily VOSClim BUFR data onto the Met Office's operational external FTP server, to be available for the DAC to access in case of problems with the GTS data. This work has been delayed somewhat due to the Met Office changing its external FTP server system.

13 The 47 elements included in the BUFR messages have not changed since they were agreed at VOSClim-III in January 2002. For ease of reference, the list is attached at **Appendix D**.

Masked Call signs

14 The masking of ship call signs has been discussed elsewhere, including in Item IV-A 3.1, but it should be noted that the use of generic ‘SHIP’ callsigns may cause problems with the data transfer and the monitoring of VOSClim ships.

APPENDIX A TO ANNEX XII

MONITORING CRITERIA FOR SUSPECT SHIPS

1. For each ship and each variable, there should be at least 20 reports during the period (if there are fewer reports the statistics may be unreliable and no action is needed).

2. Then, either:

   a) The number of gross errors should exceed 10% of the number of observation reports (where the observation-background (o-b) limits for individual gross errors are shown in column 4 of the following table); or,

   b) One of the limits shown in columns 2 and 3 in the table should be exceeded for either:
      (i) the mean value of o-b over the period (absolute value), or
      (ii) the standard deviation of o-b over the period

(1) **Variable**	(2) **Mean o-b limit**	(3) **Std. Dev. o-b limit**	(4) **Gross error limit**
Pressure (hPa)	**2.5**	**5.0**	**15.0**
Wind speed (m/s)	**5.0**	**10.0**	**25.0**
Wind direction (degrees)	**30.0**	**60.0**	**150.0**
Air Temperature (^{0} C)	**2.0**	**4.0**	**10.0**
Relative humidity (%)	**10.0**	**20.0**	**50.0**
Sea surface temp. (^{0} C)	**2.0**	**4.0**	**10.0**

3. If either of the limits on o-b statistics in columns 2 and 3 are exceeded the project ship's observations will be considered 'suspect' and corrective action will need to be taken (e.g. by the Port Met Officers). Column 4 contains the o-b limits for each ship observation beyond which the observation will be regarded as a 'gross error'.

APPENDIX B TO ANNEX XII

MONITORING STATISTICS FOR VOSCLIM SHIPS FOR JANUARY 2007

Standard of comparison: 6-hour forecast (background) from the Met Office Global NWP Model.
Column headings:

CallSign - Ship's call sign.
NumObs - Number of observations from each ship received during the period of the report.
%GrEr - Percentage of observations with 'gross errors' (excluded from the statistics).
Bias - Mean value of the observation-minus-background (o-b) values.
RMS - Root mean square of the o-b values.
StdDev - Standard deviation (SD) of the o-b values.

Pressure (hPa)

CallSign	NumObs	%GrEr	Bias	RMS	StdDev
8PNK	17	0.0	1.5	2.3	1.7
9KWH	43	0.0	0.2	0.6	0.6
9KWP	15	0.0	0.2	0.5	0.5
A8CN8	21	0.0	0.6	1.0	0.8
A8ET9	24	0.0	2.0	2.1	0.6
C6IZ7	14	0.0	-1.3	3.0	2.7
C6KD5	51	0.0	-0.7	3.1	3.0
C6KD6	53	0.0	-0.0	1.9	1.9
C6KD7	77	1.3	1.0	2.2	2.0
C6SS3	45	0.0	-0.7	2.0	1.9
CG2958	434	0.0	0.6	1.1	0.9
CGDS	238	0.0	0.5	0.9	0.7
CGJK	233	0.0	0.2	0.9	0.9
CGTF	58	0.0	-0.5	1.2	1.1
DGHX	26	0.0	0.5	1.1	1.0
DGXS	25	0.0	0.2	0.6	0.6
DQVH	46	0.0	-0.1	1.0	1.0
DQVI	27	0.0	-0.8	2.2	2.1
DQVJ	20	0.0	-1.8	2.3	1.5
DQVK	43	0.0	-0.6	0.9	0.7
DQVL	51	2.0	0.4	1.0	0.9
DQVM	36	0.0	-0.6	1.2	1.0
DQVN	63	0.0	-0.5	0.9	0.7
DQVO	8	0.0	-0.1	0.7	0.7
ELXS8	75	0.0	0.3	1.0	1.0
ELXT8	28	0.0	-0.9	1.3	0.9
ELZU8	52	0.0	1.2	1.4	0.7
FNCI	5	0.0	-0.5	0.7	0.5
FNCM	153	0.0	1.2	1.3	0.4
FNJI	109	0.0	0.4	0.8	0.7
GBQM	10	0.0	2.5	3.8	2.8
GBTT	37	0.0	1.0	2.6	2.4
IBPW	25	0.0	1.0	1.3	0.9
JCCX	166	0.0	0.2	0.8	0.8
JDWX	141	0.0	0.0	0.7	0.7
JGQH	307	0.0	-0.1	0.6	0.6
JIVB	204	0.0	0.0	0.6	0.6
JPBN	348	0.0	0.3	0.7	0.6
MHCQ7	31	0.0	-0.1	1.2	1.2

MHMZ8	9	0.0	-1.3	2.1	1.7
MLBB4	15	0.0	0.5	0.8	0.6
MQEC7	52	0.0	-0.2	0.6	0.6
MXBC6	6	0.0	-0.5	1.2	1.1
MXMM5	28	0.0	0.0	0.8	0.8
MYJM3	17	0.0	1.2	2.0	1.6
MYSU5	35	0.0	-0.0	1.6	1.6
MZER8	46	0.0	-0.5	1.1	1.0
MZFC6	39	0.0	0.2	0.6	0.6
MZGK7	19	0.0	-0.3	0.6	0.5
MZIM8	35	0.0	-0.5	1.5	1.4
ONDB	21	0.0	-0.8	1.4	1.1
OVSB2	24	0.0	-0.6	1.4	1.3
OVZV2	19	0.0	0.0	0.6	0.6
OYYK2	16	0.0	-0.3	0.9	0.9
OYYL2	23	0.0	-0.8	1.2	0.9
PCHS	9	0.0	0.1	1.4	1.4
PDHO	48	0.0	-2.7	2.8	0.9
PDHP	11	0.0	0.7	1.1	0.9
PDZS	64	0.0	-0.5	2.1	2.0
PECS	30	0.0	-0.6	0.9	0.7
S6TS	34	0.0	0.4	0.8	0.7
V2FM	21	0.0	0.2	0.9	0.9
VCLM	191	0.0	-0.2	1.2	1.2
VMAL	14	0.0	0.4	3.2	3.2
VNNM	37	0.0	0.4	1.0	0.9
VOCJ	221	0.0	-0.0	0.8	0.8
VQBW2	19	0.0	-0.4	1.1	1.0
VQGB2	26	0.0	0.1	1.1	1.1
VTXG	27	0.0	2.1	2.5	1.3
VTXK	68	0.0	6.5	6.7	1.5
VVGQ	16	0.0	-0.5	1.0	0.9
VVJV	9	0.0	2.0	2.6	1.7
VWNS	9	0.0	0.9	1.6	1.3
VWXG	12	0.0	-0.3	0.6	0.5
WCX8812	39	0.0	-1.3	1.6	0.9
WCX8882	24	0.0	0.6	1.1	0.9
WCX8884	27	0.0	-0.9	1.5	1.2
WFLG	58	0.0	-2.3	2.6	1.3
WNDP	18	0.0	-1.5	2.3	1.8
WRYC	27	0.0	-1.7	1.9	0.9
WRYD	15	0.0	-1.6	2.9	2.4
ZCBD3	27	0.0	1.0	1.3	0.8
ZCBN5	26	3.8	0.2	0.8	0.8
ZCDH7	23	0.0	0.6	3.3	3.2
ZDLP	50	0.0	-0.1	1.0	1.0
ZDLS1	52	0.0	0.2	0.9	0.9
ZNQO3	9	0.0	-0.0	1.8	1.8
ZQAY4	63	0.0	-2.1	2.9	2.0

APPENDIX C TO ANNEX XII

VOSCLIM SHIP SUSPECT LIST FOR JANUARY 2007

All VOSClim ship data is monitored against background 6-hour forecast fields for all variables except SST, for which analysed fields from the previous day are used.

Key to table below

NumObs : number of observations (obs) from the ship during the month
%GE : percentage of obs with gross errors (for GE limits see below)
StdDvn : standard deviation of obs-background, excluding obs with gross errors
Bias : mean obs-background, excluding obs with gross errors
RMS : root mean square of obs-background, excluding obs with gross errors

Suspect selection criteria for each variable:
at least 20 observations from the ship and one or more of the following:-
%GE > 10%
|Bias| > Bias limit (see below)
StdDvn > StdDvn limit (see below)

Limits:	Press.	Wind Speed / Direct.		Air Temp.	Rel.Hum.	SST
	(hPa)	(m/s)	(deg)	(deg C)	(%)	(deg C)
Bias limit	2.5	5	30	2.0	10	2.0
StdDvn limit	5.0	10	60	4.0	20	4.0
GE limit	15.0	25	150	10.0	50	10.0

Callsign	Element	NumObs	%GE	StdDvn	Bias	RMS
PDHO	Press	48	0	0.9	-2.7	2.9
VTXK	Press	68	0	1.5	6.5	6.7
VCLM	Speed	35	11	4.8	4.1	6.3
VTXK	Speed	63	0	3.0	7.4	8.0
ZDLP	Speed	50	14	2.4	0.5	2.5
CGJK	Temp	233	0	1.5	4.1	4.3
PDZS	Temp	63	0	2.2	2.3	3.2
CGJK	RelHu	233	0	8.8	-10.7	13.8
C6SS3	RelHu	45	0	5.6	12.5	13.7
ELXT8	RelHu	28	0	14.0	20.0	24.4
IBPW	RelHu	25	0	7.5	17.1	18.6
PDZS	RelHu	62	0	12.6	-13.0	18.1
VOCJ	RelHu	221	0	8.2	-10.5	13.3
VTXG	RelHu	27	0	9.8	10.0	14.0
ZCBN5	RelHu	25	0	6.1	10.4	12.0
DQVN	SST	65	0	0.6	2.1	2.2
VOCJ	SST	39	0	2.4	3.3	4.1

APPENDIX D TO ANNEX XII

BUFR CODE TEMPLATE

CALL_SIGN
LTTD
LNGD
YEAR
MNTH
DAY
HOUR
MINT
COLTN_CNTR
BLTN_IDNY
MSL_PESR
SRFC_WIND_SPED_RCRDG_IDNY
SRFC_WIND_DRCTN
SRFC_WIND_SPED
SRFC_WIND_U
SRFC_WIND_V
SRFC_AIR_TMPR
WET_BULB_RCRDG_IDNY
WET_BULB_TMPR
SRFC_DEW_PONT_TMPR
SRFC_RLTV_HUMDY
HRZL_VSBLY
CRNT_WTHR_TYPE
PRMY_PAST_WTHR_TYPE
TOTL_CLOD_AMNT
LWST_CLOD_AMNT
LWST_CLOD_BASE_HGHT
LOW_CLOD_TYPE
MEDM_CLOD_TYPE
HIGH_CLOD_TYPE
Q3HOUR_SHIP_DRCTN
Q3HOUR_SHIP_SPED
SEA_SRFC_TMPR_RCRDG_IDNY
SEA_SRFC_TMPR
BCKD_YEAR
BCKD_MNTH
BCKD_DAY
BCKD_HOUR
BCKD_FRCT_LNGH
MODL_SRFC_TYPE
MODL_SRFC_HGHT
BCKD_MSL_PESR
BCKD_SRFC_WIND_U
BCKD_SRFC_WIND_V
BCKD_SRFC_AIR_TMPR
BCKD_SRFC_RLTV_HUMDY
BCKD_SEA_SRFC_TMPR

Annex XIII

REPORT OF THE DATA ASSEMBLY CENTRE (DAC) OF THE VOSCLIM

Submitted by Alan D. Hall on behalf of the DAC

1. Data Assembly

The NOAA National Climatic Data Center (NCDC) is the Data Assembly Center (DAC) for the VOSClim Project. NCDC maintains several archives in support of the VOSClim Project and hosts a web presence[10] for access to project information and data.

The archive consists of three data streams:

- GTS - near-real time collection of ship observations
- BUFR – ship observations plus model fields
- GCC – Global Collection Centers delayed mode ship observations

VOSClim observations from all streams are captured based on the most current ship list[11] available. GTS ship observations are transmitted over the GTS under a variety of WMO headers. BUFR ship observations are transmitted daily via GTS under WMO abbreviated header IZZX40 from the UK Met Office. The GCC in Germany places the delayed mode collection on an FTP server quarterly. All data sources have, or will soon have, backup capability in case the primary source is unavailable.

Observations are decoded into the International Maritime Meteorological Archive (IMMA) format[12] and placed on the project web site[13].

2. VOSClim Web Page and Data Access Update

The web page and data access were changed dramatically. The web page has a new look and feel and was received positively by external reviewers.

Data access was changed from a relational database to a simpler text file format. The relational database method for access was cumbersome to load and retrieve data. Further, it did not support automated download of data. The text files are kept on an FTP server divided by data source, year, and month. This simpler access is easier to maintain by the DAC and supports automated download of data.

The URL for web access is http://www.ncdc.noaa.gov/oa/climate/vosclim/vosclimdata.html and allows viewing of the data directly by any browser. For an automated download, the data is available on an anonymous FTP site ftp://ftp.ncdc.noaa.gov/pub/data/vosclim. In either location, separate folders exist for each year beginning with 2001. The data is not duplicated in any way.

Also available for download from the FTP site is the VOSClim Ship List in MS Excel format; award pictures; ship pictures; and the statistics and suspect ship reports.

3. VOSClim Ship List

It is with great pleasure to note that the number of recruited ships has now reached 218. The original goal of recruited ships was 200.

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10 http://www.ncdc.noaa.gov/oa/climate/vosclim/vosclim.html
11 http://www1.ncdc.noaa.gov/pub/data/vosclim/vosclimshiplist.xls
12 http://www.ncdc.noaa.gov/oa/documentlibrary/vosclim/imma.pdf
13 http://www.ncdc.noaa.gov/oa/climate/vosclim/vosclimdata.html

4. DAC Discussion Topics

The SOT-IV meeting was invited to discuss the following recommendations.

4.1 New data access: The new data access is currently designed to provide monthly data for GTS and BUFR collectives. This could be maintained on a daily basis if the team so desires.

4.2 Recruitment dates: On several occasions, the recruitment date of a ship is significantly different from the date submitted to the DAC. One recruitment date was noted to be a full year difference. This causes problems for data collection if the date of recruitment is used as the beginning date. A separate process must be initiated to retrieve data that is more than a month old; this is generally a manual process.

Either the notification of recruitment to the DAC must be by the fifth of the month or the date the notification receipt should be used.

Annex XIV

REPORT ON THE E-SURFMAR VOS COMPONENT

(Submitted by Mr Pierre Blouch, E-SURFMAR Programme Manager)

I. Background

The E-SURFMAR is an optional programme of the ground-based EUMETNET Composite Observing System (EUCOS). It concerns the surface marine observations, including the VOS and data buoys. The EUMETNET is the Conference of European Meteorological Services. Sixteen countries out of the twenty-one EUMETNET Members are currently participating in E-SURFMAR Programme.

The E-SURFMAR objectives are to coordinate, optimize and progressively integrate the surface marine observations within the operational EUCOS framework. The EUCOS present goal is to optimize the ground observing system to improve short-range forecasts throughout Europe. However, it should be noted that the E-SURFMAR is also supporting VOS activities outside the EUCOS area of interest, as well as for other applications such as nowcasting and climatology.

The E-SURFMAR Programme is funded through participant contributions and the share of the contributions is based on the respective Global National Incomes (GNI). The Programme was a subject of a comprehensive study, carried out in 2004, which defines its broad outlines. The study is soon to be revised in 2008.

II. Data availability

The E-SURFMAR is currently coordinating the activities of approximately 47% of the VOS in the world. The EUMETNET ships report more than 50% of the whole observations. In 2006, the number of manned observations reported by the VOS ships continued to decrease – as well as the number of active ships – while the number of automated measurements increased. Although the balance is positive for the Numerical Weather Prediction (NWP)[14], it is negative for many other applications. The decrease of Port Meteorological Officer (PMO) activities is probably partly responsible for the situation.

By the beginning of 2007, 325 manned and 620 automated observations were received on average per day from EUMETNET ships operating into the EUCOS area of interest (North Atlantic and in the Mediterranean Sea). These figures may be compared to those of year 2002: 400 and 320 per day, respectively.

III. Automation

Presently, the E-SURFMAR participants are operating different ship-borne Automated Weather Stations (AWS):

- France is operating about 50 Batos stations (complete AWS reporting through Inmarsat-C) and 8 Minos (simple AWS reporting through Argos);
- Germany is operating about 20 Milos stations (complete AWS reporting through Meteosat);
- United Kingdom is evaluating a few different types: Automet, Avos, Batos and Minos. Seven stations were operating by the end of February 2007;
- Ireland and Spain are operating one Milos station each;
- Norway is using 3 AWS stations based on a QLC-50 system; and
- Denmark is operating one Batos station.

[14] For instance, more and more sea level pressure measurements are carried out.

Three German ships also report measurements gathered by their own dataloggers. In addition, four Batos stations funded by the E-SURFMAR were installed aboard ships in 2006, thanks to volunteer National Meteorological Services (NMS) or partners: United Kingdom, Ireland and Denmark. Four other Batos funded by the E-SURFMAR are ready to be installed, and four others will be purchased in 2007.

In 2006, the main achievement in the AWS activities was the upgrade of the Batos software on many vessels. The new version permits to report compressed data through the Inmarsat-C. The cost of communications was divided by six, allowing the transmission of hourly observations instead of 3-hourly ones at no additional cost. The increase of the number of observations is mainly due to this new capability.

Météo-France is currently developing a new simple ship borne AWS, called Baros, which would report hourly air pressure observations only. The principle is the same as for the Minos, but with a more inexpensive means of communication: The Iridium SBD will be the first prototype, and should be tested in April 2007.

