SHIP OBSERVATIONS TEAM
FIFTH SESSION

Geneva, Switzerland
18-22 May 2009

FINAL REPORT

JCOMM Meeting Report No. 63

WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

SHIP OBSERVATIONS TEAM
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NOTES

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C O N T E N T S

EXECUTIVE SUMMARY

The Fifth Session of the JCOMM Ship Observations Team (SOT) was held in Geneva, Switzerland, from 18 to 22 May 2009 at the WMO Secretariat Headquarters.

A technical and scientific workshop focusing on new initiatives and / or new developments in shipboard meteorological or oceanographic instrumentation, observing practices, data management procedures, quality control and ocean products was organized during the first day of the meeting. Seven presentations were delivered during the workshop, which covered each of the theme areas, and permitted to prepare further discussions at the main SOT Session.

The Team reviewed requirements for ship-based observations in support of climate applications as expressed by the WMO-IOC-UNEP-ICSU Global Climate Observing System (GCOS) and the Ocean Observing Panel for Climate (OOPC), as well as in support of non-climate applications (e.g. Numerical Weather Prediction, maritime safety). The Team noted that the non-climate requirements had been recently included in the JCOMM Observations Programme Area Implementation Goals. The Team reviewed requirements for instrument/platform metadata and agreed that efforts should be made to collect and make them available to the international community as part of real-time BUFR reports but also in delayed mode. It agreed to contribute to the Water Temperature instrument/platform metadata Pilot Project (META-T) effort.

The meeting reviewed the collaboration with associated programmes, including the International Ocean Carbon Coordination Project (IOCCP), the Shipboard Automated Meteorological and Oceanographic System Project (SAMOS), the Group for High-Resolution Sea Surface Temperature (GHRSST), the FerryBox project, the SeaKeepers Society, the Alliance for Coastal Technologies (ACT), the SCOR/IAPSO OceanScope Working Group, and the Oceanoscientific Campaign. Issues of common interest were discussed, including logistical aspects, and the sharing of the data.

The SOT Task Teams reported on their activities and made a number of recommendations to the Team, including:

(i) the updating of the list of Inmarsat Land Earth Stations accepting Special Access Code (SAC) 41
(ii) the excellent results from the Iridium data telecommunication Pilot Project,
(iii) the organization of an International Port Meteorological Officers (PMO) workshop in 2010,
(iv) to make the management of WMO Publication No. 47 (Pub47) more efficient,
(v) the encoding of instrument/platform metadata as part of BUFR reports,
(vi) changes proposed for the ISO Standard 10596:2009(E) "Ships and marine technology — Marine wind vane and anemometers", and
(vii) the integration of the VOS Climate Project into the wider VOS. The Terms of Reference and membership of the Task Teams have been reviewed and agreed upon.

The Task Team on Coding and the Task Team on the Iridium Pilot Project no longer exist and their activities will be merged in other Task Teams.

The Sixth Session of the Voluntary Observing Ship (VOS) Panel reviewed the status of Voluntary Observing Fleet (VOF). The EUMETNET Surface Marine Programme (E-SURFMAR) is now co-ordinating the activities of about 50% of the world's VOS. The number and type of fully automated shipboard weather observing systems on global VOS has increased to 270 operational Automatic Weather Station (AWS) systems at the end of 2008, while almost 1800 manual VOS ships are using Electronic Logbook Software. The meeting recommended that National Meteorological and Hydrological Service (NMHS) operating VOS AWS arrange to ensure that all observations, including hourly observations are inserted onto the Global Telecommunication System (GTS) for global dissemination.

The Session recalled that the PMOs provide a vital role in recruiting, training and visiting VOS ships. The proposal to hold an International PMO Meeting in 2010 was strongly encouraged to provide training to PMOs and the opportunity to strengthen relationships.

The VOS Panel reviewed the monitoring tools available to VOS programme operators, as well as the quality of VOS data as monitored by the Regional Specialized Meteorological Centre (RSMC), Exeter, and the Real-Time Monitoring Centre (RTMC) for the VOS Climate Project (VOSClim), and proposed actions to make sure that the VOS and VOSClim data remain of good quality. The meeting also received reports on the monitoring of Automated Shipboard Aerological Programme (ASAP) data by the European Centre for Medium-Range Weather Forecasts (ECMWF) and Météo France. It was noted that the quality of ASAP data was considered excellent. However, a small number of location problems were noted. The meeting reviewed recent developments with regard to the modernization of the Marine Climatology Summaries Scheme (MCSS) and received a report from the Global Collecting Centres (GCCs) operated by the United Kingdom and Germany.

The VOS Panel urged VOSClim participants to submit the IMMT data to the GCCs. The VOSClim Data Assembly Centre (DAC) reported on its activities. All observations are decoded into the International Maritime Meteorological Archive (IMMA) format and placed on the project web site. Regarding call sign masking, and future data processing at the DAC, the Team recommended that only unmasked GCC and BUFR observations should be made available to the DAC, even if it means delaying BUFR observations. Non-VOSClim ships reporting observations with the additional VOSClim elements were encouraged to join the VOSClim so their observations can be contributed.

The VOS Panel agreed on a proposal to use IMO numbers in place of the ITU ship's callsign for the encoding of FM-13 SHIP reports. It is essential that this information be submitted to WMO Publication No. 47. The Panel also reviewed VOS classes, and in light of the recommendations from the Task Team on VOSClim agreed to end the Pilot phase of the VOSClim and proposed the integration of VOSClim ships into the wider VOS by creating a new class of vessels as part of the VOS Scheme. It also agreed to create a sub-class for AWS. This will require updating the WMO Technical Regulations.

VOS operators are encouraged that all VOS meet the requirements of the VOSClim.

The Ship of Opportunity Programme Implementation Panel session focused on the technical coordination of the Expendable Bathythermograph (XBT), transect network and the growing Thermosalinograph (TSG) network. The XBT transects are a key observing network, and are implemented at approximately 83% of the goals set by OceanObs99 recommendations. The XBT network complements the Argo network by providing eddy-resolving observations of the vertical thermal structure that can be used, for example, to monitor meridional mass and heat transports, and to investigate the variability in the location and of mass and volume transports of surface currents. TSG transmission in real time on the GTS has grown tremendously since the last Panel session, to about 70 ships. These data are currently being taken in support of pCO_2 inventories, fisheries and mixed layer depth studies. The value of these data reside in that they can be taken concurrently with other ocean parameters, and in that they will be used to validate upcoming satellite missions.

The Ship of Opportunity Programme (SOOP) Implementation Panel (SOOPIP) addressed the status of implementation, XBT transect responsibilities, coordination within the SOOP communities and with others, monitoring and data management, and the future of the SOOP network. Current work is geared towards the implementation of BUFR coding for the GTS, and review of the data transmission and data archiving arrangements. The Panel addressed questions on the accuracy of the fall rate equation for XBT probes, which are crucial for climate studies.

The Panel agreed on a list of actions related to the coordination and assessment of the XBT network implementation, in data transmission, monitoring of data flow and quality, data

management, and in applications and science that are ambitious. If these were implemented, it would greatly enhance the quality of the Programme. These actions are dependent on the contributions of time and effort by the members of the Panel.

The SOT reviewed the operations of the JCOMM *in situ* Observing Platform Support Centre (JCOMMOPS), as well as the recent development with regard to the evaluation of candidates for a future Observing Programme Support Centre (OPSC).

The Team received reports from different satellite data telecommunication providers, including Inmarsat, the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), Iridium, and Service Argos. It noted that Iridium was increasingly being used and proved cost-effective and reliable for transmitting ship observations.

The Team noted the appreciation the outcome and recommendations from the meeting of the joint Steering Group for the International Data and Information Exchange (IODE) Ocean Data Portal (ODP) and the WMO Integrated Global Observing System (WIGOS) Project for JCOMM (Geneva, September 2008), and agreed to make efforts to integrate its Best Practices as appropriate. It further recommended that the buoy manufacturers establish links with the HMEI.

The Team reviewed its Terms of Reference, and proposed some changes that will be proposed to the third Session of JCOMM. The next Session of the SOT is tentatively planned to be held in Perth, Australia in mid-2011.

GENERAL SUMMARY OF THE WORK OF THE SESSION

I-1. Organization of the Session

I-1.1 Opening of the Session

I-1.1.1 The fifth 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 0900 hours on Monday, 18 May 2009, in Room A of WMO Headquarters, Geneva, Switzerland.

I-1.1.2 On behalf of the Secretary-General of the WMO, Mr Michel Jarraud, and the Executive Secretary of the Intergovernmental Oceanographic Commission (IOC), Dr Patricio Bernal, Dr Wenjian Zhang (Director, Observing and Information Systems Department, WMO Secretariat) welcomed the participants to the session, to Geneva in general and to the WMO in particular. He recalled that the oceans cover about two-thirds of the Earth's surface and oceanic phenomena have major impacts on the marine coastal environment and socio-economic activities in these regions. Weather forecasting, climate change monitoring, climate research, marine forecasting activities in support of marine transportation, response to marine pollution require ocean observations.

I-1.1.3 Dr Zhang also recalled that for decades, ships were the only means of obtaining meteorological data from them. Even though there are now several other means to obtain such information such as satellites, buoys and radars, ships still play a very important role. They provide ground truth for the validation of satellite observations and make measurements not yet obtainable by other means.

I-1.1.4 He explained that the Ship Observations Team was now becoming a mature body since its first meeting seven years ago in Goa, India. Much progress has, been made to integrate the three programmes[1] under one umbrella. The efforts of SOT have resulted in a more cost-effective way of collecting observations through observing systems that are now better standardized and addressing a wide range of meteorological and oceanographic applications. Because of the ongoing commitments and the dedication from WMO Members and the IOC Member States, a number of challenges have been successfully addressed through the SOT for example to transmit higher resolution data through new satellite data telecommunication systems, and collect climate quality data.

I-1.1.5 Dr Zhang reported that there is growing awareness by policymakers on the key socioeconomic value of weather, climate and water information and services to support policy formulation and decision-making, as well as to underpin capacity building in climate risk management, WMO will hold a third World Climate Conference (WCC-3) in Geneva from 31 August to 4 September 2009. Among the important themes of this Conference, there will be a discussion on the marine climate and the changes, which are occurring to it. One outcome we expect from the Conference is a call for a well-coordinated, globally accessible set of climate services. Another event where SOT members will have opportunity to provide input will be at the OceanOBS'09 symposium in September in Venice, which will design the foundations for the global ocean observing system in the next ten years.

I-1.1.6 The implementation of the WMO Integrated Global Observing System (WIGOS) concept should offer unprecedented opportunity to include all WMO and WMO-sponsored networks and sub-systems in the integration process, thus allowing WMO to more effectively, respond to new challenges and evolving user requirements. At the same time, WMO respects the ownership of partner organization regarding appropriate observing components being addressed in the WIGOS framework as well as their data policies. Not only is the SOT contributing to WIGOS, but the overall

1: The VOS Programme (VOS), the Ship of Opportunity Programme (SOOP), and the Automated Shipboard Aerological Programme (ASAP)

WIGOS framework will also benefit from the SOT experience with regard to integrating different types of observing fleets addressing the requirements for a wide range of applications. The SOT is indeed working at providing traceable and coherent met-ocean observations and addressing the three levels of integration proposed in the WIGOS Concept of Operations.

I-1.1.3 In closing, Dr Zhang 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 concluding, he wished the participants a successful meeting and a pleasant stay in Geneva.

I-1.1.4 The SOT chairperson, Mr Graeme Ball provided an overview of the SOT and of the goals for the meeting.

I-1.1.5 Mr Graeme Ball indicated that major goals for the meeting included:

- Reviewing of the reports and recommendations from WMO, IOC, OOPC, and other expert groups, as well as from VOSP, SOOPIP, SOT Task Teams, and Related & cross-cutting JCOMM Task Teams.
- Identifying issues requiring consideration and support from JCOMM and JCOMMOPS, and by an existing or new SOT Task Team.
- Exploring the possible integration of other groups using ships as observing platforms into the SOT.
- Acquiring knowledge of new or updated systems, improved methods and new technologies.
- Continue to standardize methods and practices concerning observing systems and methods of observation; data processing, data management and quality monitoring; as well as ship inspection procedures
- Continuing to promote and enhance communication within and between observing programmes.

I-1.1.6 The list of participants in the meeting is in ***Annex I***.

I-1.2 Adoption of the Agenda

I-1.2.1 The SOT adopted its agenda for the session based on the provisional agenda with some changes, which are in ***Annex II***.

I-1.3 Working Arrangements

I-1.3.1 The meeting agreed its hours of work and other practical arrangements for the session. The Secretariat introduced the documentation.

II. Scientific and Technical workshop, new developments

II-1 Mr Michail Myrsilidis (Hellenic National Meteorological Service), Chairperson of the Scientific and Technical Workshop, opened the Scientific and Technical Workshop. The workshop introduced and reviewed new initiatives and / or new developments in shipboard meteorological or oceanographic instrumentation, observing practices, data management procedures, quality control and ocean products. Members of the Team were invited to report on systems and related technical developments relevant to the SOT, either within their own services and operations or with which they have otherwise been directly involved.

II-2 The following presentations were made during the workshop:

- New developments and updates in VOS Electronic logbook software, including ObsJMA (Naotaka Hiraishi, JMA, Japan). The Team noted that ship's call signs were not masked as part of the data processed through the ObsJMA electronic logbook and stored onboard the ship in IMMT format.

- New developments and updates in SOOP software, including new AOML visual quality control software, implementation of Iridium transmissions in the Shipboard Environmental Data Acquisition System (SEAS) XBT transects, and implementation of TSG transmission using Iridium in SEAS TSG operations (Gustavo Goni, NOAA/AOML, USA). The Team noted that Iridium data transmission from the ship to the shore was cost-effective compared to Inmarsat although some optimization had to be made in order to reduce, substantially the data telecommunication costs.

- VOS metadata tools including VOS Form VOSP002, VOSP002 Metadata Viewer, E-SURFMAR output format, and WMO Publication No. 47 (Pub47) XML Generator (Graeme Ball, BOM, Australia). The Team noted that the tools were very efficient for collecting metadata from ships as well for preparing national input to Pub47. The tools are free for use as an option.

- Overview and demonstration of the E-SURFMAR VOS database (Jean-Pierre Kerserho, Météo France, France). The Team noted that eleven European countries plus Australia and New Zealand were using the on-line database and that national input for Pub47 could also be prepared from it.

- E-SURFMAR specifications of AWS (list of recommendations for issuing specifications) (Henry Kleta, DWD, Germany). The Team noted that two different categories of AWS were considered by the E-SURFMAR task team on AWS (i) autonomous AWS (reduced set of variables, plug and play, more simple, easy to install, and cost-effective), and (ii) integrated systems (typically measures a variety of parameters, and requires integration with the ships systems). While the E-SURFMAR task team on AWS was recommending the use of autonomous AWS for EUCOS objectives, it was noted that the ships known to report good quality observations should continue to be encouraged to make visual observations using integrated systems.

- Scientific analysis of VOSClim data (updated report) (David Berry, NOC, United Kingdom). The Team noted that the primary use of VOSClim data was to characterize the observations. The reports from VOSClim ships were shown to have fewer errors than from ordinary VOS for both air and sea temperatures. Expanding the VOSClim to all ships will reduce overall uncertainty in gridded data. The Team agreed that there was a need to raise the visibility of VOSClim data in the scientific community.

- Overview and demonstration of the VOS Quality Control Tools at Météo France (Pierre Blouch). The Team agreed that the tools were very useful and encouraged its members to use them. It was also noted that SAMOS would benefit of the Quality Control (QC) tools provided that the data are distributed on the GTS.

II-4 Abstracts of the presentations are given in ***Annex III***.

I-2. Reports by the Secretariat, OPA Coordinator, SOT Chairperson, and SOT Technical Coordinator

I-2.1 Report from the Secretariat

I-2.1.1 The Secretariat reported briefly on activities under or associated with JCOMM which have taken place since SOT-IV (April 2007), and are of direct interest to the Team. The Team noted that several meetings had taken place during the intersessional period, involving JCOMM Panels and Programmes, as well as other relevant bodies.

I-2.1.2 The Team noted, in particular that following the recommendations from the JCOMM Management Committee (MAN), the Observations Coordination Group (OCG) at its third Session (Paris, 9-11 March 2009) adopted an operating plan for the Observations Programme Area, which

was aligned with the two organizations' Expected Results. The Team agreed to cooperate to the execution of the plan. The Management Committee agreed that JCOMM needed to develop a catalogue of JCOMM Standards and Best Practices. A consultant has been recruited to undertake the work, which should be completed, and the catalogue published on the web, prior to JCOMM-III (Morocco, 4-11 November 2009). The Team agreed to contribute to this work, as appropriate.

I-2.1.3 The Team noted the development of a plan to define a standards accreditation as well as a standards development process for ocean data management under JCOMM and IODE. It recognized that the standards process was regarded as a contribution to the ODP-WIGOS Pilot Project for IODE and JCOMM. These issues are being discussed under agenda item I-5.3.

I-2.1.4 The Team noted the development within the JCOMM Data Management Programme Area of an "Oceanographer's and Marine Meteorologist's Cookbook for Submitting Data in Real Time and In Delayed Mode". The Cookbook provides instructions for many kinds of data. Completion of this manual will require assistance from the JCOMM Observations Programme Area (OPA). The "cookbook" is supplying information on procedures required to provide data for exchange in real-time, who to contact for assistance and other practical matters. Similar information will be available for delayed mode data. It is planned to present the first version of the Cookbook to JCOMM-III. The Team invited the Technical Co-ordinator to participate in this exercise from a ship-based observations point of view.

I-2.1.5 The Team noted the cooperation between the JCOMM Expert Team on Marine Climatology (ETMC) and the JCOMM Expert Team on Wind Waves and Storm Surges (ETWS) for the development of a database of extreme wave events. In addition, ETMC, ETWS, and the JCOMM Expert Team on Sea Ice ETSI have coordinated efforts in the development of marine climate indices in collaboration with the joint CLIVAR / CCl / JCOMM Expert Team on Climate Detection and Indices (ETCCDI). VOS Operators are invited to contribute to the database as appropriate.

I-2.1.6 Team Members are invited to contribute to feeding the JCOMM extreme wave database events when such events are observed by data buoys and are recorded by Team Members (***Action: Team Members, ongoing***). The information should be submitted to the Responsible National Oceanographic Data Centre for Drifting Buoys RNODC / DB who will forward it to the appropriate database.

The Meeting decided on the following action items:

I-2.1.7 To provide to the Chairperson of the JCOMM Data Management Coordination Group (DMCG), input for the "Oceanographer's and Marine Meteorologist's Cookbook for Submitting Data in Real Time and In Delayed Mode" (***Action: Technical Co-ordinator, asap***).

I-2.2 Report from the Observations Programme Area Coordinator

I-2.2.1 The JCOMM Observations Programme Area (OPA) Coordinator, Ms Candyce Clark (NOAA/CPO, USA) reported on OPA activities since the previous SOT Session. She noted that the Implementation Goals for the Observations Programme Area are based on the GCOS *Implementation Plan for Climate in Support of the UNFCCC* (GCOS-92). The OPA Implementation Goals 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 around 61% complete as measured against the implementation targets identified in GCOS-92 and the JCOMM Implementation Goals; new resources will be necessary to advance system-wide implementation. System-wide progress in the deployment of data buoys, profiling floats, tide gauge stations, and ship-based systems was summarized. JCOMM's monitoring of system performance against sampling requirements was also reviewed.

I-2.2.2 The SOT contribution to this global observing system comes from VOS including the VOSClim programme and from the SOOP network of XBT lines. These SOT contributions are

central to the global ocean system operations, not only because of the met-ocean data sets delivered from voluntary observing ships, but also because the voluntary 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. Clark noted that the VOS did not have a clear target or metric under GCOS-92. Forty-one SOOP XBT/XCTD trans-oceanic sections were called for in GCOS-92. The OOPC, through the OPA, raised a number of issues for the VOS and SOOP Panels.

I-2.2.3 The OPA Coordinator reported on the third session of the Observations Coordination Group (OCG-III, 9-11 March 2009, Paris). The Group reaffirmed that its priority remains on building and sustaining the current systems (including those coordinated under the SOT) to agreed standards with near-real-time data reporting, and broadening the base of national participation. The Group recommended that the SOT maintain contact with the SCOR group on voluntary ship ocean observations to avoid overlap and duplication, and to align messages to both ship operators and the scientific communities. It asked the SOT to discuss the management of Pub47 in order to make a recommendation to JCOMM-III. The OCG asked the SOOP to consider implementation of a stricter real-time QC for profile data. The OCG reviewed the OPA implementation goals, and proposed a strategy for updating the document, taking into account the latest developments with regard to the GCOS implementation plan and foreseen recommendations, as well as non-climate requirements arising from the CBS Rolling Review of Requirements and resulting Statements of Guidance and gap analysis. It emphasized the importance of a dialogue between those who implement the networks and potential users asking for new capabilities based on their requirements, in order to find ways forward that balance technological capability, network optimization, and funding interest. The OCG discussed the draft *JCOMM Catalogue of Standards and Best Practices*, to be presented at JCOMM-III; and discussed the JCOMM OPA metrics, and noted in particular that non-GTS data, including XBT data in the Coriolis database, should be included in metrics.

I-2.2.4 Ms Candyce Clark presented the draft “An Oceanographer’s and Marine Meteorologist’s Cookbook for Submitting Data in Real Time and in Delayed Mode”. The intention of this document is to provide a practical resource to those who collect oceanographic and marine meteorological data to facilitate contribution of the data to the international community. The focus is on in-situ, directly observed measurements, rather than on remote sensing data.

I-2.2.5 The Team noted that the JCOMM community was short of the initial plans. The OceanOBS’09 will help to invigorate the implementation of the global ocean observing system, and updating of the implementation goals. As far as the SOOP is concerned, the Team noted that recommendations will be made to OceanOBS09 to increase the number of lines to sample as part of the implementation goals. Based on present SOOP completion figures, this will therefore lead to reducing the percentage of completion of the SOOP. The Team also agreed that efforts should be made to define specific targets for some variables (e.g. Sea Surface Salinity).

I-2.2.6 The Team took note of the issues raised by OPA Coordinator, Ms Candyce Clark. The future requirements and specific recommendations and actions for VOS and SOOP were addressed during the agenda items focused on each panel. **Specific actions were decided as follows**:

(i) Review the appropriate sections of the *Progress Report on the Implementation of the Global Observing System for Climate in Support of the UNFCCC 2004-2008* (available at gcos.wmo.int) for technical errors related to their panels (***action; panel chairs; 20 June 2009***);

(ii) Review and provide comments on draft *JCOMM Catalogue of Standards and Best Practices* (***action; panel chairs; 1 July 2009***); and

(iii) Review and provide comments to OPA Coordinator on draft *An Oceanographer’s and Marine Meteorologist’s Cookbook for Submitting Data in Real Time and in Delayed Mode*

(***action; panel chairs; 1 July 2009***).

I-2.2.7 The Observations Programme Area Coordinator presented a number of variable-based metrics that examine the global coverage and adequacy of sampling from all combined in-situ networks. For the moment, these are all focused on ocean surface and subsurface variables (SST, temperature profiles, etc.).

I-2.2.8 David Berry reminded the team that calculation of surface fluxes depended not only on ocean variables, but also on marine meteorological variables over the sea surface, and questioned whether this was considered in the list of GCOS Essential Climate Variables (ECVs, see GCOS Report No. 92 for the full list). Albert Fischer replied that the ECVs include these marine meteorological variables over the surface of the ocean, but that they were categorized into the atmospheric component of GCOS rather than the oceanic. It was thus important for the JCOMM OPA to take into account not only the oceanic chapter of the GCOS Implementation Plan, but also the surface atmospheric variables in the atmospheric chapter of the GCOS Implementation Plan when considering the climate requirements for its implementation goals. These surface atmospheric variables should also be incorporated into variable-based JCOMM observing system network adequacy metrics.

I-2.3 Report from the SOT Chairperson

I-2.3.1 Mr. G. Ball provided his report as the SOT Chairperson.

I-2.3.2 Mr Ball reported that only one action item was assigned to the SOT Chair at SOT-IV and this had been completed in collaboration with the VOSP Chair. Under SOT-IV item I-6.3.5 *To review the list of JCOMM Publications for those of interest to the SOT or its sub-Panels*, the (1) the VOS Framework document, and (2) WMO No.8, Chapter 4, Marine Observations, has been updated.

I-2.3.3 Mr Ball briefly outlined the meetings he had attended, either officially or unofficially as SOT Chair. These included the Second Session of the JCOMM Observations Coordination Group (OCG, Geneva, Switzerland, 23-25 April 2007), the third Session of the OCG (Paris, France, 9-11 March 2009), the seventh Session of the JCOMM Management Committee (MAN, Melbourne, Australia, 8-12 December 2008), the twenty-third Session of the Data Buoy Cooperation Panel (DBCP, Jeju, Republic of Korea, 15-19 October 2007), and the twenty-fourth Session of the DBCP (Cape Town, Republic of South Africa, 13-16 October 2008).

I-2.3.4 Mr Ball detailed the SOT Task Teams he had participated in and specifically the tasks in which he had an active role. These included the Task Teams on Metadata for WMO Publication No. 47, Callsign Masking and Encoding, VOS Recruitment and Programme Promotion, and Instrument Standards.

I-2.3.5 Mr Ball described his involvement in the JCOMM cross-cutting issues, including: META-T, the DMPA cross-cutting Task Team on Delayed-mode VOS Data, and proposals from the third Session of the Data Management Coordination Group (DMCG, Ostend, Belgium, 26-28 March 2008) that impacted on the SOT. The issues included callsign masking; WMO No. 47; a proposal to establish a JCOMM Task Team on Table Driven Codes; and a discussion about ODAS vs. WMO No. 47 metadata.

I-2.3.6 Mr Ball also outlined a range of other activities including: four documents he had reviewed and or contributed to; involvement in the JCOMM OPSC review, involvement in the preparation for the fifth Session of the SOT; organising through WMO for SOT participation on two external panels; testing and commenting on the development of the E-SURFMAR VOS database; and his continuing role as webmaster of the JCOMM VOS website.

I-2.4 Review of Action Items from SOT-IV

I-2.4.1 The Secretariat reviewed the list of action items from the fourth Session of the SOT, Geneva, Switzerland, 16-21 April 2007 (annotated with completion status in ***Annex XX***). The meeting noted that almost all of the actions had been successfully completed, or addressed. A number of the open or ongoing action items are being addressed during this Session (SOT, VOSP, SOOPIP chairpersons' reports, reports by the Task Teams).

I-2.5 Report from the SOT Technical Co-ordinator

I-2.5.1 The former SOT Technical Coordinator, Hester Viola presented her activities for the period May 2007 – January 2009, including key tasks undertaken, meetings and visits, monitoring products, information exchange and additional tasks completed.

I-2.5.2 She noted that the priority tasks during the intersessional period continued, as before, to be:

(i.) SOOP Annual Surveys
  - o finalised up to December 2007[1]
  - o some (unchecked) data for 2008[2]

(ii.) User consultation and meetings (e.g. Observing System Monitoring Centre (OSMC), JCOMM)
(iii.) Monthly Maps (updates and additions) and reports on activities
(iv.) JCOMMOPS information system – metadata loading, reporting,
(v.) Argos related issues, user assistance
(vi.) Metadata - ODAS, Meta-T (SOOP and VOS streams)
(vii.) VOS Quality monitoring mechanisms
(viii.) BUFR templates and Codes
(ix.) Training and knowledge transfer between Technical Coordinators.

I-2.5.3 She noted that the Callsign Masking Scheme and Pub47 metadata management had become a priority and that there had been a lot of effort made on BUFR templates in the last intersessional period as the deadline for transitioning to BUFR for GTS data is 2012.

I-2.5.4 The Team noted that JCOMMOPS has produced and enhanced static monthly maps standardized across all JCOMMOPS maps. Dynamic maps are available for SOOPIP, SOT and JCOMM as a whole. The Web Map Services and Web Feature Services are available from these. Ms Viola showed some maps of other in-situ observing networks to demonstrate areas where deployment opportunities are needed from Ships of Opportunity. She mentioned that the SOOP Annual Line Sampling report had been streamlined somewhat. Some additional maps were now included in the SOOP Annual Line Sampling report to colour code the relative success of sampling on all SOOP lines. The metadata from the report is now provided in text files for all previous years of SOOPIP metadata from the JCOMMOPS database (based on the Metadata reported annually in March by SOOP operators) valid up until 31/12/2007.

I-2.5.5 Ms Viola expressed her thanks to the Team for working with her in the last two years and trusted that Mathieu Belbeoch would serve the Team very well in future. She also wished Mathieu Belbeoch luck in the new role.

I-2.5.6 The New Technical Coordinator, Mathieu Belbeoch introduced himself and presented his activities for the period February-April 2009 including key tasks undertaken, monitoring products, information exchange and additional completed tasks. He expressed that he looked forward to working with the Team in future.

I-2.5.6 **The Team agreed on the following**:

(i.) The Team invited its members to suggest information for the news section of

1: http://www.jcommops.org/FTPRoot/SOT/SOOP/Survey/
2: http://wo.jcommops.org/cgi-bin/WebObjects/SOOPIndicators

JCOMMOPS website and provide feedback on re-developments of JCOMMOPS websites, particularly the Quality Information Relay Tool (***action; SOT members; ongoing***);

(ii.) The Team reviewed the draft, which updated the Responsibilities and Duty statements for the Argo, and Data Buoy Cooperation Panel (DBCP) Technical Coordinators so that in now includes support to the SOT and OceanSITES. The agreed document is provided in ***Annex XV***;

(iii.) The Team agreed that the new JCOMMOPS website should include new SOT and SOOPIP sites with better usability and consistency, plus an integrated Quality Information Relay tool (with up-to-date Pub47 data) and an application to browse Callsign Masking information (both password protected). It requested JCOMMOPS to make necessary developments (***action; JCOMMOPS; SOT-VI***);

(iv.) The Team was asked to routinely review the maps showing data sparse areas (drifting buoys, Argo floats) in order to assess if any deployment opportunities can be identified (***action; SOT members; ongoing***);

(v.) The Team was asked to provide any deployment opportunities to the Technical Coordinators at JCOMMOPS using support@jcommops.org (***action; SOT members; next meeting***).