IV. Data communication

The KNMI and Météo-France are working together to develop a cost effective means to report observations from the conventional VOS. Data may be compressed by using the most recent version of TurboWin aboard the ships, sent ashore through Inmarsat-C and processed for GTS distribution. The unit cost per report is 2.5 times lower than if one paid for a report using the Code 41 procedure. Two Dutch and four French VOS have been participating in such a trial since October 2006 (see the report from the Task Team on Satellite Communication Systems for further information regarding this issue).

Ship owners and masters expressed their concerns regarding the availability of VOS ship's positions on public websites due to the risk of piracy acts and for commercial competitiveness reasons. Following a recommendation from the Fifty-eighth WMO Executive Council (Resolution 7 – EC-LVIII), the E-SURFMAR has been carrying out a trial, which consists in masking the ITU call signs of the ships with unique identifiers managed by the VOS operators. By the beginning of 2007, fifty European VOS, including forty-four AWS will be participating in the trial. Since they use this technique, their names no longer appear on the Web.

The use of normalized identifiers in the FM13-SHIP reports instead of ITU call signs may also help to efficiently manage the VOS fleets. Three characters of the E-SURFMAR masks are used for the type of VOS, and two characters are used for the country (i.e., ISO or non-ISO code). The quality information feedbacks are so easier to manage in this regard. For instance, they no longer need the use of any metadata table to identify the data responsible. Statistics may also be easily carried out by categories of the VOS or by the respective countries.

V. Compensations

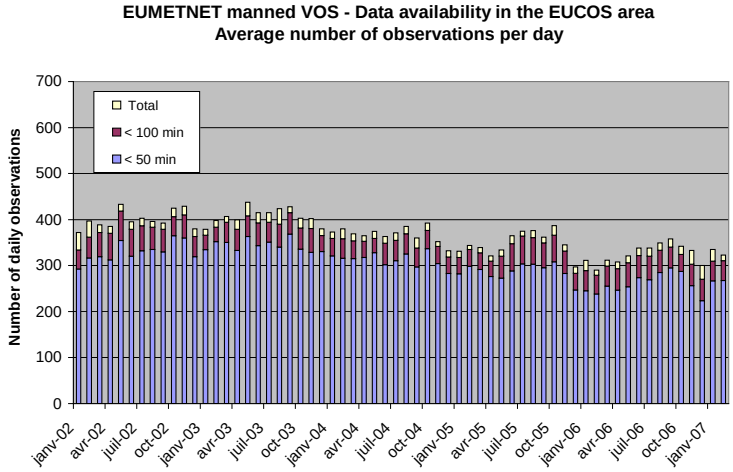
Since it's inception in 2003, the E-SURFMAR compensations have been paid each year to the VOS operators for the observations carried out by their ships. In 2007, 0.27 € should be paid for each manned observation and 0.08 € for each automated measurement. A bonus could be applied to the AWS observations carried out in a sensitive area: north of 30°N in the North Atlantic and Mediterranean Sea. Compensations are also paid to the respective National Meteorological Services (NMSs) who bear the communication costs. In 2007, about 0.18 € should be paid for each report sent by a conventional VOS and 0.06 € for each report sent by an AWS. The share of compensations between the operators and NMSs are based on the observations carried out the year before.

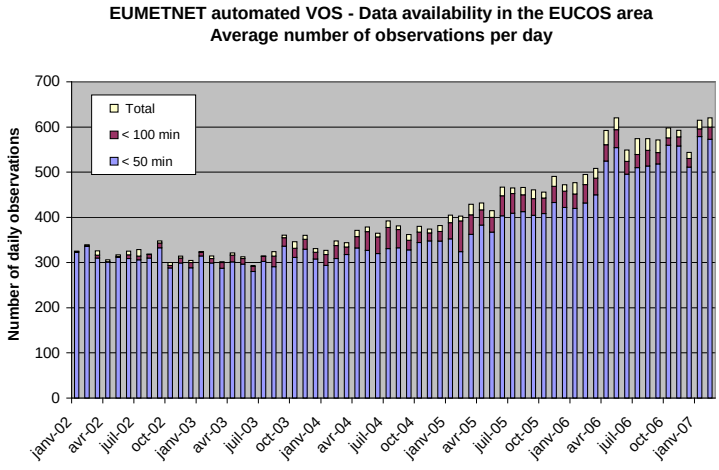
VI. Data monitoring and data quality

Since the E-SURFMAR design study was carried out, air pressure data reported by the EUMETNET ships have been monitored as a matter of priority. It appears that the quality of measurements reported by the conventional VOS is in fact worse on average than the AWS reports. Human readings tend to have non-systematic errors on sea-level pressure observations. A double correction or an absence of correction for the height of the barometer above the waterline of the ship occurs too often. Although the TurboWin interface automatically notifies the observers about such problems, the Port Meteorological Officers (PMOs) must carefully instruct these issues. Monitoring tools for the VOS are available at the following web address: http://www.meteo.shom.fr/vos-monitoring/. It should be noted that these tools are not restricted to EUMETNET ships.

VII. Meetings and websites

The Fourth Session of the VOS-TAG meeting will be held at the WMO Headquarters in Geneva, Switzerland, from 12 to 13 April 2007. The Fourth Session of the JCOMM Ship Observations Team, Geneva, Switzerland, will follow the Session from 16 to 21 April 2007 with the same venue. Further information regarding the E-SURFMAR can be located at the following website: http://esurfmar.meteo.fr/wikisurf/. The Working area (password protected) can be found at the following extension: http://esurfmar.meteo.fr/wikisurf-wa/.





Annex XV

REPORT BY THE EUMETNET ASAP (E-ASAP)
(prepared by Rudolf Krockauer, E-ASAP Programme Manager)

1. Introduction

Reducing the gap between the number of launches on board of the ships and the number of timely received messages on the GTS remains a key issue of the programme. Basically, the received data are of good quality and important for the forecast models. However, the high loss rate of >20% results both in missing data at the Met Services and higher operational costs. Reducing the loss rate is an issue of training the operators on board and improving the data transmission to the receiving Met Service (before transmitting to the GTS).

Figure 1 shows a density plot of the ASAP soundings from the period of July to December 2006, demonstrating the distribution of soundings on a grid of 2x2° mesh size. The colour scale ranges from blue (one sounding) to red (more than 16 soundings). The red regions are along the routine sailing routes of the commercial vessels. Further, the red regions are off Mauretania (operating area of the Spanish hospital ship Esperanza del Mar) and in the eastern Mediterranean (operating area of the German research vessel FS Meteor in autumn 2006).

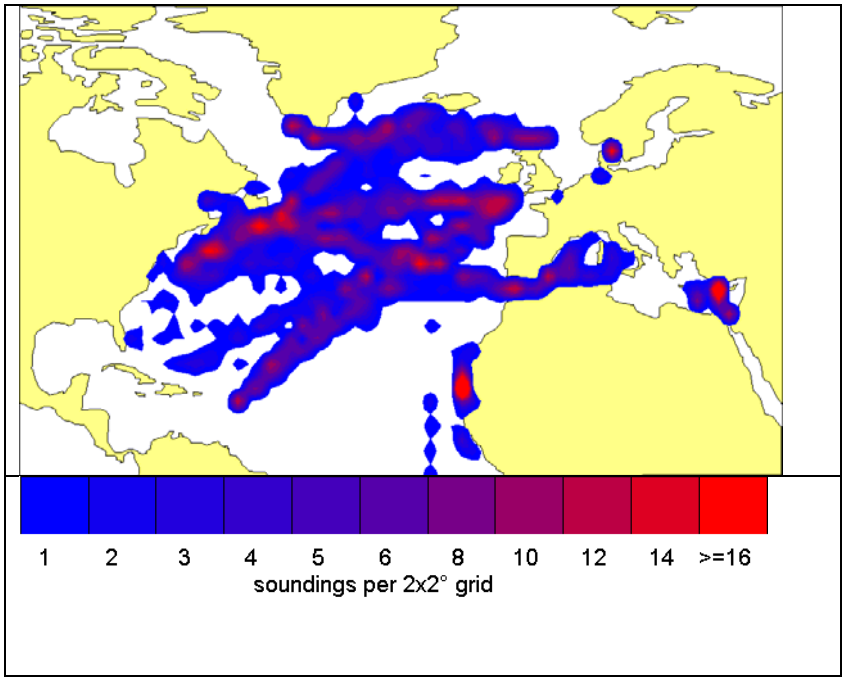


Figure 1: Distributions of the soundings from July to December 2006.

The E-ASAP is part of the EUMETNET Programme EUCOS (EUMETNET Composite Observing System). The monitoring results presented in this report are taken from both the operational EUCOS monitoring at the United Kingdom Met Office and the E-ASAP monitoring at the Deutscher Wetterdienst, Germany.

2. European ASAP systems

In 2006, sixteen European ASAP systems were in operation, after one of the three French ASAP ships was removed from the fleet in January 2006. Table 1 shows the names and operating Met Services of these systems.

Security concerns were raised from different parties regarding the public availability of true ship positions on the Internet, based on said meteorological messages. Tracking the position is possible because the call sign of the ship is part of the message. It was decided to replace the call sign of the ship by the station name of the ASAP system. The size of the station name is limited to seven characters. The Following format was introduced:

Character(s)	Content
1, 2	AS (fixed data type, i.e., 'Aerology' and 'Ship')
3, 4	ISO alpha-2 country code ('EU' for EUMETNET)
5, 6	Sequential number
7	Optional additional identifier

Following this format, all E-ASAP and integrated National ASAP systems were renamed to ASEU01-ASEU05, ASDE01-ASDE04, and ASGB01, respectively.

Table 1: European ASAP systems in 2006

No	Name	Call sign	ASAP station	Operator	Country
01	SL Performance	KRPD	ASEU01	E-ASAP	EUMETNET
02	SL Achiever	WPKD	ASEU01	E-ASAP	EUMETNET
03	Endurance	ZCBE7	ASEU01	E-ASAP	EUMETNET
04	Power	ZCBF3	ASEU01	E-ASAP	EUMETNET
05	Melfi Italia II	V2BD9	ASEU01	E-ASAP	EUMETNET
06	Atlantic Compass	KHRH/SKUN	ASDE01	E(DE)-ASAP	EUMETNET/Germany
07	FS Meteor	DBBH	ASDE01	E(DE)-ASAP	EUMETNET/Germany
08	SL Motivator	WAAH	ASDE01	E(DE)-ASAP	EUMETNET/Germany
09	Hornbay	ELML7	ASDE01	E(DE)-ASAP	EUMETNET/Germany
10	Mississauga Express	ZCBP6	ASGB01	E(UK)-ASAP	EUMETNET/UK
11	Fort Saint Pierre	FQFM	(see left)	Météo-France	France
12	Fort Saint Louis	FQFL	(see left)	Météo-France	France
13	Arina Arctica, Nuka Arctica, Naja Arctica, Irena Arctica, Mary Arctica[(1)]	OVYA2, OXYH2, OXVH2, OXTS2, OXGN2	(see left)	DMI	Denmark
14				DMI	Denmark

No	Name	Call sign	ASAP station	Operator	Country
15	Skogafoss	V2XM	(see left)	Vedurstofa Isl.	Iceland
16	Esperanza del Mar	EBUQ	(see left)	INM	Spain

(1) The 2 Danish ASAP systems are shifted between five ships.

The most important change in the ASAP fleet was the decommissioning of the French ASAP system on board of the Potomac in January 2006.

3. Monitoring

The monitoring results for 2006 are shown in Table 2. For every ASAP system, the following parameters are shown:

- Number of launches on board of the ships;
- Number of soundings received on the GTS;
- Number of timely received soundings (HH+120);
- Number of received soundings with burst heights <100 hPa;
- Number of received soundings with burst heights <50 hPa.

Details of the satellite transmission were not monitored. All ASAP, systems under E-ASAP management were configured to transmit via LES Goonhilly to the United Kingdom Met Office for distribution on the GTS. Between November to December 2006, several messages were lost due to the unexpected closing of Goonhilly. All transmissions from ships under the E-ASAP management have been changed to the LES Aussaguel until the problem with Goonhilly is resolved.

Table 2: Monitoring results for the European ASAP systems in 2006

Ship	No. of Launches on board		No. of received soundings			
	Total (including aborted)	Successful	GTS	GTS HH+120	GTS <100 hPa	GTS <50 hPa
SL Performance	430	352	305	289	269	231
SL Achiever	422	364	330	324	248	227
Endurance	266	253	235	240	202	175
Power	235	223	212	210	156	137
Melfi Italia II	418	382	375	360	299	284
Atlantic Compass	325	307	277	237	244	239
FS Meteor	286	277	243	202	230	206
SL Motivator	440	380	359	307	300	269
Hornbay	385	374	293	276	276	260
Mississauga Express	378	325	265	250	216	200
Fort Saint Pierre	305	274	271	259	227	203
Fort Saint Louis	310	272	265	260	214	191
Arctica, unit 1	586	547	508	470	416	397
Arctica, unit 2						

Ship	No. of Launches on board		No. of received soundings			
	Total (including aborted)	Successful	GTS	GTS HH+120	GTS <100 hPa	GTS <50 hPa
Skogafoss	195		168	143	152	146
Esperanza del Mar	Not submitted		191	162	162	149
Total			4297	3989	3611	3314

The difference between the performed launches on board of the ships and timely received soundings on the GTS HH+120 is mainly due to following reasons:

- Launch loss: Burst of the balloon or crash of the sonde at launch due to strong winds, turbulences, etc. [approximately 10-15% of all launches];
- Sounding loss: Failures in the sounding systems (e. g., telemetry error) or operating errors [approximately 5-10% of all launches];
- Transmission loss: Late or failing satellite communication [approximately 5-10% of all launches].

On the *SL Performance* and *Mississauga Express*, the loss rate was >25%. This is related to individual cases in both hard- and software failures over certain periods.

It has to be noted that the number of successful balloon launches also depend on the master of the ship. Some highly motivated masters allow course changes to bring the ship in the optimum position for the launch (depending on the wind conditions). This is a valuable concession particularly on big ships.

Tables 3 and 4 show the numbers of achieved burst height levels for 100 hPa and 50 hPa.

Table 3: Number of soundings with burst heights <100 hPa.

Ship	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SL Performance	26	20	18	26	27	40	15	30	10	19	24	14
SL Achiever	28	15	20	19	27	34	21	22	24	8	19	11
Endurance	9	19	17	28	18	29	19	15	8	19	11	10
Power	15	4	10	25	11	11	13	9	6	9	24	19
Melfi Italia II	15	15	11	23	38	28	29	38	29	27	32	14
Atlantic Compass	32	5	30	19	29	25	13	20	3	35	16	17
FS Meteor	0	8	21	13	25	47	16	5	14	13	36	32
SL Motivator	31	17	34	5	22	32	38	41	10	28	27	15
Hornbay	21	8	24	33	13	10	40	39	28	35	9	16
Mississauga Express	20	22	28	23	30	22	24	17	7	9	12	2
Fort Saint Pierre	15	16	19	20	23	23	16	15	15	20	23	22
Fort Saint Louis	13	19	13	16	17	17	19	22	23	17	21	17
Arctica	0	2	1	19	23	20	24	15	18	16	11	1

Ship	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Arctica	22	30	16	13	27	27	23	25	21	18	23	21
Skogafoss	12	2	15	1	23	13	14	14	15	18	9	16
Esperanza del Mar	15	1	13	14	18	15	16	18	0	21	15	16
Total	274	203	290	297	371	393	340	345	231	312	312	243

Table 4: Number of soundings with burst heights <50 hPa.

Ship	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SL Performance	25	19	13	13	21	39	15	28	10	18	18	12
SL Achiever	27	12	19	12	24	32	21	22	21	7	19	11
Endurance	9	19	16	22	17	29	17	14	6	16	6	4
Power	13	4	8	23	9	11	12	8	4	8	20	17
Melfi Italia II	12	13	11	25	33	28	29	38	27	27	30	11
Atlantic Compass	31	5	29	18	29	23	13	20	3	33	18	17
FS Meteor	0	8	19	11	25	45	16	5	14	10	33	20
SL Motivator	30	15	31	3	18	28	35	35	9	28	25	12
Hornbay	15	8	21	33	13	10	39	34	28	34	9	16
Mississauga Express	20	19	28	17	29	21	21	17	7	8	11	2
Fort Saint Pierre	10	15	17	20	20	19	16	13	14	16	23	20
Fort Saint Louis	11	16	12	16	16	13	15	22	22	14	18	16
Arctica	0	2	1	19	22	18	24	17	18	13	12	0
Arctica	19	30	15	12	23	26	20	25	21	17	22	21
Skogafoss	12	2	14	1	22	12	14	15	14	18	9	13
Esperanza del Mar	13	1	9	13	16	15	16	17	0	21	12	16
Total	247	188	263	258	337	369	323	330	218	288	285	208

4. Summary

The efficiency (Messages on the GTS / Launches) differs from ship to ship and from crew to crew. The loss rates are usually not consistent over the year, but are related to individual cases. This is partially due to the lack of skill of the operators on board. The combination of sounding and transmission system is complex. The operators did not detect several internal errors in time.

Transmission from the ship to the GTS is also unstable. This does not only include the satellite transmission from the ship to the receiving Land Earth Station, but also the forwarding and processing to and at the relevant Met Service. Different requirements regarding the data format (e.g., GTS header or no header) led to delays or denials of data at the automatic processing systems before transmitting to the GTS. Particularly the closing of Goonhilly demonstrated the vulnerability of satellite communication.

Experience shows that excellent transmission performance is achieved on those ships, where the crew sends the data manually via the ships e-mail system. However, most crews are reluctant to

return to manual transmission, as they are used to finish the work after successfully launching the balloon.

Improving the transmission from the ship to the GTS remains a key parameter to increase the efficiency and reduce the costs of the ASAP soundings.