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 Observing Panel for Climate (OOPC)

I-3.1.1.1 Albert Fischer provided a report on behalf of the Ocean Observation Panel for Climate (OOPC). The Ocean Observations Panel for Climate (OOPC) is a scientific expert advisory group, charged with making recommendations for a sustained global ocean observing system for climate in support of the goals of its sponsors: the Global Climate Observing System (GCOS), the Global Ocean Observing System (GOOS), and the World Climate Research Programme (WCRP). It also reports to JCOMM on requirements; JCOMM groups including the Ship Observations Team (SOT) coordinate a number of the in situ networks of the global module of GOOS, also the ocean component of GCOS. The OOPC thanked the members of the SOT and those contributing to SOT networks as implementers. The global ocean observing system, though incomplete in important respects, is providing essential information to users.

I-3.1.1.2 The OOPC stressed several points with operators of VOS systems:

- Making widely available recommendations for ship-borne sensors and best practices for their installation, maintenance and use, would over time, increase the homogeneity and accuracy of VOS based observations.
- Outreach to the global shipping community in all available forums, to argue the importance of their observations to the historical climate record and explaining why this is so important in a changing environment, may be a way to generate renewed commercial participation.
- Continued engagement with the META-T real time metadata project is important for a successful outcome of that project.
- Continued efforts to seek cost reductions for data transmission and to see solutions implemented are desirable.

I-3.1.1.3 The OOPC stressed several points with operators of SOOP XBT lines:

- Continued collaboration with the Argo and Surface Drifter programs to facilitate deployments where needed is important.
- Getting all XBT profile data transmitted in near real time should remain a goal, and actions to achieve this identified.
- Coordination with the global repeat hydrographic survey program, to ensure availability

of ongoing information about XBT fall-rate (and other uncertainty sources) is critical for the climate utility of the XBT program.

- Development of some data products by the XBT program would raise its visibility. The OOPC state-of-the-ocean website (ioc3.unesco.org/oopc/) is one place that could display them.
- The CLIVAR/GOOS Indian Ocean Panel is developing an effort to maintain a bibliography of papers published with XBT line data in the Indian Ocean. Working with this group, and extending this effort to the other basins would likewise raise the visibility of the program.
- Getting a task group together to develop a plan for a much wider capability for underway measurements from the SOOP ships would be very desirable. This group would address issues of sensors, standards, best practices and water and power and space needs within the ship's laboratory space for pCO_2, salinity, and each of the ecosystem and biogeochemical variables for which sensors is developed.

I-3.1.1.4 The Team took note of the points from the OOPC above, and addressed them with specific recommendations and actions during the agenda items focused on each panel. The Team noted that the Progress Report on the Implementation of the Global Observing System for Climate in Support of the UNFCCC 2004-2008 was now available[1] for technical review and comment until 20 June 2009. The Team invited the Panel Chairs in liaison with their Panel members to review the appropriate sections –e.g. for technical errors related to their panels - and provide comments as appropriate (***action; Panel Chairs; 20 June 2009***).

I-3.1.2 Use of VOS data in climate products

I-3.1.2.1 CLIMAR-III

Mr David Berry (National Oceanography Centre, Southampton, United Kingdom) reported on the outcome of the Third JCOMM Workshop on Advances in Marine Climatology (CLIMAR-III) which was held in Gdynia, 6-9 May 2008, Poland. The objectives of the meeting were: to review ongoing developments in the flow and standardization of marine (meteorological and oceanographic) data and metadata under JCOMM; to foster and coordinate the development of marine meteorological and oceanographic climate data and products, including the International Comprehensive Ocean-Atmosphere Data Set (ICOADS); and to encourage appropriate contributions for the Dynamic Part of the WMO *Guide to the Applications of Marine Climatology*. Most of the presentations[2] used ship data from VOS and its predecessors or considered the management or enhancement of these data, a special issue of the *International Journal of Climatology* will again form the dynamic part of the *WMO Guide to the Applications of Marine Climatology*.

I-3.1.2.2 Observing System

Mr Berry reported that the VOS contribution to climate observing was highlighted in several Community White Papers (CWP) to be presented at OceanObs09, 21-25 September 2009, Venice, Italy. These include CWP on the VOS, the climate record for Sea Surface Temperature (SST) and for surface fluxes[3]. Research on progress toward assessing the surface meteorological observing system adequacy for climate applications was presented at SOT-IV and at CLIMAR-III. Resource limitations have meant that no further progress on this can be reported.

I-3.1.2.3 VOS Issues Related to Climate Applications

I-3.1.2.3.1 The meeting noted that the masking of VOS callsigns remained an issue for climate applications whilst SOT and the operators developed and implemented suitable systems. In 2008 a report, "The Case for Maintaining Surface Meteorological Data Collection from Voluntary

1: http://www.wmo.int/pages/prog/gcos/
2 http://icoads.noaa.gov/climar3/
3: http://www.oceanobs09.net/cwp/index.php

Observing Ships" (Kent et al. 2008), was presented to the Atmospheric Observations and Ocean Observations Panels for Climate (AOPC) and OOPC. The AOPC called for the effects of ship masking to be minimized, and the World Climate Research Program (WCRP) Observations and Assimilation Panel (WOAP) called for unique platform identifiers.

I-3.1.2.3.2 The move by WMO toward BUFR and other Table Driven Codes remains of concern. Although there has been some interaction between CBS and the JCOMM Expert Team on Marine Climatology (ETMC) a more comprehensive approach across JCOMM is required.

I-3.1.2.3.3 Mr Berry reported that timeliness of Pub47 metadata availability at WMO remained unsatisfactory. This issue will be addressed under agenda item I-4.5.

I-3.1.2.3.4 Mr Berry invited the Team to support the ETMC proposal for modernization of the delayed-mode VOS data flow. This issue will be further discussed under agenda item SOT-V/III-3.5.

I-3.1.2.3.5 The Team noted that a study by ETMC comparing the content of different GTS streams for climate applications was in progress and initial results shown.

I-3.1.2.4 The following recommendations were made:

(vi.) WMO Publication No. 47 metadata should be available promptly.

(vii.) All ship identifiers should be made available in delayed mode and as many as possible in real time.

(viii.) The efforts of the JCOMM data management co-ordination group to develop a consistent approach to the development of data codes within WMO should be welcomed.

I-3.1.3 Rolling Review of Requirements

I-3.1.3.1 The Team noted that at its third Session, Paris, 9-11 March 2009, the Observations Coordination Group has updated the JCOMM OPA Observing System Implementation Goals (previously known as OPA strategic workplan) to better take into account non-climate requirements. This document mainly focuses on climate requirements however, those for Numerical Weather Prediction, marine services, and synoptic meteorology have been included, taking into account the results from the WMO Rolling Review of Requirements, as well as the JCOMM Statement of Guidance for Ocean Applications. This resulted in the following requirements being expressed for critical variables where deficiencies have been noted:

- Sea level: For ocean applications, *In situ* observations are used for assimilation in ocean circulation models, and for calibration / validation of the satellite altimeter and models. The sea level observing network needs enhancing so that any tide gauge makes measurements with the following minimal requirements: 1cm accuracy, 6 to 15 min high frequency data with accurate timing (1 min.). Measurements must be made relative to a fixed and permanent local tide gauge benchmark (TGBM).
- Precipitation: Precipitation should be reported in a more systematic way to meet the requirements for global and regional NWP, as well as synoptic meteorology.
- Visibility: Horizontal visibility should be reported in a more systematic way to meet the requirements for Ocean Applications (essentially for maritime safety).
- Waves: making *in situ* wave measurements in a more systematic way would permit to address the requirements for ocean applications (model and satellite product validation). Wave observations must be regarded as a key variable to be derived from satellite observations using polar altimeters for significant wave height, and SAR.
- Snow: Snow observations are required in support of global NWP mainly.
- Atmospheric profiles: ASAP units are required in support of global NWP and synoptic meteorology. The ASAP are providing aerological profiles that complement AMDAR reports over remote ocean areas where only horizontal AMDAR reports (or no such report) are

available. More information is needed in order to derive a realistic target for the programme (e.g., E-ASAP is deploying about 5000 radiosondes per year in the North Atlantic Ocean).

I-3.1.3.2 The Team noted that the observation of precipitation was very difficult because of exposure considerations. As far as visibility, other observing systems are probably more efficient than ships (AIS binary messages, visiometers on light vessels). The reporting of snow was more relevant to land regions than the oceans where the reporting of sea-ice was more appropriate.

The Meeting made the following recommendations:

I-3.1.3.3 Team Members were invited to address user requirements and particular observing systems deficiencies as expressed in:

(i) the JCOMM OPA Implementation Goals, and

(ii) the JCOMM Statement of Guidance for Ocean Applications;

I-3.1.4 Platform/Instrument metadata requirements, and META-T

I-3.1.4.1 Mr Derrick Snowden, Chairperson, Water Temperature Instrument/Platform Metadata Pilot Project (META-T) presented a review of the META-T Pilot Project, including a brief reminder of the original goals of META-T and the purpose for its inception.

I-3.1.4.2 Initially the pilot project work plan has focused on collecting information from various user groups detailing the type of metadata that should be collected for each JCOMM data stream. Work that is more recent has been focused on comparing these lists of requirements with the actual JCOMM data streams to identify the gaps in the current processes. The presentation was focused on the gap analysis as it pertains to real time VOS and XBT data.

I-3.1.4.3 The Team noted that the gap analysis showed numerous metadata elements that are not currently collected and provides a list of goals for the operational community to pursue.

I-3.1.4.4 In addition to identifying the information that needs to be collected, Mr Snowden presented some options for how it might be managed as part of an end-to-end data system.

I-3.1.4.5 The Team considered the META-T suggestions below in light of the implied changes needed to the VOS and SOOP data management and data collection procedures. Mr Snowden invited the Team to work more closely with META-T to map out a realistic pathway that will address the gaps identified here but not introduce unnecessary and burdensome changes to the current SOT practices.

I-3.1.4.6 The Team

(i.) invited the Cross cutting Task Team on Delayed Mode VOS Data (TT-DMVOS), the SOT Task Team on Pub47 metadata, and other Groups involved in SOT data management to liaise during the next intersessional period with the META-T Steering Team (***action; TT-Pub47 & TT-DMVOS; SOT-VI***);

(ii.) welcomed the participation of the following SOT members on a TSG template design group to respond to the META-T Users Survey (***action; D.Snowden, M. Belbeoch, H.Viola, J. Trinanes; SOT-VI***): Derrick Snowden (NOAA/CPO, USA), Mathieu Belbéoch (JCOMMOPS), Hester Viola (JCOMMOPS), and Joaquin Trinanes (NOAA/AOML, USA);

(iii.) invited all interested parties, even those not part of the steering team, to go to marinemetadata.org and register as a user and participant in META-T to monitor project status (***action; SOT members; SOT-VI***);

(iv.) invited META-T to liaise with the relevant VOS operator community to determine if the current average FM-13 message distributed on the GTS is populated completely.

Additionally, obtain lists of the actual fields transmitted to shore by the three electronic logbooks (***action; META-T; SOT-VI***);

(v.) requested electronic logbook developers to consider adding the functionality to transmit periodic Admin messages containing all known category 1 and 2 metadata (META-T website will include the list of desired fields) (***action; e-logbook developers; SOT-VI***);

(vi.) requested SOOP Operators to consider reintroducing the collection of meteorological observations as part of a regular XBT message (***action; SOOPIP members; ongoing***);

(vii.) invited SOT members consider joining META-T. SOT expertise would prove valuable in (a) the content and collection of metadata for Pub47 (the real world issues involved in its maintenance and the community of users that rely on it); (b) the electronic logbooks or XBT/TSG data acquisition software; (c) the installation and maintenance of the hardware on VOS ships; and (d) expertise in the delayed mode data streams for either VOS or SOOP. (***action; SOT members: SOT-VI***);

(viii.) Pub47 should be updated more regularly and pushed to the META-T server(s) as soon as possible (***action; TT-Pub47; SOT-VI***);

(ix.) SOT members are invited to consider volunteering hosting additional META-T servers (***action; SOT members; SOT-VI***).

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 (IOC Secretariat) presented a report on behalf of Maria Hood (IOC Secretariat, and IOCCP Project Coordinator), describing the International Ocean Carbon Coordination Project (IOCCP) and its intersection with the SOT.

I-3.2.1.2 The IOCCP is co-sponsored by the IOC and the Scientific Committee on Oceanic Research (SCOR) and promotes the development of a global network of ocean carbon observations for research through technical coordination and communications services, international agreements on standards and methods, and advocacy and links to the global observing systems.

I-3.2.1.3 Major activities of the IOCCP for 2009 include

(i) the Global Ocean Ship-based Hydrographic Investigations Panel (GO-SHIP) – revising the1994 WOCE Hydrographic Program Manual and developing a strategy for a global survey, post-CLIVAR. The strategy will be published as a whitepaper for the OceanObs09 conference

(ii) the Surface Ocean CO_2 Atlas Project (SOCAT) – A long-term project to develop a global common-format surface ocean CO_2 data set with well-documented quality control procedures and no interpolation

(iii) changing Times Inventory – developing a multi-platform inventory of carbon and biogeochemistry time series measurements, including coastal and non-Eulerian observations

(iv) the Guide of Best Practices for Ocean Acidification Research and Data Reporting – to be published in late 2009

(v) a summary for Policymakers / Watching Brief on Ocean Fertilization – commissioned by the IOC Executive Council and the International Maritime Organization (IMO) London Convention

(vi) Partners in the EU Carbon Observing System Coordination (COCOS) – to improve interoperability of carbon observations and data streams between the land, air, and ocean domains; and

(vii) Ocean carbon sensor directory – development and maintenance of an on-line directory of the most often used carbon and related sensors and systems.

I-3.2.1.4 The meeting noted with appreciation that IOCCP was in principle open to collaboration regarding real-time distribution on GTS of TSG data provided the cost implications are minimal and

decision is left to the discretion of individual PIs. Rik Wanninkhof (NOAA AOML) has suggested developing a pilot study for inclusion of SST and Sea Surface Salinity (SSS) on the GTS that could eventually be expanded to cover all interested carbon SOOP participants. He notes, however, that the logistic details of such a pilot experiment are not trivial. For release of salinity data in a timely manner, the IOCCP can request PIs to provide data after the end of each cruise, but personnel costs must be considered. Data are released regularly to the Carbon Dioxide Information Analysis Centre (CDIAC) and a large dataset (SOCAT, see below) will be made public at the end of 2009.

I-3.2.1.5 The meeting also noted that the IOCCP was working on a revision to the Hydrographic Program Manual for the section on "Underway Measurements: Overview, and Near-surface T, S, and bathymetry measurements." The Global Ocean Surface Underway Data Pilot Project (GOSUD) has produced a QC manual on the TSG data as part of the GOSUD manual. The chapter on Acoustic Doppler Current Profiling Measurements and Navigation, and the one on meteorological measurements from research ships ("flux" part) will also be updated.

I-3.2.1.6 The Team agreed that both the SOT and IOCCP could benefit from an enhanced collaboration regarding ship recruitment and requested JCOMMOPS to assist in this regard and act as a focal point (***action; JCOMMOPS; ongoing***).

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

I-3.2.2.1 Mr Shawn Smith (Florida State University, USA) reported on the recent developments of the Shipboard Automated Meteorological and Oceanographic System (SAMOS) initiative. SAMOS aims to improve the quality of meteorological and near-surface oceanographic observations collected in-situ on research vessels (R/Vs) and select merchant ships.

I-3.2.2.2 SAMOS initiative currently focuses on meteorological and near-surface oceanographic data collected by the scientific instrument system (a SAMOS) permanently installed on R/Vs. The SAMOS data center at the Florida State University (FSU) currently receives data transmissions from 20 U. S. operated R/Vs and one international R/V (Southern Surveyor). Four additional R/Vs are being recruited. The SAMOS initiative provides validation of science instrument systems on R/Vs using a Portable Seagoing Air-sea Flux Standard (PSAFS). The PSAFS combines a set of state-of-the-art instruments to directly measure the air-sea fluxes of heat, momentum, fresh water, and radiation and a suite of instruments making standard meteorological measurements side-by-side with the SAMOS that is permanently installed on a the R/V. The PSAFS is deployed and operated by the NOAA Earth System Research Laboratory.

I-3.2.2.3 The Team noted that the second joint SAMOS GOSUD workshop (Seattle, WA, USA 10-12 June 2008) made a number of recommendations for

(i) augmenting data from vessels making automated weather observations with routine visual cloud, weather condition, sea state, and ice conditions;
(ii.) determining critical regions for increased monitoring through underway meteorological and TSG observations
(iii.) encouraging efforts to develop new and make available historical upper-ocean and meteorological observations for use by developing nations
(iv) collecting daily, bottle samples of water to monitor TSG performance from vessels making underway thermosalinograph (TSG) measurements; and
(v.) building best practice guides and continuing education materials to support the needs of technical personnel on the front lines of data collection at sea.

I-3.2.2.4 The Team noted with appreciation that SAMOS was collaborating with the Marine Advanced Technology Education Center (Monterey, CA, USA) to develop knowledge and skills guidelines for ocean observing technicians (i.e. for making underway atmospheric and oceanic observations that meet the high-accuracy requirements for climate and oceanographic research). These actions are expected to lead to enhanced curriculum within marine technical training

programs. The Team invited its members to participate in the development of related training programs and materials (***action; SOT members; SOT-VI***).

I-3.2.2.5 The meeting noted that the SAMOS initiative was not originally designed to provide meteorological and ocean observations to national oceanographic or meteorological services. The demand to have access to high-quality SAMOS data via traditional services (e.g., GTS) has grown. The Team noted those issues that had to be addressed for making SAMOS data available, also included:

(i) how to distinguish a SAMOS report from a standard VOS report,
(ii) timeliness of delivery (is daily good enough),
(iii) reliability of SAMOS metadata, and
(iv) coordinating with responsible National Meteorological Services (NMS). Mr Smith provided an update addressing these issues, including a new initiative to automate metadata transfer from SAMOS vessels to shore and a new "real-time" U. S. R/V data repository. It requested the Task Team on Instrument Standards to follow up in liaison with Mr Smith (***action; R. Luke & S. Smith; SOT-VI***).

I-3.2.2.6 Regarding the provision of SAMOS (and other high-temporal frequency automated weather data) to national meteorological and oceanographic services, the Team discussed the issue under agenda item III-5.1.

I-3.2.3 Group for High-Resolution Sea Surface Temperature (GHRSST)

I-3.2.3.1 Dr Gary Corlett (Space Research Centre, University of Leicester, United Kingdom) reported on the activities of the Group for High Resolution Sea Surface Temperature (GHRSST) summarizing the approach that GHRSST uses to provide quality indicators for its products. GHRSST is comprised of international experts working together for the provision and application of satellite-derived SST data, and offers a suite of global high-resolution SST products, operationally in near-real-time, on a daily basis.

I-3.2.3.2 The Team noted that GHRSST was now planning to provide long-term SST climate data records covering the satellite era from 1981 onwards. Mr Corlett explained that these products had a limited requirement for ship-borne SST data due to their geographical coverage and usually high measurement uncertainty. GHRSST expressed interest in working with the SOT to address both these issues.

I-3.2.3.3 The Team noted the recommendations from GHRSST for maximising the impact and benefit of existing and future SST measurements from ships. Based on those recommendations, the Team invited its members to collaborate with GHRSST in the view (i) to make additional radiometric skin SST measurements from ships (***action; SOT members; ongoing***). The Team also requested its Task Team on Instrument Standards (i) to better characterize the uncertainties of non-radiometric SST measurements from existing ship data (this can be done using GHRSST data), and (ii) to collaborate with GHRSST to better define requirements for measurements of SST from ships (***action; TT-IS; SOT-VI***).

I-3.2.3.3 The Team noted that while metadata transmitted with the GTS observations provided for information on the type of measurement for the SST (e.g. bucket, intake), and recommended that GHRSST uses the information to provide feedback on the quality of the measurements made using the different methods used (**action; GHRSST; SOT-VI**).

I-3.2.4 Ferrybox Project

I-3.2.4.1 Wilhelm Petersen (GKSS Research Centre Institute for Coastal Research/Operational Systems, Germany) reported on the status of the Ferrybox project and recent achievements. The

FerryBox[1] concept is to fit robust autonomous measuring systems to ferries and merchant ships, which run regular routes. The concept was tested during the European Union fifth Framework Programme (EU FP5) project *"FerryBox"*, which ran from 2002 to 2005. The core work of the *FerryBox* project focused on the use by all the participants of four "core" sensors for- temperature, salinity, chlorophyll-fluorescence and turbidity along with testing of a wider range of sensors by individual groups on the routes. This project was highly successful and demonstrated the value of the measurements made as an integrated part of the marine monitoring cycle. Even after finishing this project, most of the FerryBox systems kept running just financed by the national research institutions. Some European institutions operate the routes. Many of the systems have been developed to support the requirements for both scientific and marine management data.

I-3.2.4.2 The Team noted that systems have also been in operation for sometime in Japan, Korea and in the USA and elsewhere. The FerryBox community is evolving from single institute-driven VOS lines to strategic multi-partner and trans-boundary work. In Europe, such coordination is sought as a pillar for the future deployment of pan-European coastal observing systems and will facilitate the implementation of the EU's Marine Strategy Framework and the Water Framework Directives.

I-3.2.4.3 FerryBox systems have considerable potential for increased use as part of marine management systems around the world, particularly making it possible to monitor the world's major estuaries ands coastal waters such as those of eastern Asia. A particular success has been achieved for the monitoring of air-sea fluxes of carbon dioxide through the IOCCP International Ocean Carbon Coordination Project voluntary observing ship operations. It is important that this work is continued and work particularly in shelf seas is expanded. The coastal carbon system needs to be better monitored in respect to the overall carbon cycle issues and natural carbon sequestration processes. The FerryBox approach is probably the only way that can provide the needed monitoring coverage of carbon import and export in shelf seas and acidification in the coastal zone cost effectively.

I-3.2.4.4 The Team noted that the EU Commission set up the European Marine Observation and Data Network[2] (EMODNET) to open opportunities for high technology commercial companies in the maritime sector to improve the efficiency of activities such as marine observation, management of marine resources and marine research in European laboratories. The EMODNET vision is for an end-to-end, integrated and inter-operable network of European marine observations, data communications, management and delivery systems, supported by comprehensive user-oriented toolkits. For example, FerryBoxes play a prominent role in the integrated monitoring of the German Bight of the North Sea through the Coastal Observing System for Northern and Arctic Seas[3] (COSYNA) project.

I-3.2.4.5 The FerryBox concept has considerable potential for expansion particularly for the study of inputs from the world's major riverine inputs such as the Amazon and those following into the China Seas. The FerryBoxes can make an important contribution to the development of a global system for observing the coastal ocean. For work in developing countries, the FerryBox approach is particularly important because it is highly cost effective. It can enable the Coastal Module of GOOS to happen in developing countries. Here the JCOMMOPS can play an important role.

I-3.2.4.6 The Team noted that a Community White Paper (Hydes *et al.*) was being prepared for the OceanObs'09 Symposium (Venice, Italy, 21-25 September 2009). This will provide the opportunity to discuss how local FerryBox operations might be coordinated globally through JCOMM to provide input to a Coastal GOOS system.

I-3.2.4.7 Mr Petersen explained that FerryBox systems have to be developed further on in order to increase the possibilities of automated observations on ships of opportunity including for

1: http://www.ferrrybox.org
2 : http://www.esf.org/publications/marine-board.html
3 : http://www.cosyna.de

(i) preparing already new build ships with possibilities to connect a FerryBox system (water inlet, infrastructure for external communication)
(ii) developing robust systems, self cleaning or easily cleaning by the ship crew in order to keep the maintenance to a minimum, and
(iii) further developing robust sensors suitable for autonomous operation in FerryBox systems (e.g. more robust nutrient analysers, high precise pH, algal detection by gene probes, new sensors for zooplankton).

I-3.2.5 SeaKeepers Society

I-3.2.5.1 The meeting noted the letter from John Englander (CEO, SeaKeepers Society) in reply to the invitation letter sent by the WMO Secretariat for attending this SOT Session. In his letter, Mr Englander indicated that SeaKeepers was an independent NGO, which started in 1998 with the idea to advance a new Volunteer Observing System, equipping private yachts, cruise ships, freighters and tankers with highly automated systems for meteorological and oceanographic observing.

I-3.2.5.2 Fifty-seven cost-effective SeaKeeper 1000™ systems (0.01$/observation) have been installed worldwide and experimental efforts have proven the concept. Installations include large private yachts, cruise ships, NOAA vessels, University Research platforms, and a USCG Icebreaker. The modular architecture System is capable of making meteorological (wind, air temperature, humidity, surface pressure) and oceanographic (SST, SSS, dissolved oxygen, Ph, Chlorophyll) measurements. The system is strictly supported by private donations from citizens of 14 nations, except for the contribution of NOAA assisting with satellite transmission fees.

I-3.2.5.3 The Team noted with concern that while private donors have been very generous over the years, they now take the position that if such a network is valuable to the world community, that there must be support by governments or intergovernmental agencies and institutions to keep it functioning. SeaKeepers projects to run out of operating funds by the end of June. The annual expense to keep the 57 systems operational and calibrated is approximately US$ 500,000 annually. SeaKeepers is willing to assist interested organization regarding the larger question of possible ways to support, fund, or take over their efforts of the last decade while it is still operational.

I-3.2.6 Alliance for Coastal Technologies (ACT)

I-3.2.6.1 Dr Wilhelm Petersen (GKSS Research Centre Institute for Coastal Research/Operational Systems, Germany) presented a report on behalf of Dr Mario Tamburri (Chesapeake Biological Laboratory, University of Maryland, USA) on performance measures and community outcome regarding the Alliance for Coastal Technologies (ACT). The report included a few examples of the products, services, and impacts of ACT over the past seven years, based on the program's five community-established priorities:

(i) transition emerging technologies to operational use rapidly and effectively
(ii) maintain a dialogue among technology users, developers, and providers
(iii) identify technology needs and novel technologies,
(iv) document technology performance and potential, and
(v) provide the Integrated Ocean Observing System (IOOS) with Information Required for the Deployment of Reliable and Cost-Effective Networks.

I-3.2.6.2 The Team noted that in cooperation with tens of private companies internationally, ACT has conducted a large number of technology evaluations and tested 37 instruments at 8 of the partner field sites. Evaluation reports have been produced and distributed and are available from the ACT web site[1]. The ACT workshops have facilitated cooperation with the private industry to

1 http://www.act-us.info

address research and development issues, and permitted the provision of information on technology, resulting in better industrial products being used in the marine community.

I-3.2.6.3 The Team further noted that ACT had collaborated with IOOS, NDBC, and the US Army Corps of Engineers on the development of a National Operational Wave Observing Plan and with IOOS on a National Surface Current Plan. It had also collaborated with the Marine Metadata Interoperability (MMI) program and Southeastern Universities Research Association (SURA) on the development of a National Data Integration Framework and sensor interoperability.

I-3.2.6.4 More information can be found at the ACT web site.

I-3.2.7 SCOR/IAPSO OceanScope Working Group

I-3.2.7.1 Wilhelm Petersen (GKSS Research Centre Institute for Coastal Research/Operational Systems) reported on behalf of Dr Tom Rossby (Graduate School of Oceanography, University of Rhode Island, USA) on the development of the recently approved OceanScope Working Group of the Scientific Committee on Oceanic Research (SCOR) and the International Association for the Physical Sciences of the Oceans (IAPSO). This followed the proposal made at the last SOT Session for SCOR Panel on Merchant Marine Instrumented Oceanographic Surveys.

I-3.2.7.2 The Team noted that the OceanScope would address the compelling need for new technologies with which to monitor currents, and physical, chemical and biological parameters systematically at high horizontal resolution. The first meeting will take place in Montreal July 17-19, 2009. The charge of the working group will be to review and propose possible new and emerging technologies that can be adapted to the merchant marine shipping environment. The working group will produce the OceanScope Implementation Plan for realizing these ideas.

I-3.2.7.3 The OceanScope concept proposes a new paradigm for the systematic and sustained observation of the ocean water column. It seeks to develop a partnership between the ocean observing community and merchant marine shipping industry so that a number of synergies could be realized which to date have not been possible, notwithstanding a very high level of cooperation between individual ship operators and scientists. These include (i.) an enhanced ability identify routes and operators in all oceans, (ii.) new instruments and technologies developed and optimized for automated operation on commercial vessels, and (iii.) real time data streams, automated data processing and distribution to the user community. One option for implementation of this concept would be through the establishment of an international agency, something like space agencies, which are designed to operate on decadal time lines appropriate to the challenges they face.

I-3.2.7.4 The Team noted that the organizers have agreed upon the Terms of References and the working group itself will review sponsoring agencies. A 3-year timeline was proposed culminating in decisions regarding what structures would need to be put in place to carry forward the deliberations and plans of the Working Group into the future.

I-3.2.8 The Oceanoscientific Campaign

I-3.2.8.1 Mr. Martin Kramp (SailingOne[1], Caen, France) reported on the Oceanoscientific Campaign of the SolOceans[2]. The fleet of the new SolOceans round the world sailing race will regularly sail in almost unexplored areas, especially in the Southern Hemisphere round the three capes: Good Hope, Leeuwin and Horn. This is a unique opportunity to collect and transmit scientific data of the ocean-atmosphere-interface. As a result, scientific partners (such as IFREMER, INSU-CNRS and Météo-France) initiated with SailingOne the OceanoScientific

1: SailingOne, based in the French Lower Normandy Region, is both organizing the SolOceans race and building the SolOceans one-design Class, which will also take part in other major offshore races.
2: The SolOceans is the first single-handed round-the-world sailing race in which international skippers are guaranteed to compete on equal footing thanks to new sixteen-meter high-tech SolOceans one-design monohulls, all strictly identical to one another: hull, equipment and sails. It is the first race with one leg raced per year: the first leg Europe - New Zealand during the last quarter of the year, followed by the second leg: New Zealand - Europe at the beginning of the following year. Every leg will last approximately fifty days. The number of participants is limited to twelve. The first SolOceans will start on 23 October 2011.

Campaign and each unit of the SolOceans one-design Class will be equipped with scientific probes and a modified BATOS system. The following parameters will be measured (i) wind speed and direction, (ii) air relative humidity, (iii) air temperature, (iv) sea level pressure, (v) SST, (vi) SSS, and (vii) pCO_2.

I-3.2.8.2 After the successful testing of the BATOS system in 2008 on the first unit of the SolOceans one-design Class[1], now the flow-through system[2] is under development. Existing systems do not match because of the weight and size, power consumption, water intake or the very rough offshore conditions.

I-3.2.8.3 The Team noted that at the end of 2009, the complete system would be tested under racing conditions: several units of the SolOceans one-design Class will take part in a transatlantic race.