Annex XVI

RECOMMENDATIONS, AGREED PRINCIPLES, AND ACTION ITEMS ARISING FROM THE WMO-IMO CONSULTATIVE MEETING

(Geneva, Switzerland, 12-13 February 2007)

1) Recommendations or agreed principles

Recommendations or agreed principle	Ref.
Any proposed scheme to address ship owners and masters concerns should be compliant with the Resolution 40 (Cg-XII), and there is no need to recommend any changes in the terms of the Resolution nor to reclassify VOS data.	3.1.2
A unique identification number is required for data assimilation (bias correction, automatic removal of suspect observations), quality monitoring, quality information feedback to Port Meteorological Officers, and climate studies. The ship's call sign does not necessarily have to be considered as an essential data provided that any proposed scheme permits to meet the requirements expressed in Annex I of WMO Resolution 40 (Cg-XII).	3.2.2 3.2.4 3.3.2 5.6
Ship's identification and location should not appear on public websites in real-time when this is not authorized by the ship-owners and masters.	4.3, 6.1 7.1, 7.2 7.3, 7.5
It is preferable for the longer term to adopt a universally accepted global and standardized solution using an agreed international system of masked call signs, yet to be developed.	5.5 7.2 7.3 7.7
In case a unique identification, numbering scheme was adopted, some restriction could eventually be applied to the WMO Publication Number 47 in order to avoid cross- reference between a unique number and the ship's recruiting country.	5.7
Identification of the country of recruitment in any unique identification scheme may not be necessary.	5.7
The following approach is acceptable: (i.) making the data openly available according to WMO Resolution 40 (Cg-XII), and (ii.) selectively masking the ship's identification when requested to do so by the ship owners and masters. Only users who sign an agreement are authorized to receive the non-masked reports.	5.8
It is difficult to establish the link between the availability of VOS observations on public websites and piracy. However, the perception that there is a link still exists in the shipping industry, and such security concerns have to be addressed. There are also concerns of commercial considerations amongst the shipping companies.	7.3, 7.4
Protecting the partnership of the WMO Members in the private sector, consistent with principles stated in WMO Resolution 40 (Cg-XII) is a matter of concern.	7.4
The meteorological report, including date, time, position and the measured geo-physical variables from VOS reports is essential for time critical meteorological applications, as far as the relevant shipping companies, allow for the exchange of VOS reports with no conditions on use according to WMO Resolution 40 (Cg-XII). Other variables such as some unique ship identification, and the name of the country recruiting the ship could be considered as critical to various applications although it was considered that this should be addressed by the SOT. The ship's call sign was not considered as essential in the context of WMO Resolution 40 (Cg-XII) provided that the above variables are made available.	7.8
Simple and generic design standards could potentially facilitate the recruitment of ships in the VOS fleet and the installation and siting of meteorological instruments. The active support and assistance of ship owners and of the classification societies was required. Reservations by INTERCAGO, INTERTANKO, and ICS were noted. Serious consideration must be made regarding new ship design requirements for the making of weather observations. The ship owners eventually decide on what building standards they will use.	9.4 9.5 9.8

2) Action items

Action	By	Deadline
To investigate whether it would be feasible to routinely make the database of IMO numbers available to the WMO community and under what conditions	IMO	mid-2007
To cooperate with MSC sub-committee for investigating the use of LRIT to transmit weather observations	SOT, IMO	2008
To invite ICS, IMO, CBS, and CCl at the SOT-IV meeting	WMO	03/2007
To improve timeliness of the original data and to directly discuss with the UK Met Office how the technical procedures could be adjusted in order to minimize the impact.	JMA, Met Office	04/2007
To investigate whether the private sector users of these data could help in reducing the cost or impact of a solution.	USA	mid-2007
To consider removing the country name from unique identification schemes	SOT	SOT-IV
To promote the added value of VOS observations in support of marine meteorology and climatology and maritime safety with the shipping industry	SOT	SOT-IV
To complete the proposed applications/concerns vs. security levels table in such a way to reflect as many possible concerns in the table	Pierre Blouch	EC-LIX
To undertake a review of the implementation impact of masking	SOT	2008
To consult nationally in order to present a coherent and more focused proposals at SOT-IV, that could be reviewed by the SOT and possibly endorsed	Australia, France, Japan, UK, USA	SOT-IV
To establish an ad hoc task team on call sign masking schemes	SOT	ASAP
To explore long term solutions	SOT	SOT-IV
To prepare a report to EC-LIX proposing to maintain Resolution 7 (EC LVIII) in force and to continue the trials for another year, on the basis of the recommendations from the SOT regarding a unified approach to call sign masking.	SOT USA WMO	30/04/2007
to liaise with USA and Japan in order to inform the WMO Members in advance about the implementation of their respective trial schemes	WMO	ASAP
To draft new version of MSC 1017 and then submit it to MSC-89 for approval	SOT WMO and IMO	SOT-IV MSC-89
To consider proposing a Resolution to the IMO on met-ocean services similar to A.706(17) for navigational warnings. To present the first proposal to the appropriate IMO Sub-committee(s) for endorsement	WMO and IMO	mid-2007 IMO sub-comm. IMO Assembly
To focus WMO and IMO common activities in specific topics to be considered as Pilot Projects (e.g., GMDSS website).	WMO and IMO	mid-2007
To encourage the use of AWS	SOT	SOT-IV
To draft a document on ship design. ICS then to investigate impacts.	SOT ICS IACS	mid/late 2007
To prepare a promotional DVD	SOT WMO	mid/late 2007

Annex XVII

RESOLUTION 7 (EC-LVIII)

Res. 7 (EC-LVIII) – SHIP OWNERS AND MASTERS' CONCERNS WITH REGARD TO VOS DATA EXCHANGE

THE EXECUTIVE COUNCIL,

Recalling, the request made by the Executive Council at its fifty-seventh session for the JCOMM Ship Observations Team (SOT) to assess the risks associated with allowing Voluntary Observing Ships (VOS) call signs, and position data being made freely available on external websites not maintained by the National Meteorological or Hydrometeorological Services, and to provide options to address the problem, as appropriate,

Noting the proposals prepared by PMO-III and endorsed and submitted to the Executive Council by the JCOMM Co-presidents,

Acknowledging;

(1) The seriousness of the problem, which, if not adequately addressed, could ultimately lead to the disappearance of the majority of VOS reports available on the Global Telecommunication System (GTS),
(2) The concerns on the issue expressed by ship owners and masters,

Recommends:

(1) Members that, in consultation with ship owners, wish to protect the identity of VOS may implement ship call sign masking, for a trial period of one year, a process which would facilitate open distribution of masked data on the GTS;

(2) All Members implementing such a process to provide for the secure exchange of ship call signs and reports affected by the masking process, so as to assist in resolving real-time monitoring and climate analysis problems;

Requests the Secretary-General, as a high priority issue, to establish a high level dialogue, involving Members affected, the International Maritime Organization, the International Chamber of Shipping, shipping companies, and relevant organizations and technical commissions, for example the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology or the Commission for Basic Systems, in order to determine if there is a link between VOS data availability on external websites and piracy and other ship security issues; to review the implementation and impact of masking; and to propose a general and universally acceptable solution to the issue that would address the concerns of ship owners and masters, as well as the data monitoring and quality information feedback requirements, for consideration by the Executive Council at its fifty-ninth session in 2007.

Annex XVIII

DRAFT RESOLUTION (EC-LIX)

Draft Res.??? (EC-LIX) – SHIP OWNERS AND MASTERS' CONCERNS WITH REGARD TO VOS DATA EXCHANGE

THE EXECUTIVE COUNCIL,

Recalling:

(a) the request made by EC-LVII for the JCOMM Ship Observations Team (SOT) to assess the risks associated with allowing Voluntary Observing Ships (VOS) call signs and position data being made freely available on external Websites not maintained by the National Meteorological or Hydrometeorological Services (NMHSs), and to provide options to address the problem, as appropriate,

(b) the request made by EC-LVIII for the Secretary-General, as a high priority issue, to establish a high level dialogue, involving affected Members, the International Maritime Organization, the International Chamber of Shipping, shipping companies, and relevant organizations and technical commissions, in order to determine if there is a link between VOS data availability on external Web sites and piracy and other ship security issues; to review the implementation and impact of masking; and to propose a general and universally acceptable solution to the issue that would address ship owners and masters' concerns as well as the data monitoring and quality information feedback requirements, for consideration by the fifty-ninth session of the Executive Council in 2007,

(c) The recommendation by EC-LVIII that Members who, in consultation with ship-owners, wish to protect the identity of VOS may implement ship call sign masking, for a trial period of one year, a process which would facilitate open distribution of masked data on the GTS,

(d) the recommendation by EC-LVIII that all Members implementing such a process to provide for the secure exchange of ship call signs and reports affected by the masking process, so as to assist in resolving real time monitoring and climate analysis problems,

Noting:

(a) the outcome, recommendations, and agreed principles by the high-level WMO-IMO consultative meeting, Geneva, Switzerland, 12-13 February 2007, and its recommendation to seek a universally accepted global and standardized solution using an agreed international system of masked call signs, yet to be developed;

(b) the outcome and recommendations by the fourth meeting of the JCOMM Ship Observations Team, Geneva, Switzerland, 16-21 April 2007, in this regard;

(c) the outcome and recommendations by the second session of the JCOMM Expert Team on Marine climatology, Geneva, Switzerland, 26-27 March 2007;

(c) The trial ship masking schemes implemented by a few WMO Members and their technical implications in terms on quality monitoring, and climate related applications;

Recognizing:

(a) that it is difficult to establish the link between the availability of VOS observations on public websites and piracy and, the perception that there is a link, which still exists, in the shipping industry, and such security concerns have to be addressed;

(b) That there are also concerns of commercial considerations amongst the shipping companies;

Acknowledging:

(a) The seriousness of the problem, which, if not adequately addressed, could lead to a decline on the participation in the Voluntary Observing Ship (VOS) Scheme, and therefore a significant decrease in the VOS reports available on the GTS,

(b) The concerns on the issue expressed by ship owners and masters,

Recommends:

(a) Members who, in consultation with ship-owners, wish to protect the identity of VOS may extend their current trial call sign masking schemes as per Resolution 7 (EC-LVIII),

(b) Members who, in consultation with ship-owners, wish to protect the identity of VOS and who have not implemented such schemes, may implement a call sign masking scheme, a process which would facilitate open distribution of masked data on the GTS;

(c) All Members implementing such a process to provide for the secure exchange of ITU call signs and reports affected by the masking process, so as to assist in the timely resolving of real time monitoring and climate analysis problems, and to minimize the technical implications for the Commission for Basic System (CBS) Lead Centre for the Quality Monitoring of Marine Data;

(d) All Members implementing such a process to seek long term solutions in a way consistent with recommendations from the WMO-IMO consultative meeting, Geneva, Switzerland, 12-13 February 2007, the Second Session of the JCOMM Expert Team on Marine Climatology, Geneva, Switzerland, 26-27 March 2007, and the fourth Session of the JCOMM Ship Observations Team, Geneva, Switzerland, 16-21 April 2007;

(e) Pending the universal acceptance and implementation of a more suitable solution and the CBS migration to table driven codes, trial masking schemes may be continued in successive years unless decided otherwise by the Executive Council;

Requests:

(a) the Secretary-General, as a high priority issue, to continue the high level dialogue, involving affected Members, the International Maritime Organization, the International Chamber of Shipping, shipping companies, and other relevant organizations and technical commissions (e.g. the JCOMM, CBS, CCl), in order to review the implementation and impact of masking; and to propose a general and universally acceptable solution to the issue that would address ship owners and masters' concerns as well as the operational, data monitoring and quality information feedback, and climate requirements.

Annex XIX

RECOMMENDATIONS BY THE SOT REGARDING IMPACT OF NATIONAL REGULATIONS ON VOS OPERATIONS

Impact on VOS Operations

The ISPS Code and Customs regulations are interpreted and enforced differently in each country. The respective NMS and PMOs need to be keep informed on issues regarding national regulations and to comply with these requirements so that PMO visits to ships and the issue of equipment can proceed without delay.

ID for Personnel

All PMOs must have current identification cards for the relevant ports. Before an ID card is issued, the PMOs maybe subjected to Police security checks, and required to undertake port security and safety training courses. In addition to the port security requirements, the PMO must follow the port safety standards by wearing the specified protective clothing. The PMOs must arrange to be listed on the Ships' 'Visitor's List' to ensure port access to a ship is given.

Failure to have the right identification or be on the 'Visitor's List' may mean access to the port is denied and the opportunity to visit a ship is missed. This may be a waste of time for a PMO, but more importantly the chance to recruit a ship or load met buoys or floats are lost.

Equipment Documentation

The NMS and PMOs need to keep appraised on issues regarding national regulations pertaining to the supply or retrieval of meteorological and scientific equipment on ships. If Customs documentation is required, the respective NMSs must comply with these requirements. It is important that PMOs do not try to shortcut these regulations, as this may expose the PMO to suspicion of breaching security regulations, and could unnecessarily expose a ship to the same scrutiny.

If Export or Import entries are required, the NMS or PMO needs to work closely with a Customs broker to facilitate the timely production of required documentation, so that the PMO can visit to recruit a ship, or load buoys as planned.

NMS Experience to date

Most of the NMSs have indicated that the biggest impact from the ISPS Code has been the requirement to obtain authorized identification for all personnel visiting ports. Obtaining the required documentation has taken time, and experience has shown that the PMOs may require specific identification cards for each port visited, because the ISPS compliance regulations can differ from port to port. The NMSs have reported that some ports require the PMOs to attend security and safety courses, and that at many ports PMOs must use the port transport to a ship's berth, which makes the delivery of bulky items, such as buoys or floats more difficult. Some PMOs have faced the frustration of not being able to visit a ship because their names have not been on the 'Visitor's List'. The NMSs have reported that compliance requires advanced planning, and that the PMOs must be well informed on the requirements of the ports they visit.

Only a few countries reported the need to complete Customs documentation in order to get instruments on or off the wharf. In these countries the NMSs is working with the national authorities to ensure they comply with the regulations.

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Annex XX

QUESTION/ANSWERS REGARDING INMARSAT

Mr Brian Mullan, Inmarsat, regarding the questions asked by the SOT Chairperson, Mr Graeme Ball and the VOSClim Task Team Chairperson, Ms Sarah North, in preparation for the fourth SOT meeting, provided the following answers.

1.) Ownership of the SAC Code 41 list. How changes to SACs can be promulgated in an organised fashion so that ship observers can be notified in due time (and Admiralty Publications updated).

Although Inmarsat originally defined the Short Access Codes (SACs) for distress and safety purposes, it is a national matter how and whether any or all of these services are provided by a particular Inmarsat Land Earth Station (LES). Additional codes for general utility may be defined separately by individual LESs. Inmarsat has no influence on what or how such additional codes may be defined or used. It should be noted that additional SACs could be numerical, alphabetical or alphanumerical.

2.) Will the regionalisation/personalisation of SAC41 become more widespread? For example, Australia has, because of the takeover of Xantic by Stratos, needed to introduce SAC1241 as a regional alternative to SAC41 to ensure timely delivery of the VOS reports (BBXX) in this region to Melbourne. What is the long-term future of SAC41?

Please see 1.) above
As the use of SAC 41 is a national matter, the Inmarsat is unable to provide insight on this issue.

3.) Why SAC41, presumably a standard Inmarsat service, is not available at all LESs. Explaining to ships that you can send free of charge to some LES but not to others is not always easy or in fact understood.

Please see 1.) above
The provision of SACs is a national matter. Recommendations on costs for SAC 41 are set out in IMO Resolution A.707(19) and it is a matter for individual LESs whether or not to charge for this SAC service.

4.) Costs – these appear to vary substantially depending on which Inmarsat provider one goes to, but are comparatively expensive when compared to other satellite systems. This is putting pressure on the SOT operators to find less expensive solutions such as Iridium and Globalstar.

Please see 3.) above
Users are free to choose which service provider to use and to "shop around" for the best price and service quality.

5.) Alternative SACs - the possibility of switching national VOS fleets to new dedicated three-figure SACs is now appearing. However, how are these new SACs being managed; are Inmarsat suppliers permitted to set them up as they wish or are they be registered centrally somewhere?

As in 1.) and 2.) above
The individual LESs are free to determine new SACs and are under no obligation to coordinate codes.

6.) It is still a little unclear how many of the Inmarsat providers actually provide a 'global' SAC41 service - we know that Stratos do provide global coverage, and presumably also France Telecom and maybe Telenor. However, this is not clear from the current Code 41 list.

Today, Inmarsat can confirm that Telenor, Stratos/Xantic and France Telecom offer global SAC41 services. However, as indicated above, individual LESs are free to alter their own arrangements. Other LESs also offer SAC41 in a single ocean region.
Since the SAC list is dynamic, it is not practicable for Inmarsat to offer such a list as always being "current".

7.) Could Inmarsat encourage the Global Maritime Distress and Safety System (GMDSS) Inmarsat equipment suppliers to upgrade their systems to accommodate weather reporting (which is also a International Convention for the Safety of Life at Sea (SOLAS) provision linked to safety) (some systems do not even have a floppy disk or USB connection for transferring the observations)?

All mobile earth station equipment provides SAC capabilities.
Some manufacturers provide a second communication port, the use of which can provide the services you refer to here. The provision of a second communication port is not mandatory upon manufacturers. However, Inmarsat will undertake to advise all Inmarsat C manufacturers that there is a clear demand for such a facility.
Given that the Inmarsat C operating system for the GMDSS terminals is DOS, it is considered impractical to put a USB port on such equipment. However, some non-GMDSS Inmarsat C and mini-C equipment uses Windows-based messaging software. Any PC that would be used for such an application will have its own USB port, although the PC itself would be connected to the Inmarsat C / mini-C via a serial port.

8.) Data Compression - such systems (e.g., DNID) have potential to greatly reduce costs but seem to be easier for some Inmarsat suppliers to set up than others (e.g., appeared difficult with Stratos).

A DNID (data network identity) is not, of itself, a compression mechanism. However, the DNID data-reporting protocol can be used to initiate transmission of binary-encoded weather data. This is a user-defined service by such as a meteorological service provider who reached agreement with an associated LES to provide this service.

9) Closure of the LES - the closure of Goonhilly LES presented us with major problems with initial data losses and continuing data timeliness problems. From the weather reporting perspective, this closure was poorly handled with no trialing of new data routing systems.

Commercial forces drive rationalisation of LES services.
Please provide an explanation of "data losses" and "data timeliness problems" above.
Services through a particular LES is a commercial agreement between the MSI providers/recipients and the LES used. Such commercial agreements normally contain contingency arrangements that provide for alternative routing. We understand that Stratos had such agreements in place.

10) Why, when an LES changes to not accepting SAC41, is not it the responsibility of the individual provider, or better still Inmarsat, to advise WMO rather than the other way around as is the current practice. Very often we learn about changes after the event - forewarning would provide the opportunity to advise ships in advance of impending changes and thus significantly reduce data loss.

As already stated, the SAC provision is a national matter and Inmarsat has no influence on national decisions or the timing thereof.

11) Back up facilities - we need to be sure that if an LES like Goonhilly closes (or fails) that there is a back up system so that observations can be re-routed to another supplier if necessary. This is not only pertinent to incoming ship observations but also the outgoing MSI forecasts.

Please see 9) above, regarding commercial, contingency arrangements

12) LRIT – We understand, but we need some confirmation, that this system may be provided via Inmarsat. If so, is there any potential for its performance standards to be enhanced so that it could also be used for limited weather information reporting?

LRIT is an IMO-defined service, for which Inmarsat expects to be one of the airtime providers. Use of the LRIT data is outside the scope of the Inmarsat involvement in this service. IMO Resolution MSC.210(81) provides the Performance Standards for ship-borne equipment to be used for LRIT – this is attached to the covering email.
Any changes to the LRIT Performance Standard would have to be proposed to IMO by national administrations.

Annex XXI

NEW PROPOSAL FOR THE MMMS QUESTIONNAIRE

APP/O/MMS-Q2

MARINE METEOROLOGICAL SERVICES MONITORING PROGRAMME QUESTIONNAIRE

To Masters, Deck Officers, Skippers, Sailors, icebreaking services and other marine users

In order to monitor the effectiveness of the weather and sea bulletins produced and transmitted by Meteorological Services, the World Meteorological Organization would appreciate your cooperation in completing the following questionnaire. The objective of this programme is to improve the level of meteorological support to all marine user communities.

Ship's Name & Call Sign	
Type of ship (SOLAS or non-SOLAS)	
or other marine user activity (specify)	
Activities (merchant, ferry, cruising, fishing, recreational, icebreaking)	
Country of registry	
Name of master	
Operational area(s)	
Voyage from	to
Date, time, position when the questionnaire completed	

Please complete the following questionnaire by placing a tick mark under the appropriate column heading and providing additional information or comments as appropriate.

		Good	Average	Poor	Issuing Met Service	Station
1	**Reception of GMDSS info. Please rate the quality of reception:** (should be filled at least by SOLAS vessels)					
A	via INMARSAT SafetyNET					
B	via Navtex (518 kHz)					
2	**Reception of other Safety info.** (This section should be filled at least by non-SOLAS vessels)					
A	via Navtex (490 or 4209.5 kHz)					
B	via HF Radio					
C	via VHF Radio					
D	via visual signals					
E	via e-mail					
F	via web interface					
3	**Storm and Gale warnings. Please rate the following:**					

A	Comprehension of warnings					
B	Accuracy of warnings					
C	Terminology used					
D	Usefulness (anticipation, parameters, thresholds…) **Please comment in Section 9**					

4	**Sea Ice and Icebergs Information (to be for mariners in areas with floating ice). Please rate the following:**					
A	Clarity of information					
B	Accuracy of information					
C	Timeliness					
D	Terminology used					

5	**Wave and Storm Surge Information. Please rate the following:**					
A	Clarity of information					
B	Accuracy of information					
C	Timeliness					
D	Terminology used					

6	**Weather and Sea bulletins. Please rate the following:**					
A	Comprehension of bulletins					
		Good	**Average**	**Poor**	**Issuing Met Service**	**LES/Navtex Station**
B	Accuracy of bulletins					
C	Are bulletins on time?					
D	Terminology used in bulletins?					
E	Usefulness (parameters,…) *Please comment in Section 9*					

7	**Graphic broadcasts (e.g. Facsimile). Please rate the following:**					
A	Are charts received on time?					
B	Accuracy of information on charts					
C	Comprehension of symbols					
D	Quality of reception					
E	Is this a useful service?	**Yes** ☐ **No** ☐			If Yes, please comment in Section 9 on how the service could be improved.	

8 **Please visit (http://weather.gmdss.org). Comment in Section 9 on the quality of the GMDSS website.**

9 **Land Earth Stations (LES) Inmarsat** (This section should be filled only by Voluntary Observing Ships)

A	Rate your success in contacting a LES to send your weather observation messages (OBs)				LES: _____
B	Do you experience delays in sending your OBs?	**Yes** ☐ **No** ☐			
C	Do any LES refuse to accept your OBs?	**Yes** ☐	LES if Yes: _____		

10 Other related problems (if any) – include ship's position, date and time.

11 Suggested improvements

_____
Master's signature

Use additional sheets if necessary.

For each case, complete one questionnaire

After completion, please return to the following address:

Ocean Affairs Division
Applications Programme Department
World Meteorological Organization
7 bis, avenue de la Paix
Case postale No.2300
CH-1211 Geneva 2
Switzerland
Telefax: +41 22 730 8128
E-mail: oca@wmo.int

Annex XXII

DBCP/SOOP TRUST FUND AND STATEMENTS OF ACCOUNT

1) IOC STATEMENT OF ACCOUNT FOR 1 AUGUST 2005 ~ 31 JULY 2006

193-GLO-2001

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION

Mr. Charpentier Salary, Mission and Other Costs

(Statement of Account from 1 August 2005 to 31 July 2006)

(Expressed in US Dollars)

Balance Brought Forward as at 1 August 2005 :				**85,634.73**	
Funds Received from:	NOAA	Aug-05		105,000.00	
	Sams Research	Aug-05		975.00	
	Bill Woodward	Aug-05		1,000.00	
	WMO	Sep-05		82,600.00	
	Meteo France	Sep-05		1,000.00	
	Canada	Oct-05		1,000.00	
	WMO	Oct-05		4,000.00	281,209.73
Deduct:					
Disbursements					
Salary of Mr Charpentier :					
	8/2005-12/2005			59,555.26	
	1/1/2006			11,979.06	71,534.32
Missions :					
	Mr Charpentier				
	Washington/San Diego - USA - 23/04/2005 to 07/05/2005		3,489.35		
	Visit PMEL - 02/06/2005 to 08/06/2005		2,774.49		
	Halifax - Canada - 17/09/2005 to 24/09/2005		2,456.14		
	Chile - 12/10/2005 to 27/10/2005		5,104.52		
	Paris - France - 18/11/2005		687.72		
	USA - 12/12/2005 to 16/12/2005		2,877.11	17,389.33	
	Ms Hester Viola				
	Toulouse July 2006			712.96	18,102.29
Sub-contract :					
	"Collecte Localisation Satellites" - paid in October 2005			14,663.42	
	Servicio Meteorologico Nacional - paid in Sep/Nov. 2005			8,000.00	22,663.42
Cash balance as at 31 July 2006					**168,909.70**

INTERIM WMO STATEMENT OF ACCOUNT AS AT 31 JULY 2006

World Meteorological Organization

Data Buoy Co-operation Panel

Interim Statement of Account as at 31 July 2006

(expressed in US dollars)

Balance from 2005		25,621	
Adjustment to Opening Balance (2004-2005 Support Costs)		(3,460)	
Adjusted Opening Balance			22,161
Contributions received			83,493
Total Funds Available			105,654
Obligations Incurred			
Travel - non-WMO Staff		20,095	
Travel - WMO Staff		2,019	
Total expenditures		22,114	
Support Costs (1%)		221	
Total expenditures including Support Costs			22,335
Balance of Fund		US $	83,319
Represented by.			
Cash at Bank	84,473		
Exchange Adjustments	9,962		94,435
Less: Unliquidated Obligations	11,099		
Accounts Payable	17		11,116
		US $	83,319

CONTRIBUTIONS RECEIVED

Australia		16,200
France		47,393
Germany		6,000
India		3,000
New Zealand		2,400
South Africa		4,500
United Kingdom		4,000
	TOTAL	83,493

WMO FINAL STATEMENT OF ACCOUNT AS AT 31 DECEMBER 2005
(actions arising from this Panel session are indicated in bold)

World Meteorological Organization

Data Buoy Co-operation Panel

Final Statement of Account as at 31 December 2005

(expressed in US dollars)

Balance from 2003				125,361
Contributions received				246,481
Total Funds Available				371,842
Obligations Incurred				
	2004	**2005**	**Total**	
Consultants	9,992	10,911	20,903	
Travel	9,459	7,533	16,992	
Transfer to Marine Programe	12,000	-	12,000	
Contribution to JCOMMOPS Data Devt	6,527	-	6,527	
Contribution to DBCP/JTA Mtg 33080/2005	-	3,000	3,000	
Payment to IOC/ Logistic Support	204,000	82,600	286,600	
Bank charges	128	71	199	
	242,106	104,115	346,221	
Balance of Fund			US $	25,621
Represented by.				
Cash at Bank		26,775		
Exchange Adjustments		9,962		36,737
Less: Unliquidated Obligations		11,099		
Accounts Payable		17		11,116

	US $	25,621

CONTRIBUTIONS RECEIVED	2004	2005	Total
Australia	16,875	14,500	31,375
Canada	12,500	12,500	25,000
CLS Service ARGOS	10,000	-	10,000
France*	36,633	73,746	110,379
Germany	5,000	5,000	10,000
Greece	2,200	-	2,200
Iceland	2,250	-	2,250
India	-	3,000	3,000
Ireland	1,517	-	1,517
Japan	10,000	2,000	12,000
Netherlands	1,970	-	1,970
New Zealand	2,395	2,000	4,395
Norway	395	-	395
South Africa	3,750	3,750	7,500
USA	22,500	2,000	24,500
TOTAL	127,985	118,496	246,481

*The contributions from France received in 2004 include their contributions for the years 2002-03.

DATA BUOY CO-OPERATION PANEL

Statement of income and expenditure
For the period 1 January to 31 December 2006
Amounts in United States dollars

1.	Balance brought forward , 1 Jan 2006	25,621	
1.1	Adjustment to Surplus - 2004-2005 Support Costs	(3,460)	
1.2	Adjusted beginning balance		22,161
2.	Income:		
2.1	Contributions received (please see below for details)		126,188
3.	Total available funds during reporting period		148,349
4.	Expenditure		
4.1	Direct project costs		
4.1.1	Individual contractors	12,090	
4.1.2	Travel - Other Representatives ad hoc travel	21,988	
4.1.3	Ad hoc travel of staff to attend non WMO mtgs	2,019	
4.1.4	Other Contributions	6,518	
4.1.5	Total direct costs	42,615	
4.2	Indirect project costs		
4.2.1	Support costs at 3%	1,278	
4.2.2	Bank charges	121	
4.2.3	Exchange differences	(8,928)	
4.2.4	Rounding differences	(87)	
4.2.5	Total indirect costs	(7,616)	
4.3	Total project expenditure		34,999
5.	Balance of fund at 31 December 2006		**113,350**

Details of Contributions received during the period 1 January -31 December 2006

	Total	**for 2006**	**for 2007**
Australia	16,200	16,200	-
Canada	20,000	20,000	-
CLS Argos	15,000	-	15,000
France	47,393	47,393	
Germany	11,000	6,000	5,000

REVIEW ON THE STATUS OF DBCP TRUST FUND
Submitted by Frank Grooters, Finalized on 29 August 2006

DBCP TRUST FUND Summary

BUDGET BASED ON WMO and IOC ACCOUNTING FOR 2004-2006 (AS AT 11 July 2006), IN US DOLLARS

Item	Receipts	2004-2005 Obligation	Balance at 31 Dec.	Receipts	2006 Obligation	Balance at 31 Dec.	Receipts	2007 Obligation	Balance at 31 Dec.	Receipts	2008 Obligation	Balance at 31 Dec.
DBCP												
Balance Brought Forward	226,744			273,338			296,371			324,748		
Contributions	748,556			142,293			214,100			214,100		
Adjustment to match WMO/IOC												
Expenditure												
Technical Coordinator		281,734			40,127			83,123			84,000	
Consultancy		20,903			15,000			15,000			15,000	
Travel		53,668			22,100			28,100			28,000	
Bank Charges/Support Cost		199			4,080			500			500	
IOC		286,600										
Marine Programme		12,000										
JCOMMOPS		43,858			20,000			22,000			22,000	
Publications					2,000			2,000			2,000	
Miscellenious					8,633							
Contingency								30,000			30,000	
Supp Meetings/Workshops/Training		3,000			7,320			5,000			5,000	
Total DBCP	**975,300**	**701,962**		**415,631**	**119,260**		**510,471**	**185,723**		**538,848**	**186,500**	
Balance of DBCP Trust Fund			**273,338**			**296,371**			**324,748**			**352,348**
								Estimation		Rough estimation		

DBCP Trust Fund: Income and Expenditure

(based on WMO and IOC Finance Information as at 11 July 2006, in USD)

DBCP	1 Jan2004 - 31 Dec 2005 WMO	IOC			Estimated Jan-Dec 2006 WMO	IOC	Estimated Jan-Dec 2007 WMO	IOC
Receipts								
Brought Forward	125,361	101,383			25,621	247,717	113,781	182,590
Contributions (listed below)	246,481	502,075			142,293	0	109,100	105,000
Adjustment to Match WMO								
Total Receipts	**371,842**	**603,458**			**167,914**	**247,717**	**222,881**	**287,590**
Expenditure/Oblig'ns								
Consultancy (JTA Chair)	20,903				15,000		15,000	
Tech Coordinator		281,734				40,127		83,123
JCOMMOPS logistic supp		37,331				15,000		15,000
IOC	286,600				0		0	
Marine Programme	12,000							
Travel/Missions								
Tech Coordinator		36,676				10,000		16,000
DBCP Chairman	4,342				2,100		2,100	
JTA Chairman	12,650				10,000		10,000	
Bank Charges/SuppCost	199				4080		500	
Projects & Activities								
Publications					2,000		2,000	
JCOMMOPS Data Devt	6,527				5,000		5,000	
Miscellenious					8,633			
Contingency							30,000	
JCOMMOPS IS migration							2,000	
Supp. DBCP Mtgs/WSs	3,000				7,320		5,000	
Total Expenditure	**346,221**	**355,741**			**54,133**	**65,127**	**71,600**	**114,123**
Balance of Fund	**25,621**	**247,717**			**113,781**	**182,590**	**151,281**	**173,467**
Contributions								
Argos Inc		1,000						
Australia *	31,375				16,200		16,200	
Canada *	25,000	1,000			40,000		20,000	
CLS	10,000				15,000		15,000	
E-SURFMAR					47,393		48,000	
France(incl E-SURFMAR)	110,379	1,000						
Germany *	10,000				6,000			
Greece	2,200							
Iceland	2,250							
India *	3,000				3,000		3,000	
Ireland	1,517							
Japan *	12,000							
Netherlands	1,970							
New Zealand *	4,395				2,400		2,400	
Norway	395							
South Africa *	7,500				4,500		4,500	
United Kingdom		975			4,000			
United States of America *	24,500	207,500			3,800	0		105,000
WMO		290,600				0		0
Total	**246,481**	**502,075**	**0**	**0**	**142,293**	**0**	**109,100**	**105,000**
	* incl. 2005 contribution		E=estimate				E	E

1. The difference between Expenditure (IOC $286600) and income from WMO ($290600) is $1000 from the WMO Regular Budget
2. The income from Germany is SOOPIP 2004 and 2005 (2*$5000)
3. The income from Japan is SOOPIP 2004 and 2005 (2*$5000) and DBCP $2000
4. The WMO income from USA includes $2000, from Australia $1000 for the 2005 Argentina arrangement
5. The IOC income from USA includes $105000 advanced payment for 2006 incl. SOOPIP 2005 AND $12500 SOOPIP and $90000 DBCP 2004
6. The income from France include late payments for 2002 and 2003 and E-SURFMAR 2004 and 2005 (@ 40k€
7. Income from E-SURFMAR 2006, payment made by France
8. Miscellaneous includes cost for interviews new TC in 2006
9. Bank charges/Support cost 2006 includes Support cost 2004-2005 ($3461), Estimate 2006 (1% total expenditures: $419) and estimate bank charges @ $200
10. $4000 in 2006 from UK as supplement to 2004 contribution
11. $20000 from Canada as supplement to the 2005 contribution, payment in 2006
12. $3800 allocated to DBCP TF in 2006 from US contribution $10000 for support DBCP Workshop Reading; $7320 total expenditure under item Supp. DBCP Mtgs/WSs in 2006

EXPENDITURES AND INCOME FOR 2005 ~ 2007

Agreed by the Panel at its 22nd Session (20 October 2006)

SUMMARY

INTERIM BUDGET BASED ON WMO and IOC ACCOUNTING FOR 2004-2006 (AS AT 11 July 2006) IN USD

Item	Receipts	2004-2005 Obligation	Balance at 31 Dec.	Receipts	2006 Obligation	Balance at 31 Dec.	Receipts	2007 Obligation	Balance at 31 Dec.	Receipts	2008 Obligation	Balance at 31 Dec.
DBCP												
Balance Brought Forward	226,744			273,338			309,185			212,185		
Contributions	748,556			138,493			214,100			214,100		
Adjustment to match WMO/IOC												
Expenditure												
Technical Coordination		281,734			40,127			93,000			98,000	
Consultancy		20,903			15,000			15,000			15,000	
Travel		53,668			14,119			22,100			28,000	
Bank Charges/Support Cost		199			4,080			1,000			1,000	
IOC		286,600										
Marine Programme		12,000										
JCOMMOPS		43,858			20,000			45,000			40,000	
Outreach and Publications					2,000			**10,000**			10,000	
Contingency								**50,000**			50,000	
Supp Meetings/Workshops		3,000			7,320							
New Technical Evaluation								**30,000**			30,000	
Capacity Building								**25,000**			25,000	
Collaborative Arrangements								**20,000**			20,000	
Total DBCP	**975,300**	**701,962**		**411,831**	**102,646**		**523,285**	**311,100**		**426,285**	**317,000**	
Balance of DBCP Trust Fund			**273,338**			**309,185**			**212,185**			**109,285**
								Estimation		Rough estimation		