I-3.2.8.4 The Team agreed that it would be beneficial to the global ocean observing system if the race boats could be used for the deployment of drifters or Argo floats from data sparse regions (e.g. Southern Ocean). It invited SailingOne to consider offering such a possibility and requested JCOMMOPS to discuss the issue with SailingOne and, if agreeable to investigate in what conditions this could be realized (***action; JCOMMOPS & SailingOne; SOT-VI***).

I-4. Reports and recommendations by the Task Teams

I-4.1 Task Team on Satellite Communication Systems

I-4.1.1 The Chairperson of the SOT Task Team on Satellite Communication Systems, Ms Sarah North (Met Office, United Kingdom), reported on the activities of the Task Team since the previous SOT Meeting. At SOT-IV, the remit of the Team was amended by removing the word “costs” from its title and it was tasked with evaluating 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. It also monitors the cost implications of Inmarsat satellite communications sent by Code 41, and takes into account related work undertaken by the Task Team on SOT Iridium and the DBCP Iridium Pilot Project.

I-4.1.2 The Task Team has produced a spreadsheet prepared by the E-SURFMAR programme, which compares the relative cost advantages and limitations of Inmarsat, Iridium, and Meteosat transmission systems proposed for Automatic Weather Stations. Short Burst Data (SBD) transmission costs associated with the Iridium system currently offer notable savings when compared to other systems. The Iridium, with a two-way communication ability and global coverage, is now being used for a number of different shipborne AWS systems.

I-4.1.3 With respect to Inmarsat, the Team noted that the use of data compression could result in significant cost savings (e.g. as used with BATOS AWS systems). The messages are emailed on by the Land Earth Stations (LES) to the processing centre(s). Decoding software is then used to prepare the FM-13 SHIP (or FM-96 BUFR) reports for insertion on the GTS.

I-4.1.4 Another factor that will have a bearing on transmission costs in the coming years is the migration to Table Driven Codes, such as BUFR. However, it is anticipated that the growing use of shipborne AWS systems is also likely to give rise to a variety of proprietary transmission formats, the relative merits and cost benefits of which will need to be investigated by the Team in the coming years.

1: One-design Class: all the yachts of the SolOceans race are completely identical to each other in size and equipment. So scientific equipment has no influence on the sailing competition.
2: Flow-through-system: The system which will measure the ocean data at the surface (e.g. salinity, pCO_2). There will be one or several flow-through chambers for used probes. The system contains also a pump, debubbler, filter and valves.

I-4.1.5 The Team agreed that the first task of the Task Team Terms of Reference should be broadened to clearly include the real time collection of satellite data in support of SOOP (***action; TT-Satcom; SOT-VI***). The Team updated the Terms of Reference accordingly.

I-4.1.6 As reported at SOT IV Goonhilly LES was effectively closed in November 2006 and the Inmarsat C services were transferred to Burum LES in the Netherlands. Although, this transition was supposed to be flawless, and the Goonhilly LES ID numbers were continued, it nevertheless resulted in serious data transmission losses and significant data delays, including for the ASAP data. However, E-ASAP vessels are now using a new dedicated email system whereby the TEMP-SHIP messages are mailed direct to DWD, who currently manage the programme. This has resulted in a marked drop in the cost of Code 41 transmissions via Goonhilly.

I-4.1.7 The Team noted that the number of manually reporting VOS, sending their weather observations direct by email, rather than via Code 41, had continued to grow since SOT IV, thereby reducing the burden of transmission costs faced by the meteorological services. This trend is expected to continue in the coming years, as broadband communication systems become more widely available on merchant ships. The Team advised VOS operators, whenever possible, to encourage their manually reporting VOS, to consider moving to the use of email to send their weather reports in lieu of using Inmarsat Code 41 (but subject to individual ship-owners being willing to absorb the costs) (***action; VOS operators; ongoing***).

I-4.1.8 To ensure that data losses are not experienced in future, the Team reiterated the recommendations made at SOT IV, (i) that suitable emergency back-up arrangements may be needed, whereby data can be transferred to another LES/Supplier, and (ii) that there was a need to have a clear mechanism to keep LES ID numbers up to date with ownership of the list clearly assigned to ensure that any changes are promulgated swiftly to VOS focal points and thence to observing ships. The Secretariat requested the Team to communicate any changes to the WMO Secretariat for updating the list maintained there[1] (***action; TT-Satcom; ongoing***).

I-4.1.9 The Team noted that since SOT IV a number of changes to the Code 41 list had arisen (i.e. changes to Vizida listed ID series) that could possibly result in some additional delays in data availability. To prevent such delays occurring, the Team recommended that relevant ships should switch to using the X04 ID Series codes (list available on the WMO web site[1]). Because many non US operated VOS also send their observations via US based LES it is therefore incumbent on individual VOS operators to make the changes known to their VOS fleets (***action; VOS operators; ongoing***).

I-4.1.10 The fact that code 41 observations are now routed globally from all Inmarsat satellite footprints, now brings into question the principle laid down in WMO guidance that weather reports should be sent to the nearest LES. Clearly, this is not happening nowadays and can be complicated by the fact that some ships may be instructed by their shipping companies to use only prescribed LES suppliers. Also, because the majority of LES that accept Code 41 observations are located in the Northern hemisphere it can be difficult to be sure which LES is the nearest. However, recent changes proposed to the TurboWin program (Version 4.5 beta) included a facility to recommend which LES should be used for sending observations.

I-4.1.11 The Team recognized that the current trend to conglomerate LES service providers thereby reducing the overall number of available Code 41 LES, inevitably adds to the unfairness of the Code 41 reverse charging system. Introducing new ID number series also introduces new risks of increased charges being incurred by a smaller number of national meteorological services

I-4.1.12 The Team requested the Secretariat to update the list of LES on the WMO web site according to the updated list presented by the Task Team (***action; Secretariat; asap***). It recommended that a new column should be added to the list to clarify which national met services are incurring the costs (***action; TT-Satcom; asap***).

1: http://www.wmo.int/pages/prog/amp/mmop/inmarsat_les.html

I-4.1.13 The Team recalled that in 2003, the Task Team originally undertook an initial review of Inmarsat costs borne by National met services whose countries host LES. Given the significant changes that have taken place since that time, as outlined above, the Team instructed the Task Team to undertake a further review to determine the actual costs currently be faced by individual members in order to help guide future decisions about reducing the Inmarsat cost burden (***action; TT-Satcom; asap***).

I-4.1.14 The Team recommended that the Code 41 list in WMO Publication 9 Volume D should be revised to reflect the updated list of LES that accept Code 41 messages. Details should be promulgated by WMO to all VOS operating countries listed WMO Publication No 47 (***Action; Secretariat; end 2009***).

I-4.1.15 The Team noted that there had been several instances reported recently where observations sent to certain LES at non-standard hours, or in certain geographic areas, had not been inserted on the GTS. This not only represented wasted observation data, but also wasted costs. Accordingly, the Team further recommended a review should be undertaken of relevant GTS bulletins for ship observations as listed in WMO Volume C1 (Catalogue of Meteorological Bulletins) (***action; Secretariat; end 2009***).

I-4.1.16 Given the value of all real-time observations, and the fact that the International Convention for the Safety of Life at Sea (SOLAS) requires ships to undertake more frequent observations when in the vicinity of tropical cyclones, the Team requested the WMO Secretariat to invite members to check the accuracy of their entries in WMO Volume C1 to ensure that all ship observations are circulated on the GTS irrespective of the hour that they are sent or the geographical area they are sent from (***action; Secretariat; asap***).

I-4.1.17 The Team noted with appreciation, that although Automatic Identification System (AIS) carried by VOS were not presently capable of transmitting weather data, and recent developments within the IMOs correspondence group on AIS appeared, to have accepted that weather data should be included in one of the proposed future binary message formats (see also agenda item III-4.4).

I-4.1.18 The Team noted that since SOT IV, the Met Office had been circulating BBXX coding/transmission error lists to VOS operators via the JCOMMOPS PMO and VOS mailing lists so that remedial action can be taken. Recognising the need to minimise such errors the Team invited other National Met Services that host LES to consider circulating similar information via the JCOMMOPS mailing lists (***action; relevant NMHSs; ongoing***).

I-4.1.18 The Team noted that current trials of call sign masking methods would also have potential implications for determining Inmarsat satellite communication costs. If call signs were masked by securely held, but unique, generic identifiers, it would still be possible to assign individual ship communications costs back to the originating VOS operating countries. This will be necessary for programmes like E-SURFMAR, where participating countries are compensated for the communication costs incurred by their VOS (and for costs incurred by non European VOS that are paid by E-SURFMAR members). Where the non-unique identifiers disguise ships identities such as 'SHIP' it will be more difficult to correctly, assign the costs associated with individual ships, unless the Inmarsat numbers of all the ships that use a particular LES are known. The use of 'SHIP' on European VOS would make it extremely difficult for the E-SURFMAR program to arrange compensation for its member countries.

I-4.2 Task Team on SOT Iridium Pilot Project

I-4.2.1 Ms Gerie Lynn Lavigne (Meteorological Services, Canada) reported, on behalf of the Chairperson of the SOT Task Team, on SOT Iridium Pilot Project, Ms Yvonne Cook (Meteorological Services, Canada), on the activities of the Task Team since the last SOT Meeting. The SOT-IV established a Task Team on SOT Iridium Pilot Project to guide, in close cooperation

with the Task Team on Satellite Communications System, the SOT Iridium Pilot Project in evaluating and demonstrating 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.

I-4.2.2 Ms Lavigne summarized the results of the pilot project based on data transmissions from the prototype Iridium-based Automatic Voluntary Observing Ship (AVOS) system installed onboard the Canadian Coast Guard (CCG) research vessel, Amundsen from July 2007 – November 2008, as well as of the ship Nunakput in the summer of 2006. Results were also presented from Météo-France and NOAA who are participating in the Iridium Pilot Project.

I-4.2.3 The meeting noted that the Iridium transmissions were reliable in the Canadian Arctic. This was concluded, based on 90 % data availability. The 10% data unavailability was mostly due to problems unrelated to Iridium transmissions. Nonetheless, the Iridium Pilot Projects have demonstrated a significant improvement in reliability of communications in Northern waters.

I-4.2.4 In addition to improved performance, the Team also noted the significant cost savings versus the current INMARSAT arrangement Canada has with NOAA. Cost savings will continue to be realized with the Iridium even if the frequency of AVOS observations is increased to hourly in all areas.

I-4.2.5 In addition, the Iridium communication solution also offers the following benefits:

- Capability for 2-way communications, allowing for direct connection with hardware on AVOS to assist with troubleshooting and diagnostics. Our current platforms do not support this, however next generation AVOS payload will offer this functionality;
- Processing of FM13 SHIP messages will be directly handled by The Canadian Meteorological Centre (CMC) in Canada, removing the dependency on NOAA;
- The option for IP data routing means there would no longer be the requirement to decode binary satellite messages directly; and
- The Iridium solution allows more control of AVOS data routing.

I-4.2.6 However, the team noted the following risks and challenges of adopting Iridium:

- Dependency on American-based commercial satellite provider for both data reception and processing. Note, however, this dependency is also an issue with current INMARSAT AVOS.
- All Meteorological Services Canada (MSC) AVOS data will be routed through the Iridium provider through CMC to the GTS.
- No guarantee that SBD data costs will remain at current rates; price increases are likely over time.

I-4.2.7 The Team noted that the AVOS system will be transmitting observations on an hourly basis regardless of location.

I-4.2.8 Mr Pierre Blouch reported on the use of Iridium Short Burst Data (SBD) to transmit VOS data. Eight BAROS systems have been tested with SBD and a dedicated data processing centre developed by Météo France for GTS encoding and data distribution, quality control, and metadata handling and reporting. The transmission of short 17-byte raw binary messages from ship to shore was the preferred option. Metadata will be soon added in the GTS reports at the data processing centres. Bi-directional data transmission permits to request system status and setup some metadata fields remotely (e.g. barometer height). The meeting noted that the timeliness was excellent as 95% of the reports sent on GTS are received within 10 minutes.

I-4.2.9 The Iridium Pilot Project Task Team was merged in the SatComm Task Team (See agenda item I-7.5).

I-4.3 Task Team on ASAP

I-4.3.1 The SOT Task Team Chairperson on ASAP, Mr Rudolf Krockauer (DWD, Germany), reported on the activities of the Task Team since the last SOT Meeting. The SOT-IV, amongst other things, decided to establish a Task Team on ASAP to 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. The Team is also tasked to 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, as may be required by some members. The Team is currently coordinating 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.

I-4.3.2 Mr Krockauer reported that there were only two significant ASAP programmes, the European programme E-ASAP with 12-16 ships in 2007-2008 and the Japanese programme with 5 ships. 6307 reports have been received in 2008, 3546 originating from fifteen E-ASAP ships, 1391 from the Norwegian Weather Ship POLARFRONT, 696 from five Japanese research vessels, and the rest basically from other research vessels (i.e. POLARSTERN, RON BROWN, AGULHAS). He further explained that the Task Team report was focusing on EUMETNET ASAP (E-ASAP), since the European programme is the only a programme which is predominantly based on a fleet of merchant ships (with the exception of two ships). E-ASAP is planning to increase the fleet from 15 to 19 vessels in 2009. The Team noted that reducing the loss ratio (difference between number of launches on board the ships and number of soundings received on the GTS) remains a challenging task for ASAP operations on board of merchant vessels. The number of ships, which routinely provide upper air soundings on the GTS throughout the year, is about 20 worldwide. Occasionally, some research vessels, which perform soundings during certain research campaigns. However, these activities are usually limited to a few weeks.

I-4.3.3 The Team noted that E-ASAP decided to change the satellite communication from Inmarsat-C to Iridium. First implementations and tests showed promising results, and for transmission of high-resolution BUFR data.

I-4.3.4 The Team noted with concern that the conditions to involve merchant vessels in ASAP operations have significantly deteriorated due to the global financial crisis, which came up in 2008. The shipping industry reacts with shorter charter contracts and reduced line services. Three ships of the E-ASAP fleet were lost in Nov/Dec 2008 due to changes in the sailing routes. The current financial crises has a high impact on the shipping business and many shipping companies are not able to provide ships for ASAP operations on long term line services in dedicated ocean regions. The limited space on board can partly be overcome by choosing open deck launchers instead of container launchers. However, long time services are essential for regional programmes like E-ASAP. Installation and de-installation require financial and managerial efforts, which are not worth for line services of less than six month.

I-4.3.5 The Team noted that an impact study of the Norwegian Meteorological Institute in 2007 showed a significant and positive impact from the E-ASAP network on the NWP results in Europe. A worldwide ASAP programme would have more options to find participating ships since the sailing routes are not bound to specific regions. However, this requires clear agreements on the financing (taking into account the uneven spatial distribution of soundings and possible changes in the sailing routes) and management (in case that technical maintenance has to be transferred to other countries due to changed sailing routes).

I-4.3.6 ASAP monitoring issues are discussed under the VOS Panel session in agenda item III-3; and ASAP Trust Tund issues discussed under agenda item I-7.2.

I-4.3.7 Mr Johan Stander (SAWS, Republic of South Africa) indicated that the SA Agulhas made 135 ascents, 15 re-launches, with a failure rate of 11%. At this stage, there will not be any ascents

this year due to financial constraints. However, spare radiosondes made available from SOT members would help tremendously as the S A Agulhas is the only vessel doing accents in the Southern Oceans; an area which is crucial for NWP. Within 3 years a new research vessel will take over from the S A Agulhas - it is expected to be more than 320 days at sea and to report more data and more ascents. At the same time, South Africa is investigating keeping the upper air system on the S A Agulhas provided the international funding will be made available to assist with this programme. Interested SOT members are invited to contact Mr Stander directly (***action; SOT members; SOT-VI***).

I-4.3.8 The Team agreed that the presence of non-professional observers onboard ASAP ships was causing problems. For example, a skilled operator is required to decide whether to launch a balloon or not. Also, for the same reason, full automation of ASAP is not an option at this point.

I-4.3.9 The complete Task Team report is provided in ***Annex XII***.

I-4.4 Task Team on VOS Recruitment and Programme Promotion

I-4.4.1 Julie Fletcher (Met Service New Zealand), Chairperson of the SOT Task Team on VOS Recruitment and Programme Promotion, presented the report on behalf of the Task Team. The SOT-IV re-established the Task Team on VOS Recruitment and Programme Promotion, which was mainly tasked to further the promotion of VOS activities, and to develop the generic pre-installation design standards that will eventually be available to ship builders and classification societies.

I-4.4.2 The meeting noted the following achievements of the Task Team during the last inter-sessional period:

(i.) Submitted the 'Generic Design Installation' draft document to WMO.

(ii.) Compiled a list of documents providing impact assessments on the use of VOS data.

(iii.) Designed the new PowerPoint presentation "Partnership between Marine Industry and Marine Meteorological and Oceanographic Communities V3 2008".

(iv.) Reviewed the VOS Framework document.

(v.) Developed new VOS Recruitment and metadata collection tools in conjunction with the TT on Metadata for WMO No. 47

(vi.) Revised the old Maritime Safety Committee (MSC) Circ 1017, New MSC Circular MSC.1/Circ.1293 issued by IMO 10/12/2008.

(vii.) Reviewed the SOT certificate of appreciation for ships participating in the various voluntary observing programmes and proposed set of guidelines and issuing criteria[1].

(viii.) Updated reference material on the VOS website

I-4.4.3 The meeting agreed that the following Task Team item still requiring action:

(i.) The 'Generic Design Installation' document requires review and completion, and discussion with the International Chamber of Shipping (ICS) and the International Maritime Organization (IMO) how to progress it.

I-4.4.4 The meeting endorsed the two recommendations proposed by the Task Team:

1: http://www.bom.gov.au/jcomm/vos/information.html

(i.) Small modifications to items 1, 3, and 5 of the Terms of Reference (***action; Secretariat; asap***).

(ii.) That WMO, in support of PMO activities, commit to holding an International PMO Meeting (PMO-IV) in 2010 (***action; WMO Secretariat; early 2010***).

I-4.4.5 The Team agreed that input from SOOP was required for the generic ship design document and invited the SOOPIP Chairperson, Dr Gustavo Goni to contribute to the document (***action; SOOPIP Chairperson; 31 July 2009***). The team requested the WMO Secretariat to submit the generic ship design to IMO (***action; WMO Secretariat; asap***). The Team recommended approaching the International Association of Classification Societies (IACS) at a later stage.

I-4.4.6 The Team agreed to encourage participation of new members in the Task Team.

I-4.5 Task Team on Metadata for WMO Publication No. 47

I-4.5.1 The Chairperson of the SOT Task Team on metadata for WMO Publication No. 47 (Pub47), Mr Graeme Ball (BOM, Australia), presented the report on behalf of the Task Team. The SOT-IV re-established its Task Team on WMO Publication No. 47, which was tasked amongst other things to regularly review the Pub47 metadata requirements and make recommendations, as appropriate. The Task Team is also monitoring the receipt of regular Pub47 updates at WMO from participating VOS members. The report highlighted the activities of the Task Team during the inter-sessional period. Three recommendations on the presentation and availability of Pub47 on the WMO website, and seven on changes to metadata requirements were provided in the report.

I-4.5.2 During the inter-sessional period, the Task Team monitored the submission of Pub47 reports to WMO and these were presented in tabular form by year since SOT-V. The Task Team was pleased to note that the majority of contributing countries are now using the XML metadata exchange format.

I-4.5.3 The Task Team updated Code Table 1801 during the inter-sessional period to reflect a change by the International Organization for Standardization (ISO) to its list of 2 letter country codes. The revised WMO No. 47 Metadata Version 03 document (version 3.3) was uploaded to the VOS website on 3 June 2008.

I-4.5.4 The Task Team made six recommendations regarding the presentation and availability of WMO No. 47 on the WMO website. These were:

(i.) That SOT members optionally provide the metadata to Pub47 on a monthly basis instead of quarterly, or as soon as possible after a major change, with a copy to E-SURFMAR and JCOMMOPS

(ii.) That WMO commits to update Pub47, a mandatory WMO publication, on the WMO website each quarter within 2 months of the due date for submission by members (WMO website updated by 15 May, 15 August, 15 November and 15 February).

(iii.) That WMO routinely forwards national Pub47 submissions to JCOMMOPS and E-SURFMAR for operational use by the VOS community (***action; WMO Secretariat; asap***).

(iv.) JCOMM and CBS discuss the future management of observing platform metadata as part of the WIS.

(v.) That WMO commits to display all Pub47 metadata, including all footnotes, on the WMO website.

(vi.) That WMO commits to urgently, improve the usability of the Pub47 metadata presented on the WMO website.

I-4.5.5 The Task Team made seven recommendations to the Team concerning changes to metadata requirements or improvements to the documentation:

(i.) To remove CR – Chart Room from Code Table 0204 – Location of the barometer. The Task Team considers that in most cases the chart room and the wheelhouse are connected.

(ii.) To (a) remove SL - Sling psychrometer and (b) rename W - Whirling psychrometer to W - Whirling or Sling psychrometer in Code Table 0801 - Exposure of the hygrometer and Exposure of the dry bulb thermometer. The Task Team considered these two instruments to be same and recognised that the names are used interchangeably.

(iii.) To introduce 30 – VOSClim, for a VOS Climate Reference Ship, as a new class of meteorological reporting ship in Code Table 2202. The Task Team recommended this new VOS class to differentiate ships operating and reporting to VOSClim standard from the regular VOS.

(iv.) To introduce an AWS sub-class within each of the VOS classes as follows: 15 – Selected (AWS), 35 – VOSClim (AWS), 45 – Supplementary (AWS) and 75 – Auxiliary (AWS) in Code Table 2202. The Task Team recognised there is a need to be able to (1) differentiate between the levels of sophistication of AWS installed on ships, and (2) differentiate between AWS owned and installed by an NMS as opposed to an AWS installed and owned by the ships as this has potential maintenance implications.

(v.) To permit multiple Pub47 entries from one ship if multiple observing systems are fitted and operated completely independently of each other. The Task Team considers in such cases that each observing system is an independent observing platform with unique metadata and each should therefore be reported individually. Each system needs to be reported with a unique ID that corresponds to the entry in Pub47;

(vi.) To improve documentation by adding the full definitions of each VOS Class to Code Table 2202.

(vii.) To make mandatory for all ships classified as VOSClim: (1) the full suite of recommended digital images and (2) all suggested sketches and drawings.

I-4.5.6 The Team agreed that the storing of ship's digital images was the responsibility of SOT members; they may wish to make such images available on-line from their web sites and provide information about the corresponding URLs to Pub47 and/or E-SURFMAR.

I-4.5.7 E-SURFMAR metadata database can be recommended to members for storing digital images.

I-4.5.8 The Team recommended that the PMOs should update the metadata records directly following the inspection of a ship.

I-4.5.9 The team agreed that Pub47 should include the real call signs, which should not be masked to ensure that the masking scheme is not compromised.

I-4.6 Task Team on Coding

I-4.6.1 Ms Hester Viola (SOT Technical Coordinator) reported on behalf of the Chairperson of the SOT Task Team on Coding, Mr Craig Donlon (European Space Agency), reported on the activities of the Task Team since the previous SOT Meeting. The SOT-IV re-established its Task Team on

Coding primarily to 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.

I-4.6.2 Ms Viola presented a progress report on compiling requirements for table driven coding of ship-based observations. She also presented the requirements for inclusion of more metadata in the XBT BUFR template, as well as the progress of submission of the XBT template to the JCOMM DMPA Task Team on Table Driven Codes (TT-TDC). The changes proposed to the WMO Expert Team on Data Representation and Codes (ET-DRC) were outlined, namely that the XBT template had been submitted and was almost ready for resubmission to the successor of the ET-DRC, the Inter-Programme Expert Team on Data Representation and Codes (IPET-DRC), based on review now underway by the TT-TDC. Some updates to the BUFR definitions affecting the VOS template/s were also presented.

I-4.6.3 Following Task Team recommendations, the SOT in turn suggested that SOT members requesting changes or additions to BUFR tables (definitions or templates) should consult the SOT representative on the DMPA TT-TDC (Frits Koek, KNMI, Netherlands) or JCOMMOPS, who can relay the SOT input to the DMPA Task Team on Table Driven codes (TT-TDC) (***action; SOT members; ongoing***).

I-4.6.4 Based on a recommendation made by the JCOMM Data Management Coordination Group (DMCG), the Team reconsidered the role of its Task Team on coding, and agreed to submit its requirements through the DMPA TT-TDC. The Team agreed that having only one JCOMM group to deal with CBS on table driven code issues was more appropriate, as these issues span all Programme Areas. The Team therefore decided that the SOT Task Team on Coding was no longer required but established an SOT Advisory Group comprised of Frits Koek, and the chairpersons of the VOSP, SOOPIP, and Task Team on ASAP to liaise with JCOMMOPS and make recommendations to the DMPA TT-TDC on SOT related coding issues. The Team also nominated Frits Koek to represent the SOT in the DMPA TT-TDC.

I-4.6.5 The meeting agreed on the following:

(i.) Requirements for VOS messages represented in BUFR have been defined; however, these need to be finalized by the SOT Task Team on Coding or its representatives, including the requirements developed by the PMO workshop in 2007. There is a need to assess whether one comprehensive template can be developed or if more than one is needed. The results of this work need to be passed to the DMPA TT-TDC. – VOS representatives on the Task Team and VOS members, JCOMMOPS – before next Inter-Programme Expert Team on Data Representation and Codes meeting (no date set) (***action; Frits Koek & DMPA TT-TDC; asap***);

(ii.) The XBT BUFR template needs to go through a final review by the Task Team and SOOPIP/GTSPP representatives before being re-submitted for validation to the IPET-DRC through the DMPA TT-TDC (***action; Frits Koek & DMPA TT-TDC; next IPET-DRC meeting***);

(iii.) The Team asked the SOT TT on Coding to forward SOT related Master Table 10 requirements from ocean forecasting system operators (GODAE) including ecosystem modellers, and other appropriate user communities to the DMPA TT-TDC (***action; Frits Koek & DMPA TT-TDC; next IPET-DRC meeting***). The team noted that once submitted by the DMPA TT-TDC, Master Table 10 would then have to be validated by the IPET-DRC, via ECMWF and one other centre;

(iv.) A requirements document, for inclusion of Meta-T metadata, needs to be prepared for ASAP and GOSUD (TRACKOB) data flows. Additionally, the XBT BUFR template originally included XCTD data elements within it, but recently they have been separated out. The requirements for XCTD data to be included in the Table Driven Code Forms

should be assessed (this platform type was not considered in the newest version submitted for the XBT BUFR Template). These requirements should be assessed in liaison with SOOPIP/GTSPP representatives. (***action; Frits Koek & DMPA TT-TDC; next IPET-DRC meeting***);

(v.) Requirements for reporting ice conditions in BUFR should also be considered. (***action; Frits Koek & DMPA TT-TDC; next IPET-DRC meeting***).

I-4.6.7 The WMO/JCOMM ETSI had noted at its last meeting (2007 March, JCOMM Meeting Report 51) that there was a requirement for sea-ice observations from ships in order to provide ground truth for satellites, and for general maritime safety. It wished to work with the JCOMM TT on Table Driven Codes to define appropriate BUFR tables to enable the necessary information to be supplied in real-time. Although a few ships and shore stations used the WMO-ICEAN code, there were also a number of other local codes, which were used to distribute information via the GTS. Information was also passed in plain text via radio or email. The SYNOP code was in universal use, and a preferred option would be to expand what could be reported in this code using BUFR format. The ETSI also submitted a document describing their coding work, which reproduced in ***Annex XIV***.

I-4.7 Task Team on Instruments Standards

I-4.7.1 The SOT Task Team Chairperson on Instrument Standards, Mr Robert Luke (NOAA/NDBC, USA), reported on the activities of the Task Team since the previous SOT Meeting. The SOT-IV re-established its Task Team on Instrument Standards, which was tasked mainly to 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. The report addressed the key issues assigned to the Team in its Terms of Reference and identified the key areas where progress has been made since SOT IV. Taking into account the work undertaken by the ETMC and the new crosscutting ETMC-SOT Task Team on Delayed Mode VOS Data (TT-DMVOS), the report invited the Team to consider carefully how the project should develop in the future, so that it can help to raise the climate quality of data within VOS, and thereby contribute to the Global Climate Observing System (GCOS).

I-4.7.2 The Team noted that the Task Team had produced “Instrument Standards Guidelines” which include a list of corresponding WMO, IOC, and national publications for each of the SOT programme components. A status report on instrument standards equipment was also presented.

I-4.7.3 As requested by SOT-IV, the Task Team has also been conducting an inter-comparison of Electronic Logbooks and the results and recommendations were presented to the meeting. In general, there was close agreement between the observations output by the 3 E-Logbook types (TurboWin, SEAS and OBSJMA). All E-Logbook software types have built in checks and balances, and sample observation number 3 tested the inter-dependency between various elements. All E-Logbook types required the wet bulb to be lower than or equal to dry bulb. All E-Logbook types recognized the relationship between present weather and cloud, between cloud amount, type and height, and between tendency code 4 and nil pressure change. In these cases, the E-Logbooks prompted the observer to amend the entry before the programme would move forward. The significant variations between the 3 E-Logbook types were related to the measurement of dew point temperature, the calculation of Apparent Wind Speed and Direction to True, the use of wind Speed Units, the calculation of MSL Pressure, and inter-dependability of measurements.

I-4.7.4 The Team noted that in the feedback that followed the circulation of the Inter-Comparison Report, there was considerable discussion about the coding of swell, in particular the need to differentiate between swell not observed (i.e. no data) and no swell (calm sea). The Inter-Comparison revealed that the 3 E-logbook types coded these differently. There was also discussion about the need to transmit groups containing no data, with a strong plea to reduce the number of groups transmitted to save on communications costs.

I-4.7.5 The 'E-Logbook Inter-Comparison Results' report was sent to the three E-logbook manufacturers (KNMI for TurboWin, JMA for OBSJMA and NOAA for SEAS) and the members of TT on Instrument Standards, on 2 September 2008, seeking feedback on how the Recommendations might be implemented. E-Logbook Manufacturers Responses were presented to the meeting.

I-4.7.6 The Team endorsed the following recommendations from the Task Team as proposed in the Electronic Logbook Inter-Comparison Report:

(i.) that all E-Logbook software report Dew point to one decimal place.
(ii.) that the algorithm for calculating Dew point be standardised between E-Logbooks and approved by ETMC.
(iii.) that ETMC approve the swell coding options and should follow the guidelines in ***Annex XIX***;
(iv.) that TurboWin and SEAS software implement a QC check to correlate the reported wind speed with wind wave height.
(v.) that all E-Logbook software provides more information on screen to aid in the selection of correct code figures for Visibility (VV) and Height of base of lowest cloud (h) when the ranges and heights are at the boundaries of the levels. Refer to WMO manual on Codes (WMO No 306) FM13-XII Ext. SHIP. For VV refer to WMO code table 4377 and note that if the distance of visibility is between two of the distances given, the code figure for the smaller distance shall be reported. For h refer to WMO code table 1600 and note that a height exactly equal to one of the values at the ends of the ranges shall be coded in the higher range.
(vi.) that SEAS and TurboWin prompt for the entry of ship speed if it is not entered.