DBCP Trust Fund: Income and Expenditure

(based on WMO and IOC Finance Information as at 11 July 2006) in USD

DBCP	1 Jan2004 - 31 Dec 2005 WMO	1 Jan2004 - 31 Dec 2005 IOC			Estimated Jan-Dec 2006 WMO	Estimated Jan-Dec 2006 IOC	Estimated Jan-Dec 2007 WMO	Estimated Jan-Dec 2007 IOC
Receipts								
Brought Forward	125,361	101,383			25,621	247,717	126,595	182,590
Contributions (listed below)	246,481	502,075			138,493	0	109,100	105,000
Adjustment to Match WMO								
Total Receipts	**371,842**	**603,458**			**164,114**	**247,717**	**235,695**	**287,590**
Expenditure/Oblig'ns								
Consultancy (JTA Chair)	20,903				15,000		15,000	
Tech Coordination		281,734				40,127		93,000
JCOMMOPS logistic supp		37,331				15,000		15,000
IOC	286,600				0		0	
Marine Programme	12,000							
Travel/Missions								
Tech Coordinator		36,676				10,000		20,000
DBCP Chairman	4,342				2,100		2,100	
NON-DBCP	12,650				2,019			
Bank Charges/SuppCost	199				4080		1,000	
Projects & Activities								
Outreach and Publications					2,000		10,000	
JCOMMOPS Data Devt	6,527				5,000		**10,000**	
Contingency							30,000	20,000
JCOMMOPS IS migration							**20,000**	
Supp. DBCP Mtgs/WSs	3,000				7,320			
New Technical Evaluation							30,000	
Capacity Building							25,000	
Collaborative Arrangement							20,000	
Total Expenditure	**346,221**	**355,741**			**37,519**	**65,127**	**163,100**	**148,000**
Balance of Fund	**25,621**	**247,717**			**126,595**	**182,590**	**72,595**	**139,590**
Contributions								
Argos Inc		1,000						
Australia *	31,375				16,200		16,200	
Canada *	25,000	1,000			40,000		20,000	
CLS	10,000				15,000		15,000	
E-SURFMAR					47,393		48,000	
France(incl E-SURFMAR)	110,379	1,000						
Germany *	10,000				6,000			
Greece	2,200							
Iceland	2,250							
India *	3,000				3,000		3,000	
Ireland	1,517							
Japan *	12,000							
Netherlands	1,970							
New Zealand *	4,395				2,400		2,400	
Norway	395							
South Africa *	7,500				4,500		4,500	
United Kingdom		975			4,000			
United States of America *	24,500	207,500				0		105,000
WMO		290,600				0		0
Total	**246,481**	**502,075**	**0**	**0**	**138,493**	**0**	**109,100**	**105,000**
	* incl. 2005 contribution		E=estimate				E	E

Annex XXIII

ASAP TRUST FUND

WORLD METEOROLOGICAL ORGANIZATION

ASAP TRUST FUND

Statement of Account as at 31 December 2005

		SFR
Balance, 1 January 2004		50,478
Contributions received		48,615
Total Receipts		99,093
Obligations		
Consultancy	10,966	
Travel	1,584	
Equipment-Other	21,628	
Bank charges	13	
Support Costs	2,393	
Total Obligations Incurred		36,584
Total funds available		62,509
Represented by:		
Cash at Bank		62,509

Contributions	**2004**	**2005**	**Total**
Australia (for WRAP)	-	46,115	46,115
Iceland	500	500	1,000
United Kingdom	1,500	-	1,500
Total	2,000	46,615	48,615

ASAP Trust Fund

Statement of income and expenditure

For the period 1 January to 31 December 2006

Amounts in Swiss Francs

1. Balance of fund at 1 January 2006			62,509
2. Expenditure:			
2.1 Direct project costs:			
2.1.1 WRAP Consumables (GBP 6,033.07)	13,603		
2.1.2 Total direct project costs		13,603	
2.2 Indirect project costs			
2.2.1 Support Costs 7%	952		
2.2.2 Exchange Difference	79		
2.2.3 Total indirect project costs		1,031	
2.3 Total project expenditure			14,634
3. Balance of fund at 31 December 2006			47,875

Certified correct:

Luckson Ngwira
Chief, Finance Division

23-Feb-07

Annex XXIV

CHANGES PROPOSED BY THE SOT-IV TO THE TERMS OF REFERENCE OF THE SHIP OBSERVATIONS TEAM (SOT) FOR CONSIDERATION BY JCOMM-III

The Ship Observations Team shall:

1. Review and analyze requirements for ship-based observational data expressed by relevant existing international programmes and/or systems and in support of marine services, and coordinate actions to implement and maintain the networks to satisfy these requirements;

2. Provide continuing assessment of the extent to which those requirements are being met;

3. Develop methodology for constantly controlling and improving the quality of data;

4. Review marine telecommunication facilities and procedures for observational data collection, as well as technology and techniques for data processing and transmission, and propose actions as necessary for improvements and enhanced application;

5. Coordinate PMO/ship greeting operations globally, propose actions to enhance PMO standards and operations, and contribute as required to PMO and observers training;

6. Review, maintain and update as necessary technical guidance material relating to ship observations and PMOs;

7. Liaise and coordinate as necessary with other JCOMM Programme Areas and expert teams, as well as with other interested parties;

8. Participate in planning activities of appropriate observing system experiments and major international research programmes as the specialist group on observations based onboard ships, including voluntary observing ships, ships-of-opportunity and research ships;

9. Seek for opportunities for deploying various kinds of measuring devices and widely publicize those opportunities;

10. Develop as necessary new pilot projects and/or operational activities and establish new specialized panels as required;

11. Carry out other activities as agreed by participating members to implement and operate the SOT programme and to promote and expand it internationally;

Terms of Reference of Component Panels

SOOP Implementation Panel

1. Review, recommend on and, as necessary, coordinate the implementation of specialized shipboard instrumentation and in situ observing practices, taking into account the OOPC sampling strategies;

2. Coordinate the exchange of technical information on relevant oceanographic equipment and expendables, development, functionality, reliability and accuracy, and survey new developments in instrumentation technology and recommended practices;

3. Ensure the distribution of available programme resources to ships to meet the agreed sampling strategy in the most efficient way;

4. Ensure the transmission of data in real time from participating ships; ensure that delayed mode data are checked and distributed in a timely manner to data processing centres;

5. Maintain, through the SOT Technical Coordinator, appropriate inventories, monitoring reports and analyses, performance indicators and information exchange facilities;

6. Provide guidance regarding the SOT Technical Coordinator's support for the SOOP;

7. Prepare annually a report on the status of SOOP operations, data availability and data quality

ASAP Panel

The ASAP Panel is terminated and all of its outstanding, and proposed future activities passed to the SOT Task Team on ASAP established by SOT-IV. Decisions regarding the management of the ASAP Trust fund are transferred to the SOT.

VOS Panel

1. Review, recommend and coordinate the implementation of new and improved specialized shipboard meteorological instrumentation, siting and observing practices, as well as of associated software;

2. Support the development and maintenance of new pilot projects;

3. Oversee the efficient performance and operation of the VOSClim Project

4. Develop and implement activities to enhance ship recruitment, including promotional brochures, training videos, etc.

5. Prepare annually a report on the status of VOS operations, data availability and data quality

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Annex XXV

STATUS OF ACTION ITEMS FROM SOT-III

Green: Done or being undertaken
Black: Not done, not relevant anymore, status unknown, or ongoing
Red: Yet to be considered

para	Action	Responsible	Comment
I/2.3.4	In order to integrate observations under the coordination of SOT, representatives from the biological and chemical data communities of observations to be invited to SOT-IV	SOT chairperson and Secretariat	IOCCP to be represented at SOT-IV
I/3.4.4	The Observations PA Coordinator to recommend to JCOMM-II, as an explicit statement, that the GCOS Monitoring Principles be integrated into the revised terms of reference for relevant subsidiary bodies of JCOMM	Observations PA Coordinator	Res. I, JCOMM-II
I/3.5.3	SOT Task Team of Codes, chaired by Craig Donlon, to propose BUFR descriptors for a new set of reporting codes to enable the new class of observations to be used in operational agencies.	Task Team on Coding	Done, plus coding activity within SOT (VOSClim, META-T, XBTs)
I/4.1.2	A single page recruitment flyer to be made available on the JCOMMOPS and VOS web sites	JCOMMOPS Coordinator and BoM	Done
I/4.1.3	Recruitment Power Point Presentation to be kept under review; used whenever appropriate, and made available on the JCOMMOPS and VOS web sites	JCOMMOPS Coordinator and BoM	Done + ongoing
I/4.1.4	Task Team on VOS Recruitment and Programme Promotion to present draft design standard proposal to the classification society for comments and input.	Sarah North, Steven Cook	Contacts made by Sarah North with Lloyds registry (were relatively supportive). Contacts made by WMO at MSC-82, Istanbul December 2006 with ICS and IACS. ICS is reluctant (cost impact). Formal letter being sent by WMO to IACS (Jan 2007). Cook: had contacts with local ship builder who said that this should be feasible with proper future planning and resources.
I/4.1.5	The generic SOT certificate be made available on the JCOMMOPS and VOS web sites.	JCOMMOPS Coordinator and BoM	Done
I/4.1.6	International newsletter to be kept under review; consideration could be given to make articles available electronically	Task Team on VOS Recruitment and Programme Promotion	Done. Sarah North 1/2007: E-SURFMAR had suggested that the Wiki website might be used as a repository for potential articles. E-SURFMAR has developed the Wikilog http://esurfmar.meteo.fr/wikilog/index.php/Main_Page to store phenomena type reports principally from TurboWin. A page for Marine Observing Articles has been added on the E-SURFMAR wiki at http://surfmar.meteo.fr/wikisurf/index.php/Marine_Observing_Articles An international newsletter is still desirable, but nobody has the resources to take it on - so unless one of the current newsletters is expanded to take on an international perspective it will remain an outstanding item. (KNMI have in the past offered to include some non Dutch material in their MIM bulletin, but this is something that hasn't been properly explored yet)
I/4.2.8	SOT chairperson and WMO Secretariat asked to take necessary actions so that WMO EC-LVII be informed of the results of the Accounting Authority solution to a global cost sharing scheme for members	WMO Secretariat	Done

para	Action	Responsible	Comment
I/4.2.9	Task Team on Telecommunication Costs to monitor the problem of cost burdens to members	Task Team on Telecommunication Costs	Ongoing
I/4.3.4	WMO Secretariat to implement a mechanism to identify updated records in Pub. 47	WMO Secretariat	Done. Update date added
I/4.3.4	Send out a formal letter to PRs of VOS asking they send the latest updated information so that outdated metadata can be excluded in future updated versions of the Pub. 47.	WMO Secretariat	Done. Letter sent to WMO Members (1) advise on de-recruited vessels, (2) Quarterly submission of metadata required on a quarterly basis, and (3) Prepare for submissions in version 3 format as of 1 July 2007.
I/4.3.5	WMO Secretariat to send quarterly reminder to VOS focal points, using VOS focal point mailing list, mentioning importance of metadata to encourage metadata submission. VOS operators to ensure that up-to-date metadata are regularly provided to the WMO Secretariat.	WMO Secretariat and VOS operators	Ongoing; WMO to initiate quarterly issue of emails
I/4.3.8	WMO to investigate the possibility of making the Pub. 47 database available to VOS operators in read-only mode.	WMO Secretariat	Done
I/4.3.9	SOT chairperson to raise the issue of electronic version of Pub. 47 to be a priority issue in the WMO Secretariat.	SOT chairperson	Pub 47 addressed at JCOMM-2 but not the WMO priority issue
I/4.3.11	JCOMMOPS to upgrade their unofficial version of WMO Pub. 47 to include all available fields.	JCOMMOPS	Under action. Proposal being prepared by JCOMMOPS for SOT-IV
I/5.2.4	SOT should be kept informed of any relevant development regarding telecommunication facilities in its future sessions.	Inmarsat, Argos, EUMETSAT	Ongoing
I/8.2	The ad hoc Task Team to thoroughly review the contents and template for the SOT Annual Report so that the 2004 Annual Report can be published. SOT members to send their comments to Mr Graeme Ball as soon as possible	ad hoc Task Team and SOT members	2004 report not produced. 2005 report done. 2006 report to be discussed at SOT-IV
I/9	The Secretariat to submit the proposed revised version of TORs to JCOMM-II for consideration and approval.	Secretarial	Done
I/9.2	OPA chairperson to provide guidance to the SOT on if and how in situ data, which is collected by fishery organizations, coastal moorings and navies but not currently part of established groups (DBCP, Argo, etc.), might be included.	OPA chairperson	
I/10	National reports received at the SOT-III together with other written national reports received by the Secretariat to be published in the SOT National Report.	Secretariat and participants	Reported included in 2005 SOT report. SOT-IV reports to be included in 2006 report.
I/11.2	The exact dates and venue for SOT-IV to be finalized as soon as possible.	chairpersons and Secretariat	Still under investigation, e.g. Bologna or Rome, 16-21 April 2007
II/1	A scientific and technical workshop to be organized in conjunction with SOT-IV. Participants to submit papers to next workshop.	Secretariat and SOT chairperson	Done

para	Action	Responsible	Comment
III-A/2.3.2	Barometer calibration practices of countries to be made available on VOS web site.	VOS operators and BoM	Done. Was discussed at PMO-3. Email sent by SOT Chairperson with draft inspection form in early April 2006. VOSP Chairperson finalized form based on received inputs. The tables showing national barometer, barograph and transfer standard instrument types and practices were put on the VOS website in June 2006. http://www.bom.gov.au/jcomm/vos/national_practices_pressure.html
III-A/2.4.7	Météo-France to take action to extend the monitoring period from 14 to 21 days, if appropriate, and possible.	Météo-France	Not done. P. Blouch 1/6/2006: Does not have the human resources to extend the period to 21 days. Does not consider this task as a matter of priority
III-A/3.1.2	KNMI to investigate possibility of enhancing TurboWin by developing a self-training tool such as a video on how to use TurboWin.	KNMI	Under action. KNMI is gathering all types of different information. It will (probably) become a PowerPoint presentation instead. TurboWin 4.0 has been released in mid-January 2007, but training materials and FAQs were not included in TW yet. KNMI is planning to prepare them and distribute them via the web soon after TW 4.0 release.
III-A/3.1.3	TurboWin to be modified to save an archived copy of the IMMT-2 log data when the option to transfer the data to disk is selected.	KNMI	Done. This was implemented in Version 3.6, the version currently in use by Australia. Next issues will have this option as well.
III-A/3.2.1	VOS Panel chairperson to collate information on global VOS automation for presentation at subsequent VOS Panel sessions.	VOS Panel chairperson	Done, Ongoing
III-A/3.2.4	Status information of VOS automation to be kept updated. The list to be included in the SOT Annual Report	VOS Panel chairperson	Ongoing. Reports from VOSP Chairperson included in 2005 report. New information available at SOT-IV. Planned for inclusion in 2006 annual report.
III-A/3.3.2	SAMOS ships, not yet doing so, to contribute to the VOS programme, and where appropriate to VOSClim	SAMOS ships	To be discussed at SOT-IV
III-A/3.3.2	SOT members to consider possible interactions with SAMOS programme and to contact SAMOS directly, if appropriate	SOT members	To be discussed at SOT-IV
III-A/4.1.3	VOS Panel members to take any possible actions to prevent making the ship positions available on web sites	VOS operators, SOT chairperson	Under action. Discussed at PMO3, WMO-EC, WMO-IMO consultative meeting
III-A/4.1.3	WMO Secretariat to inform NMS about the security risk by making ship data available on web sites so that they can monitor the situation and take appropriate actions.	WMO Secretariat	WMO EC-LVIII, EC-LIX
III-A/4.1.3	WMO Secretariat to advise the WMO Executive Council (EC) about the risk by making ship data available on web sites and that the problem will continue to exist whilst FM-13 SHIP is included as “essential data” in the Resolution 40 (Cg-XII)	WMO Secretariat	Rejected by EC-LVIII
III-A/4.1.4	Weather charts issued by NMS on their web sites should not display Ship Data and callsigns as it exposes ships to a security risk.	NMS	Discussed at PMO-III, WMO EC-LVIII
III-A/4.2.2	VOS chairperson and WMO Secretariat to prepare an updated version of the Annex to MSC Circular 1017; and WMO Secretariat to request the IMO Secretariat to issue a MSC Circular Accordingly	VOS Panel chairperson, WMO Secretariat	Under action. The revised MSC Circ 1017 was drafted and sent to WMO. Still under discussion. The high-level dialogue, Geneva, 12-13 February 2007 discussed this issue and recommended to include “ship security” issue and to refer to Regulation V/5 on Meteorological Services and Warnings of the SOLAS convention. SOT4 invited to discuss it.
III-A/4.2.2	PMO and VOS operators encouraged to show of the MSC circular, once issued, to mariners as it oftentimes does not reach mariners on ships	PMO and VOS operators	Ongoing

para	Action	Responsible	Comment
III-A/4.2.3	WMO to raise the issue of having masters' standing orders to include the statement "the making of weather observations, when it is safe to do so, should be undertaken" with the International Chamber of Shipping (ICS) that represents the Shipowners/Operators worldwide	WMO Secretariat	Done. Letter send to ICS 2/2007.
III-A/4.2.4	Tools developed by the Task Team on VOS Recruitment and Programme Promotion (e.g. flyer, power point presentation) to be used to promote VOS through shipping companies	Task Team on VOS Recruitment and Programme Promotion	Ongoing
III-A/4.2.4	WMO to enhance the relationship with IMO on issues such as future ship design.	WMO Secretariat	WMO sent letter to IACS. Discussed at WMO-IMO consultative meeting.
III-A/4.3.3	A list of PMOs and their details to be lodged with the Port Security Committee (PSC) to allow an easier PMO access	PMOs, VOS operators as appropriate	
III-A/4.3.4	Monitor and take appropriate action to get NMS personnel accepted as bona fide visitors acting on Government business.	VOS Panel and SOT chairpersons, WMO Secretariat	Under action. Raise it with IMO and express concerns about the added impositions the introduction of the ISPS code has placed on PMOs globally. VOSP Chairperson provided input to WMO.
III-A/4.4.1	VOS operators need to be familiar and comply with their National Customs requirements to ensure ongoing VOS operations.	VOS operators	
III-A/4.5.3	VOSP to provide to the VOSP chairperson a list of other improvements to the marine meteorological services monitoring questionnaire to be passed to the ETMSS for inclusion in the next questionnaire.	VOSP chairperson, Task Team on VOS Recruitment and Programme Promotion	Done. VOSP circulated a redrafted version for comment. Revised questionnaire sent ET-MSS Chairperson, Henri Savina, 30/8/2006. Discussed at ET-MSS-2, ETWS-II, ETSI-III.
III-A/4.6.2	In the short term, provide regular lists of ships which are declared as being recruited by more than one country	Dr Elizabeth Kent	Done. This has been taken over by Pierre Blouch from Meteo France who has led the development of a "Multi Recruitment Tool" which is run automatically on the 9th of each month (or manually when required) to download the latest available version of Pub. 47 and generate a user- friendly display by country of the ships in the latest edition with conflicting entries. http://www.meteo.shom.fr/vos-monitoring/multi-recruit.html (last update 2nd quarter 2006)
III-A/4.6.2	Lists of ships which are declared as being recruited by more than one country to be published on the E-SURFMAR web server	Mr Pierre Blouch	Done. http://www.meteo.shom.fr/vos-monitoring/multi-recruit.html
III-A/4.7.3	Liaise with the CBS Expert Team on GTS-WIS Operations and Implementation (ET-OI) of the CBS OPAG ISS to consider requirements for the exchange of test SHIP reports	Mr Pierre Bloch as SOT focal point	Under action. P. Blouch 1/6/2006: Meteo-France is sending a few reports with TESTFRx as callsign. In May 2006, there was no report from AVOSTES onto the GTS but some from TEST. Unknown whether they have the same origin. Status in January 2007: - Environment Canada and Meteo-France are using TESTCAx and TESTFRx as test callsigns when needed; - Environment Canada no more uses AVOSTEST; - Callsign TEST appears from time to time from a location close to Los Angeles, CA (218 reports in December 2006).
III-A/5.1.3	The current format for the criteria for the six variables being monitored to be amended to highlight the actual criteria being flagged.	RSMC Exeter	Done
III-A/5.1.4	Discuss and decide the details of a procedure to inform RSMC Exeter of remedial actions taken by PMOs based on suspect ship lists, based on the feedback system used for buoy monitoring.	RSMC Exeter, JCOMMOPS Technical Coordinator, VOS Panel chairperson	Done. 19/06/2006: No formal mechanism is required. Individual NMS or VOS FPs would, on a voluntary basis, email RSMC with comments regarding action taken, or reason found for bad data. 7/2006: Chairperson preparing simple point by point instructions for PMOs and VOS Program Managers, especially for new personnel, e.g. reply to JCOMMOPS QCrelay messages from the RSMC about the nature of investigations into ships supplying suspect data and the actions(s) taken.

para	Action	Responsible	Comment
III-A/5.1.5	Review the format of the six-monthly reports.	RSMC Exeter, VOS Panel chairperson	Done
III-A/5.1.6	Advise the RSMC Exeter (Met Office) of e-mail address to be added to distribution list for monthly monitoring statistics for VOS.	VOS focal points and ship operators	See below.
III-A/5.1.6	RSMC Exeter (Met Office) to use national ship lists for monthly monitoring statistics for VOS as appropriate, since Pub. 47 is updated on quarterly basis.	RSMC Exeter	Done. RSMC Exeter is looking at moving towards using the Pub47 list, basically because it's easier to maintain a single list and Pub47 is updated by more countries, e.g. http://www.metoffice.com/research/nwp/observations/monitoring/marine/VOF/index.html AU, NZ, NL, DE & UK are now sending monthly copies of their complete VOS list to RSMC Exeter as this was simpler to incorporate into the 'master' Pub47 list.
III-A/5.1.7	RSMC Exeter (Met Office) to include timeliness information on the VOS as a whole in its monthly reports to produce timeliness plots for all VOS national fleets listed in WMO Pub. 47 and make available on the Met Office web site.	RSMC Exeter, VOSP chairperson	Done. The timeliness information can now be found at: http://www.metoffice.com/research/nwp/observations/monitoring/marine/TOR/index.html where there is a table summarizing the data timeliness for each country, and the plot showing the timeseries for a few of the countries (hoping to extend to include all countries). Timeliness information for individual callsigns on the Pub47 list can also be found here.
III-B/1.3.2	DAC to link to the latest version of Pub. 47 on the WMO web site and the JCOMM VOS web site, and the tools for metadata display and interrogation on the JCOMMOPS website.	DAC	Done
III-B/1.3.2	Scientific Advisers to be responsible for the association of metadata with individual VOSClim reports. A mechanism for the provision and storage of VOSClim digital images to be investigated.	Scientific Advisers and DAC	Partly done
III-B/1.3.3	Increased recruitment of VOSClim ships.	VOSClim operators, VOS operators who have yet to contribute	Done, ongoing
III-B/2.1.2	RMTC to take appropriate actions so that only reports received in ocean areas (model surfact type ‘ocean’) would be included in the monitoring statistics.	RTMC	Done. RTMC is transferring its monitoring system. Will probably apply the 'land/ocean mask' when they transfer the relevant part of the monitoring system. RTMC are currently aiming to have sea-only statistics available for February 2007.
III-B/2.1.2	Operators who had responded to the monitoring statistics to provide feedback on remedial actions.	VOSClim operators	Partly done. See III-A/5.1.4
III-B/2.1.2	Once the VOS monitoring feedback system is established, using JCOMMOPS facility, mechanism to be extended to VOSClim project.	RTMC, JCOMMOPS Coordinator, VOSClim operators	Not done. See III-A/5.1.4
III-B/2.1.2	An up-to-date list of the project focal points to be maintained on the web site.	VOSClim operators	Done. List also maintained on WMO web site
III-B/2.1.2	Modifications to the list of participating ships to be sent to the RTMC and VOSClim Data Assembly Centre	VOSClim operators	Partly done
III-B/2.2.1	DAC and RTMC to take actions to recover data from the Met Office to fill the gap in the BUFR data stream between the end of April and the end of August 2003 due to the transition from e-mail to GTS transmission of the BUFR data stream.	DAC and RTMC	Done
III-B/2.2.2	DAC and the RTMC to agree on improved mechanisms, which will be put in place to avoid RTMC BUFR data loss.	DAC and RTMC	In hand
III-B/2.2.2	Mechanisms for simplifying data delivery between RTMC and the DAC, such as ftp, to be considered	DAC and RTMC	In hand

para	Action	Responsible	Comment
III-B/2.2.2	DAC to simplify data delivers to users using ftp site.	DAC	Partly done
III-B/2.2.2	RTMC to investigate whether the monthly statistics and suspect lists can be transferred to the DAC by ftp rather than e-mail.	RTMC	Done. The RTMC started placing the monthly statistics and suspect lists on their external FTP server during the autumn of 2006.
III-B/2.3	VOSClim operators to ensure implementation of the latest version of IMMT.	VOSClim operators	Ongoing, partly done
III-B/2.3.2	All contributing members of the VOSClim project to review their delayed mode data submission processes to the GCCs in IMMT-2 or IMMT-3, and ensure or work toward their processes and submissions being up-to-date	VOSClim operators	Ongoing
III-B/2.3.3	France to attempt to revise the BATOS system.	France	Done. The new version of the software produces its outputs according to the IMMT3 format.
III-B/3.1.1	Since the lack of delayed mode data for the VOSClim project is a problem, as an interim measure VOSClim operators to provide raw data from the data entry software direct to the Scientific Advisers.	VOSClim operators	Not done
III-B/3.1.2	Scientific Advisers to convene an informal 'Scientific Users Group' to widen expertise, inform the development of the high-quality dataset and guide the assessment and exploitation of the value of VOSClim datasets.	Scientific Advisers	Partly done. This was raised at the Second International Workshop on Advances in the Use of Historical Marine Climate Data (MARCDAT-II) held at the Hadley Centre, Met Office, Exeter, UK, 17-20 October 2005. A number of scientists agreed to perform this role and will be asked to contribute to and comment on the analysis of the VOSClim dataset described below.
III-B/3.1.2	A strategy for the future production and maintenance of a high-quality dataset to be developed and agreed based on results of assessment of value of VOSClim datasets. The strategy to include a determination of how many ships and observations will be needed to ensure the quality of the dataset.	Scientific Advisers	In hand. The assembly and analysis of the VOSClim dataset began in May 2006 and a preliminary analysis and dataset was expected to be complete by the end of July 2006. The software required to associate real-time and delayed-mode data is under development and software to associate metadata from Pub. 47 with the reports has already been developed. Analysis was expected to begin in early June 2006 and input from the informal users group be solicited. This has not progressed as hoped. Various problems with using the datastreams were encountered and have not been fixed yet. A different approach is now proposed to trying to develop the dataset and this work is still in progress. Progress report will be presented at SOT-IV.
III-B/3.1.3	JCOMMOPS to set up and maintain a VOSClim Task Team mailing list.	JCOMMOPS	Done
III-B/3.1.4	New Task Team on VOSClim to prepare a report to SOT-I on, inter-alia, overarching VOSClim issues.	Task Team on VOSClim	Done. 2007/01: Sarah North will do in liaison with Liz Kent when the results of Liz's analysis of the VOSClim data becomes available
III-B/3.1.5	Scientific Advisers to produce a VOSClim dataset for presentation at SOT-IV. Mechanisms for the maintenance of the dataset to be developed.	Scientific Advisers	Partly done. See actions II-B/3.1.2; SOT-IV See actions II-B/3.1.2; SOT-IV Some progress should be reported at SOT-IV
III-B/3.1.5	VOSClim operators who are currently not providing delayed mode data in IMMT-2 and IMMT-3 formats to the GCC to contact the Scientific Advisers (eck@soc.soton.ac.uk) to arrange delivery of delayed mode data as a temporary measure to allow scientific assessment to proceed.	VOSClim ship operators	Not done. There has been a little progress on this item (June 2006). Germany and the UK are now able to complete the VOSClim datastream by performing MQCS on data in IMMT-3 format. Canada, Australia and Japan are in the process of developing this capacity and are expected to be in a position to provide this information before the end of the year. We are awaiting information from the Netherlands and France. Unfortunately the Indian VOSClim ships are not recording the additional VOSClim parameters. Unkonwn whether AU and JP have managed to implement IMMT-3 by the end of 2006. Any delayed mode data coming through the GCCs is not currently made available on the VOSClim website.

para	Action	Responsible	Comment
III-B/3.2.2	As an alternative to issuing a VOSClim Newsletter, Robert Luke (USA) to include an updated VOSClim article in a coming edition of the US Mariner Weather Log. NMS encouraged to take similar actions.	Robert Luke, NMS	Done. http://www.vos.noaa.gov/MWL/dec_05/vos.shtml
III-B/3.2.3	DAC to review the front page of the VOSClim web site and make revisions as appropriate. The Task Team on VOSClim to advise the DAC regarding any web site enhancement.	DAC and Task Team on VOSClim	Done. A new frontage for Website has been done http://lwf.ncdc.noaa.gov/oa/climate/vosclim/vosclim.html
IV/1.1.5	XBT community to review and comment to the SOOPIP chairperson on the two Japanese papers concerning the comparison between TSK and Sipican T5 probes and possible changes in the fall rate equation.	XBT community	
IV/1.2.4	SOOP Coordinator to continue to work on the number of probes for the global climate line requirements.	SOOP Coordinator	
IV/1.2.6	Refine reporting to identify ships sending old JJXX codes, for targeted upgrading	Bob Keeley/MEDS	Ongoing. For JJXX the number of platforms reporting in this form has fallen to zero. There are a few that report in JJYY. SOOPIP Coordinator to contact individual ship operators routinely.
IV/1.2.6	Add to the technical documents list on the SOOPIP website, taking note of 2 papers brought by Kanno (Japan)	All, via the SOOP coordinator	Ongoing
IV/1.2.6	Panel members urged to submit updates for the technical report and papers section of the SOOP/JCOMMOPS web site.	SOOPIP members	Ongoing
IV/1.3.1.4	Improve the timeliness, where possible, of reports to the SOOP coordinator for Semestrial Reports	All XBT operators	
IV/1.3.1.5	SOOP Coordinator to investigate feasibility of specific monitoring products in order to discriminate between the two modes of operation and report at the next SOT meeting.	SOOP Coordinator	No progress. To be discussed at SOT-IV
	Report separately, if possible, the number of XBT drops outside the SOOP-identified lines, such as the German moorings, Japan regional surveys	SOOP Coordinator	
IV/1.4.2.2	Exchange technical information: Robert Luke will be a focal point for e-mail dissemination of information on new technical developments impacting SOOP observations to the small group of interested parties	Robert Luke SOOPIP chairpserson	Under action. In August 2005 R. Luke sent an email to the respective Panel Chairs asking that each Chairperson consolidate their groups information and submit it accordingly. In early 2007, only the VOS and ASAP Panels have submitted information

para	Action	Responsible	Comment
IV/2.2.2	Efforts to be renewed to recruit ships on indicated lines.	SOOP operators	Under action IRD at the same level in 2006 as in 2004 (AX01, AX05, AX11, AX15, AX20). Indian Ocean and AX34 if IRD continues to fund Devil units. NOAA able to install and operate a new ship on route AX-34. NOAA successful in collecting 4 or 5 very good XBT transects and several buoy deployments. Reduced funding support for LDX sampling forced NOAA to stop sampling on this route. Will try to re-instate. IX15: A ship was recruited by SIO (MSC Didem), but the routing of all MSC ships has changed to Mauritius - Sydney. SIO/CSIRO are sampling Mauritius - Bass Strait as the closest alternative to IX15. IX21: A ship was recruited by SIO (S.A. Sederberg), autolauncher installation and first cruise completed in May 2006. PX06/PX31 (SIO): The preferred track is PX06/PX09 but there is no shipping at present. PX06/PX31 (Tauranga-Suva-Los Angeles) is the alternate and has been sampled since beginning of 2005 and in some earlier years (see http://www-hrx.ucsd.edu/px09/p090502.html) PX08 instead of PX50: PX08 (Port Chalmers-Panama) is being sampled by SIO in high density mode as the nearest alternative to PX50. If PX50 shipping becomes available SIO will revert to that line. BSH: on line AX-11 Europe – Brazil the CMS Cap Finisterre was replaced by the ship CMS MONTE OLIVIA (Callsign: DAJC). IX06 Mauritius - Malacca Straight: Japan is currently searching for a suitable ship and looking for funding (JMA); The National Research Institute of Far Seas Fisheries (NRIFSF) and JAMSTEC are still searching for a ship, but it is hard to find a suitable VOS for IX6.
IV/2.2.2 IV/2.3.1	Target recruitment of SOOP ships on lines identified in the line responsibility discussions (IV/2.2.2); and liaise with the two groups identified in IV/2.3.1	As indicated	Ongoing
IV/2.2.2	Identify opportunities for cooperation on drifting buoy deployments: The Gulf of Guinea was identified as an area with poor deployment opportunities, IRD will approach the ship on the AX15 line to see if this is a possibility	IRD	Still being investigated. Denis Diverres 1/6/2006: IRD has installed a TSG on Safmarine Nokwanda in November 2005. IRD projected to add a XBT system by the end of 2006. The seamen seem to be interested in scientific measurements. IRD has already experimented Solo floats deployments on AX11 during ARAMIS cruises, in collaboration with Robert Roddy, NOAA. Deploying SOLO float is quite easy and only requires a small experience. Denis Diverres visited Nokwanda in Rotterdam on 18th June 2006 and asked them about the floats.
IV/3.3.5	Identify common consistent set of metadata that is of use to the XBT operators, and what can be provided to scientific users, in advance of the JCOMM OCG workshop on the real-time provision of metadata	SOOPIP chairperson to initiate with XBT operators	Done. Now under META-T
IV/3.4.5	Addition of GTSPP unique tag in BUFR tables and template	SOOP coordinator	To be undertaken by SOT team on codes and META-T PP in liaison with Codes group established by JCOMM/DMCG, October 2006. Proposal to be submitted to ET/DRC, April 2007
IV/3.4.5	Investigate the requirements for migration to BUFR reporting for XBTs, including status, what will be required to do it, whether countries are ready to move to it	SOOPIP chairperson to initiate with XBT operators	Under action. Discussed via email; USA possibly to initiate action. Will report at SOT-IV

para	Action	Responsible	Comment
IV/3.4.7	Designate appropriate contact points to work with the SOOP Coordinator in order to work on potential impact of developing BUFR encoding/distribution capability and to work out a proposed BUFR template for ADCP data	XBT operators	Under action. Discussed via email; USA possibly to initiate action. Progress reported at SOT-IV
IV/3.4.7	Submit proposed ADCP BUFR template to the CBS Expert Team on Data Representation and Codes (ET/DRC)	SOOP coordinator	To be undertaken by SOT team on codes and META-T PP in liaison with Codes group established by JCOMM/DMCG, October 2006. Proposal to be submitted to ET/DRC, April 2007
IV/4.1.1	Send XBT sampling plans for each route maintained	XBT operators, to Chairperson and SOOP coordinator	IRD at the same level in 2006 as in 2004 (AX01, AX05, AX11, AX15, AX20). Indian Ocean and AX34 if IRD continues to fund Devil units. PX05(Japan-New Zealand): JAMSTEC/JMA ceased to observe on PX05 line in March 2006 because of reduced funding support. IX09(North)&IX10(Eastern part): A new ship (KAMINESAN:HPJF) replaced the former ship (KATORI:3FRY5) in December 2005. In 2006, JAMSTEC plans to make 12 transects on IX09(North)& IX10(Eastern part) line and deploy about 25 XBTs or XCTDs per transect, which means 4 drops per day. PX40(Hawaii-Japan): In 2006, Tohoku Univ./ JAMSTEC plan to make 3 transects on PX40 and deploy about 100 XBTs or XCTDs per transect, which means 30 miles spacing drops.
IV/4.1.1	Ask OOPC to review N-S vs. E-W line assignment vs. required horizontal resolution	SOOPIP chairperson	
IV/5.1.3	Proposed JCOMMOPS Terms of Reference to be submitted to JCOMM-II for adoption.		Done
IV/5.1.6	OCG to investigate the possibility to eventually establish a JCOMM Trust Fund dedicated to JCOMMOPS development and operations	OCG	JCOMM-II made rec.
IV/5.1.7	Secretariat to investigate if Member States presently contributing to DBCP/SOOP and AIC Trust Funds would agree in principle that their contributions be made to a JCOMM Trust Fund dedicated to JCOMMOPS instead.	Secretariat	Under action. JCOMMOPS roundtable…
IV/5.1.8	VOS and ASAP Panels or Members/Member States participating in SOT to investigate making contributions to the trust fund once/if established.	Members/Member States participating in SOT	Under action. JCOMMOPS roundtable…
V/5.1.1	JCOMMOPS Coordinator to prepare a simple static web page, accessible through JCOMMOPS and the SOT page, in coordination with the ASAPP chairperson.	ASAP chairperson and JCOMMOPS Coordinator	Under action. Web page created by Hester Viola with assistance from ASAPP Chairperson (http://www.jcommops.org/sot/asapp/) . Needed to be refined.