I-4.7.7 After ETMC approval by email before the end of June 2009 (***action; S. Woodruff; 30 June 2009***), the Team asked members in charge of E-logbook developments to implement these changes (***action; e-logbook developers; asap***). The Electronic logbook software (including TurboWin, SEAS, and ObsJMA) issues are also being discussed under agenda item III-2.1.

I-4.7.8 Taking into account, the work undertaken by the Expert Team on Marine Climatology (ETMC) and the new cross-cutting (ETMC-SOT) Task Team on Delayed Mode VOS Data (TT-DMVOS), the Team considered how the project should develop in the future, so that it can help to raise the climate quality of data within VOS, and thereby contribute to the Global Climate Observing System (GCOS). The Terms of Reference of the Task Team as well as its membership were updated to reflect those discussions. In particular, the team agreed with the replacement of Yvonne Cook (Environment Canada) with Gerie-Lynn Lavigne (Environment Canada) in the Task Team Membership.

I-4.7.9 The Team noted that the Task Team together with the JCOMM focal point on the WMO Commission for Instruments and Methods of Observation (CIMO) matters, Dr. Chung-Chu Teng (NOAA, National Data Buoy Center, USA), reviewed the ISO Standard 10596:2009(E) "Ships and marine technology — Marine wind vane and anemometers" which was prepared by the Technical Committee (ISO/TC) No. 8, Ships and marine technology, Subcommittee (SC) No. 6, Navigation. Numerous items did not match with the WMO Guide on Meteorological Instruments and Methods of Observation (WMO No. 8) even though the ISO 10596 used the WMO No. 8 as one of its main references. The Task Team proposed some changes to the standard in an effort to ensure continuity and quality of worldwide-fielded wind equipment. Based on the Task Team recommendations, the SOT proposed the following:

1. That the WMO Secretariat contact the ISO TC 8/SC 6 group and request the following (***action; WMO Secretariat; asap***):

    a) The changes proposed by the Task Team on Instrument Standards should be reviewed by the ISO TC 8/SC 6 for possible inclusion into the ISO 10596.

b) Ensure that the changes to Section 7 are incorporated into ISO 10596 or proper response provided to the WMO Secretariat and SOT as to why the variance of WMO No. 8 Requirements cannot be implemented.
c) A proper revision of ISO10596 is promulgated for review and publication within normal WMO/ISO channels.

2. That the SOT national focal points coordinate nationally with their ISO/TC or SC representative to ensure proposed changes are incorporated (***action; SOT NFPs; asap***).

I-4.7.10 While manufacturers also require standardization, the Team noted with appreciation the HMEI offer to assist on ISO issues as it has close links with some of the ISO groups

I-4.7.11 The Team noted that efforts of developing high quality best practices for the VOF with the goal of publishing them as a JCOMM Technical Report were still ongoing. The Team requested the Task Team to continue its efforts and report at the next SOT meeting (***action; TT-IS; SOT-V***).

I.4.7.12 The Team noted that there was still a need to investigating how the different publications or technical documents dealing with best practices could be better integrated into less number of documents or into existing ones had not started. This issue will also be discussed under agenda item I-5.3 (WIGOS).

I-4.7.13 The Team encouraged its members to continue to update their equipment information and Instrumentation standards (including Automated Weather Stations (AWS)) to the Task Team on Instrument Standards (***action; SOT members; ongoing***).

I-4.7.14 For climate applications, the Team encouraged SOT members developing and maintaining e-logbooks to preserve the source code of historical versions of e-logbook systems (***action; SOT members developing e-logbooks; ongoing***).

I-4.8 Task Team on Call sign masking and encoding

I-4.8.1 Mr G. Ball (BOM, Australia), Chairperson of the Task Team on Callsign Masking and Encoding, presented the report on behalf of the Task Team. SOT-IV established the Task Team to oversee the implementation of MASK[1], ENCODE[2] masking schemes, and develop guidelines as necessary. It was also tasked to 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.

I-4.8.2 During the inter-sessional period, the Task Team:

(i.) Prepared instructions for members considering implementing a MASK callsign-masking scheme.

(ii.) Contributed to a WMO letter to the Permanent Representatives (PR) of Japan and the USA with WMO regarding (1) maintaining a national archive of unmasked VOS data, and (2) advising when these unmasked data can be released to international archives.

(iii.) Developed rules for accessing the MASK vs. REAL[3] information at JCOMMOPS. These rules were incorporated in a letter from WMO to PRs regarding callsign-masking schemes.

1: MASK - Unique, repeating identifier. The masking identifier is assigned by the NMS that recruited the ship.
2 : ENCODE - Unique, non-repeating identifier. The identifier is derived from encrypting elements in the message, e.g. callsign + latitude + longitude.
3: REAL - Official ITU callsign of the ship.

(iv.) Approved the MASK scheme proposed by Australia.

(v.) Established a log of national MASK schemes, including MASK-like schemes operated by E-Surfmar, E-ASAP and SeaKeepers.

(vi.) Participated in a discussion pursuant to the establishment of a WMO numbering system for underway sampling reports (TESAC) from seals.

(vii.) JCOMMOPS, as an interim step, has developed a flat file containing the MASK V REAL metadata provided by members, which is available by secure FTP to registered members. Upgrading of the JCOMMOPS system to provide a secure database solution should be completed by the end of June 2009 (***action; JCOMMOPS; 30 June 2009***).

I-4.8.3 Mr Ball reported that whilst no action had occurred during the inter-sessional period regarding the ENCODE callsign masking scheme; this would be the Task Team's focus during the coming inter-sessional period.

I-4.8.4 The Team noted that focal points for accessing the JCOMMOPS database of MASK vs. REAL shall be nominated by the Permanent Representatives of countries with WMO. The Team invited its members to have their PMOs nominated (***action; SOT members; ongoing***).

I-4.8.5 The team noted that the reports from ships sailing in the Antarctic region should not be masked because of Antarctic Treaty requirements.

I-4.9 Task Team on the VOS Climate Project (VOSClim)

I-4.9.1 The Chairperson of the SOT Task Team on the VOS Climate Project (VOSClim), Ms Sarah North (Met Office, United Kingdom), presented a review of the activities of the Task Team since SOT-IV and consideration of its assigned tasks. The SOT-IV re-established a Task Team on VOS Climate Project (VOSClim) which was tasked to: (i.) coordinate, maintain, promote and enhance the VOS Climate project, monitor its performance and encourage increased participation; (ii.) 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; (iii.) review all relevant JCOMM Publications to make sure they are kept up-to-date and comply with Quality Management terminology; and (iv.) prepare a report to SOT-IV on, inter-alia, the over-arching VOSClim issues (Should VOSClim be continued as a project, Is the high-quality dataset a valuable resource, How can the lessons of VOSClim be used to improve data quality in the wider VOS).

I-4.9.2 The team noted that the target of 250 participating ships has now been exceeded and encouraged SOT members to upgrade, wherever possible, all their existing VOS to VOSClim standards (***action; SOT members; ongoing***). The Team noted with appreciation that the VOSClim project was now operationally mature with many of the obstacles identified at previous sessions of the SOT having been overcome. Levels of ship participation set by the SOT have been met and the data flow processes are now operating as required with the relevant datasets readily available to users via the project website.

I-4.9.3 However, whilst the implementation phase of the project has now been completed, there has been limited progress with the evaluation stage, which is intended to demonstrate the added value of the VOSClim datasets.

I-4.9.4 Taking into account the work undertaken by the ETMC and the new crosscutting Task Team on Delayed Mode VOS Data (TT-DMVOS), the Team agreed that the time was now right to extend the good practice established for VOSClim ships to the wider VOS community. This will raise the climate quality of data from the wider VOS on a sustained basis, and thereby contribute to the Global Climate Observing System (GCOS). The Team agreed that the VOSClim should be now discontinued as a separate 'project' and should actively start upgrading, whenever possible, all

existing VOS to VOSClim standards. This issue is further addressed under agenda items III-4.1 (implications for the wider VOS) and III-4.5 (review of VOS categories).

I-4.9.5 The team agreed that the requirement for Port Met Officers to additionally fill in the new hardcopy recruitment/update form (VOSP002) could be waived for those ships where the required Pub47 metadata is collected on board using electronic logbooks such as TurboWin (***action; PMOs; ongoing***).

I-4.9.6 The Team recalled discussions under agenda item I-4.5, and requested the Secretariat to ensure that the Pub47 metadata available on the WMO website is regularly updated, or alternatively to consider a more appropriate method of hosting the metadata so that it is readily available to users of the project datasets (***action; Secretariat; asap***).

I-4.9.7 The Team recalled that the issue of archiving digital images associated with the collected metadata was clarified under agenda item I-4.5

I-4.9.8 The team requested the Task Team on Instrument Standards to undertake an intercomparison study of the algorithms associated AWS observation coding software, in order to resolve any potential inconsistencies (***action; TT-IS; SOT-VI***).

I-4.9.9 The Team agreed with the recommendations made by the scientific advisers concerning the future need to link the VOSClim data flow to that being proposed by TT-DMVOS.

I-4.9.10 The Team agreed to revise the Task Teams Terms of Reference, to reflect the proposed changes to the project, and pending discussions under agenda item III-4.1.

I-4.9.11 The complete report by the Task Team on the VOS climate Project is provided in ***Annex VIII***.

I-4.10 Terms of Reference and membership of the Task Teams

I-4.10.1 The Team reviewed the Terms of Reference and Membership of its Task Teams. The new agreed upon Terms of Reference and memberships are provided in ***Annex IV***.

III. Sixth Session of the VOS Panel (VOSP-VI)

III-1. Programme review

III-1.1 Report by the VOSP Chairperson

III.1.1.1 The VOS Panel Chairperson, Ms Julie Fletcher (Met Service, New Zealand), opened the sixth Session of the VOS Panel. She reported on activities undertaken during the last intersessional period (April 2007 – May 2009). There has been considerable activity in the period with a number of significant tasks being completed. The work has mostly been undertaken by email, but meetings with the SOT Chair, WMO Secretariat and some Task Team members occurred at DBCP-23, Jeju, Republic of Korea, October 2007 and VOS actions were progressed with the SOT Chair at the Bureau's Port Met Agents' workshop in Melbourne in November 2007.

III.1.1.2 Ms Fletcher reported that much work has been done to advertise the VOS Programme, from the creation of the new PowerPoint presentation to the issuing of the new IMO MSC Circular No 1293. However, at the time of writing (March 2009), global shipping is in a state of dire retrenchment with 10% of the world's container vessels unemployed as owners and operators cannot find cargo to fill them. VOS operators are facing changes to their fleet composition, as ships are laid up and withdrawn form regular liner service. Against this background, the number of ships reporting per month rose from around 2000 per month in mid 2007, to 2150 per month in mid 2008, but by February 2009 had dropped to around 1900 per month. The count of reporting ships is done by JCOMMOPS and the callsign SHIP is counted only once, when in fact many ships are reporting

as SHIP. The actual number of observations per month has risen, due to an increased number of automated systems being installed. The MeteoFrance observation-counting tool shows some 1,415,000; ship observations were made by global VOS in 2008, which around 275,000 more than in 2007. Within the last two years, the Danish VOS programme has finished, and another major European VOS programme is under review. However, it is pleasing to note that Brazil has re-activated their VOS programme in 2008.

III.1.1.3 To address security concerns, the JMA commenced their Callsign Masking scheme in December 2007, by replacing the callsigns on some Japanese observations with the generic SHIP identifier based on shipowners' request. While recognizing JMA efforts to implement a parallel distribution system from the un-masked data in order to address the requirements for climate applications and quality monitoring, the Team recalled the difficulties experienced by those users to make necessary developments and adjust their data processing systems. The team noted with appreciation that JMA preserved the original data.

III.1.1.4 The dedicated work of the global PMO network underpins the programmes co-ordinated under SOT, in particular the VOS programme, and work is ongoing to provide PMOs with more tools and support. PMOs are working hard to retain ships and attract new recruits, but this is difficult in the current economic climate. There is consensus that, an international PMO Meeting in 2010 would benefit the PMOs and strengthen relationships in a role, which relies heavily on international co-operation.

III.1.1.5 The VOS Monitoring tools have further improved over the last two years with MeteoFrance recently developing tools to compare extra variables e.g. humidity, wind wave, etc. with outputs from both the MeteoFrance and ECMWF models. The tools although widely used, are still not being utilised by all NMS and PMOs, so opportunities to improve observation quality, by the routine use of the tools and feedback to ships are being lost.

III.1.1.6 The new metadata for Pub47 version 3 was introduced in July 2007. New tools were developed to assist countries without a suitable database, to collect and submit the new variables in XML output format. There is major frustration that the WMO Publication No. 47 is still not up to date. (At March 2009, Q2 2008 is the latest published).

III.1.1.7 Ms Fletcher explained that the future of the VOSClim project, a new proposal to identify SOT ships, new technology challenges, and a proposal to introduce new sub-classes for AWS, were all issues that will be addressed within this VOSP-VI Session.

III-1.1.8 The Team invited its members to collection information in support of the VOS programme, showing how the VOS data are being used and add value to a number of applications, or how they impact final products, and to provide the information to the VOSP chairperson (***action; VOSP members; SOT-VI***).

III-1.2 Review of Action Items from the VOSP-V

III-1.2.1 The Panel reviewed action items from the VOSP-V, 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 XX***.

III-2. Programme implementation

III-2.1 VOS automation and electronic logbook software

III-2.1.1 Status of VOS automation

III-2.1.1.1 Ms Julie Fletcher, VOS Panel Chairperson presented the VOS Automated Status report for 2008, with details of national VOS automation being taken from national SOT Annual Reports.

III-2.1.1.2 She reported that the number and type of fully automated shipboard weather observing systems had increased to 270 operational AWS systems at the end of 2008, while almost 1800 manual VOS ships were using Electronic Logbook Software.

III-2.1.1.3 Information on the status of automation by country was presented in two categories:

- Status of VOS Automated Observing Systems (AWS) - Table 1 (***Annex VI***)
- Status of VOS using (non-AWS) Electronic Logbook Software - Table 2 (***Annex V***)

III-2.1.1.4 The Panel noted that challenges with respect to installing automated systems on board VOS ships continued to include:

(i.) Funding restraints
(ii.) Problems in finding 'long term' ships – the length of charter is often insufficient to justify AWS installation
(iii.) Difficulties in siting equipment for best exposure
(iv.) Volatility of ship routes
(v.) Lack of warning of withdrawal of ships and potential loss of AWS equipment.

III-2.1.1.5 Regarding the Ship AWS data on GTS, the Team noted that the number and type of VOS AWS installations was increasing globally, with many AWS sending back raw data to NMS for processing. The Panel reminded NMHS of the importance of inserting the ship AWS data onto the GTS, and especially to ensure that hourly data if available was disseminated in non-synoptic hour bulletins. The meeting recommended that NMHS operating VOS AWS make arrangements to ensure that all observations, including hourly observations are inserted onto the GTS for global dissemination (***action; NMHS; ongoing***).

III-2.1.1.6 The meeting requested NMHS to provide details of VOS Automation to VOS Panel Chairperson if their data required updating (***action; NMHS; ongoing***).

III-2.1.2 Status of Electronic logbooks

ObsJMA

III-2.1.2.1 The Panel noted with appreciation that JMA released the new electronic logbook software OBSJMA for Windows version 2.00 in March 2009. The software can work with Microsoft Windows Vista Operating System (OS) in addition to the previous version of the OS. Moreover, it has new added features including a more detailed pressure correction scheme and screens to aid in the selection of correct code figures for Visibility (VV) and Height base of lowest cloud (h) for accurate reporting.

TurboWin

III-2.1.2.2 Frits Koek (KNMI, Netherlands) presented an overview of recent developments with regard to the TurboWin software. In December 2008, a new TurboWin 4.5 beta version was distributed to a selected number of Meteorological Services. This new TurboWin version for the VOF will be released June 2009 after the implementation of the comments on the beta version and the SOT meeting (wave coding issue). Most important new features in TurboWin 4.5 are:

- Added TurboWin User Guide;
- Option to show monthly user statistics;
- To insert/change (masked) call sign, now a password is required;
- Added chapters of Marine Observers Handbook;
- Redesign waves data input pages.

III-2.1.2.3 First half of 2009, TurboJWS 1.0 beta will be made available to testers. This version can be compared to the basics of TurboWin. The main difference with TurboWin will be the Java Web Start mechanism and - because it is programmed in Java - it can run on several operating systems (Windows, Linux, Mac OS, and Solaris). Quite simply, Java Web Start is a mechanism for program delivery through a standard web server. Typically initiated through the browser, these programs are deployed to the client and executed outside the scope of the browser. Once deployed, the programs do not need to be downloaded again. They can automatically download updates on start-up without requiring the user to go through the whole installation process again. The Team recommended to remove the copy of the FM13-SHIP report automatically generated by the TurboWin software from the display at the bottom of the page in order to prevent it from being used to manually copy and send the report (***action; F. Koek; asap***).

SEAS

III-2.1.2.4 The Panel noted that in conjunction with the E-Logbook comparison review, SEAS version 8.0 dated 19 September 2009 now encodes and displays the dew point to the tenth of a degree. Other updates to the software include reporting parameters input can be either, feet or meters, Fahrenheit or Celsius, and either hecto-Pascals or Inches of Mercury. SEAS 8.0 can now work with any Windows operating system of Vista and below and is still the only E- Logbook that can process the observation for output via INMARSAT Code 41, binary, or even electronic mail (E-mail).

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

III-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). He noted that E-SURFMAR was co-ordinating the activities of about 50% of the world's VOS.

III-2.2.2 Although some of the topics were discussed in detail under other agenda items, Mr Blouch drew the meeting's attention to a number of developments carried out since SOT-IV. In particular:

(i.) The development and the first deployment of a simple AWS called 'Baros'. This station reports only air pressures and GPS positions through Iridium Short Burst Data (SBD). Twelve stations have been built. Priority was given to E-ASAP ships for the first installations, but ships plying in the Mediterranean Sea will be equipped soon;

(ii.) The data compression on Batos AWS reporting through Inmarsat-C (~55 units) has allowed hourly observations to be made instead of 3-hourly, without any increase in communication costs;

(iii.) The "half compression" data technique has also been successfully tested on a few ships. Unfortunately, it has not been deployed operationally. The TurboWin software is able to produce such reports, which may be sent through Inmarsat-C thanks to a dedicated SAC (different from Code 41). Communication costs are reduced by at least 50%. The decoding software can be freely distributed;

(iv.) The use of normalized GTS identifiers, which may be considered as "masked callsigns" on about 90 VOS ships, including 60 AWS. This practice facilitates the monitoring and the management of the E-SURFMAR fleets and avoids full identification of the ships on the Internet. A cross-reference list of mask/real callsigns is regularly provided to JCOMMOPS;

(v.) The development of a database that is able to manage online the Pub47 metadata, as well as the "masked" callsigns. Consequently, all metadata from European VOS are quickly updated and available for the WMO and IOC communities. CSV and XML files may be uploaded and downloaded. Mr Blouch proposed to the meeting that non-European VOS operators should also be invited to add metadata for their fleets into the

database. In this respect, it was noted that the database already hosts Australian and New Zealand VOS metadata.

(vi.) The E-SURFMAR monitoring tools have been further enhanced. Improvements include the comparisons to model outputs for more observed parameters, the use of ECMWF analysis in addition to the French ones, the use of a sea/land mask to improve the reliability of interpolated model outputs, and the use of metadata when known to adjust the observations.

III-2.2.3 Mr Blouch also informed the meeting about the establishment of an E-SURFMAR Task Team on AWS. The main purpose of this team is to define and agree on specifications, which can be used in calls for tender for the procurement of basic and complex AWS for use on observing ships recruited by E-SURFMAR participants. The team recently met for the third time in Geneva on 14-15 May and will produce a report which will be made available to all VOS operators (i.e. not only European).

III-2.2.6 The team noted that about fifty percent of the operational VOS worldwide were recruited by E-SURFMAR and that all VOS operators could benefit from the E-SURFMAR experience. The team also noted that E-SURFMAR was planning to undertake an impact study using VOS data for the period December 2008 to January 2009 and invited E-SURFMAR to communicate the results once available to the VOSP chairperson (***action; P. Blouch; SOT-VI***).

III-2.2.5 The full report on E-SURFMAR VOS activities is provided in ***Annex XI***.

III-2.3 Port Meteorological Officers (PMOs)

III-2.3.1 Status of PMO global network

III-2.3.1.1 Julie Fletcher, Chairperson of the VOS Panel, reported on the status of the global PMO network and emphasized that the PMO network underpins the success of the Voluntary Observing Ships' Scheme (VOS).

III-2.3.1.2 The meeting noted that there were about 23 countries with 'active' VOS programmes, with these programmes being supported by approximately 80 PMOs. The team expressed concerns that since VOSP-V, Denmark had ceased its VOS programme with the loss of two PMOs, and that another European VOS programme was under review. On a brighter note, Brazil recommenced its VOS programme in 2008.

III-2.3.1.3 Whilst PMOs provide a vital role in recruiting, training and visiting VOS ships, their duties have increased to assist a range of SOT activities including, the loading of drifting buoys, XBTs and floats for deployment. Their work has become more technical and may include basic AWS maintenance, so PMOs of the future need to have a range of technical skills and good computer literacy. The proposal to hold an International PMO Meeting in 2010 was strongly encouraged to provide training to PMOs and the opportunity to strengthen relationships in a role, which relies heavily on international co-operation and is becoming more complex and requiring new skills (e.g. computer skills, deploying drifters and floats, using e-logbooks, retrieving delayed mode data, and installing AWS). Some gaps have also been noted in the PMO network in certain regions especially in WMO Regional Association I and III. The meeting urged the WMO Secretariat to consider this activity as a priority on Capacity Building (***action; WMO Secretariat; asap***).

III-2.3.1.4 Ms Fletcher drew the Panel's attention to the document summarizing 'The Role and Responsibilities of the PMO' and to the Quick Reference Guide for PMOs on the VOS website.

III-2.4 Monitoring tools

III-2.4.1 Julie Fletcher, Chairperson of the VOS Panel, presented an update on the Monitoring Tools available for VOS Programme Managers and PMOs.

III-2.4.2 The Panel was advised that there was a good set of web-based tools available to monitor the quality, quantity and timeliness of VOS data. The tools developed by Meteo France provide near real-time monitoring, whilst the UK Regional Specialised Meteorological Centre (RSMC) and the UK Real-Time Monitoring Centre (RTMC) provide monthly and biannual monitoring for VOS and VOSClim respectively. The JCOMMOPs monthly VOS status map displays the quantity and global coverage of all Ship observations. The Quality Information Relay mechanism based at JCOMMOPs enables monitoring centres and NMSs to send VOS FPs advisory messages about suspect Ship data so corrective action can be taken.

III-2.4.3 The Team encouraged NMHSs 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 (***action; SOT members; ongoing***).

III-2.4.4 Ms Fletcher reported that the monitoring tools could all be accessed through the JCOMM VOS Scheme website[1].

III-2.4.5 MeteoFrance has recently developed some new tools, which provide comparisons for new variables such as humidity, wave height and wave period, against ECMWF and Meteo-France model outputs. Other initiatives include; improvements to the model outputs, such as the use of sea/land masks, and the ability to access ship metadata to determine the anemometer height for wind speed data comparisons. The Panel recalled that this topic has been presented by Pierre Blouch during the Scientific and technical Workshop (agenda item II).

III-2.4.6 The Panel invited its members to make use of the monitoring tools, check the list of ships rejected by the UK Met Office assimilation scheme and provided monthly by RSMC, Exeter, and take corrective action as required. Status maps can also be used to identify areas where data are needed.

III-2.4.7 The Panel noted that the JCOMMOPS Quality Information Relay (QIR) mechanism was effective provided that the required metadata (i.e. call sign, and recruiting country) was made available to JCOMMOPS routinely. However, the Panel recognized that the JCOMMOPS Quality Information Relay (QIR) tool was not used to its potential and invited monitoring centres to report problems regarding VOS data through the QIR (***action; monitoring centres; ongoing***). The meeting noted that JCOMMOPS offered to redesign the tool to make it more user-friendly for VOS users.

III-2.4.8 Ms Fletcher stressed that routine use of the Monitoring Tools and timely feedback to ships to correct problems will improve the quality and quantity of observations provided by VOS ships.

III-2.5 Metadata and Reporting tools

III-2.5.1 VOS Pub47 metadata generation tools

III-2.5.1.1 The Team recalled that a range of metadata tools, modelled on those used by the Australian Bureau of Meteorology, were developed to assist VOS Programme Managers and PMOs to collect the requisite WMO Publication No. 47 metadata and to provide it to WMO in XML metadata exchange format.

III-2.5.1.2 The tools, developed in Word and Excel, include:

1. A Word-based **Form VOSP002** to record the metadata.

2. An Excel-based **VOSP002 Metadata Viewer** to view and format the metadata for other applications, and

1: http://www.bom.gov.au/jcomm/vos/resources.html#operational6

3. An Excel-based **Pub47 XML Generator** to create a properly formatted XML file containing the requisite Pub47 metadata.

III-2.5.1.3 The Team noted with appreciation that these tools were in the public domain for the benefit of members, particularly those without a national VOS database, or those lacking the capability to produce an XML file for Pub47 metadata from their national VOS database. The Team invited its members to use the tools within their own NMS as appropriate ***(action; members; ongoing***).

III-3. Monitoring and data management

III-3.1 - Regional Specialized Meteorological Centre (RSMC), Exeter, VOS monitoring report

III-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. It routinely produces biannual quality reports as well as providing essential feedback to VOS operators regarding the quality of the data delivered by VOS ships. The Met Office (RSMC Exeter) continues to compile lists of ships that have produced suspect observations each month, which are sent to the WMO Secretariat. Since 2005, they have also been made available via the Met Office web site[1].

III-3.1.2 The Panel noted that the Met Office had recently introduced password protection to its observation monitoring web site, but that, it was straightforward to obtain a login and password to gain access by following the online instructions. The Panel agreed that the monitoring criteria are set at the correct levels as shown in ***Annex VII***.

III-3.1.3 The Met Office also produces monthly lists of monitoring statistics for all VOS. To maintain an up to date list of ships, the Met Office advised that it was now using the latest Pub47 meta-data for European and Australasian fleets downloaded from the online E-SURFMAR metadata database. Recognising the need for metadata lists to be maintained up to date, the Panel agreed that the RSMC should continue to use the downloaded E- SURFMAR metadata, and requested E-SURFMAR to make sure that the required metadata for all VOS fleets are made available for download from this site (***action; ESURFMAR; asap***).

III-3.1.4 It was noted that the lists of VOS monitoring statistics available on the Met Office monitoring web-site had been modified to remove the country identifier for those ships with unique masked call-signs (the ship name is also omitted). The Panel agreed that the unique masked call sign should be replaced in the VOS monitoring statistics with the original call sign (and the ship name also reinstated) (***action; RTMC; asap***). It was noted that a facility had been added to the monitoring website to enable the download of VOS statistics as an MS Excel file.

III-3.1.5 Timeliness information for VOS reports received at the Met Office is also made available from the observation-monitoring web site in graphical format[2].

III-3.1.6 This information showed that the majority of ship reports continue to be received promptly, with over 60% received within 30 minutes and 90% within 90 minutes of the observation time. Timeliness information for individual ships is also available from the website.

III-3.1.7 It was noted that the SHIP masking scheme implemented in December 2007 was preventing the Met Office from monitoring data from individual Japanese and some US ships. Although the Met Office had established a method for collecting data with real call signs from JMA's FTP server, the Met Office was not able to route the data to its meteorological database (due to resource issues and problems with guaranteeing its security). The meeting noted that JMA requests ships to report weather message with original call sign, wherever possible. As a result,

1: http://www.metoffice.gov.uk/research/nwp/observations/monitoring/index.html
2: http://www.metoffice.gov.uk/research/nwp/observations/monitoring/marine/TOR/index.html

the total number of un-masked ship reports originating from Japan in 2008 increased by 30% compared to 2007. However, it was reported that ship owners and maritime organizations in Japan are still highly concerned about the piracy issue. The Panel agreed that it was not necessary to mask the Pub47 call signs because it does not include location information.

III-3.1.8 The Panel noted with interest that the Met Office had recently set up a scheme for ranking the performance of VOS ships in terms of the timeliness, quantity and quality of their reports. This system was already being used to assess the annual performance of UK VOS and for determining which individual ships should be presented with awards. Details of the scheme are shown in ***Annex VII***. The panel requested the Met Office to circulate these rankings through the JCOMMOPS mailing lists for evaluation and with a view to providing them on an annual basis on the UK Met Office website for all VOS (***action; UK MetOffice; asap***). VOS operators were invited to consider the value of the proposed performance ranking system and to advise the Met Office if they considered that the parameters used were appropriate (***action; VOS operators; end 2009***). VOS operators were also invited to consider performance rankings when issuing awards to their individual VOS fleets (***action; VOS operators; ongoing***).

III-3.1.9 The Panel agreed that the bi-annual report on the quality of surface marine data provided by the RSMC, Exeter, was of little value for VOS real-time quality monitoring purposes.

III-3.1.10 The full report by the RSMC, Exeter, is provided in ***Annex VII***.

III-3.2 - Real-Time Monitoring Centre (RTMC) for the VOSClim project monitoring report

III-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 Met Office, United Kingdom. The RTMC continues to produce monthly suspect lists and monitoring statistics for all project ships using the ship lists maintained on the VOSClim website and the criteria shown at ***Annex IX***. The Panel agreed that these values were set at the appropriate level.

III-3.2.2 The Panel noted that the Met Office continued to transfer VOSClim ships' observations and the associated co-located model data to the VOSClim Data Assembly Center (DAC). Since SOT-IV, the Met Office has started putting a backup copy of the daily VOSClim BUFR data onto the Met Office's operational external FTP server so that it is available for the DAC to access in case of problems with the GTS transmission.

III-3.2.3 The Panel agreed on the following:

- We should continue to apply the VOSClim quality monitoring criteria to the VOSClim ships but still retain the VOS monitoring criteria for the wider VOS;
- The VOSClim ship list should continue to be maintained until at least SOT-VI at the VOSClim DAC;
- The monitoring statistics should continue to be made available from the VOSClim DAC website;
- The VOSclim website should continue as a separate website with a link to the VOS website;

III-3.2.4 The full report by the RTMC VOSClim is provided in ***Annex IX***.