para	Action	Responsible	Comment
V/5.2.2	ASAP brochure to be kept under review at future ASAP Panel sessions as appropriate	ASAP chairperson and Secretariat	Under action. Although it is only three years since ASAP last revamped the brochure there have been a lot of changes recently - so it should really be updated to reflect the additional E-ASAP systems now in operation and the fact that WRAP is no longer in existence etc. However we should consider the future need for this brochure given the limited resources available to NMS to become involved in ASAP operations, and the fact that E-ASAP is now the key player in this area. On balance it is useful to have a brochure to hand to prospective new ASAP ships to introduce them to upper air work and, it is included in the TurboWin programme. So on balance it is probably worth revising. Perhaps we could get some draft revised text together for SOT IV to consider. Rudolf Krockauer provided updated information for the brochure: Countries that currently operate ASAP systems on a regular basis are Japan, Denmark (2), France (2), Germany (4), Spain (1), Iceland (1), the USA, and the UK (1). However, some countries also recruit ships to perform ASAP soundings on a less regular basis, when a perceived need is established. In addition, the twenty participating European National Meteorological Services which comprise EUMETNET are also involved in ASAP operations. There are presently five EUMETNET ASAP (E-ASAP) ships in operation which are plying North Atlantic and Western Mediterranean routes. One of the goals of E-ASAP is a joint financing and central core management of the European ASAP fleet (E-ASAP and national ASAP systems). Three German and one British ASAP systems are directly managed by E-ASAP. E-ASAP also contributes to the World Weather Watch (WWW) through a limited number of soundings outside the so-called 'EUCOS area' (10N-90N, 70W-40E). Original source file of the brochure is lost. Text of the ASAP brochure was submitted to Sarah North in January 2007. Pictures should be available from TurboWin.
V/5.3.2	E-ASAP store high-resolution data, if appropriate and possible.	E-ASAP	Data telecommunication cost issue. BUFR capability needs to be developed.

Annex XXVI

LIST OF ACTION ITEMS FROM SOT-IV

Abbreviations:

SOT TC	Technical Coordinator of the SOT
TT/Instr	SOT Task Team on Instrument Standards
TT/Codes	SOT Task Team on Coding
TT/VRPP	SOT Task Team on VOS Recruitment and Programme Promotion
TT/Sat	SOT Task Team on Satellite Communications System
TT/ASAP	SOT Task Team on the ASAP
TT/VOSClim	SOT Task Team on the VOSClim Project
TT/DMVOS	Task Team on Delayed Mode VOS Data

Item	Action	By	Deadline
II-4.1	to provide the results of the XBT Recorder Inter-comparisons study on the SOOPIP web site	SOT TC	Aug 2007
II-4.5	to provide VOSClim uncertainty maps and time series of uncertainty	TT/VOSClim	End 2007
II-4.5	To include VOS ships providing good quality data in the VOSClim provided that appropriate metadata are made available	VOS Operators	Ongoing
III-3	To publish the national reports provided by the Members as well as the PowerPoint presentations made at SOT-IV on CD-Rom within the SOT annual report for 2006	Secretariat (WMO)	End 2007
I-2.1.13 and IV-3.5.7	To conduct a comparison study of electronic logbooks (including algorithms, and documenting the calculation methods of dew point for historical purposes), with participation from both SOT and ETMC	TT/Instr	SOT-V
I-2.1.14	To provide guidance to the ETMC regarding GTS distribution in BUFR code, in particular: (i) whether BUFR is going to be assembled on board or at the local receiving NMSs before being inserted into the GTS, and (ii) if on board, which BUFR template should be used.	TT/Codes	Sept 2007
I-3.2.4.3	Ferrybox to cooperate with the GOSUD project for dissemination and archiving of the temperature and salinity underway data collected. To make the data available to GOSUD	GOSUD (Loic Petit de la Villeon) Ferrybox (Colijn)	SOT-V
I-4.1.4	To approach the Maritime Safety Committee with a joint document from JCOMM (WMO-IOC) and the International Chamber of Shipping (ICS).	TT/VRPP Secretariat	Aug 2007
I-4.1.5	To consider producing a VOS training video	TT/VRPP	SOT-V

I-4.4.2	To check the VOSClim project website (recently updated) to verify ships and call sign changes to make sure that none are missing	VOSClim operators	Ongoing
IV-1.1.12	To work with WMO in order to identify active ships and remove the historical records from WMO Pub. 47 for ships which are not active anymore	VOSP Chairperson Secretariat (WMO)	Mid 2008
IV-2.1.1.6	To fill in the VOS automation fields in their submissions of WMO Publication 47 metadata as of 1 July 2007 as the new format that will come into force by then will permit the inclusion of such information	VOSP Members	1 July 2007
IV-2.1.1.7	To increasingly implement automated systems on the fleet while at the same time recognizing the requirements expressed by the ETMC that traditional variables that can only be observed manually should continue to be submitted	VOSP Members	Ongoing
IV-2.1.1.8	To review and correct the data in the document presented by the Chairperson and to provide the Chairperson with details of any automated VOS systems that are not included in this report	VOSP Members	SOT-V
IV-2.1.1.10	To liaise with Russia during the next intersessional period and to seek its participation at the next SOT meeting	Secretariat (WMO)	SOT-V
IV-2.1.1.11	To help for having the SOT requirements considered by the manufacturing industry	HMEI (Bruce Sumner)	SOT-V
IV-2.1.2.6	To clearly document software versions on the web sites where the e-logbook software can be downloaded and to provide on-line as well as off-line (onboard, electronic or paper) training tools	VOSP Members providing e-logbooks	SOT-V
IV-2.1.2.8	To always record the call sign and/or the VOS ID as assigned by the national meteorological service in the electronic logbooks	VOSP Members operating e-logbooks	Ongoing
IV-2.1.2.10	To enhance coordination amongst the Task Teams and cross cutting activities for addressing all the new requirements for IMMT, BUFR, satellite data communications, VOS ID	All relevant TT	SOT-V
IV-2.2.3 and IV-3.6.6	To use the web based Pub47 database system provided by E-SURFMAR for submitting the Pub. 47 metadata to the WMO	VOSP Members who don't already have their own databases and tools	Ongoing
IV-2.2.4	Interested Members to contact Pierre Blouch to obtain copies of the half compressed data transmission software	VOSP Members	Ongoing

IV-2.3.2.5	To liaise with USA regarding organization of the Fourth International PMO Workshop in 2009	Secretariat (WMO) USA	Early 2009
IV-2.3.31	To take steps to enhance their PMO activities	VOSP Members from regions where gaps appear in the PMO network	SOT-V
IV-2.3.3.3	To engage with the IMO to ensure that the training syllabus for ship officers (e.g. the Standard of Training and Certification for Watchkeepers (STCW) convention) ensures adequate training in the modern observational practices	SOT Members	SOT-V
IV-2.4.1.6	To routinely use the JCOMMOPS QC relay tool for reporting on systematic errors	RSMC, Exeter Quality monitoring centres	Ongoing
IV-2.4.1.6	To make use of the available tools to monitor the quality of the VOS data and to provide feedback to ships on how to improve bad data, and to use the monthly VOS status maps to identify data sparse areas where more ship observations are required	VOS Programme Managers PMOs	Ongoing
IV-2.4.1.6	To advise the RTMC (email to obsmon@metoffice.gov.uk) of investigations undertaken into the causes of bad data identified on the VOSClim Suspect List and to report on the corrective actions taken	VOS Programme Managers	Ongoing
IV-2.4.1.6	To provide a summary of corrective actions by email to the VOSClim RTMC	PMOs VOS Focal Points	Ongoing
IV-2.4.1.9	To provide for a web page summarizing the quality monitoring tools now available and providing appropriate links	SOT TC	Sep 2007
IV-2.4.2.6	To continue the developments of the Dirkzwager vessel tracking tools and report on their effectiveness at the next SOT Session	E-SURFMAR.	SOT-V
IV-3.1.5	To keep the lists of VOS National Focal Points as well as the list of PMOs contact Points up to date based on the submissions from the Members for the SOT annual Report or as advised	Secretariat (WMO)	Ongoing
IV-3.1.5	To make sure that the mailing lists maintained at JCOMMOPS are consistent with the lists provided on the WMO web site	SOT TC	Ongoing
IV-3.2.5	To use a slightly higher limit of 12% for the bias limit criteria for the real time monitoring for relative humidity	VOSClim RTMC	ASAP
IV-3.2.6	To provide details of remedial actions taken to the DAC by email	PMOs	Ongoing
IV-3.3.8	To avoid masking the delayed mode data using SHIP	VOS Operators	Ongoing

IV-3.4.4	To consider the following recommendations by the meeting regarding the display and availability of VOSClim project data on the website: (i) there is a need for maintaining the list of VOSClim ships up to date, (ii) the notification of the recruitment to the DAC must be the date of notification, (iii) a link to VOS web site should be added on the VOSClim web site, (iv) the DAC should keep track of call sign changes (e.g. beginning/ending dates for call signs)	VOSClim DAC	Ongoing
IV-3.5.6	To produce the TT-DMVOS project plan	TT/DMVOS	August 2007
IV-3.5.9	Not to mask the delayed mode data	VOS Operators	Ongoing
IV-3.5.11	To consider attending the CLIMAR-III workshop, Gdansk/Sopot/Gdynia, Poland, 6-9 May 2008	SOT Members	May 2008
IV-3.7.1	To make efforts to increase the number of observations and the number of VOS ships recording the additional parameters	VOSP Members	Ongoing
IV-3.7.1	To consider how many observations are needed from the VOSClim yearly	TT/VOSClim	End 2007
IV-3.7.1	To investigate whether the VOSClim photographs could be stored with Pub47 Metadata	Secretariat (WMO)	End 2007
IV-3.7.1	To directly submit metadata to the RSMC, Exeter on a monthly basis in addition to the quarterly submissions to WMO	VOSP Members	Ongoing
IV-3.7.1	To investigate the possibility of including a metadata module in SEAS possibly based on the stand alone TurboWin input module	USA	SOT-V
IV-3.7.1	To revise the VOSClim brochure	TT/VOSClim	Mid 2008
IV-3.7.1	To consider a way to discriminate between VOSClim and non-VOSClim ships for ships not listed in the VOSClim in case of extending the Principle of all VOSClim data going to one central repository (DAC) to be used for all VOS data.	VOSClim DAC	Mid 2008
IV-4.1.2.7	To negotiate with some of the web sites making ship positions and identification available on their web sites to delay the availability of the data in certain regions to be defined	VOSClim USA	End 2007
IV-4.1.2.8	To investigate releasing the delayed mode data using REAL after a period to be defined	VOSP Members implementing SHIP	End 2007

IV-4.3.4	To routinely check the multiple recruited ship list available from the URL http://www.meteo.shom.fr/vos-monitoring/multi-recruit.html and to attempt to reach an agreement to determine which country should be assigned future responsibility for the indicated ships on the 'multiple recruitment' list	VOSP Members	Ongoing
IV-4.4.7	To aim at phasing out the future supply of mercury thermometers to observing ships	VOS operators	Ongoing
IV-4.4.8	To consider providing mercury spillage kits on ships where mercury remains in use in order to mitigate risks associated to health and safety for the ships, the observing officers and ship's staff, and for the PMOs	VOSP Members	Ongoing
IV-4.4.9	To act as a liaison with the manufacturing industry regarding the use of electronic devices meeting SOT requirements	HMEI (Bruce Sumner)	SOT-V
IV-4.4.11	To conduct Intercomparisons between the old mercury thermometers and proposed new technology and to pass the results to the TT on Instrument Standards for documentation purposes	VOSP Members TT/Instr	SOT-V
IV-4.5.4	To advise the extent of data rejections in the countries hosting Inmarsat LES in order that a clearer assessment of the extent of the problem can be determined, and to report to the VOSP Chairperson	VOSP Members	SOT-V
IV-4.5.5	To make use of the JCOMMOPS quality information relay web page or mailing lists to inform the VOS operators about persistent e-logbook problems and to set up the data processing software routines to automatically relay rejected messages back to the VOS recruiting country focal points	VOSP Members	Ongoing
IV-4.5.6	To implement appropriate quality control checks in e-logbooks	VOSP Members	SOT-V
IV-4.5.6	To make efforts to provide via JCOMMOPS and the mailing lists information on errors found by the Members and the monitoring centres	RSMC, Exeter	Ongoing
IV-4.5.6	To consider the editing of training materials such as CD-Roms as well as the organization of training workshops	TT/VRPP	SOT-V
IV-4.6.3	To investigate the conduction of an impact assessment study of the VOF in liaison with other appropriate bodies and to report at the next SOT Session.	TT/VRPP	SOT-V
IV-5.1.3	To investigate whether SAMOS could become a participant of the US VOS	R. Luke SAMOS	SOT-V

IV-5.1.3	To provide comments on the Guide to making climate quality meteorological and flux measurements at sea to Shawn Smith	VOSP Members	End 2007
IV-5.1.4	To consider making more SST observations in support of GHRSST while recording appropriate metadata including measurement type and the depth of the instrument	VOS Operators	Ongoing
IV-5.2.2	To liaise with the WMO Secretariat regarding updating the MSC circular 1017 to include ship owners and masters concerns regarding VOS data exchange.	VOSP Chairperson WMO	MSC-83
V-2.2.1	To contribute to the trust fund and to set priorities and a workplan for the XBTs that could be purchased by the Trust Fund, should donations be received	SOOPIP Members	SOT-V
V-2.3.3	AX-15, Europe - Cape of Good Hope. Gustavo Goni noted that a Spanish university was running a TSG on a ship on this route, and that he would contact them to see if XBT sampling was possible (report back to SOOPIP Chairperson)	Gustavo Goni	ASAP
V-2.3.3	PX-36, Christchurch – McMurdo. The Panel noted that the *Palmer* plied this route occasionally, and Pezzoli agreed to contact the Palmer to see if they were willing to perform XBT sampling in the Southern Ocean (report back to SOOPIP Chairperson)	Glenn Pezzoli	ASAP
V-2.3.3	PX-81, Honolulu - Coronel (Chile). Pezzoli noted that the ships on this line had ceased calling in Hawaii. Pezzoli and Fujimoto agreed to search for a ship that did the Japan to western coast of S. America route nonstop (report back to SOOPIP Chairperson).	Glenn Pezzoli Toshifumi Fujimoto	ASAP
V-2.3.3	PX-81, Honolulu - Coronel (Chile). The Secretariat agreed to contact the Chilean IOC focal point to identify a correspondant in the shipping industry, to also help in the search for an appropriate ship (report back to SOOPIP Chairperson)	Secretariat (IOC)	ASAP
V-2.3.4	To contact the German research vessel the *Polar Stern*, to see if they would be willing to perform complementary high-resolution XBT sampling in the Southern Ocean on their CTD sections between Antarctica and Cape Town (report back to SOOPIP Chairperson)	Birgit Klein	ASAP
V-2.3.4	Feedback on the actions decided regarding Polar Stern making high-resolution XBT sampling would be brought to the CLIVAR basin panels by the OOPC Secretariat	Albert Fischer	End 2007