III-3.3 ASAP QC Monitoring report

III.3.3.1 Monitoring activities of ECMWF in support of the ASAP

III.3.3.1.1 The ECMWF representative, Mr Antonio Garcia-Mendez reported on the monitoring activities by ECMWF for the ASAP. ECMWF is monitoring ASAP data on a daily and monthly basis. As in previous years, the area covered by operating ASAP units is mostly the Atlantic Ocean and areas close to Japan. Several ASAP units covered areas in the Southern Hemisphere.

III.3.3.1.2 The number of ASAP reports received at ECMWF was slightly reduced compared to 2007. The percentage of ascents reaching 100 hPa was back to values around 95% in the second half of 2008. The meeting noted that it was important to increase the number of soundings reaching the upper stratosphere as such data permit to estimate the vertical structure of the atmosphere, which in turn is used to calibrate satellite radiance observations.

III.3.3.1.3 Some problems related to wrongly located reports were still noted (e.g. change of the sign of the longitude or reporting some erroneous position on an intermittent basis). Mr Garcia-Mendez stressed that even a small number of bad ASAP reports can adversely impact the quality of weather forecasts. The Panel noted that the positions errors were due to the use of un-trained personnel. However, the Panel noted with appreciation that the quality of ASAP profiles has continued to be good and extremely valuable.

III-3.3.1.4 The Team noted that the vertical statistics showed good quality data obtained in areas where high vertical resolution data with good quality is important for the NWP models. The number of pieces of information received at mid tropospheric levels during 2008 was similar to 2007 at 00, 06 and 12 UTC. At 18 UTC, there was a 35% reduction in the numbers compared to 2007. The percentage of ascents reaching 100 hPa was around 95% in the second half of 2008. These values were smaller in 2007. There is still a positive trend in the number of reports reaching the upper stratosphere.

III-3.3.1.5 The number of corrupted call signs was reduced in 2008. There is still a problem of wrongly located reports although it is less severe than in 2007. This problem does not appear in the Japanese ASAP data.

III.3.3.2 Report by the ASAP Monitoring Centre

III.3.3.2.1 The representative of Météo France, Mr Gérard Rey, reported on the status and operation of the ASAP monitoring centre.

III.3.3.2.2 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.

III.3.3.2.3 At its last Session, the SOT reviewed 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. Required developments have been made during the last intersessional period with quarterly reports and annual reports produced accordingly in 2007 and 2008. The Team noted that the quarterly frequency was more appropriate to give to the ASAP operators an opportunity to correct quickly difficulties in the data dissemination. The Team thanked Météo France for its efforts and useful developments.

III.3.3.2.4 The Team noted that during 2008, Météo-France Toulouse received 7058 upper air messages (TEMP-SHIP) from ships and platforms. This number of messages is similar to the 2007's one. The reports were received from 26 different call signs; two of them were test call signs.

III.3.3.2.5 The Team noted with appreciation that the quality of the ASAP reports was generally of a high standard, with only a small percentage of erroneous data. A few corrupted call signs can be seen from time to time but with a frequency much lower than in 2007. Japanese ships seem to follow a different procedure with an important shift between the sending of a message and the synoptic hour. Some ships also improved significantly their delay of transmission. The Team noted that there was no significant degradation.

III-3.3.3 The Team thanked both ECMWF and Météo France for their activities in monitoring ASAP data.

III-3.4 Global Collecting Centres (GCC) report on the VOS and VOSClim

III-3.4.1 Ms Nicola Scott (United Kingdom MetOffice) presented a summary of the 2008 Global Collecting Centre (GCC) annual report. The WMO Commission for Marine Meteorology (CMM, now JCOMM) established the Marine Climatological Summaries Scheme (MCSS) in 1963. In an effort to improve data flow and quality of global marine data, two Global Collecting Centres (GCCs) were created in 1994 through Recommendation 11 (CMM-XI). The role of the GCCs is to collect all marine climatological data observed worldwide, ensure that minimum quality control procedures have been applied; generate a complete global data set; and provide to the Responsible Members under the MCSS quarterly.

III-3.4.2 The 2008 GCC report marks the fifteenth year of operation. Ms Scott reported that 878,886 observations were received during 2008 from 16 countries. This is 20% less than the amount received in 2007. Fifty percent of data originated from automated/fixed stations and data buoys. Over 90% of data was submitted in IMMT-III format. Throughout 2007 and 2008 there has been a notable increase in the number of occurrences of elements being reported blank; this is consistent with the increase of automated/fixed/buoy data where only selected elements can be reported. Some observations were reported on land during 2008, considerably less than in 2007. It has been brought to the attention of the GCCs that a number of dregs identified (e.g. 605 in 2008) and reported quarterly is often not representative of the amount of duplicated/problem data occurring yearly. However, due to data being resubmitted in later quarters, the true number of duplicated/problem observations was over 18,000 (30x more than identified quarterly). It is then up to the Responsible Members (RMs) to deal with these problem data as they see fit.

III-3.4.3 As of 31st December 2008 there were 10 CMs in total with 255 recruited VOSClim ships worldwide. During 2007 and 2008 the amount of VOSClim data, being received each year has levelled off with contributions being 6% of the total VOS data each year. 48,583 observations originating from VOSClim ships were received in 2008. Data was received from 9 of the 10 CMs within the pilot project. The number of observations containing VOSClim additional elements remains about 25% lower than the total. Non-VOSClim ships reporting observations with the additional VOSClim additional elements are encouraged to join the VOSClim so their observations can be contributed (***action; SOT members; ongoing***). During 2008, only 4 dregs were identified from the quarterly exchange process for VOSClim data. However, due to data being resubmitted in later quarters, the true number of duplicated/problem observations was 2,366. As with VOS data, there has been an increase in the occurrence of elements reported blank for VOSClim data. VOSClim have notably more occasions of blank elements compared to VOS.

III-3.4.4 In terms of coding, the GCCs noticed that for 2008 35% of all observations came from automated stations/data buoys (platform coding = 4) and 15% came from fixed stations (platform coding = 5). However, not all countries using AWS on their ships are using the correct coding for automated stations (4) at the element 41, Observation platform. For both users and statistics, it is vital that the correct information of source and platform of the observation is recorded. In future, there will be great importance placed on the correct coding of these two elements, as the revised IMMT (version 4) should include a coding number for electronic logbook at element 40 and a coding for VOSClim recruited ships at element 41. SOT members are encouraged to ensure that the information is properly coded for automated stations (***action; SOT members; ongoing***).

III-3.4.5 The Team noted the continuing problem of an increased number of ships reporting under the anonymous/masked callsign of 'SHIP' (or similar) due to security concerns. When callsigns are masked, it is not possible for GCCs and RMs to fully quality control these data; comparisons with real-time, verifying positions and identifying duplicates can prove extremely difficult. In the case of VOSClim, the UK Met Office's Real Time Monitoring Centre commitment for VOSClim is unable to be properly fulfilled if observations are made under a masked callsign and cannot be effectively identified. Consequently, their VOSClim data will not be contributed to the pilot project. As proposed by the GCCs, the Team requested data to be submitted un-masked and when no longer sensitive (***action; SOT members; ongoing***).

III-3.4.6 Ms Scott reported on the following improvements made to the MCSS during 2007/2008:

- A modernisation of the MCSS is in progress and being driven by 2 task teams – TT-DMVOS (Task Team on Delayed-Mode VOS Data Management) &. TT-MOCS (Task Team on Met/Ocean Climatological Summaries). The aims and outcomes are discussed further in item III-3.5 on the MCSS, however in brief, the work will include proposing a new modernized data flow, development of a more detailed 'Quality Control Standards' and identifying a suitable data archive.
- VOSClim element SLL's (Max height of deck cargo above summer max load line) upper tolerance limit within the MQCS-V has been increased from 32 to 40m to allow for larger new generation ships.
- The CM membership was revised in 2008. A questionnaire was distributed during December 2007 and the results were used to establish an up-to-date list of CMs. The new membership amounts to 26 CMs and can be viewed in table 1.
- During 2008, it was agreed the GCCs should become more proactive in the data collection process. The GCCs plan to approach the 10 CMs who did not submit data in 2008 to provide assistance. This should increase data flow and ultimately data stored within the archives.
- Both GCCs have been nominated by their respective NMSs as Data Collection or Production Centres (DCPC) for the WMO Information System (WIS). Further information can be found on the WMO web site[1].

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

III-3.5.1 Mr Scott Woodruff, Chairperson of the JCOMM Expert Team on Marine Climatology (ETMC) reported on the recent developments with regard to the Marine Climatological Summaries Scheme (MCSS). The Task Team on Delayed-mode VOS data (TT-DMVOS), started functioning as of April 2007 and includes crosscutting membership from both OPA and DMPA, representing a new active area of collaboration. This Task Team is focusing 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 (GTS) data, and other ship-based data, e.g., Shipboard Automated Meteorological and Oceanographic System (SAMOS) and Global Ocean Surface Underway Data (GOSUD). Links are also planned to the JCOMM Pilot Project for WIGOS and the International Comprehensive Ocean-Atmosphere Data Set (ICOADS[2]).

III-3.5.2 The meeting noted that the ETMC Task Team on Marine-meteorological and Oceanographic Climatological Summaries (TT-MOCS) was at an earlier stage of development and without a permanent Chair, but offered the potential for organizational links to the WMO Commission on Climatology (CCl) including the joint CCl/CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices (ETCCDI). This TT has discussed options for modernizing the content, format and dissemination methods for MCSS data and products to include satellite data, Geographical Information Systems (GIS) compatibility and internet-based web services respectively.

III-3.5.3 A joint TT-DMVOS/TT-MOCS planning meeting was held 10 May 2008 in Gdynia, Poland. For TT-DMVOS, a number of detailed new proposals were developed for enhancing the delayed-mode and real-time data flows, including the roles of Global Collecting Centres (GCCs). For TT-MOCS, it was agreed that the limited near-term focus would be on climatologies, and some work has been done since then to engage relevant science partners particularly on wind climatologies.

1: http://www.wmo.ch/pages/prog/www/WIS-Web/home.html
2: http://icoads.noaa.gov/

III-3.5.4 To help knit together the eventual flow of data and products between the two TTs (and ultimately to users), the ICOADS already produces year-month and monthly long-term climatological summaries (in standardized netCDF format), which are proposed to feed into the JCOMM Pilot Project for WIGOS. Another upcoming development likely to strongly influence the roles and work plans of both the TTs will be the OceanObs'09 meeting[1] (Sept. 2009, Venice).

III-3.5.5 The Panel noted that the new classification of VOSClim and AWS proposed under agenda item IIII-4.5 will impact on IMMT format. The Panel invited the ETMC to address this issue by email and report to the VOSP Chairperson on implication before the end of June 2009 (***action; S. Woodruff; 30 June 2009***).

III-3.5.6 **The meeting made the following recommendations:**

(i.) That SOT continues to take an active role in the TT-DMVOS activities, and engage with TT-MOCS in the future as appropriate.

(ii.) To endorse recommendations, planned for JCOMM-III (from ETMC/TT-DMVOS/GCCs) for relatively minor revisions to the International Maritime Meteorological Tape format (IMMT-IV) and Minimum Quality Control Standards (MQCS-VI), with implementation of the new versions proposed for data collected as from 1 January 2011 (***action; Secretariat; SOT-VI***).

III-3.5.7 **The meeting decided on the following action items** (deadlines to be agreed at the meeting)**:**

(i.) Action 1: Investigate appropriate archiving format(s) at the GCCs taking into account the IMMT format and the modernized International Maritime Meteorological Archive (IMMA) format (offering greater flexibility and direct compatibility with ICOADS) (***action; TT-DMVOS; GCCs, August 2009***).

(ii.) Action 2: SOT members invited to discuss the proposed new TT-DMVOS data flow and provide feedback to TT-DMVOS via the GCCs (***action; SOT; August 2009***).

(iii.) Action 3: SOT invited to provide views on the proposed development of a Higher-level QC (HQC) standard, and modernized climatological summary products to replace the outdated Marine Climatological Summaries (MCS). Also suggest how products will be served to users, e.g., through RMs, ICOADS, and the WIGOS Pilot Project; including the role of Geographical Information Systems (GIS) (***action; SOT, TT-DMVOS, TT-MOCS; August 2009***).

(iv.) Action 4: Discuss the desirability of new names to replace the data flow and MCS components of the outdated "MCSS" terminology (***action; SOT, TT-DMVOS, TT-MOCS; August 2009***).

III-3.6 VOSClim Data Assembly Centre (DAC) report

III-3.6.1 Data Assembly

III-3.6.1.1 Mr Alan Hall (NOAA/NCDC, USA) reported on the activities of the VOSClim Data Assembly Centre (DAC). 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[2] for access to project information and data. The archive consists of three data streams:

- GTS - near-real time collection of ship observations

1: http://www.oceanobs09.net/
2: http://www.ncdc.noaa.gov/oa/climate/vosclim/vosclim.html

- BUFR – ship observations plus model fields
- GCC – Global Collection Centers delayed mode ship observations

III-3.6.1.2 VOSClim observations from all streams are captured based on the most current ship list[1] 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 and placed on the UK Met office's operational external FTP server.

III-3.6.1.3 Beginning the first quarter of 2008, the DAC relieved the GCC of its duty to parse VOSClim observations from the full GCC global delayed mode file. The DAC receives the GCC global file, parses the observations, and places the data on the VOSClim website. A report containing the number of VOSClim observations by participating country is also generated and provided to the GCC for inclusion in its annual report.

III-3.6.1.4 All observations are decoded into the International Maritime Meteorological Archive (IMMA) format[2] and placed on the project web site[1].

III-3.6.2 VOSClim Web Page and Data Access

III-3.6.2.1 Mr Hall reported that the VOSClim web page retained its user-friendly format and continued to receive positive feedback from researchers and others interested in the VOSClim project. Access is available in text file format where appropriate and IMMA format for observations and anonymous FTP. Both FTP and HTTP access are maintained. Observations are divided by data source, year, and month.

III-3.6.2.2 The URL for web access[3] allows viewing of the data directly by any browser. Anonymous FTP access[4] is also provided. 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 Microsoft Excel format; award pictures; ship pictures and the statistics and suspect ship reports.

III-3.6.3 VOSClim Ship List and Participation

III-3.6.3.1 The Team noted with appreciation that the number of recruited ships was up to 273. The original goal of recruited ships was 200. Participation in VOSClim continues to increase. Forty-two ships were recruited in 2008 and 2009 while only 11 vessels were withdrawn during the same period.

III-3.6.4 Call Sign Masking Impacts on the DAC

III-3.6.4.1 Mr Hall reported that impacts due to call sign masking had been minimal to date. For security concerns, the project ship list does not include masked call signs under which a particular ship may report. Due to this factor, only original call signs on the project ship list are currently being parsed.

III-3.6.4.2 As recommended at the Task Team on Delayed Mode VOS data (TT-DMVOS) meeting (Gydinia, Poland, 10 May 2008), an archive was set up at the National Climatic Data Center (NCDC) to store US VOS observations with original call signs (after a 90-day periodicity) which were initially transmitted over the GTS with a masked call sign. To date, the released, un-masked data is only being archived, with intentions that it will be used later for data archaeology purposes.

III-3.6.4.3 The meeting noted that the JMA VOSClim ships are not masked.

1: http://www1.ncdc.noaa.gov/pub/data/vosclim/vosclimshiplist.xls
2: http://www.ncdc.noaa.gov/oa/documentlibrary/vosclim/imma.pdf
3: http://www.ncdc.noaa.gov/oa/climate/vosclim/vosclimdata.html
4: ftp://ftp.ncdc.noaa.gov/pub/data/vosclim

III-3.6.5 The Team made the following recommendations

III-3.6.5.1 Regarding call sign masking and future data processing at the DAC, the Team recommended that only unmasked GCC and BUFR observations should be made available to the DAC, even if that means delaying BUFR observations (***action; GCCs & RTMC; ongoing***). The meeting urged members to not mask the VOSClim ships real time data, and to provide for the REAL callsign in the delayed mode data (***action; VOSClim operators; ongoing***) GTS masked observations will not be collected by the DAC.

III-3.6.5.2 Recruitment dates: On several occasions, the recruitment date of a ship is significantly different from the date submitted to the DAC. For optimum processing of VOSClim data, the Team recommended notification of new recruits to the DAC immediately upon initiation of the new vessel (***action; SOT members; ongoing***).

III-3.6.5.3 The Team encouraged non-contributing countries to submit delayed mode observations to include VOSClim elements.

III-3.6.5.4 The Team noted with appreciation that in the context of VOSClim being expanded to the wider VOS, the DAC remained committed to making VOSClim datasets available.

III-3.6.5.5 The meeting noted that the status map of VOSClim observations collected via the GCCs for 2008 showed gaps compared to the real-time data map. This indicates that not all of the IMMT data of VOSClim ships are being provided to the GCCs. The Panel urged VOSClim participants to submit the IMMT data to the GCCs (***action; NMSs; ongoing***).

III-3.6.5.6 The DAC noted the plan to end the VOSClim project status and integrate the VOSClim fleet under the VOS as a new class, and encouraged the programme operators to upgrade as many ships as possible to VOSClim class (***action; VOS operators; ongoing***).

III-3.6.5.7 The DAC acknowledged that they could process data from an increasing number of VOSClim ships and offered to continue acting as such.

III-3.6.5.8 The Panel noted that NOAA's Climate Database Modernization Program (CDMP), under the auspices of the National Climatic Data Center, has a mission to preserve historical environmental and marine data and make it available online to researchers. Data from around the world is currently being digitized and included in valuable datasets for climate research. By preserving historical records digitally, assurance is given that significant information will not be lost and will be available for future generations. Panel members are invited to contact Eric Freeman and Scott Woodruff if they are interested to benefit from the CDMP.

III-3.7 My VOS Data Management System

III-3.7.1 Mr Robert Luke (US VOS Programme Manger) demonstrated the new US developed mySQL database for monitoring, updating, and reporting metadata records for US VOS ships. MyVOS also allows VOS programmes to manage day-to-day operations of the programmes such as visits, fielding of equipment, and PMO and ship performance. The US VOS Programme has offered this Internet based tool for any VOS programme who may need better programmatic support. The VOS Programmes from Greece, New Zealand, South Africa, and the United Kingdom will test the myVOS system to ensure it fits their programme's needs. Additionally, Scripps Institution of Oceanography (SIO) and NOAA's AOML will test myVOS in support of their SOOP efforts.

III-4. Issues for the VOS

III-4.1 VOSClim – project status – results / implications for the wider VOS

III.4.1.1 Taking into account the report of the Task Team on the VOSClim Project, the VOS Panel agreed that the 'project' phase of VOSClim should now be ended, and that the benefits learned from the project should be applied to the wider VOS.

III.4.1.2 Noting that the Task Team on WMO Publication No. 47 metadata had proposed the addition, of a new category of 'VOSClim (VOS Climate Reference Ship)' and 'VOSClim (AWS)' into Pub47, table 2202, the panel considered the development of an appropriate criteria for use by VOS Operators and Port Met Officers when determining whether, currently Selected VOS are suitable for upgrading to performing climate standard observations.

III.4.1.3 The Panel considered the level at which the criteria should be set, recognising that imposing too prescriptive standards would unnecessarily risk reducing the volume of additional VOSClim elements available for climate analysis. Following detailed consideration, the Panel agreed with the criteria shown at ***Annex XIII***.

III.4.1.4 Accordingly the Panel agreed that VOS Operators should be encouraged to apply this criteria and that, whenever possible, they should be requested to make determined efforts to upgrade their existing VOS to VOSClim standards in order to help ensure the future availability of climate quality marine data (***Action; VOS Operators and PMOs; asap & ongoing***). The Panel also requested that VOS operators and Port Met Officers should start applying the criteria at ***Annex XIII*** to determine which manually reporting ships or AWS ships are suitable for upgrading to VOSClim standards (***action; VOS operators and PMOs; asap & ongoing***).

III.4.1.5 Since the number of ships complying with VOSClim standards was now likely to increase, it was recognised that this could impact, on the ability of the VOSClim RTMC and DAC to handle the increased volume of data. It was therefore necessary to ensure the continued flow of the necessary VOSClim data streams including, in particular, the ongoing availability of the associated forecast model values (***action; RTMC; asap***).

III.4.1.7 The Panel asked the UK Met Office and US NCDC to confirm that, in the light of the expected increase in VOSClim data volume, they would remain committed to continue to support the functions of the VOSClim RTMC and the VOSClim DAC respectively, and to provide the necessary associated data (e.g. monitoring statistics, co-located model values etc.) (***Action; Met Office RTMC and NCDC DAC; asap***).

III.4.1.8 With respect to the end of the VOSClim project, the panel agreed that there is still a role for the Task Team during the transition of VOSClim from project status to a 'class' within VOS. The Task Team should be re-established, with membership reviewed, for the next inter-sessional period, and then reviewed at SOT-VI. The Team agreed with the new Terms of Reference for the Task Team as provided in ***Annex IV***.

III-4.1.9 The team noted that integrating the VOSClim back under the VOS umbrella by adding a VOSClim class will impact the WMO Technical Regulations, and in particular the following:

a) WMO No. 47, International List of Selected, Supplementary and Auxiliary Ships;
b) WMO No. 544, WMO Manual on the Global Observing System (GOS) (section 2.3.3 Sea Stations which makes references to selected, supplementary, and auxiliary);
c) WMO No. 488, WMO Guide to the Global Observing System (GOS) (section 3.2.1.3.3 Mobile sea stations which defines selected, supplementary, and auxiliary, and criteria for recruiting VOS; there is also section 3.7 dealing with climatological stations although these are basically land stations but a note could be added to refer to VOSClim);
d) WMO No. 558, Manual on Marine Meteorological Services (Section 5.6.1 Collection & exchange of data, 6.2.1.1 reporting of freak waves, Appendix I-13 IMMT format);
e) WMO No. 471, Guide to Marine Meteorological Services (section 1.4.1 VOS scheme, 1.4.8 Port Meteorological Officers, Chapter 6 the VOS Scheme, Annex 3.C IMMT format).

III-4.1.10 The Panel agreed to promote such required changes through JCOMM and the CBS. The Voluntary Observing Ships Scheme - A Framework Document (JCOMM TD No.4) will have also to be updated. The Panel asked the Secretariat to coordinate this action in liaison with the SOT and VOSP chairpersons, and the Task Team on VOSClim (***action; Secretariat; SOT-VI***).

III-4.2 IMO – report on WMO / IMO actions, progress on MSC circular, etc.

WMO Voluntary Observing Ship' (VOS) Scheme

III-4.2.1 The Team noted with appreciation, that following the SOT-IV recommendations, and the follow up discussions with the VOSP Chairperson, the SOT Chairperson, and the Secretariat, a revised version of the MSC Circ. 1017 "Participation in the WMO Voluntary Observing Ships' (VOS) Scheme" (11 June 2001), was submitted to the eighty-fifth Session of the IMO Maritime Safety Committee (MSC), London, 26 November to 5 December 2008. The MSC revoked MSC/Circ. 1017 and issued MSC.1/Circ.1293 on 10 December 2008.

III-4.2.2 The new circular addresses ship owners and masters concerns with regard to VOS data exchange, and indicates how the WMO community is addressing the issue. It enlightens the need for the VOS scheme participation of the shipping industry vis-à-vis the concerns expressed. It also includes references to the Regulation V/5 on Meteorological Services and Warnings of the SOLAS convention.

Marine Meteorological Services Monitoring Programme

III-4.2.3 The Team noted that the new questionnaire to monitor and evaluate the effectiveness of the weather and sea bulletins, produced and transmitted by National Meteorological Services, was sent out by the Secretariat in March 2009. It requested the Port Meteorological Officers and National VOS Focal Points to fully, engage in this exercise and to ensure the maximum distribution of the questionnaire to shipmasters.

Expansion of the Global Maritime Distress and Safety System (GMDSS) and the Worldwide Navigational Warning Service (WWNWS) into Arctic Waters

III-4.2.4 The Team noted that in 2006, IMO decided to expand the Global Maritime Distress and Safety System (GMDSS) and the World-Wide Navigational Warning Service (WWNWS) into the whole of the Arctic Ocean, including the opening of the Northern Sea Route for international shipping. The Team therefore, discussed the possibility of expanding the VOS scheme and the PMO network into the Arctic region, and agreed that this would require identifying maritime companies sailing regularly in the region and likely to provide long-term commitment to the VOS, as well as establishing PMO offices at appropriate ports in the region. The Team invited its members to investigate that option and discuss with maritime companies as appropriate (***action; SOT members; SOT-VI***).

III-4.2.5 The meeting noted with appreciation that informal discussions were underway to organize another high level WMO, IMO, International Hydrographic Organization (IHO) meeting in 2010 to address issues of common interest between those organization, including in particular, the promotion of the VOS scheme, generic ship design, and maritime safety issues.

III-4.3 Proposed Ship ID for SOT

III.4.3.1 Mr. G. Ball, Chairperson of the SOT, presented a proposal for a universal VOS ship identification number.

III.4.3.2 Mr Ball advised the Team that the VOS has traditionally used the International Telecommunication Union (ITU) call sign of the ship in weather reports. For most of the history of the VOS, once a call sign was issued to a ship it would remain for the lifetime of the ship. In recent years, there had an increasing trend for ships to be re-registered following a change of ownership

with a resultant change of call sign. If the ship happens to be a VOS, the responsible NMS does not always learn of the change in an expedient manner, if at all. This has many implications for network management, quality monitoring and performance monitoring and data availability:

(i) The responsible NMS fails to count the observations received with the new call sign, hence any performance report for the affected ship will be erroneous.

(ii) Monitoring centres cannot correlate the new call sign with an entry in Pub47; hence, any suspect data will go unchecked. The monitoring centres must also develop new biases for the apparent new call sign.

(iii) DACs, researchers and other users do not know to combine the observations from the original call sign with the new call sign.

III.4.3.3 Mr Ball discussed the possibility of MASK[1] as one option to eliminate the problems associated with a changed call sign, but concluded that a global MASK scheme would involve too many overheads and recurring obligations. Mr Ball then proposed the IMO Number, where one exists, to substitute for the ITU call sign.

III.4.3.4 Mr Ball discussed the advantages and disadvantages of the proposal as well as the implications of this scheme on: (i) an NMS implementing a call sign masking scheme, and (i) an NMS submitting metadata for Pub47. Mr. Ball also informed the Team that this proposal would satisfy a META-T requirement to report IMO Number as real-time metadata.

III.4.3.5 Mr Ball noted that using of the IMO Number in the manner proposed might require IMO approval, and would be discussed by WMO and IMO prior to SOT-V.

III.4.3.6 The Team made the following recommendations:

(i) That a vessel issued with an IMO Number shall substitute the IMO Number for the ITU call sign in unmasked ship's weather reports.

(ii) If a vessel does not have an IMO Number, it shall continue to use the ITU call sign in unmasked ship's weather reports.

(iii) That WMO sets a date for introducing the scheme, having first consulted with IMO, NMSs, monitoring centres, DACs and other processing centres to ensure their ability to handle a seven-digit identifier as the call sign (***action; WMO Secretariat; end 2009***).

(iv) That WMO advises PRs that existing practices and procedure for (1) Pub47, and (2) call sign masking, are unaffected by the introduction of the scheme (***action, WMO Secretariat; end 2009***).

III.4.3.7 The meeting noted that the proposed ship identification scheme could potentially impact some real-time and/or delayed mode users, inside and outside the WMO community. For example, historical time-series would have to be reconstructed to ensure consistency of the identification numbers, and to prevent mixing ITU call signs with IMO numbers within a series. Cross reference list of existing call signs vs. new IMO numbers will have to be established, and maintained until the end of this migration process. The Team agreed to trial a few ships using the IMO identification number to verify if the observations are delivered through the real-time system. Results should be reported to the VOSP Chairperson (***action; UK+DE+NZ+AU+JP+US; 31 July 2009***).

III-4.4 Technology challenges

1: MASK - Unique, repeating identifier. The masking identifier is assigned by the NMS that recruited the ship.

III-4.4.1 Julie Fletcher, Chairperson of the VOS Panel, reported on some technology challenges for the VOS, including the SOT's participation in the IMO Correspondence Group on AIS (Automatic Identification System) Binary Messages, Long Range Identification and Tracking (LRIT), the implications of the European Union's restrictions on the use and transportation of Mercury (replacing Mercury-in-glass thermometers), and solutions to address the lack of floppy drive facilities in some PCs and Inmarsat terminals.

Automatic Identification System (AIS)

III-4.4.2 Ms Fletcher recalled that the Automatic Identification System (AIS) was a system used by ships and Vessel Traffic Services (VTS) principally for identification and locating vessels. The AIS provides a means for ships to exchange ship data electronically including identification, position, course, and speed, with other nearby ships and VTS stations.

III-4.4.3 In addition to the ship details routinely sent ashore in binary AIS messages; investigations are now underway to determine whether additional variables, such as weather data, could be included in the AIS message. Sarah North (UK MetOffice) has been appointed the SOT representative to the AIS Correspondence Group on the AIS Binary Messages. The Panel will continue to monitor the AIS situation with respect to using it to send meteorological data in the future (***action; Sarah North; SOT-VI***). The Panel asked Ms North to circulate the AIS document to the SOT mailing list[1] (***action; S. North; asap***).

Replacement of Mercury Thermometers

III-4.4.4 At the SOT-IV, the Panel was advised of proposals by the European Union to ban, from 2011, mercury exports and the marketing of mercury in certain types of thermometers. The SOT Members within the European Union were invited to consider the implications of the restrictions on the use of mercury, and Members based outside the European Union were invited to investigate whether similar restrictions apply in their countries. Countries need to plan for the replacement of mercury thermometers on observing ships.

III-4.4.5 The panel was advised that the Netherlands has already switched to using alcohol thermometers, while France is using the Vaisala HM34 on their remaining manual VOS. The UK and Germany are still testing and assessing alternative options. Australia advised that they could continue to source mercury thermometers from their German supplier under the current regulations.

III-4.4.6 The Team urged the NMHSs to comply with national regulations regarding mercury use and assess the options to replace mercury thermometers on their VOF in the future (***action; SOT members; asap***).

Lack of floppy drive facilities in INMARSAT terminals

III-4.4.7 Changing technology means that floppy drive facilities are not always available on PCs or Inmarsat terminals for the transfer of TurboWin observations for transmission. The Team encouraged PMOs to become familiar with other transmission methods, such as, an email. (***action, PMOs, ongoing***)

III-4.4.8 The Team invited VOS operators and PMOs to provide ships with clear instructions on how to send data via an email (***action; PMOs; ongoing***). It further invited NMHSs receiving observations by this method or by non-LES, methods to ensure that the reports are inserted onto the GTS for global distribution (***action; NMHSs; ongoing***).

III-4.4.9 Because of problems noted at some centres regarding the reception of email from ships (e.g. formatting, and use of multiple sending addresses), the Panel requested the Task Team

1: sot@jcommops.org

on Satellite Telecommunication Systems to investigate whether a single email address could be used by ships to send VOS observations to a single shore data processing centre (***action; TT-Satcom; SOT-VI***).

III-4.5 Review of VOS Classes

III.4.5.1 Julie Fletcher, Chair of the VOS Panel, presented the report on existing VOS Classifications and discussed the introduction of a new Classification for VOSClim ships and new sub-classes for ships equipped with AWS.

III.4.5.2 The existing VOS classifications of Selected, Supplementary and Auxiliary, are described in The Guide to Marine Meteorological Services, WMO-No.471 Chapter 6.

III.4.5.3 Essentially, the classifications denote the quality of the meteorological instrumentation on-board and the regularity or otherwise of the observation programme. The description 'certified meteorological instruments' refer to instruments belonging to an NMS. These NMS supplied instruments have been certified for use by an NMS laboratory, prior to installation, as meeting WMO specifications and are regularly inspected/re-calibrated. Non-NMS instruments, such as those belonging to a ship, are considered to be not certified, as they have not been subject to NMS laboratory calibration, and therefore are not traceable to international meteorological instrument standards.

III.4.5.4 Certain assumptions can be made about observations based on their VOS classification, so it is important that ships be assigned the correct classification. For example, if a ship is listed as 'Selected' but is in fact, using non-certified ship's instruments, the quality of the data will be uncertain. To give data users' confidence in the data, ships classified, as 'Selected' must be carrying certified NMS meteorological instruments.

III.4.5.5 The NMSs were urged to assign the correct VOS Classification (Selected, Supplementary or Auxiliary) to each VOS ship. The classification must match the classification code listed in the Pub47 metadata.

III.4.5.6 **VOSClim class:** The Panel recalled that it had already considered and agreed, a recommendation from the Task Team on VOSClim, to establish a new class of meteorological reporting ship called VOSClim (VOS Climate Reference Ship). The criteria for declaring a ship as VOSClim was discussed under agenda item III-4.1.

III.4.5.7 **New Classifications to cover AWS**: The Panel agreed that the existing VOS classifications did not adequately cover the case of AWS on ships. In addition, with the increasing number of AWS shipboard installations, the Panel considered the introduction of VOS sub-classifications for AWS. New AWS sub-classifications were considered necessary to (1) be able to differentiate between the level of sophistication of different AWS, and (2) differentiate between AWS owned, installed and maintained by an NMS as opposed to an AWS owned by a ship with a less rigorous maintenance schedule and no instrument traceability. New AWS sub-classifications will make it easier to count and report on the growing numbers of AWS systems globally.

The Panel agreed on the following:

III.4.5.8 The Panel accepted the proposal to add an AWS sub-class to each of the existing VOS classes, including the new VOSClim class. The number indicated is the 'new' Pub47 Table 2202 entry.

- 15 – Selected (AWS)
- 35 – VOSClim (AWS)
- 45 – Supplementary (AWS)
- 75 – Auxiliary (AWS)

III.4.5.9 The Panel established and agreed on criteria for the new AWS sub classes. The Panel noted that several WMO publications would have to be updated because of the new VOSClim Class and the AWS Sub-Classes. It requested the Task Team on VOSClim and the Task Team on Instrument Standards to liaise with the Secretariat, and appropriate JCOMM and CBS Expert Teams in view to realize the VOSClim and AWS integration in the VOS fleet and implement the resulting required changes to the following **publications** (***action; TT-VOSClim & TT-IS; asap***):

- WMO Publication No. 47, International List of Selected, Supplementary and Auxiliary Ships
- WMO No 471, WMO Guide on Marine Meteorological Services (Chapter 6 - The WMO Voluntary Observing Ships' Scheme)
- WMO No. 544, WMO Manual on the Global Observing System (GOS) (section 2.3.3 Sea Stations which makes references to selected, supplementary, and auxiliary)
- WMO No. 488, WMO Guide to the Global Observing System (GOS) (section 3.2.1.3.3 Mobile sea stations which defines selected, supplementary, and auxiliary, and criteria for recruiting VOS; there is also section 3.7 dealing with climatological stations although these are basically land stations but a note could be added, to refer to VOSClim)
- JCOMM TD No.4, The Voluntary Observing Ships Scheme – A Framework Document

III.4.5.10 The Panel requested the Task Team for Instrument Standards to define guidelines for instrument certification, and inspection for inclusion as an annex in a future revised version of JCOMM TD No. 4 (***action; TT-IS; SOT-VI***). The Association of Hydro-Meteorological Equipment Industry (HMEI) offered to help in this regard. The Panel also recognized the value of promoting ISO standards for the certification of meteorological and oceanographic instruments, and requested the Task Team on Instrument Standards to assist in this regard (***action; TT-IS; SOT-VI***).

III.4.5.11 The Panel agreed with the following definition for the VOSClim class**:**

- A mobile ship station equipped with sufficient certified meteorological instruments for making observations, transmits regular and timely weather reports, enters the observations in an IMMT compliant electronic logbook and has a proven record of providing high quality observations. A VOSClim ship should have at least a barometer, a thermometer to measure SST, a psychrometer (for AT and humidity), a barograph and possibly an anemometer. In addition, a VOSClim ship must be inspected at less than six monthly intervals, the full range of metadata must be maintained in WMO Publication No. 47, the full suite of digital images, sketches and drawings must be available, and the delayed-mode IMMT data must be submitted to the GCCs.

III.4.5.12 The Panel agreed with the following definitions for the AWS sub-classes:

(i.) **Selected (AWS)** – an AWS system equipped with certified meteorological instruments to measure at least at least air pressure, pressure change, temperature and humidity. Optional sensors would include wind speed, direction, and sea temperature measurement. The AWS may or may not have the facility for manual input of the visual elements, and transmit reports at least three hourly or more frequently. The AWS should have the facility to log the data.

(ii.) **VOSClim (AWS)** - An AWS system equipped with certified meteorological instruments to measure at least air pressure, pressure change, temperature and humidity. Optional sensors would include wind speed, direction, and sea temperature measurement. The AWS may have a facility for manual input of the visual elements, and transmit reports at least three hourly or more frequently. The AWS must have the facility to log the data including the extra VOSClim delayed-mode groups. In addition, a VOSClim (AWS) ship must be inspected at less than six monthly intervals, the full range of metadata must be maintained in Pub47, the full suite of digital images, sketches and drawings must be available, and the delayed-mode IMMT data must be submitted to the GCCs.

(iii.) **Supplementary (AWS)** –an AWS system equipped with a limited number of certified meteorological instruments, reporting regularly.

(iv.) **Auxiliary (AWS)** – an AWS system using non-certified meteorological instruments, reporting regularly.

III-5. Future work programme and implementation issues

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

III-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, OceanSCOPE, and the Alliance for Coastal Technologies (ACT). All of these had provided a report on their respective activities under agenda item I-3.2 (report by Associated Programmes).

III-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.

III-5.1.3 The VOSP Chairperson noted several areas where VOS expertise in vessel selection, recruitment, instrument installation and quality monitoring could be used to assist associated programmes. These were:

- IOCCP – Carbon Project – PMOs could assist in this project by suggesting and recruiting suitable ships for pCO_2 measurements, and where possible assisting with installation and maintenance visits.

- GHRSST – The GHRSST project wants to use VOS SST data and VOS members could assist by commenting on historical SST data collected by their ships. Where feasible, Research vessels could in future use radiometric skin SST sensors to gather more accurate SST data.

- SAMOS – VOS can assist SAMOS by providing guidance on how to integrate SAMOS data into VOS and how to insert data onto GTS in real-time. A meeting was held with the SAMOS Chairperson (see below) to identify issues and suggest a path forward.

- YOTREPS (plain language reports from yachts) can provide valuable data to national centres but are not suitable for integration in the VOS.

III-5.1.4 The meeting noted the outcome of the informal discussions on the side of the SOT meeting regarding GTS transmission of SAMOS observations with Shawn Smith (SAMOS chairperson), Graeme Ball (SOT chairperson), Julie Fletcher (VOSP chairperson), and Robert Luke (U.S. VOS Program Manager). As a result, Mr. Smith agreed to develop procedures for submitting a subset of SAMOS observations via the GTS (***action; S. Smith; asap***). This activity will be conducted in close collaboration with the U.S. VOS Program. The participants agreed that submitting hourly reports to the GTS on a once/day schedule was useful for a variety of users. Specific tasks include:

(i.) Developing a MASK for use to, uniquely identify SAMOS GTS reports. The MASK scheme will be submitted according to the procedures outlined by the TT on Call Sign Masking and Encoding. Once approved, management of the MASK will be coordinated between the SAMOS chairperson and the U. S. VOS Program.

(ii.) Developing a protocol to submit hourly sub-samples selected from one-minute SAMOS observations to the U.S. NDBC. These samples will be provided once per day (as soon as possible after SAMOS data are received at the SAMOS data center, nominally 0000 UTC).

The SAMOS chair envisions moving towards more frequent (6 hourly) transmissions to NDBC as possible (e.g., via the NSF funded R2R project).

(iii.) NDBC will format the FM-13 message from the sub-samples and submit to the GTS

(iv.) Establishing a protocol to submit SAMOS metadata to U. S. VOS program for submission to Pub47. This will take advantage of the expansion of Pub47 to accept multiple sets of metadata from a single vessel. One option discussed was having SAMOS data technicians (responsible for SAMOS metadata) to conduct some PMO activities in terms of vessel visits to collect SAMOS metadata. Vessel recruitment to SAMOS will continue to be managed by the SAMOS chairperson. One item that will need further discussion is the certification of instruments used to provide SAMOS observations, most of which are not provided by the NMS, but instead are selected and installed by the research vessel operator.

III-5.1.5 Other topics of discussion with SAMOS included:

(i.) Mr. Smith has agreed to act as a liaison between VOSP and U. S. R2R project for university research vessels. The focus will be to ensure that any real-time component of the R2R project will allow access to parameters desired by VOSP. Ms. Fletcher noted that 6 hourly reporting would be the minimum to achieve the timeliness desired by VOSP, with hourly being ideal.

(ii.) Automation of ship-to-shore metadata transfers were agreed to be an issue related primarily to research vessels. These vessels have dedicated technical personnel who may alter sensor configuration at a frequency not typical of merchant vessels participating in VOS. Sensor deployment and configurations on merchant VOS are conducted only by PMOs and a mechanism is in place to update these metadata.

III-5.2 Action items

III-5.2.1 The VOS Panel noted that the action items arising from the Panel discussion would be reviewed under agenda item I-9. These are provided in the SOT action list in ***Annex XXI***.

III-6. Organizational matters

III-6.1 Review the Terms of Reference of the VOSP

III-6.1.1 The panel reviewed its Terms of Reference (TOR) and agreed that they continued to be appropriate with some minor changes in TOR number 3 (to now read, “Oversee the transition of ships from VOSClim project status to the VOSClim class within the VOS, and encourage other suitable ships to be upgraded to the VOSClim class”). The new proposed Terms of Reference for the VOS Panel are provided in ***Annex XVIII***.

IV. Eighth Session of the SOOP Implementation Panel (SOOPIP-VIII)

IV-1. Programme review

IV-1.1 Report by the SOOPIP Chairperson

IV-1.1.1 The Panel Chairperson, Gustavo Goni, opened the Eighth Session of the SOOP Implementation Panel (SOOPIP) and reported on the achievements of the Panel during the last intersessional period, as well as giving an overview of the Program.

IV-1.1.2 The Ship Of Opportunity Program (SOOP) is dedicated to coordinating and providing assistance and guidance to activities related to the deployment and installation of oceanographic equipment, and in particular of expendable BathyThermographs (XBTs) and ThermoSalinoGraphs (TSGs). The SOOP also provides a platform for the deployment of other platforms, such as surface drifters and profiling floats. The XBTs continue being a key component of the ocean observing system, with the network approximately 65% complete or 82% complete (with respect to the number of XBTs or the number of transects carried out as specified by OceanObs’99 goals

respectively) in March 2009. Deployments continue being done in Frequently Repeated (FR) and High Density (HD) modes, with approximately 25,000 deployments per year, of which 23,000 were transmitted in real-time on the GTS. XBTs currently represent 20% of all upper ocean thermal profile observations, and complement the Argo network by providing eddy-resolving observations along fixed transects that are used, for example, to monitor meridional mass and heat transports.

IV-1.1.3 The SOOP Implementation Panel (SOOPIP) was involved in numerous activities related to technology, implementation, data management and science during 2007 and 2008. The main accomplishments were:

- the maintenance of a very complex XBT network, which requires the collaboration of the international community,
- development of new technology, such as a new XBT autolauncher that allows the deployment of Deep Blue and Fast Deep XBTs,
- increase of data transmitted in real-time on the GTS,
- testing of BUFR format for XBT and TSG transmissions,
- sponsoring of a workshop on the XBT Fall Rate Equation in Miami in April, 2008,
- testing of Devil data acquisition card in SEAS software,
- creation of an XBT bibliography,
- continued strong collaboration with pCO_2 and fishery communities,
- writing of a Community White Paper for the OceanObs'09 meeting,
- a stronger educational component, by installing a TSG system in the University of Virginia Semester At Sea Program, the development of a dedicated web page for this operation, and teaching of classes on board,
- making data available in quality controlled delayed-mode for scientific research,
- increasing from 10 to 70 the number of ships transmitting TSG observations in real-time.

IV-1.1.4 Continued work required for the upcoming intersessional period includes the full implementation of the BUFR format in XBT and TSG transmissions, and an increase of transmissions in real-time on the GTS.

IV-1.1.5 The Panel asked the Technical Coordinator to maintain an updated SOOPIP web page, to contain recent SOOP activities as requested by the SOT and SOOPIP chairpersons. (***action; Technical Coordinator; ongoing***)

IV-1.1.6 The Panel asked the Chairperson to finalize the XBT bibliography, and create a TSG bibliography, both for posting on the web site (***action; Chairperson, Technical Coordinator, 1 September 2009***)

IV-2. Programme implementation

IV-2.1 Review of Action Items from SOOPIP-VII

IV-2.1.1 The Panel reviewed the action items from the seventh SOOPIP Session, which are shown along with their status in ***Annex XX***. The JCOMM Trust Fund had not received any donations for XBT purchases, although the mechanism exists (see IV-2.4 below). Despite the efforts of Panel members, none of the under sampled XBT lines flagged in the previous session for particular action were successfully restarted, primarily due to a lack of identified appropriate ships on the route but also due to priorities from funding constraints. The other outstanding actions were addressed, or are addressed with more specific actions below stemming from this session of the Panel.

IV-2.2 Status of the current sampling programme

IV-2.2.1 The Chairperson reported on the status of the current sampling programme. XBT sampling continues being done in two modes:

- 25 Frequently Repeated transects, with 6-8 deployment per day and 12-18 transects per year,
- 24 High Density transects, with 1 deployment every 15-25 km, 4 transects per year.

Deployments in Low Density mode started to be phased out with the implementation of profiling floats. However, this happened without a scientific justification.

IV-2.2.2 In reality the Programme had diverged from the recommendations made from 1999, dropping about 23,000 probes per year out of the 35,000 that would be required to, fully sample the design recommendations. Not all of those 23,000 probes contribute to the core mission of the SOOP XBT lines. The number of probes deployed per year has remained constant.

IV-2.2.3 Although most of the data were transmitted in real-time into the GTS, there is still a need to encourage some institutions to do it, as these profiles are useful in the initialization of climate forecast models. The number of profiles added to the historical archives that had not been transmitted in real time, mostly coming from research cruises, was 5,300 for 2007 and 1,100 for 2008, but these numbers will change since some institutions delay their submission between one to five years. Several transects, such as PX80 and AX18, were not fully implemented due to lack of traffic along their routes. Other transect were under sampled because of funding, logistics and recruiting issues.

IV-2.2.4 The Panel urged all institutions operating XBT transects and TSGs to transmit data in real time or near-real-time onto the GTS, or to request the assistance of the chairperson to do it (**action; SOOPIP members; ongoing**)

IV-2.2.5 The Panel noted operational models only use a few points and not full resolution XBT profiles. Some institutions are not transmitting full resolution profiles in real-time, when this was actually a recommendation of OceanObs99. The Panel asked for an investigation if FR profiles are really needed and if they are currently being used (***action; Chairperson, Technical Coordinator, ongoing***).

IV-2.2.6 The Panel asked IRD/Noumea, with the assistance of IFREMER and/or AOML to transmit XBT transect data in real-time onto the GTS (***action; Technical Coordinator, Loic Petit de la Vileon, Chairperson; immediate***)

IV-2.2.7 The Panel requested the Technical Coordinator, working with SOOPIP members, to identify institutions and operators that are not currently transmitting XBT and GTS data in real time, (***action; Technical Coordinator and Chairperson; ongoing*****)**; see also IV-3.6.3)

IV-2.2.8 The Panel requested that the SOT Technical Coordinator identify which recommended transects (later taking into account the recommendations coming from OceanObs'09) were not being implemented, that the Chairperson identify the reasons, and that the two together explore how to help these institutions **(*action; Technical Coordinator and Chairperson; ongoing*)**.

IV-2.2.9 In order to improve coordination within SOOPIP, with the entire SOT, and for deployment opportunities for other observing networks, the Panel urged members to inform the Technical Coordinator on a quarterly basis of their deployment plans (***action; SOOPIP members; quarterly***).

IV-2.2.10 The Panel requested members to provide regular updates to the Technical Coordinator of the list of ships operating XBT transects, for the maintenance of a centralized database or list (***action; all SOOPIP members and Technical Coordinator; ongoing***).

IV-2.2.11 The Panel urged members to continue efforts to accomplish recruitments in transects that were not carried out (***action; Chairperson and all SOOPIP members; ongoing***).

IV-2.3 XBT Transect Responsibilities

IV-2.3.1 SOOPIP aids the scientific and operational communities to implement the recommended XBT transects. Institutions collaborate intensively to implement them.

IV-2.3.2 The Panel reviewed and agreed the provisional table below with information on the institutions taking the lead in one or more aspects of the implementation of the XBT transects.

Transect	Agency	Status	Year	
AX01	5,1	Active		
AX07	1	Active	1995	
AX08	1, 6	Active	2000	Agency key
AX10	1	Active	1997	
AX11		Active		1 USA-AOML
AX15	5	Active		2 USA-SIO
AX18	1, 11, 6	Active	2002	3 USA-NMFS
AX20	5			4 AUS-CSIRO
AX22	2, 11	Active	1996	5 FRA-IRD/BREST
AX25	1, 6, 20	Active	2004	6 ZAF-UCT
AX29	1			7 FRA-IRD/NOUMEA
AX32	1, 3	Active	1981	8 JPN-TOHOKU-U
AX34				9 AUS-BOM
AX97	1, 13	Active	2004	10 GER-BSH
PX02	9	Active		11 ARG-SHN
PX04	7			12 IND-NIO
PX05	16, 17, 7			13 BRA-FURG
PX06/PX 31/PX13	2, 7, 1		1986	14 UK-UKMO
PX08	2, 1	Active	2004	15 IND
PX09	2, 1		1987	16 JPN-JMA
PX10	2, 1	Active	1991	17 JPN-JAMSTEC
PX11	9	Active		18 NZL-MSNZ
PX18	1			19 JPN
PX21				20 UK-BAS
PX26	1	Active		21 IT-ENEA
PX30	4, 2, 7	Active	1991	21 IT-INOGS
PX34	4, 2	Active	1991	
PX36				
PX37	2, 1	Active	1991	
PX38	2	Active	1993	
PX40	8, 17	Active	1998	
PX44	2, 1	Active	1991	
PX50	18, 2	Active	1993	
PX81	2		1997	
IX01	9, 1	Active		
IX06	6	Active		
IX08	12	Active	1992	
IX09	14, 17			
IX10	14, 16,17			
IX12	9	Active		
IX14	12	Active	1990	
IX15	2, 4, 6	Active?	1994	
IX21	2, 4, 6	Active	1994	
IX22	9	Active		
IX28	4, 2	Active	1993	
IX31	2	Active		
MX01	21			

MX04	21			
MX05	22			

IV-2.3.3 The Panel asked the Chairperson to update the table of transect responsibilities periodically **(*action; Chairperson; once yearly*).**

IV-2.4 JCOMM XBT Probe Pool (and ship consumable) Trust Fund

IV-2.4.1 The Panel recalled JCOMM-II decision 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. The purpose was to initially, focus on XBTs, but other expendables could be added in time. An official letter from the Chairperson of the SOT to the WMO should authorize proposed expenditures if sufficient commitments are made to the Trust Fund.

IV-2.4.2 Goni reported that inquires made in the US to provide funds for this fund were not successful mainly because of the lack of mechanisms available to accomplish this type of operation. NOAA continues to provide funds to purchase XBT probes at a reduced price and ship them to international partners (France, Australia, Brazil, and South Africa). The number of probes provided directly by NOAA, currently 2000 per year, would increase in the future. These probes account for approximately 15% of probes deployed globally, and 100% of the probes deployed by France, Brazil, and South Africa. These steps continued as no contributions were made to this Trust Fund during the last intersessional period. SOOPIP still have to formulate a workplan for the XBTs to be purchased by the Trust Fund, should donations be received.

IV-2.4.3 The Panel urged members to consider contributing to the Trust Fund for consumables (***action; all SOOPIP members; ongoing***).

IV-2.5 Thermosalinograph Operations

IV-2.5.1 Goni reported on the Thermosalinograph operations under SOOP. A TSG is an instrument placed close to the water intakes of ships that measure the sea surface temperature and salinity along the track of the ships. The objectives during 2007 and up to date have been in implementing real-time transmissions from ships that had TSG installations in place. During 2007-2008 TSG, data from approximately 70 ships were transmitted into the GTS. TSGs are done mostly in repeated transects and allowed concurrent observations with other platforms, such as XBTs, Continue Plankton Recorders (CPRs), pCO_2 systems, and Acoustic Doppler Current Profilers (ADCP). One of the most longstanding TSG operations is carried out by the M/V Oleander, in a joint effort by the University of Rhode Island, University of Stony Brook, NOAA/AOML, and NOAA/NEFSC. Observations from TSGs will be used to validate observations from upcoming satellite missions.

IV-2.5.2 Unlike XBTs, TSGs do not have recommended transects and TSG observations are not an official component of the Ocean Observing System. TSG observations are currently being used to investigate mixed layer depth properties in tropical regions, mainly linked to ENSO events. The real-time transmissions are done to the GTS and to Coriolis Data Center. Brief descriptions of main TSG operations and results are being included in the OceanObs09 Community White Paper. NOAA/AOML and Ifremer continue strong collaboration in TSG data exchange.

IV-2.5.3 Goni noted that TSG data was not routinely being used by forecast systems when in the GTS TRACKOBS format.

IV-2.5.4 The Panel asked all TSG operators to check with major modelling centers whether TSG data are assimilated, and if not, the reasons for not including the data (***action; SOOP TSG operators; immediate; follow-up by Technical Coordinator***).

IV-2.5.5 The Panel asked members to identify if there are other observations (pCO_2, CPR, ADCP, etc.) that could benefit the operational community if they are transmitted on the GTS (***action; SOOP members to report to Chairperson; ongoing***)

IV-2.5.6 The Panel asked the Technical Coordinator to request that the TESAC code table include TSGs as a defined recorder type, to allow transmission on the GTS under this format (***action, Technical Coordinator, immediate***).

IV-2.5.7 The Panel asked a small group to explore any implications of reporting TSG data in TESAC format on the entire data stream, and to the BUFR template (***action; Chairperson, Trinanes, Petit de la Vileon, Viola, Bringas; ongoing***)

IV-2.5.8 The Panel requested JCOMMOPS and GOSUD to clearly separate the XBT/XCTD and TSG networks as separate contributions to SOOP, in order to raise the visibility of TSG observations in particular (***action; TC and GOSUD; September 2009***)

IV-2.6 Oleander Project

IV-2.6.1 Wilhelm Petersen gave a presentation on behalf of Tom Rossby, who invited SOOPIP members to become involved in the SCOR-IAPSO Working Group for OceanScope, focused developing a vision for an extended capacity to measure the oceans from merchant vessels.

IV-2.6.2 The Oleander has been in service for 17 years to measure upper ocean currents, between Bermuda and New England, transecting the Gulf Stream. The recent addition of an enhanced XBT program will allow the measurement of temperature fluxes with more confidence.

IV-2.6.3 The Oleander is probably the single most comprehensive ocean observatory on a ship of opportunity. It has produced the longest record of monitoring the Gulf Stream.

IV-2.6.4 The Panel requested an exploration of the connection between SCOR/IAPSO and SOOP (***action; Chairperson, Technical Coordinator, via Rossby; immediate***)

IV-2.6.5 The Panel recommended that an article in the BAMS (or a similar publication) on ocean observations is prepared by the investigators, supporting the implementation of ADCP, CPR, pCO_2, XBTs and TSG, in the Oleander (***action; Chairperson; immediate***)

IV-2.7 Report on the Argo Project

IV-2.7.1 Mathieu Belbéoch reported on Argo developments since the previous SOT Session. While Argo had achieved the 3000 float milestone, it nevertheless fell short of requirements in the southern hemisphere by about 600 floats. Global deployment and replacement of the Argo array is a challenging issue and incurs a significant expense. The Panel agreed that more cooperation was required under JCOMM to maintain the global arrays.

IV-2.7.2 Ninety percent of Argo profiles reached the GTS and the Global Data Access Centres (GDACs) within 24 hours of collection, and the Argo Information Centre (AIC) to ensure that every float deployed distributed its data as appropriate and closely monitors the data distribution.

IV-2.7.3 Operational centers are reporting positive impacts from the early years of Argo implementation, and have stressed their requirement for long-term continuation of the array for adequate evaluation. The research community has rapidly adopted Argo and the data is being used widely.

IV-2.7.4 The Argo Steering team made efforts to promote an educational use of Argo. In particular, Argo status and products will be included in the Google Ocean content offer. Other elements of the GOOS will follow.

IV-2.7.6 Transiting research vessels and commercial ships are used for float deployment wherever possible. However, in remote ocean regions, particularly in the South Pacific and Indian

Oceans, opportunistic traffic is not sufficient. Through a collaboration of U.S. and New Zealand Argo programs, a series of dedicated deployment cruises has been carried out using the Research Vessel Kaharoa. Argo looked forward to the cooperation of SOOPIP members in helping to deploy Argo floats.

IV-2.7.7 Regarding cooperation with other observing networks, the Panel asked for an identification of potential areas of collaboration with SeaKeepers and Ferryboxes (***action; for Chairperson and Technical Coordinator***).

IV-3. Monitoring and data management

IV-3.1 Review of the 2007 survey

IV-3.1.1 The former SOT Technical Coordinator, Hester Viola presented the JCOMMOPS Monitoring and Issues report on behalf of the JCOMMOPS team. She explained the changes which had had been undertaken by the Centre during the last intersessional period. Support is now being provided to the following Observing Programs:

- The Argo Profiling Float Program (70 % Mathieu Belbeoch)
- The Data Buoy Cooperation Panel (70 % Hester Viola)
- The OceanSITES reference station network (30 % Hester Viola)
- The Ship Observations Team (30% Mathieu Belbeoch)

IV-3.1.2 JCOMMOPS had been able to employ the services of an IT expert (1/2 time) for Web Development for all programs.

IV-3.1.3 The information system was upgraded during the last intersessional period and usage statistics have been collected since the beginning of 2008 for all JCOMMOPS websites. This gave a good indication of the level of use and the audience of the site. This will help in specifying how new JCOMMOPS web services should be designed in the future.

IV-3.1.4 Viola went through some of the key reports generated, especially the SOOP Annual Sampling report, which was completed for 2006 and 2007 and had begun for 2008.

IV-3.1.5 Viola has also completed an ad-hoc comparison of the Line Sampling Success over the last 6 years (2002-2007). Eleven (11) out of the forty-five (45) lines had been consistently well sampled or improved over the six-year period. However, (i) eight (8) lines had been consistently under sampled or not sampled, and (ii) in the six-year period, fifteen (15) lines had worsened.

IV-3.1.6 The Panel agreed that the Ad-hoc comparison of SOOP Line Sampling Success (2002-2007) was a useful exercise in assisting them with regard to resource planning, line responsibility review, and global SOOP network optimization.

IV-3.1.7 The Panel requested the Chairperson and Technical Coordinator work to agree on how to define sampling indicators to ensure they accurately reflect the goals of each transect (i.e. some have lower time sampling goals). The Technical Coordinator is asked to monitor sampling indicators on a bimonthly basis. (***action; Technical Coordinator and Chairperson; end 2009***)

IV-3.1.8 The Panel asked the Technical Coordinator to investigate discrepancy in indicators of almost contiguous transects, such as for PX11 and IX22 (***action; Technical Coordinator; end 2009***)

IV-3.1.9 The Panel urged its members to provide input to the SOT Technical Coordinator on a timely fashion in order for the results of the annual survey for the previous year to be provided early in the year (***action; SOOPIP members: ongoing***).

IV-3.1.10 The Panel requested the Technical Coordinator review formatting of code description in WMO FM63 to clarify use of D….D or 99999 A1bwnbnbnb rather than its current formatting which implies D….D or 99999, followed by A1bwnbnbnb. (***action; Technical Coordinator, JCOMM-III***)

IV-3.1.11 Regarding communication with the SOT Technical Coordinator, Mathieu Belbeoch, the Panel proposed to contact him through the support@jcommops.org email address as emails sent to the latter are forwarded to both Technical Coordinators. This will permit Hester Viola to assist the SOT if necessary.

IV-3.1.12 Belbeoch presented some cross-program issues and discussed future plans for JCOMMOPS development. For example, JCOMMOPS is planning:

(i) to completely redesign its web site to make it easier to use and more integrated across all programs (as part of this exercise, the quality control feedback mechanisms for VOS, Argo and DBCP will be improved)
(ii) to coordinate updates to Best Practice documents that shall be organized for all SOT programs.
(iii) to be actively involved in BUFR template requirements definition
(iv) to address the requirement for a new resource to work on Cruise Planning, and (v) to address the need for improved products to track deployment opportunities with SOT vessels.

IV-3.1.13 The Panel requested its members to provide feedback, as required, on the SOOPIP and JCOMMOPS websites and reports generated by JCOMMOPS, especially if it would be useful for new reports or content to be developed. The Panel specifically asked its members to comment on the usefulness of the Monthly SOOP BATHY report, and indicate whether this report shall be discontinued or changed. (***action; SOOPIP members, ongoing***).