V-2.4.1.3	To approach institutions for appropriate representatives, for appropriate members of the group in the intersession to perform their two tasks	Secretariat (IOC)	SOT-V
V-2.4.1.4	To record the launch system type, the probe type, the serial number, and the date of manufacture of the XBT in the metadata, to help if a future determination of the fall rate equation is found to depend on one of these variables	SOOP operators	Ongoing
V-2.4.2.4	To put on the SOOPIP web site's publication section the SIO and AOML manuals for high density XBT equipment set up and operation	SOT TC	Mid 2007
V-2.5.5	To send a certificate of appreciation to the ship of IX08	SOOPIP chairperson	ASAP
V-2.5.5	To insert the data from IX08 into the GTS	Gopalakrishna Gustavo Goni	ASAP
V-2.6.5	To consider adopting and improving Argo QC procedures to achieve an homogeneous standard for automated real-time QC of XBT profiles before insertion on GTS	CSIRO AOML	End 2007
V-2.6.5	To host documentation once the real-time QC standards are defined for XBT profiles	JCOMMOPS	End 2007
V-3.1.5	To investigate the possibility of streamlining the SOOP survey report with increasing web links	SOT TC	SOT-V
V-3.1.5	To provide ongoing feedback to the TC on the usefulness of the SOOP survey report	SOOPIP Members	ASAP
V-3.1.5	To seek advice from the OOPC and the CLIVAR basin panels on the usefulness of the SOOP reports	SOT TC	ASAP
V-3.3.1.11	To work on a unified definition of scientific QC for the delayed-mode data stream	SOOPIP members involved in GTSPP	End 2007
V-3.3.1.11	To investigate submitting a proposal to NOAA's Data Stewardship Program to restart the GTSPP based at NOAA/NODC	Gustavo Goni Charles Sun	ASAP
V-4.1.7	to serve on the organizing committee for an Upper Ocean Review	Gustavo Goni	2009
V-5.2.3	To coordinate procedures for near-real-time insertion of salinity data on GTS	IOCCP AOML	End 2007
V-5.2.3	To urge IOCCP to release salinity data to data archives in a timely manner	SOOPIP Chairperson	ASAP
V-5.2.4	To work with the Ferrybox project to allow for near real-time insertion of data onto the GTS	AOML Franciscus Colijn	ASAP

V-6.2.1	To seek the representation of Brazil (contact Dr Maricio Mata, FURG) and South Africa (contact Dr Isabelle Ansorge, UCT) at future meetings of the panel	Secretariat (IOC)	SOT-V
VI-1.1.9	To investigate the issue of JCOMMOPS hosting and maintaining an online ASAP metadata database	SOT TC	SOT-V
VI-1.1.14	To provide guidance and to suggest specific areas that should be targeted in order to improve the quality of the global NWP model forecasts	ECMWF (Antonio Garcia-Mendez)	End 2007
VI-3.1.1.3	To investigate availability of materials showing the need for radio sonde data in the Southern Hesmisphere and in the North Pacific for satellite calibration	ECMWF (Antonio Garcia-Mendez)	End 2007
VI-3.1.1.4	To notify E-ASAP position errors to Rudolf Krockauer for investigation and tentative correction of the problems	ECMWF (Antonio Garcia-Mendez)	Ongoing
VI-3.1.2.7	To investigate feasibility and to produce the proposed special study special studies on the dissemination of the TEMPSHIPS	Météo France (Gérard Rey)	ASAP
VI-3.1.2.9	To go ahead with the required developments and routine production of the ASAP monitoring report	Météo France (Gérard Rey)	ASAP
VI-3.1.2.10	To investigate the issue of issue of standardizing TEST ASAP reports and to make proposals	TT/ASAP	End 2007
VI-4.1.3	To include the list of basic factors that need to be taken into consideration when recruiting a new ASAP ship in the ASAP web pages at JCOMMOPS	SOT TC	Sep 2007
VI-4.1.8	To contact POGO and investigate the issue of having Research Vessels taking part in the activities of the ASAP	TT/ASAP	Mid 2008
VI-4.6.1	To carefully check the liability insurances and to avoid launching radiosondes when the ship is sailing closer to 75 nm from the coasts	VOS Members	Ongoing
VI-6.6.4	To discuss the details and practicalities of the Australian reimbursement from the ASAP Trust fund	Secretariat (WMO) Australia	ASAP
I-5.1.2.8	To make sure that the JCOMMOPS database will remain consistent with the formal version of the WMO Publication No. 47 which resides at WMO	JCOMMOPS	ASAP
I-5.1.2.10	To investigate providing additional on-line tools to query the Pub47 database and to investigate whether it would be possible and under what condition to restricting access to the Publication	Secretariat (WMO)	end of 2007

I-5.1.2.10	To make every effort to make the compiled submissions routinely available within one month of the due date for the quarterly national submissions	Secretariat (WMO)	Ongoing
I-5.2.1.3	To relay additional questions from the Members of the Task Team on Satellite Communication Systems to Inmarsat and to provide the SOT Chairperson with the answers	TT/Sat Secretariat (WMO)	SOT-V
I-5.2.1.3	To provide the Secretariat with additional questions to ask Inmarsat if needed	SOT Members	SOT-V
I-5.2.1.5	To write to the Inmarsat LES operators on a regular basis to check that the list of LES is correct and to provide the information to the WMO for inclusion in the dedicated WMO web page	TT/Sat	Ongoing
I-5.2.1.6	To keep the SOT informed regarding the AIS systems evaluation on moored buoys in order to extend the effective range and for transmitting meteorological data	Robert Luke	SOT-V
I-6.2.1.2	To liaise with the META-T in order to take the META-T requirements for category 1 metadata into account when defining BUFR templates for ship data	TT/Codes TT/Instr META-T	ASAP
I-6.2.1.3	To investigate and recommend data transmission codes and content, storage and distribution of data, for META-T Pilot Project data streams specific to ship observations	SOT Members TT/Codes	ASAP
I-6.2.1.4	To work with the TT-DMVOS to update the delayed mode exchange format	META-T	ASAP
I-6.2.2.3	To submit any required changes to BUFR tables and templates to the JCOMM DMPA Table Driven Codes Task Team (TT/TDC) for consideration by the CBS Expert Team on Data Representation and Codes	TT/Codes	End 2007
I-6.2.2.4	To develop and test the encoding of XBT and TSG data and associated metadata in BUFR using trial BUFR templates	AOML	End 2007
I-6.2.2.4	To initiate work for eventually transmitting XBT data on GTS in BUFR format and to liaise with AOML in order to benefit from its experience in this regard	SOOPIP Members	SOT-V
I-6.2.2.4	To make recommendations to the DMPA TT on TDC regarding improving consistency between the Argo and XBT templates	TT/Codes	End 2007
I-6.3.2 and I-6.3.6	To continue the efforts of developing high quality best practices for the VOF with the goal of publishing them as a JCOMM Technical Report during the next intersessional period	TT/Instr Secretariat (WMO)	SOT-V

I-6.3.5	To review the list of JCOMM Publications for those of interest to the SOT or its sub-Panels	SOT Chairperson VOSP Chairperson SOOPIP Chairperson TT/ASAP Chairperson	Mid 2008
I-6.3.7	To change the Terms of references of the specific Task Teams to include the reviewing the relevant documentation	Secretariat Task Teams	ASAP
I-6.3.7	To investigate how the different publications or technical documents dealing with best practices could be better integrated into fewer number of documents or into existing ones	TT/Instr	SOT-V
I-6.3.7	To consider adopting VOSClim best practices more generally under the VOS scheme	TT/VOSClim	SOT-V
I-8.5.1	To consider contributing to the Ship Consumables Trust Fund administered by the WMO	SOT Members	Ongoing
I-8.6.1	To submit the proposed revised version of the SOT Terms Of Reference to JCOMM-III for consideration and approval	Secretariat	JCOMM-III

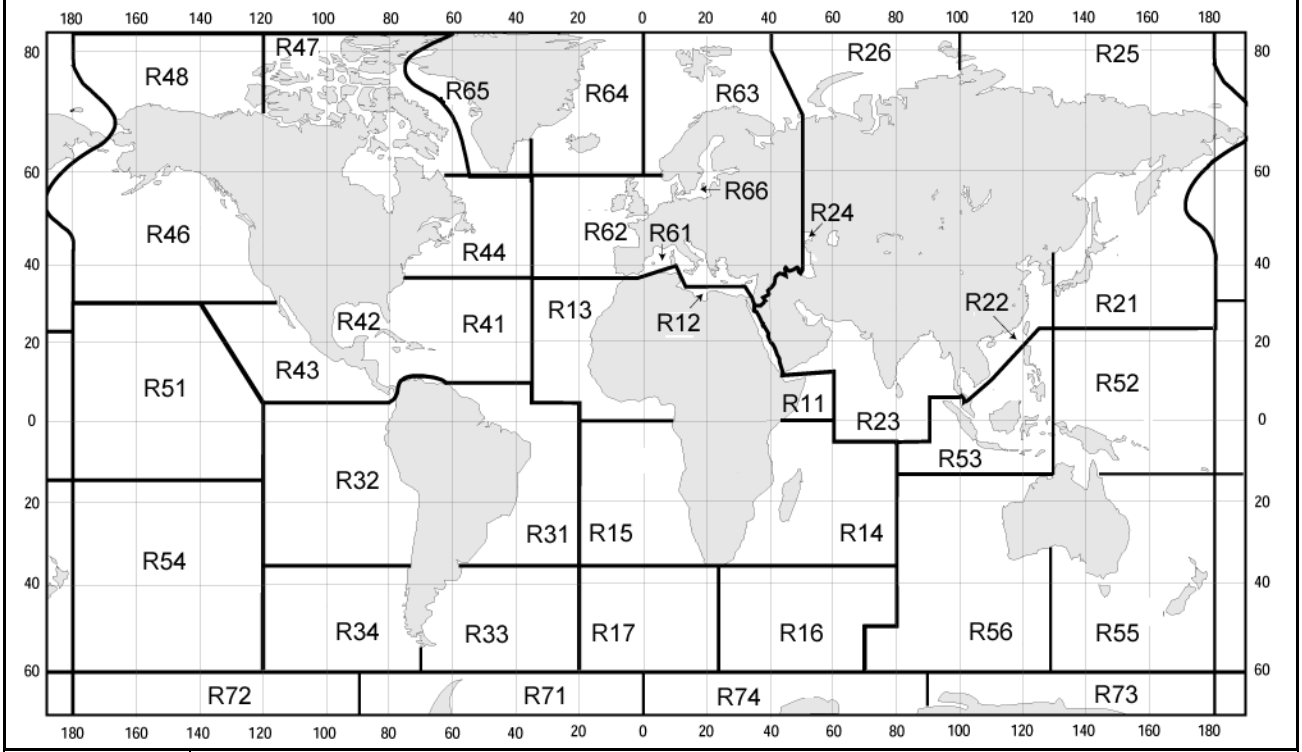
Annex XXVII

GLOBAL VOS ROUTES

Proposed global VOS route scheme

(Table 1802, WMO No. 47 Metadata version 3)

rte **Route**

Code	Description/marine area
	
R90	More than 10 separate marine areas (see Note 2).
R91	Inland sea or river (see Note 3).
R92	Variable or no fixed route (see Note 2).

Note 1 A maximum of 10 marine areas visited by the ship can be reported individually, otherwise use R90.

Note 2 For R90 or R92, specify the most visited marine area(s) by the ship in the footnote if this can be determined, e.g. “most visited - R62, R41”.

Note 3 For R91, specify the location in the footnote, e.g. “Black Sea”, “Mackenzie River”.

Note 4 Use footnotes as necessary to provide more detail, e.g. “coastal service”, “fixed location”.

Note 5 If using the semi-colon delimited metadata exchange format, include the relevant marine area in the footnote if more than one **rte** is defined, e.g. “R73 – Austral Summer only”, otherwise format the footnote as shown in the examples for Notes 2 – 4.

Annex XXVIII

LIST OF ACRONYMS AND OTHER ABBREVIATIONS

AIC	Argo Information Cerntre
AOPC	Atmospheric Observations Panel for Climate (GCOS/WCRP)
ASAP	Automated Shipboard Aerological Programme
ASAPP	Automated Shipboard Aerological Programme Panel
BATHY	Bathythermograph report
BUFR	Binary Universal Form for Representation of Meteorological Data
BSH	Bundesamt für Seeschifffahrt und Hydrographie
BUOY	Report for Buoy Observations (GTS)
CAVASSO	Project for Atlantic VOS pCO_2 measurement
CBS	Commission for Basic Systems (WMO)
CDIAC	Carbon Dioxide Information Analysis Centre
CIMO	Commission for Instruments and Methods of Observation (WMO)
CLIVAR	Climate Variability and Predictability (WCRP)
CLS	Collect Localisation Satellites
CMM	Commission for Marine Meteorology (WMO)
CNRS	French National Centre for Scientific Research
COAPS	Center for Ocean Atmosphere Prediction Studies
COP	Conference of the Parties
CSIRO	Commonwealth Scientific and Industrial Research Organization (Australia)
CTD	Conductivity-temperature-depth probe
DAC	Data Assembly Centre
DBCP	Data Buoy Cooperation Panel (WMO-IOC)
DCS	Data Collection System
DMCG	Data management Coordination Group
DODS	Distributed Oceanographic Data System
E-ASAP	EUMETNET ASAP
E-SURFMAR	EUCOS Surface Marine Programme
ECMWF	European Centre for Medium-Range Weather Forecasts
EEZ	Exclusive Economic Zone
EGC	Enhanced Group Code
EGOS	European Group on Ocean Stations
ENCODE	Specific masking of the ship's identification within GTS reports using a non repeating encoded ship's identification
ET	Expert Team
ETMC	Expert Team on Marine Climatology
ETMSS	Expert Team on Maritime Safety Services
EUCOS	EUMETNET Composite Observing System
EUMETNET	The Network of European Meteorological Services
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
GARP	Global Atmospheric Research Programme
GCC	Global Collecting Centre (for the MCSS)
GCOS	Global Climate Observing System
GDPFS	Global Data Processing and Forecasting System (CBS)
GHRSST-PP	Global Ocean Data Assimilation Experiment (GODAE) High Resolution Sea Surface Temperature Pilot Project
GMDSS	Global Maritime Distress and Safety System
GNI	Gross National Income
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
GOS	Global Observing System (WWW)
GPS	Global Positioning System
GTS	Global Telecommunication System (WWW)
GTSPP	Global Temperature Salinity Profile Programme

ICSU	International Council for Science
IFREMER	Institut Francais de Recherche pour l`Exploitation de la Mer
IGOSS	Integrated Global Ocean Services System
IMET (program)	Improved Meteorology program
IMO	International Maritime Organization
IMO	Icelandic Meteorological Office
IMSO	International Mobile Satellite Organization
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOCCP	International Ocean Carbon Coordination Project
IODE	International Data and Information Exchange (IOC)
IRD	Institut de recherche pour le développement (France, ex ORSTOM)
ISS	Information Systems and Services (CBS)
JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
JCOMMOPS	JCOMM in situ Observing Platform Support Centre
JMA	Japan Meteorological Agency
LES	Land Earth Station (Inmarsat)
MASK	Specific masking of the ship's identification within FM-13 GTS reports using a unique repeating identification number
MCSS	Marine Climatological Summaries Scheme
MEDS	Marine Environmental Data Service (Canada)
MQCS	Minimum Quality Control Standards
MSC	IMO's Maritime Safety Committee
MSG	METEOSAT Second ¨Generation
NDBC	National Data Buoy Center (NOAA)
NCDC	National Climatic Data Center (NOAA)
NCEP	National Centers for Environmental Prediction (NOAA)
NMS	National Meteorological Service
NMHS	National Meteorological and Hydrological Service
NOAA	National Oceanic and Atmospheric Administration (USA)
NODC	National Oceanographic Data Centre
NWS	National Weather Service (NOAA)
OceanObs	First International Conference for the Ocean Observing System for Climate
OCG	Observations Coordination Group
ODAS	Ocean Data Acquisition Systems
ONR	Office of Naval Research (UN Navy)
OOPC	Ocean Observation Panel for Climate (of GOOS, GCOS, WCRP)
OPAG	Open Programme Area Group (CBS)
OSEs	Observing System Experiments
OSSEs	Observing System Simulation Experiments
PMO	Port Meteorological Officer
QC	Quality Control
RCC	Rescue Coordination Centres
REAL	FM-13 GTS report where the ship's identification (the call sign) is not masked
RIC	WMO Regional Instrument Centre
RM	Responsible Members (MCSS)
RTMC	Real Time Monitoring Center
RSMC	Regional Specialized Meteorological Centre
SAMOS	Shipboard Automated Meteorological and Oceanographic System
SBSTA	Subsidiary Body for Science and Technological Affairs (UN FCCC)
SCOR	Scientific Committee on Oceanic Research
SEAS	Shipboard Environmental Data Acquisition System (USA)
SHIP	GTS Report of surface observation from a Sea Station (FM-13)
SHIP	Specific masking of the ship's identification within FM-13 GTS reports using the generic letters "SHIP"
SMHI	Swedish Meteorological and Hydrological Institute
SOC	Southampton Oceanography Centre (U.K.)

SOLAS	International Convention for the Safety of Life at Sea
SOO	Ship-of-Opportunity
SOOP	Ship-of-Opportunity Programme
SOOPIP	JCOMM Ship-of-Opportunity Programme Implementation Panel
SOT	Ship Observations Team
SSS	Sea Surface Salinity
SST	Sea Surface Temperature
SURFA	Surface Flux Analysis Project
TEMP-SHIP	Upper-level temperature, humidity and wind report from a sea station
TESAC	Temperature, Salinity and Current Report
THORPEX	The Observing system Research and Predictability Experiment
TIP	Tropical Moored Buoy Implementation Panel
TOGA	Tropical Ocean and Global Atmosphere (WCRP)
TOR	Terms of Reference
TRACKOB	Code for reporting marine surface observations along a ship's track
TSG	Thermosalinograph
TT/QCAS	Task Team on Quality Control and Automated Systems (SOOPIP)
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	UN Framework Convention on Climate Change
UOP	Upper Ocean Panel (CLIVAR)
UOT	Upper Ocean Thermal review
URL	Universal Resource Locator
VOS	Voluntary Observing Ship
VOSP	Voluntary Observing Ship Panel
VOSClim	Voluntary Observing Ships Climate Subset Project
VSOP-NA	VOS Special Observing Project-North Atlantic
WCRP	World Climate Research Programme (WMO/IOC/ICSU)
WIS	WMO Information System
WMO	World Meteorological Organization
WRAP	Worldwide Recurring ASAP Project
WWW	World Weather Watch (WMO)
XBT	Expendable Bathythermograph
XCTD	Expendable conductivity-temperature-depth probe