IV-3.1.14 With the view to manage SOOP metadata better, the Panel concurred with the recommendation made under agenda item I-4.5 that JCOMMOPS receives copies of Pub47 for national submissions from WMO. Belbeoch noted that he would cooperate with E-SURFMAR to avoid duplication.

IV-3.1.15 The Panel noted with great appreciation the work of the SOT Technical Coordinator as a part of JCOMMOPS in supporting the efforts of the Programme. It urged members to identify additional funding to support the Technical Coordinator **(*action; all SOOPIP members, ongoing*)**.

IV-3.2 XBT and TSG BUFR testing

IV-3.2.1 Joaquin Trinanes presented the work of NOAA/AOML in the testing of BUFR encoding procedures for XBT and TSG data and metadata.

IV-3.2.2 AOML has been playing a role in the migration from the Traditional Alphanumeric Codes into Table-Driven Code Forms for XBT and TSG data. This migration should be completed by 2012. One of the outcomes of SOT-IV was that AOML would lead the development and testing of BUFR encoding procedures for XBT and TSG data and associated metadata. During this period, XBT and TSG bulletins have been created in BUFR format, using ad-hoc templates. The NOAA National Centers for Environmental Prediction (NCEP) was contacted in order to ensure successful decoding. Additionally and within the US IOOS Data Integration Framework, synthetic T/S profiles were created and provided to NCEP in NetCDF and BUFR formats. This interaction allowed detection of problems related to the maximum size of the bulletins being ingested by NCEP and gave us the opportunity to make the BUFR encoding procedures more robust and efficient.

IV-3.2.3 A new XBT template, comprising new descriptors and enhancing the metadata capabilities of previous templates, will be soon available for validation. Consequently, AOML will start creating BUFR bulletins using the new sequences and will try to expand the number of parties decoding the files, including other Numerical Weather Prediction Centres (NWPCs).

IV-3.2.4 The Panel requested that a small working group determine the values of the GTSPP quality flag table, including global and depth specific entries to be used in BUFR tables (***action; Chairperson, Technical Coordinator, Trinanes, Snowden, Bringas, Sun, Petit de la Vileon; end 2009***)

IV-3.2.5 In order for a template to be approved for operational use, at least two centres, with separate software implementations, must validate the template encoding. NOAA/NCEP is one centre that has participated in tests using ad hoc templates. Once the templates are complete, NOAA/NCEP and another centre must validate the AOML encodings. The panel solicited other agencies, in addition to NOAA/NCEP, to participate in the test to decode BUFR XBT and TSG messages (***action; SOOPIP members; asap***).

IV-3.2.6 The Panel noted that metadata requirements will inform the development of a BUFR template for underway data, which has not been started and is behind schedule relative to the 2012 deadline for switching GTS transmissions to BUFR. The Panel requested its members with expertise in thermosalinograph data or thermosalinograph operational systems to provide input to the META-T Pilot Project, the SOT-TC or the DMPA TT-TDC on the metadata requirements for thermosalinograph data (***action; SOOPIP members; asap***).

IV-3.3 Global Temperature Salinity Profile Programme (GTSPP)

IV-3.3.1 Charles Sun (NOAA/NODC, USA), Chairperson of the Global Temperature Salinity Profile Programme (GTSPP) presented an overview and future directions of the GTSPP. He recalled that the GTSPP was a joint program of the International Oceanographic Data and Information Exchange committee (IODE) and JCOMM.

IV-3.3.2 The last meeting was held at the East-West Center, Honolulu, Hawaii, USA on 27 October 2008. The meeting discussed, in particular the XBT fall rate issue, GTSPP data formats, evaluation of a Cyclical Redundancy Check (CRC) in identification of real-time and delayed mode duplicates, identifying GTSPP data product centres and delayed-mode data assembly centres, cooperation with other programs, and the future of GTSPP.

IV-3.3.3 Sun suggested a careful usage of terminology when referring to different classes of SOOP data. The first was *real-time*, which was clear, and should refer to data put on the GTS soon after collection. For *delayed-mode* data there was confusion – this should refer only to data that was originally on the GTS as *real-time* data and then later quality controlled and submitted to the NODC. Data that never made it onto the GTS but is later sent to the NODC should be called '*historical data'.*

IV-3.3.4 Over past two year period 2007–2008, GTSPP continued to deal in greater volumes of data. The Integrated Science Data Management (ISDM) of Canada managed Real-time data. The U.S. National Oceanographic Data Center (NODC) provided data processing services for delayed mode data and maintenance of the Continuously Managed Database (also known as the GTSPP archive). Delayed mode data includes the full resolution data from XBTs or CTDs from the ships, or fully processed and quality controlled data from the organizations that provide the real time low-resolution data to the GTS (Global Telecommunication System). GTSPP continued to improve its capabilities of serving the GTSPP data for operations and climate research.

IV-3.3.5 The GTSPP collaborated with a number of international programs. In particular, it managed the XBT data collected by the SOOP operators. The GTSPP developed a strategy for linking XBT profiles to the SOOP XBT survey lines that were sampled, and has been working closely with SOOP to assist in proper documentation of the XBT fall rate in the CMD. GTSPP produced monthly real-time maps including data density maps. The GTSPP published a catalogue of the data collected, statistics of data on the GTS from various sources and monitoring reports for each ocean basin. In addition, the GTSPP also publishes a monthly ship report that contains errors found. This is then sent to the operators for corrections.

IV-3.4 Global Ocean Surface Underway Data Pilot Project (GOSUD)

IV-3.4.1 Loic Petit de la Vileon presented an overview and future directions of the Global Ocean Surface Underway Data (GOSUD) Project.

IV-3.4.2 The GOSUD is acquiring, controlling the quality, storing in standard format, and disseminating the collected, mostly by cargo vessels, the underway sea surface salinity data. It is establishing a close co-operation with relevant data centres to build a database and develop data management procedures and standards. Recently, the GOSUD decided to expand the project to other parameters with salinity as the priority. In 2006, considering the strong complementary interest between the US Shipboard Automated Meteorological, the Oceanographic System (SAMOS project) and GOSUD, it was decided that a joint effort be made to improve access to the high quality underway meteorological and near-surface data collected by research vessels and merchant ships and to also identify common potential data providers.

IV-3.4.3 The GOSUD data structure is based on a GDAC –Global Data Assembling Center-that centralizes and distributes the data. The data are provided to the GDAC either directly through national contributions or through the GTS (trackob format). The Coriolis data centre hosted by Ifremer-France operates the GOSUD GDAC. The US-NODC (Silver Spring, Maryland) holds the data in their long-term ocean archive. In addition, the US-NODC continuously mirrors the GDAC FTP data server. The Integrated Science Data Management (ISDM, Canada) provides a monitoring function, comparing what is circulating on the GTS and what is available at the GDAC. The objective is to identify new potential sources of data.

IV-3.4.4 The amount of data that have been collected has significantly increased from 2007 to 2008. This means that the GOSUD effort to enlarge the network to new data providers produced positive results. For the moment, most of the data that are archived in the GDAC are near real-time data. One of the challenges of the years 2009-2010 will be the ability of the project to produce a delayed mode dataset.

IV-3.4.5 The Second joint SAMOS-GOSUD meeting was held in Seattle, June 2008. The GOSUG meeting recommended expanding access to the underway meteorological and TSG observations in the remote ocean regions and the marginal seas. The scientific user community must determine critical regions for increased monitoring. The GOSUD is encouraging efforts to develop new, and to make available historical upper-ocean and meteorological observations for use by developing nations. One strong conclusion from the GOSUD meeting was that the GOSUD, should form a closer relationship with the scientific community, and CLIVAR in particular, to identify which observational parameters the GOSUD should acquire and from which oceanic regions to acquire them.

IV-3.4.6 The GOSUD work Plan for 2009-2010 will focus on (i) continuing to enlarge the network of data collectors and providers; (ii) starting the process of elaborating a delayed-mode dataset; and (iii) taking in account the scientific needs and the satellite community requirements (SMOS and AQUARIUS validation).

IV-3.4.7 The Panel requested a clarification of the roles of both the GOSUD and the SOOP in the TSG network. It also suggested that the SOOP focuses on the implementation and the GOSUD on the data (***action; for Chairperson, Technical Coordinator, Petit de la Vileon, Smith; end 2009***)

IV-3.5 Global temperature data distribution by Coriolis

IV-3.5.1 Loic Petit de la Villeon (IFREMER, France) presented a report on the activities of the Coriolis data centre (Brest, France) regarding global temperature data management, distribution, and monitoring.

IV-3.5.2 The Coriolis data center is operated by the French Oceanographic Data Centre (SISMER) at IFREMER and acts as the French NODC. It holds in situ oceanographic data. The main data sources are Argo floats (Coriolis is a national and global DAC), data from research and merchant vessels, mooring, surface drifters, and gliders. The data is all quality controlled, and numerous reports on the data are available. TSG data would soon be included in the objective analysis, which would be extended to the sea surface.

IV-3.5.3 Data are distributed in near real time for assimilation into ocean forecast models. Further information is available at http://www.coriolis.eu.org/cdc/

IV-3.6 Discussion of data and metadata issues

IV-3.6.1 The Panel discussed a number of data and metadata issues related to the presentations above and formulated the following related actions.

IV-3.6.2 The Panel recommended the establishment of a common data format for real-time XBT profiles (***action; Snowden; SOT-VI***).

IV-3.6.3 The Panel asked the Technical Coordinator, GTSPP, and/or GOSUD to generate a plot of missing delayed-mode data (***action; TC, GTSPP, GOSUD, ongoing***), in order to identify the institutions that need to contribute. It asked the Technical Coordinator and Chairperson to explore how to help these institutions (***action; TC and Chairperson; ongoing***).

IV-3.6.4 The Panel asked all XBT operators to implement the unique ID algorithm presented by Sun, to submit the delayed-mode data to the GTSPP, and explore how to help these institutions if needed (***action; all SOOPIP members; SOT-VI***), and asked Paul Chinn to clearly document the CRC algorithm (***action; Chinn/GTSPP, immediate***).

IV-3.6.5 The Panel asked a small working group to establish and document homogeneous quality control steps for real-time use, probably similar to those used for Argo profiling floats, plus a few additional steps (***action; Chairperson, TC, Sun, Boyer, Petit de la Vileon; SOT-VI***).

IV-3.6.6 The Panel asked a small working group to establish and document homogeneous quality control steps in delayed-mode data, probably similar to those used for Argo profiling floats, plus a few additional steps (***action; Chairperson, TC, Sun, Boyer, Petit de la Vileon; SOT-VI***).

IV-3.6.7 The Panel requested an identification of the different delayed-mode databases currently available and their differences to aid users on when to use them (***action; Technical Coordinator, Sun, Boyer, Chairperson; SOT-VI***).

IV-4. Issues for the SOOP

IV-4.1 Future global requirements: Evaluation of the XBT network

IV-4.1.1 Goni presented a report on the OceanObs'09 Community White Paper on the SOOP for which he was lead author. The scientific community determined that there was a need for a community white paper at the OceanObs09 meeting in order to:

- Assess the state of the XBT network as recommended by the last upper ocean thermal review panel (OceanObs99)
- Communicate the value of XBT observations in scientific research and model initialization,
- Evaluate if the OceanObs99 recommendations still hold,
- Make new recommendations based on the current knowledge of the ocean, the full implementation of Argo, operational altimetry, and improvement of ocean models.

IV-4.1.2 This CWP makes emphasis on the following themes:

- Review of the status of OceanObs99 recommendations,

- Summary of goals of XBT transect in each of the three different sampling modes
- Summary of key results obtained from XBT observations,
- Highlight of key scientific results,
- Provision of recommendations on new transects, data transmissions, and data management.

IV-4.1.3 The OceanObs09 recommendations will contain every, transect in FR and HD modes recommended by OceanObs99, and it will add several transects which have been identify to be of key importance for current monitoring and climate studies. Recommendations in this manuscript include:

- Sponsorship of JCOMM to carry an analysis to evaluate the XBT network,
- Strong support of FR and HD transects,
- Creation of an XBT Science Team, possibly working with SOOPIP,
- Support of further XBT fall rate equation experiments,
- Support of simultaneous observations of other parameters,
- Exploration of new technologies, such as underway CTDs.

IV-4.1.4 This manuscript can be downloaded from www.oceanobs09.net/cwp/review/

IV-4.1.5 The Panel requested its members to provide feedback to Gustavo Goni on the draft Community White Paper (***action; SOOP panel members; 1 August 2009***).

IV-4.1.6 The Panel requested Goni to ensure SOOP efforts are recognized by the appropriate OceanObs'09 CWPs, and that SOOP is referenced as SOOP and not VOS (***action; Chairperson; 1 September 2009***).

IV-4.2 Operational XBT Systems and Developments

IV-4.2.1 Derrick Snowden provided an overview of the different hand launched XBT systems used by USA, France, and Australia, as well as the auto-launched systems used by AOML, and SIO. He reported on the satellite transmission systems and real time file formats used with the AMVER/SEAS and Devil systems.

IV-4.2.2 The Panel requested AOML to upgrade the SEAS software to correctly report salinity from xCTD drops (problem identified for PX37) (***action; AOML; end 2009***)

IV-4.2.3 Results were presented from an estimated cost comparison between sending several file formats using the four Argos-2, Iridium SBD, Iridium Direct Connection, and Inmarsat-C satellite services. The cost comparison indicates that the Service Argos option is the cheapest, followed by the Iridium options and finally by the Inmarsat-C option. However, there are stringent limitations to the size of a message that can be sent via the Service Argos system although the next generation Argos-3 satellite system promises to provide higher throughput, tests remain to be made.

IV-4.2.4 The satellite coverage for the Iridium system is significantly more complete than for the Argos system, and both the Iridium SBD, and the Iridium Direct Connection systems have options to provide GPS data directly, hence a separate GPS instrument is not necessary.

IV-4.2.5 Inmarsat has been a reliable satellite service provider to the US SOOP program for years. It does not have any limitations on file sizes that affect the XBT program and the transmissions are reliable. Additionally most Inmarsat-C transceivers also have GPS receivers. The cost however, is extremely high relative to other systems.

IV-4.2.6 The Panel noted that Inmarsat and Iridium permitted email communication from ship to shore but not Argos. Email service is a desirable feature for High Density XBT riders for example in order to permit communication with a technical team on shore for trouble shooting.

IV-4.2.7 The Panel requested members to explore the possible use of Argos-3 for data transmission (***action; Chairperson, Snowden, Trinanes, Ortega, by SOT-VI***)

IV-4.2.8 The Panel requested the Technical Coordinator to stay abreast of how Identify how new technologies can aid SOOP, such as self-contained XBT launchers, alternative transmission options, underway CTDs, etc. (***action; Technical Coordinator; ongoing***)

IV-4.3 Monthly reports on XBT code and data quality

IV-4.3.1 Mathieu Ouellet presented the monthly reports on GTS data quality, code usage, and SOOP line occupation produced by ISDM, Fisheries and Oceans Canada. The ISDM decodes, processes, and quality controls GTS profile data and applies GTSPP quality control methods. A monthly report on the data quality, code usage, and SOOP line occupation is produced. These are available at ftp://ftp.meds-sdmm.dfo-mpo.gc.ca/pub/ShipReport

IV-4.3.2 The data quality tests attempt to identify root problems, which are responsible for systematic problems in a platform's month profiles, and report on overall data quality statistics. The code usage tests identify old codes or current codes with missing or incompatible instrument or recorder information. The SOOP line occupation reports suffered from transect definitions that do not always match the ship route.

IV-4.3.3 The reports have had a number of successes, as well as problems that were being examined. Ouellet indicated he would use a list of ships and their known sampled SOOP transects in order to improve the SOOP transect monthly map and report generated by ISDM.

IV-4.4 XBT Data Tracking

IV-4.4.1 Francis Bringas presented the data tracking activities at AOML. The aim of the SOOP data tracking activities is the verification of data flows from the source (observation platform) to the processing centers, where the data is analyzed, quality controlled, and sent to the Telecommunication Gateway at the National Weather Service (NWS) from where the data is inserted into the Global Telecommunication System (GTS).

IV-4.4.2 Since this is a very complex process, the tracking of these data ensure that the information obtained by different observation platforms are received and that they are generated with the correct format so that it can be successfully disseminated through the GTS. Otherwise, the data cannot be used or, if communication problems are not detected, lost. The flow of different kinds of oceanographic data, including XBT, TSG, buoys, drifters and TAO/PIRATA arrays is verified.

IV-4.4.3 Among the several problems that may occur, the most common are:

- Specified platform type not expected from a specific group of headers.
- Data received from ships with unknown Call Sign.
- Observations transmitted with wrong date/time.
- Duplicate data being sent.
- Data drops: the data is transmitted but it is not reaching its destination.
- General errors in data codification and format.

IV-4.4.4 When a problem is found (in data format or transmission) the type of data and the source is determined and the person responsible is contacted. This is a daily process.

IV-4.4.5 Belbeoch requested that these reports be made available to JCOMMOPS (***action, Bringas, ongoing***)

IV-4.4.6 The Panel requested an evaluation of the differences of the currently available XBT monthly reports (JCOMMOPS, AOML, ISDM), to investigate if collaborative work would be more effective (***action; Technical Coordinator, Ouellet, Trinanes; SOT-VI***)

IV-4.5 Devil XBT Iridium Operations

IV-4.4.1 Alex Papij (Turo Technology Pty Ltd), made a presentation on Devil XBT Iridium Operations. The Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia originally developed the Turo Devil XBT System, with support from the Australian Bureau of Meteorology (BOM). The original requirements called for real time JJVV transmission. Argos satellite telemetry had previously been used by these organisations so Argos was incorporated into the Devil System. Since then the Iridium satellite system has become more accessible and viable for Devil XBT operations. Turo Technology into the Devil XBT System has now implemented iridium short burst data (SBD) messaging and CSIRO has deployed it on all their SOOP vessels. Papij described the formatting and configuration, noting the differences between Iridium SBD and Argos implementations.

IV-4.4.2 Two systems were deployed on SOOP line IX28 in December 2008 and detailed technical data on the Iridium SBD transmissions was collected. Single and multi-SBD messages were sent and received, poor signal strengths events were recorded, transmission failures and durations were analysed. This demonstrated the performance in a real practical SOOP XBT application.

IV-5. Future work programme

IV-5.1 Explanation of Depth and Temperature Biases in XBTs

IV-5.1.1 Viktor Gouretski gave a presentation on a new correction method for depth and temperature biases in XBT data.

IV-5.1.2 A global set of XBT data was compared with quasi-collocated and quasi-simultaneous CTD and bottle data. The comparison revealed two types of biases in the XBT data: a thermal bias and depth bias. The latter is translated into the temperature bias due to the presence of the vertical temperature gradient. In accordance with an earlier study (Gouretski and Koltermann, 2007) the bias was found to be time-dependent and was obviously responsible for artificial warming of the world ocean during the 1970-80s reported earlier in several publications.

IV-5.1.3 The collocated analysis suggests that the XBT fall velocity varies with depth. Immediately after entering, the water XBT probes were shown to move 10-30% slower compared to the velocity given by the manufacturer's fall rate equation. This new result is confirmed 1) by independent side-by-side XBT/CTD inter-comparison experiments and 2) by direct measurements of the XBT fall velocity conducted in a specially designed test facility. This depth overestimation within the upper 100m is obviously responsible for a strong positive XBT temperature bias normally detected in the upper layer. In agreement with numerous earlier studies, a depth underestimation by XBTs below about 100 m in data was confirmed.

IV-5.1.4 Due to their amount, the XBT data are of big interest for climate change assessment issues. However, their use for the climate related calculations is severely limited due to the biases described above. In the light of new findings, tests in a test facility are needed to properly document the hydrodynamic behaviour of the XBT probes in the near-surface layer and thus allow the correction of the existing XBT fall rate equation.

IV-5.2 Results from 3 XBT/CTD comparison tests in the Bay of Bengal and Arabian Sea

IV-5.2.1 Tim Boyer presented results of XBT/CTD comparison tests done in cooperation with V.V. Gopalakrishna.

IV-5.2.2 The time dependence of the fall rate equation bias was shown in the work presented by Gouretski. Some regional differences have also been identified in recent studies. This study focused on the North Indian Ocean, with side-by-side XBT and CTD casts. The Arabian Sea and Bay of Bengal both have strong and similar temperature stratification, but the surface layer in the Bay of Bengal is much fresher.

IV-5.2.3 Overall, the experiments found:

- There is a significant variability between near-simultaneous CTD casts. This complicates comparison tests
- Minimizing XBT – CTD differences over possible drop rates shows a narrow band of legitimate initial velocities (a coefficient) over a large range of decelerations (b coefficient).
- No conclusive pattern of warm or cold bias emerges in the Arabian Sea. In the Bay of Bengal, XBT data are slightly cooler than CTD data.
- In addition to depth differences, a small thermal bias (usually < 0.08) is present in many comparison tests. The bias may equally be negative or positive.

IV-5.2.4 In individual cruises in different parts of the northern Indian Ocean, different results were found for the fall rate equation:

- The Sagar Kanya cruise (Bay of Bengal) yields a drop rate with slightly higher initial velocity and deceleration than H95.
- The Sagar Purvi cruise (Arabian Sea) shows a large range of drop rates, with an ellipse centred near H95
- The Sagar Sukti cruise (Arabian Sea) shows a large range of drop rates, with initial velocity less than H95. However, this is a sparse data set with disparate results.

IV-5.2.5 The implications for climate studies are:

- Composite temperature anomalies using XBT data vs. CTD data give different structure vs. depth in both the Arabian Sea and Bay of Bengal.
- Based on these 3 cruises, this uncertainty is not reduced in the Arabian Sea using alternative drop rates, but is reduced for the Bay of Bengal.
- Bay of Bengal XBT record can be used for climate change studies. More tests would be helpful in the Bay. Climate change studies in the Arabian Sea with XBT data should be executed with care.

IV-5.2.6 Goretski suggested that the very large scattering of the deceleration coefficient means that the initial fall rate is the problem, and that only the initial velocity correction and not a deceleration should be used.

IV-5.2.7 Goni noted that XBTs are still fine for heat advection and geostrophic calculations, that the fall rate equations impacted climate studies.

IV-5.3 One Year after the Miami XBT Fall Rate Equation Meeting: Status of knowledge

IV-5.3.1 Franco Reseghetti presented the status of knowledge of the XBT fall rate equation based on laboratory studies, examination of the historical scientific record, and in situ studies.

IV-5.3.2 Both calibrations showed variability from probe to probe and from day to day, although the results were well within the accuracy (0.2 °C) specified by Sippican. Older probes had a higher wire linear density than newer probes. Kizu has noted differences in the length, weight, shape, and dimensions between TSK and Sippican XBT probes that can affect their fall rate.

IV-5.3.3 A number of old reports (Ph.D. thesis, Navy reports) identified variability in the fall rate.

IV-5.3.4 His conclusions are that:

- uncertainties in XBT results still remain;
- descriptions used of the probe motion could be an approximation and fall rate coefficients could depend on temperature;
- further checks and comparisons both in Lab and in situ are needed (but they are expensive);'

- a global reanalysis of all available data is needed, but old data and reports are frequently customised or not available to the community;
- we could start from the analysis of what happens in the first part of XBT motion, which implies the use of a dedicated tank facility, such as the one at Ifremer/Brest

IV-5.3.5 Due to the continuing uncertainty regarding the fall rate equation of the XBTs, and its impact on climate studies, the Panel recommended the following three actions:

IV-5.3.5.1 Identifying facilities for fall-rate tests for near-surface ocean conditions, potentially at Ifremer, US Stennis Center, etc. (***action; Chairperson; immediate***)

IV-5.3.5.2 Tracing older technical reports that address FRE question (***action; Reseghetti; ongoing***)

IV-5.3.5.3 Approaching Sippican for:

- the results of their Fall Rate Equation (FRE) experiments
- making them an active participant in the FRE experiments
- encouraging donation of the XBT probes for these experiments

(***action; for Chairperson, Technical Coordinator, HMEI***)

IV-5.4 Review the Terms of Reference of the SOOPIP

IV-5.4.1 The Panel reviewed its Terms of Reference (ToR) (***Annex XVIII***), and agreed to the proposed changes noted there. These explicitly note the different networks, XBT, TSG, CPR, etc. that contribute to and are coordinated by the SOOP program. They note the aid given by SOOP to other observing networks, and suggest close links to the scientific community using SOOP observations.

IV-5.5 Review the membership of the SOOPIP

IV-5.5.1 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 the last few years. Brazil and South Africa, in cooperation with the USA, are active in the maintenance of XBT lines.

IV-5.5.2 The Panel recalled that SOOP membership was open.

IV-5.5.3 The Panel recommended that a scientific workshop focused on XBTs be held for 1-1.5 days in conjunction with the SOOPIP meetings. This might require different arrangements such as parallel sessions for the SOT panels to accommodate. (***action; Chairperson and Secretariat; SOT-VI preparations***)

I-5. Support infrastructure

I-5.1 JCOMM in situ Observing Platform Support Centre (JCOMMOPS) and future Observing Programme Support Centre (OPSC)

I-5.1.1 JCOMMOPS activities during the last intersessional period

I-5.1.1.1 The Technical Co-ordinator of the SOT presented a report on the JCOMMOPS activities during the last intersessional period. Ongoing tasks included, uploading updates to Pub47 into the JCOMMOPS database, maintaining mailing lists, updating Monthly Maps for SOOPIP, VOS, ASAP and JCOMM, maintaining updates to the Mask to Real data file at JCOMMOPS, based on operator inputs quarterly. As reported under agenda item I-2.5, Mr Mathieu Belbéoch took over the responsibility of SOT Technical Coordinator from Ms Hester Viola in the beginning of

2009. JCOMMOPS worked in such a way to permit a smooth transition. JCOMMOPS has also been working on the following:

(i.) Maps and websites: high resolution maps, web services, new general SOT map created, QC relay tool updated;
(ii.) Metadata: participation in META-T, assistance with regard to the Ship masking issue and provision of a secured REAL/MASK database;
(iii.) Observing network monitoring: production of the SOOP Annual Line Sampling Reports for 2006, 2007, and initiation of the 2008 report; input provided to the WMO Rolling Review of Requirements.

I-5.1.1.2 The Team thanked both Ms Hester Viola and Mr Mathieu Belbéoch for their efforts to develop JCOMMOPS further and provide better support to the SOT.

I-5.1.2 Future Observing Programme Support Centre (OPSC)

I-5.1.2.1 The Team recalled that at SOT-IV, it had approved the JCOMM Observations Coordination Group round-table review of the future JCOMMOPS. The Secretariat reported on the latest developments in this regard. Following further discussions with the JCOMM Management Committee, fifth session (Geneva, Switzerland, 5-7 October 2007), and the Observations Coordination Group at its second Session (Geneva, Switzerland, 23-25 April 2007), a joint WMO-IOC circular letter was issued in September 2007 to call for the submission of Letters of Intent (LOIs) to host a JCOMM Observing Programme Support Centre (OPSC). A copy of this circular letter was presented to the Team.

I-5.1.2.2 The team noted that fifteen Letters of Intent had been received by the Secretariat and objectively evaluated by a committee lead by the JCOMM Co-Presidents. Evaluation was made in two steps. In the first step, a short list of five candidates was proposed for undergoing further evaluation. In the second step, the evaluation committee was expanded by the JCOMM Management Committee to include representatives from the Argo Steering Team, the DBCP, the SOT, OceanSITES, the IOCCP, the Global Sea Level Observing System (GLOSS), the WMO Integrated Global Observing System (WIGOS), the OOPC, and the WMO and IOC Secretariats. The evaluation Committee, then engaged in a negotiation with the selected institution. The final decision regarding the future OPSC host remains, to be made jointly by the WMO Secretary General and the IOC Executive Secretary.

I-5.1.2.3 The third session of the JCOMM Observations Coordination Group, Paris, France, 9-11 March 2009 was invited to review the draft Terms of Reference (TOR) for the OPSC. The Team noted that these activities and actions will be presented to the third Session of JCOMM (JCOMM-III), Marrakech, 5-12 November 2009. JCOMM-III will be invited to agree on the Terms of Reference for the OPSC or extended JCOMMOPS. The Team proposed to add the word “Cooperation” within the TOR of JCOMMOPS to reflect.

I-5.1.2.4 The Team endorsed the overall JCOMMOPS evaluation and OPSC development process as conducted until now and planned for JCOMM-III.

I-5.1.2.5 The Team noted with appreciation that the sixtieth WMO Executive Council (EC-LX) and the forty-first IOC Executive Council had both requested Members to commit resources through voluntary contributions, to support the implementation and operations of the OPSC.

I-5.1.2.6 The Team discussed, optimal ways for the future development of the SOT through its Technical Co-ordinator in the context of this development. In particular, the Team discussed the use of JCOMMOPS (and the future OPSC) as a portal for ship metadata.

I-5.2 Telecommunication facilities

I-5.2.1 Inmarsat and IMSO

IMSO

I-5.2.1.1 The International Mobile Satellite Organization (IMSO) presented the Meeting with a written report. IMSO is an inter-governmental organization that oversees maritime distress, safety and security communication services provided via Inmarsat and other mobile satellite service operators worldwide. These public interest services are dedicated to maritime safety within the Global Maritime Distress and Safety System (GMDSS) established by the International Maritime Organization (IMO), and include distress alerting, search and rescue co-ordinating communications, maritime safety information (MSI) broadcasts, and general communications.

I-5.2.1.2 The Team noted that IMSO also acted as the International LRIT Co-ordinator, appointed by IMO to coordinate the establishment and operation of the international system for the Long Range Identification and Tracking of Ships (LRIT) world-wide. LRIT provides for every ship on an international voyage to report automatically its position, at least four times every day, to a shore database operated by or on behalf of its Flag State, using mobile satellite communications.

I-5.2.1.3 In 2006, the IMO Maritime Safety Committee decided to appoint IMSO as the LRIT Coordinator, to perform specific functions defined in the IMO LRIT Performance Standard and Functional Requirements for LRIT. The central function of the LRIT Coordinator is the audit and review of Data Centres in the international LRIT system. However, IMSO has to perform a number of other tasks, for example

(i) participating in the development of technical specifications for the LRIT system and the testing of new or modified procedures or arrangements for communications
(ii) issuing requests for the submission of proposals for the establishment and operation of the International LRIT Data Centre and/or the International LRIT Data Exchange, evaluating any proposals received
(iii) participating in the testing and integration into the LRIT system of LRIT Data Centres, the International LRIT Data Centre and the International LRIT Data Exchange
(iv) investigation of operational or technical disputes or invoicing difficulties and making recommendations for their settlement
(v) review the performance of Application Service Providers providing services to the International LRIT Data Centre
(vi) audit the performance of the International LRIT Data Exchange and its fee structure, if any and
(vii) verify that Contracting Governments, Search and Rescue services receive only the LRIT information they have requested and are entitled to receive.

INMARSAT

I-5.2.1.1 The Inmarsat Maritime Safety Services and its use for meteorological applications presented the Meeting with a written report.

I-5.2.1.2 The Team noted that the provision of some Short Access Codes (SACs) defined for distress and safety purposes is a national, optional matter. Routing arrangement of all SAC codes, existing and new, is a national matter of each LES. Inmarsat has no influence on what or how such additional codes may be defined or used. IMO Assembly Resolution A.707(19) gives recommendations on the costs for SAC code 41 and others maritime safety-related codes and it is a matter for individual LESs whether or not to charge for these SAC services. It is also up to users to choose which service provider or LES to use to send messages to SACs and to find the best price and service quality.

I-5.2.1.3 Sending a message to SACs is a standard service that is supported by all Inmarsat C and mini-C maritime terminals, SOLAS and non-SOLAS compliant. The meeting reviewed, to the best of Inmarsat knowledge, a list of Inmarsat C LESs with their access code in four ocean regions and provision of SAC 41.

I-5.2.1.4 The system comprises two types of mobile terminals – Inmarsat C and **mini-C** terminals. Mini-C is an evolution of the existing Inmarsat C technology and supports all Inmarsat C maritime services, depending on model, combined with a significantly reduced level of power consumption.

I-5.2.1.5 Data reporting service (which is not, in itself, a compression mechanism) is intended for transferring small quantities of data from a Mobile Earth Station (MES, e.g. a terminal onboard a ship) to a pre-determined terrestrial user and has the potential to greatly reduce communication costs. The data may be deposited into a data-reporting file at the addressed LES and this file is retrieved by the terrestrial user or forwarded by an LES operator. The service depends on local arrangements between the terrestrial user and the service provider or the LES operator. The new enhanced data reporting service, recently developed, provides additional protection and reliability by means of an acknowledgement mechanism relayed to the mobile on a successful reception of the entire enhanced data report. It also provides a status request facility to ensure reliable data transfer.

I-5.2.1.6 The data reporting protocol can be used to initiate transmission of binary-encoded weather data, based on FM-13 ship code or SCADA applications. This is a user-defined service by e.g. a meteorological service provider who reached agreement with an associated LES to provide this service. For example, the service may be added to the existing TurboWin (and other) software as a separate module and connected to the main Inmarsat C or mini-C GMDSS terminals via a second communication port, which is available on some models. It is not mandatory for the manufacturers to provide a second communication port. However, Inmarsat undertakes to advise all Inmarsat C manufacturers that there is a clear demand for such a facility.

I-5.2.1.7 Since the Inmarsat C system is mandatory on certain types of SOLAS compliant ships and required by IMO SOLAS Convention, Inmarsat provides regular reports on its performance to the International Mobile Satellite Organisation (IMSO) for further submission to IMO. Inmarsat and LES operators, confirming that there are no capacity issue, are closely monitoring the system capacity.

I-5.2.1.8 The Team noted that Inmarsat developed a new maritime communication system, FleetBroadband, to provide simultaneous broadband data and voice through a compact mobile terminal via the Inmarsat fourth generation satellites on a global basis. Two types of FleetBroadband terminal are available, with different performance capabilities and size. Both terminals are designed specifically for the marine environment and support voice, fax and SMS.

I-5.2.1.9 The Team discussed the Long Range Identification and Tracking of ships (LRIT), an IMO-defined service, for which Inmarsat is one of the communication providers. The LRIT started on 31st December 2008 but take-up is quite slow. The implementation period is extended until 30 June 2009, mainly due to some countries who need to decide on Data Centres and ASPs. There are some cost concerns that reporting rates are not finalised yet, with other funding issues still under discussion. The Inmarsat C and mini-C terminals are part of the communication equipment for LRIT, using modified data reporting and polling protocol, i.e. enhanced data reporting or enhanced pre-assigned data reporting, and implemented on some models. More models are under type approval now. The IMO Resolution MSC.210(81) provides the performance standards and functional requirements for LRIT. In addition to the GMDSS requirements, the shipborne equipment should comply with some minimum requirements.

I-5.2.1.10 The team recommended that some of the SAC codes indicated in the document presented to the Team under this agenda item were not necessarily being used to report weather

observations and suggested that these should be trialled before being included in the list posted on the WMO web site. The latter list should be restricted to the list provided by the Task Team on Satellite Telecommunication Systems.

I-5.2.2 EUMETSAT

I-5.2.2.1 The Meeting was presented with a written report by EUMETSAT on the status and operational use of channels allocated for data transmission via meteorological satellites.

I-5.2.2.2 The Team recalled that in recent years, problems with data transmission reliability experienced by the ASAP and VOS operators when using the Meteosat Data Collection Platform (DCP) system, resulted in the move to Inmarsat for the relay of data. Although it is not foreseen by ASAP or other ship operators to move back to Meteosat, EUMETSAT has been looking into methods of improving the DCP system for the benefit of all system users. EUMETSAT has been investigating the feasibility of High Rate Data Collection Platforms (HRDCP) for use on current and future generations of Meteosat. The HRDCP system will be tested during 2009, with the aim of offering an operational service in 2010. The system will be part of the Meteosat Third Generation System.

I-5.2.2.3 The team noted that the new HRDCP was expected to have several benefits for the user over the existing system i.e.

(i) Greater message size (maximum message size of 65535 bytes using the 90 second transmission window);
(ii) Increased transmission rate (1200 bps);
(iii) higher message repetition rate (e.g. sending the same 649 bytes in approximately 10 seconds);
(iv) efficient use of transmission channels thanks to more efficient and flexible use of the Meteosat DCP channels; and
(v) Improved data integrity thanks to modern encoding techniques of the DCP message).

I-5.2.3 Argos

I-5.2.3.1 The Meeting was presented with a report on the status and operational use of polar orbiting satellites through Service Argos. The Argos constellation includes six satellites, i.e. four NOAA satellites operational with Argos-2 instrument, one METOP satellite operational with Argos-3 instrument, and a NOAA satellite launched in February 2009 with Argos-3 instrument. The Argos ground network is composed of three global receiving stations (2 NOAA and 1 EUMETSAT) and fifty-three regional stations. The Argos processing network is composed of two redundant processing centres in Washington, USA and Toulouse, France. A third processing centre is operated in Toulouse inside CNES for higher security purposes.

I-5.2.3.2 The third generation Argos system, Argos-3, is now fully operational. The next satellite carrying Argos-3 will be launched in July 2010 (MetOp 2). The next satellite carrying Argos-3 will be launched in end 2010 – beginning 2011 (SARAL – ISRO, India Space Agency). The next one will be MetOp-2, scheduled for 2011. The increased capabilities of Argos-3 should significantly improve the performance of existing Argos equipped meteorological stations. Argos-3 platforms are able to transmit more data with a secured data collection, enjoy longer lifetimes and can be remotely controlled (two-way). The real time data distribution of XBT through Argos-3 could be evaluated with the high data rate capability to transfer high-density XBT profiles. The CLS offered to assist the SOT in case it wished to evaluate these new capabilities through a dedicated SOT-SOOP program. The meeting invited SOOP operators interested in testing Argos-3 to make direct contacts with CLS (***action; SOOP operators; SOT-VI***).

I-5.2.3.3 The Team noted that CLS had improved the Argos processing system and was now able to decode most GPS manufacturer formats and provide GPS positions in real time. Since 2008 GTS, processing time has been improved (by nearly 10 minutes). The Team noted that CLS

was now an Iridium Value Added Reseller (VAR) and had Iridium and Argos data processing capabilities, including for GTS distribution purposes (e.g. BUFR).

I-5.2.3.4 As already done with DBCP and Argo program, CLS is gradually improving the cooperation with SOT program through its day-to-day links with JCOMMOPS and Argos users.

I-5.2.3.5 The Team noted that despite an increasing number of platforms using Iridium to report meteorological or oceanographic data, there has been no decrease noted with regard to the number of platforms reporting through Argos. CLS explained that the global number of Argos platforms is still increasing: meteorological or oceanographic platforms (drifters and Argo floats mainly) are stable (6 700 seen each month, see presentation) and that the biology segment using very small low-power transmitters is growing fast (6,200 PTTs seen each month). Argos has never played a significant role in VOS and thus is not impacted by the use of Iridium, but since CLS is, an Iridium VAR would happy to help in this field.

I-5.2.4 Iridium

I-5.2.4.1 Dan Mercer (Vice President & General Manager, Europe, Middle East, Africa & Russia, Iridium Satellite, LLC) presented a report on the status and operational use of Iridium low earth orbit satellites.

I-5.2.5 Review of satellite data telecommunication systems

I-5.2.5.1 David Meldrum, Chairperson of the Data Buoy Cooperation Panel (DBCP) presented an overview of the current status of mobile satellite systems relevant to SOT operations and data collection activities. The review included description of candidate satellite systems sorted out by (i) geostationary earth orbit (GEO) satellites such as Inmarsat D+, Inmarsat Broadband Global Area Network (BGAN), Data Collection Platforms (DBCP e.g. GEOS, METEOSAT), and Inmarsat Mini-M, Inmarsat C & Mini-C, (ii) mid-altitude earth orbit (MEO) satellites such as New ICO, and (iii) low earth orbit (LEO) satellites such as Argos, Orbcomm, Iridium, and Globalstar.

I-5.2.5.2 Mr Meldrum also provided a comparison of message-based systems outlining characteristics such as message size, airtime cost, monthly price, terminal power consumption, availability of two-way communication, polar coverage beyond the reach of geostationary satellites, data rate, time to send one message, and delivery time.

I-5.2.5.3 The Team agreed that the experience of the DBCP with regard to collection of observational data, data processing, Quality Control, and GTS distribution should be followed in order to avoid the problems that the DBCP faced in its early days concerning the existence of multiple GTS insertion points for data collected via the Argos System. While Iridium is increasingly being used, and specific data processing systems developed, DBCP solutions could help prevent such problems.

I-5.3 WMO Integrated Global Observing Systems (WIGOS)

I-5.3.1 The WMO Secretariat reported on the development of the WMO Integrated Global Observing Systems (WIGOS) and recalled that the WMO Fifteenth Congress (Cg-XV) agreed on establishing a comprehensive, coordinated, and sustainable system of observing systems with ensured access to its component observing systems' data and products through interoperable arrangements (Res. 30 – Cg-XV). Congress recommended to initiate five Pilot Projects, one of which being the integration of marine and other appropriate oceanographic observations into the Global Observing System (GOS). The Fifty-ninth WMO Executive Council (EC-LIX) (Geneva, Switzerland, 28-30 May 2007), established a Working Group on WIGOS and WIS (EC WG WIGOS-WIS) to follow the development of an over-arching WIGOS Development and Implementation Plan, and also to review the progress in the implementation of WIGOS / WIS "Pilot Projects".

I-5.3.2 The Team noted that WIGOS / WIS will address all WMO Programmes and Co-sponsored programmes requirements, ensure availability of required information, meet data quality standards, and facilitate access in real / quasi-real time as well as to archived information. JCOMM responded quite pro-actively to the challenge proposed by the Congress and Executive Council and drafted an ambitious WIGOS Pilot Project for JCOMM as an important contribution to the development of WIGOS / WIS respecting the ownership of partner organizations regarding their components of the observing system. The Pilot Project is expected to demonstrate the strong and growing level of collaboration and coordination between the WMO and IOC stakeholders both striving to enhance and sustain global ocean observing networks and provide free and unrestricted data access in line with their respective data policies.

I-5.3.3 The Pilot Project for the integration of marine and other appropriate observations into the GOS, also named WIGOS Pilot Project for JCOMM, has been working pro-actively since WMO Cg-XV for developing its Project and Implementation Plans. The deliverables of the WIGOS Pilot Project for JCOMM are: (i) to promote and document instrument best practices and related standards, (ii) build marine data systems that are interoperable with WIS and (ii) promote quality management and standards. The Pilot Project multi-disciplinary approach will permit the provision of consistent, coherent, timelier and better quality data and products, while at the same time minimizing duplication.

I-5.3.4 The Team noted that the Sixtieth WMO Executive Council (EC-LX) urged Members to participate actively in the Pilot Project and engage in active cooperation with the oceanographic data centres in order to ensure the development or interoperable arrangements between their data systems and the WIS. The Council also recognized the importance of JCOMM's decision as part of its ongoing mandate to produce a catalogue of existing standards and best practices in marine meteorology and oceanography in connection with observing systems and exchange of observations. It urged Members to consider providing assistance to this effort as a contribution to the WMO Quality Management Framework. Given the need for continuous operation of a global ocean observing system in support, inter alia, of coupled ocean-atmosphere climate modelling and operational ocean prediction, as well as the limited lifetime of individual platforms, data buoys, floats, ship-based and bottom-mounted systems, the Council urged Members to establish a system of national ocean centres or services dedicated to the implementation and maintenance of ocean observing systems and to improve cooperative support and coordination through the JCOMM.

I-5.3.5 The Team noted the outcome and recommendations from the ad hoc planning meeting for the JCOMM Pilot Project for WIGOS (Ostend, Belgium, 29 March 2008), and the meeting of the joint Steering Group that followed (Geneva, Switzerland, 18-19 September 2008). The Team noted with appreciation that it had already contributed quite actively to the Pilot Project. For example, the SOT Task Team on Instrument Standards has proposed changes to the WMO Guide to Meteorological Instrument and Methods of Observation (WMO No. 8). These have been reviewed and approved by the Joint Steering Group, Chung-Chu Teng (NDBC, USA), JCOMM focal point on CIMO matters, and by Peter Dexter (BOM, Australia), JCOMM Co-President. The changes have then been submitted to the sixth Session of the CIMO Management Group (St. Petersburg, 25-26 November 2008). Nicola Scott, United Kingdom GCC, is also a member of the Pilot Project joint Steering Group, assisting in the making of the VOS delayed mode data available via the WIS. The Team is also actively contributing through (i) e-logbook intercomparison, (ii) XBT fall rate evaluation, and (ii) the collection and exchange of ship and instrument metadata through WMO Pub47, JCOMMOPS, the Water Temperature Metadata Pilot Project (META-T), and the ODAS Metadata Service (ODASMS) operated by the National Marine Data and Information Service (NMDIS – China).

I-5.3.6 The Team agreed that additional efforts by Team Members should be made for achieving a better integration of SOT Best Practices and Standards into the WIGOS. This objective can be achieved through:

(i) Contributing to the development of WIGOS Best Practices and Standards, e.g. providing input to WMO Publications No. 544 – Manual on the GOS – , No. 488 – Guide

on the GOS – , and No. 8 – WMO Guide on Meteorological Instruments and Methods of Observation –. The Team requested the Task Team on Instrument Standards to keep under review these Publications and make proposals through the WMO Secretariat and the JCOMM Focal Point on CIMO matters if necessary (***action; TT-IS; ongoing***);

(ii) Implementing those WIGOS agreed upon Best Practices and standards, and in particular, to provide the ship platform / instrument metadata to Pub47, JCOMMOPS, META-T servers, and the ODASMS as appropriate (***action; Team members; ongoing***); and

(iii) Contributing to the development of specialized and / or regional marine Instrument Centres or assist candidate instrument centres as appropriate (***action; Members; mid-2009***).

I-5.3.7 The Team invited its members to check the Pilot Project implementation plan[1] and identify how they could practically contribute to the Pilot Project (***action; Team members; ongoing***).

I-6. Programme promotion, and information exchange

I-6.1 SOT Annual report

I-6.1.1 The Team noted that the SOT Annual report for 2007 was compiled by the WMO Secretariat and published on CD-Rom as JCOMM Technical Report No. 41 (WMO/TD-No. 1431). The CD-ROM also includes the DBCP Technical Document No. 33 (DBCP Annual report for 2007) as well as the DBCP Technical Document No. 32 (Presentations at the DBCP Scientific and Technical Workshop, Jeju, Republic of Korea, 15-16 October 2007). The SOT Annual report for 2007 is also available via the web[2].

I-6.1.2 The annual report contains a list of national reports that have been submitted to the Secretariat, as well as RSMC and VOSClim RTMC monitoring reports, the reports by the Task Teams, the status of Global VOS Automation as at December 2008, and URLs of web pages of interest (e.g. contact points listed on the JCOMM web site). The annual report for 2008 is about to be compiled on CD-ROM (JCOMM Technical Report No. 46, WMO/TD-No. 1459) using the same structure as the previous issue.

I-6.1.3 The Team requested the VOSP, SOOPIP, and ASAP TT Chairpersons to comment and provide feedback to the SOT Chairperson regarding the format of the National Report (***action; VOSP, SOOPIP, ASAP TT chairs; asap***).

I-6.2.1 JCOMMOPS web sites and information exchange, including SOT web site

I-6.2.1.1 Mr. Mathieu Belbéoch reported on the status of the websites maintained at JCOMMOPS including the following:

Web site	*URL*
JCOMMOPS	http://www.jcommops.org/
SOT	http://sot.jcommops.org
SOOPIP	http://www.jcommops.org/soopip/
VOS	http://www.bom.gov.au/jcomm/vos/
ASAP	http://www.jcommops.org/sot/asap/

I-6.2.1.2 He presented the web mapping applications supported by JCOMMOPS as well as recent developments for the SOT, SOOPIP, and ASAP Websites.

1: http://www.wmo.int/pages/prog/www/wigos/documents/Impl_Plan_JCOMM.pdf
2: ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-TR/J-TR-41-SOT-ANN-2007/index.html

I-6.2.1.3 The Team noted that JCOMMOPS Website was further developed with news Items added and meeting records included. JCOMMOPS and SOT web pages were updated to include links to the SOT Flyer, VOS Brochure and Certificate of Appreciation and the SOT Recruitment presentation on the SOT web. Extra information about ASAP was added to the VOS section. A link to the 'Callsign Masking instructions' was added on the SOT website. JCOMMOPS did also set up a secure FTP site for the Ship Callsigns Masked by Europe and Australia. JCOMMOPS began writing a specification for a new JCOMMOPS website, which will include new SOT and SOOPIP sites with better usability and consistency.

I-6.2.1.4 The Team noted that in order to, better understand the audience of the JCOMMOPS websites, Google Analytics tracking tool was implemented for the JCOMMOPS, DBCP and SOOP websites.

I-6.2.1.5 JCOMMOPS also updated the draft ASAP website to include links to the ASAP brochure, ASAP monitoring, and a new document for Guidance on ASAP recruitment (based on input provided by the UK Met Office, Sarah North).

I-6.2.1.6 The meeting noted that JCOMMOPS worked with IRD/IFREMER to discontinue to old URL of the SOOPIP website, which was no longer needed. Minor changes were made to the SOOP web pages for a more consistent look and feel. The documentation on the SOOPIP website relating to Best Practices was updated. Three new links were added on the front page to direct users to the relevant materials, being prepared within NODC relating to XBT intercomparison, XBT quality monitoring and XBT fall rate Equation issues. The Best Practices and Publications page was updated; and information added to the SOT and SOOP websites about Quality Monitoring procedures.

I-6.2.1.7 The SOOP Annual Line Sampling Report interactive map was updated for the 2007 SOOP report and to include all of the Sampling Success assessments from 2005 onwards. The web application for the SOOP sampling indicators used in the SOOP Annual Sampling Report 2007 was modified so that each line would consist of just a link to the web, which would then generate the sampling information on-the-fly, This improves the efficiency of generating and using the report significantly. This process involved developing the capability on the SOOP Sampling Webpage (known as a Direct Action) to call for the results for any SOOP line from the annual report dynamically. This functionality can be used to simplify the annual report for 2007 onwards.

I-6.2.1.8 Mr Belbéoch reported that JCOMMOPS had provided text files for all previous years of SOOPIP metadata from the JCOMMOPS database (based on the Metadata reported annually in March by SOOP operators) - it is up until 31/12/2007. This is to be provided every year (***action; JCOMMOPS; ongoing***).

I-6.2.1.9 The interface of the QC Relay tool was updated in response to requests from several users.

I-6.2.2 VOS website

I-6.2.2.1 Mr G. Ball, webmaster of the JCOMM VOS website[1], reported on the status of the website.

I-6.2.2.2 The report included a brief background about the development of the website, an outline of the website's structure, a chronology of changes to the website since SOT-IV and possible future improvements or changes to the website.

I-6.2.2.3 The JCOMM VOS website is a valuable resource for VOS Programme Managers and PMOs, and a source of general information about the VOS Scheme to interested visitors, ship owners and shipping companies.

1: http://www.bom.gov.au/jcomm/vos/

I-6.2.2.4 Mr Ball reported that as well as adding a range of new metadata collection and reporting tools, adding new documents and instructions, and updating many existing documents, the other major change during the inter-sessional period was a complete re-design and re-structuring of the website. The website also now features the new VOS logo.

I-6.2.2.5 The contents of the website is now organised into five sections:

1. VOS Scheme
2. Port Meteorological Officers
3. Supplementary Programmes
4. Resources
5. Information & Links

I-6.2.2.6 Mr Ball reported on a recent addition to the VOS website created in Google Earth entitled “find a PMO”. Mr Ball requested members to examine the application, to provide updates to the details as necessary, and to provide photographs of PMOs for inclusion in the fly-out details.

I-6.2.3 VOSClim website

I-6.2.3.1 The team recalled that the VOSClim web page was maintained by the National Climatic Data Center (acting as the DAC for the VOS Climate Project). The VOSClim web page retains its user-friendly format and continues to receive positive feedback from researchers and others interested in the VOSClim project. Only minor updates to links and additions of new data files and stats have taken place since SOT-IV. The overall layout of the web page remains the same.

I-6.2.3.2 The home page for the VOSClim project[1] and links from this location are provided to all other pertinent VOSClim information:

- Data access is located on the Project Datasets webpage and ftp server (insert page here);
- The project ship list containing all participating vessels (active, withdrawn and self-recruited) as well as links to ship photographs and WMO metadata listings (Pub47) can be accessed on the Ship information web page;
- Monthly statistics and suspect ship lists produced by the UK Real Time Monitoring Center are found on the Data Monitoring web page;
- Self-recruited ships point to be added here;
- Project documents and promotional material can be located on the Project Documents web page;
- Finally, links to format documentation, datasets, institutions and other related web pages are located on the Links web page.

I-6.2.4 Marine Observers Log (Wikilog)

I-6.2.4.1 The Team recalled that the Marine Observers Log[2], kindly hosted by Météo France, was created in 2006 for reporting additional phenomena observations received from (i) Ships Meteorological Logbooks, including observations logged using electronic logbooks, and (ii) Individual marine observations and correspondence received from observers or individuals. The log is primarily intended for reports from observers participating in the VOS Scheme and is typically used to report phenomena such as e.g.

- Thunderstorms, hurricanes, typhoons, depressions and squalls
- Waterspouts and funnel clouds
- Electrical phenomena and thunderstorms

1: http://www.ncdc.noaa.gov/oa/climate/vosclim/vosclim.html
2: http://esurfmar.meteo.fr/wikilog/

- Currents, tide rips, whirlpools, disturbed water and freak waves
- Whales, dolphins and other mammals such as seals
- Birds, bats, insects etc observed on board
- Fish, sea snakes, turtles and other marine life
- Bioluminescence, milky seas, phosphorescent wheels
- Optical phenomena such as haloes, rainbows, fogbows, coronae, refraction etc.
- Crepuscular rays, 'flash' phenomena and noctiluscent clouds
- Comets, meteors, meteorite showers, eclipses etc.
- Sunspots, aurora, satellites and 'UFO's'

I-6.2.4.2 The Team noted that no major changes had been made to the structure of the web site since in was established. Phenomena have been recorded on the web site by the United Kingdom, the Netherlands, and on one occasion by Australia. Météo-France is not responsible for the web site content and phenomena are entered on a voluntary basis.

I-6.2.4.3 Persons submitting material for inclusion on the log, or seeking to reproduce material, reports, sketches, photos or other illustrations appearing on this Wiki site should observe the copyright provisions given in the website.

I-6.2.4.4 The Team invited its members and Port Meteorological Officers to encourage marine observers to provide reports suitable for adding to the Marine Observers Log (***action; SOT members & PMOs; ongoing***).

I-6.3 Focal point mailing lists

I-6.3.1 The Team noted that the SOT, VOS, VOSClim, PMO, and SOOPIP contact lists were being maintained by the Secretariat on the JCOMM web site[1]. JCOMMOPS also maintains the corresponding electronic mailing lists as below. All members of the SOOP and VOS lists now appear in the SOT general mailing list. All lists were crosschecked against groups and contact lists on the website JCOMM web site to ensure that they are consistent.

List	*Email address*
General SOT contact points	sot@jcommops.org
VOS focal points	vos@jcommops.org
VOSClim focal points	vosclim@jcommops.org
SOOPIP focal points	soopip@jcommops.org
Useful PMO contact points	pmo@jcommops.org
New list added in 2008 for the SOT Task Team on ship callsign masking	sot-tt-masking@jcommops.org

I-6.3.2 The Team requested JCOMMOPS to create mailing lists for each of the SOT Task Team (***action; JCOMMOPS; asap***)

I-6.4 Publications and brochures

I-7.5.1 The Team took note of the range of material available on the websites (see item I-6.2).

I-7. Organizational matters

I-7.1. Review of the SOT Management Team

I-7.1.1 Mr. G. Ball, Chair of the SOT, presented a review of the SOT Management Team.

1: http://www.jcomm.info

I-7.1.2 Mr Ball reminded the Team that the positions of the Chairs, of SOT, VOSP and the SOOPIP were all of a 4-year appointment by JCOMM, and will be reviewed at JCOMM-III, November 2009. The Team was invited to endorse the re-nomination of the incumbent chairs, or nominate new candidates for one or more of the positions.

Action: *The Team endorsed the re-nomination of Mr G. Ball as Chair of SOT, Ms J Fletcher as Chair of VOSP, and Mr G. Goni as the Chair of SOOPIP.*

I-7.1.3 Mr Ball described the recent re-organization at JCOMMOPS to take on a coordinating role for OceanSITES and the subsequent re-allocation of TC duties. He reminded the Team that the SOT-IV defined the role of the SOT TC as "*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-7.1.4 Mr Ball outlined the functions of the SOT TC and highlighted some new work requirements proposed by the SOT Chair and the sub-panel chairs.

Action: *The Team endorsed the additional requirements proposed by the Chair of SOT and the sub-panel Chairs.*

I-7.1.5 Mr Ball reminded the Team that the SOT TC is employed and supervised by UNESCO, whilst the Chair of the SOT provides technical guidance and prioritising of tasks.

I-7.2. Funding issues

I-7.2.1 SOT Technical Coordinator

I-7.2.1.1 As reported by the chairperson under agenda item I-2.3, funding for the SOT Technical Coordinator is managed through the DBCP. Contributions for the position are made via the DBCP Trust Fund operated by WMO. Commitments to the DBCP Trust fund for 2009 are reproduced in ***Annex XVI***.

I-7.2.1.2 The Team noted that the DBCP, Argo, and the SOT share some of the expenditures such as logistical support, and JCOMMOPS Information System developments. However, there is no provision now in the DBCP budget for expenses related to missions of the SOT Technical Coordinator.

I-7.2.1.3 The Team agreed that contributions for the SOT TC would continue to be made to the DBCP, and invited the DBCP to record the SOT TC mission expenses as a separate line item (***action; DBCP; DBCP-25***). Considering the shared expenses, and actual contributions towards JCOMMOPS as a whole, and the SOT in particular, the Team asked the SOT Chairperson to negotiate with the DBCP Chairperson the amount that should be allocated to the proposed "SOT TC mission" line item, as well any funds that might be transferred to the Argo Trust Fund at IOC to compensate for the resulting deficit of support that Argo is receiving form its Technical Coordinator. This will be discussed at the next DBCP Session in view to make an agreeable proposal (***action; SOT Chairperson; asap***).

I-7.2.1.4 The Team recalled that the DBCP/SOT Trust Fund was running at zero nominal growth in the last few years and invited contributing members to consider increasing their contribution. It also invited non-contributing members to contribute to the Trust Fund.

I-7.2.2 Ship Consumables Trust Fund

I-7.2.2.1 The Team recalled Recommendation 3 (JCOMM-II, Halifax, Canada, September 2005), *Consumables for Ship-Based Observations*, which effectively established a common fund for ship consumables. This common fund will provide, Member States with a mechanism to pool financial

resources for international programmes, therefore being able to take advantage of increased purchasing power to deliver (i.) better price for consumables, and (ii.) increased quantity of consumables, thus enabling developing programmes to take advantage of any surplus consumables. Whilst the Trust Fund is initially focusing on XBT probes, other expendables could be added in the future.

I-7.2.2.2 The Team noted that no contribution had been made to the Ship Consumables Trust Fund at this point. Countries were urged by the Team to consider contributing to the Trust Fund, which is administered by the WMO (***action; SOT members; ongoing***).

I-7.2.3 ASAP Trust Fund

I-7.2.3.1 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 the Fourteenth Session of the ASAP Panel (ASAPP-XIV, SOT-II, London, United Kingdom, 2003), this Trust Fund was used to support the Worldwide Recurring ASAP Project (WRAP), including the contract for project leader.

I-7.2.3.2 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 XVII***. The Team noted that no expenditure was made since the last SOT Session.

I-7.2.3.3 The Team agreed that no additional contributions were needed at this point.

I-7.2.3.4 The Team recalled the decision made at SOT-IV that the Australian Bureau of Meteorology (BOM) should eventually be reimbursed for the unspent funds corresponding to the substantial unspent contribution by Australia for the WRAP - due to the termination of the WRAP. The BOM Representative proposed to leave the unspent Australian funds (i.e. CHF 46,115) in the ASAP Trust Fund, provided these could be used for the benefit of the BOM as deemed appropriate by the incumbent BOM SOT Focal Point. The ASAP Panel agreed with these conditions.

I-7.2.3.5 Regarding the remaining funds in the ASAP Trust Fund, after subtracting the BOM contribution, the ASAP Panel also agreed at the SOT-IV to use the residual money for the design, editing, printing, and distribution of the new ASAP brochure. The ASAP Panel had also agreed that the remaining funds 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. Noting that no expenditures had been made during the last intersessional period in this regard, the Team agreed again with these decisions.

I-7.3 Review the Terms of Reference of the SOT

I-7.3.1 The Team recalled 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. Some further minor changes were proposed by the Secretariat in consultation with the Chairpersons of SOT, VOSP, ASAPP, and SOOPIP, to mention the ASAP Programme – which is continued - while the ASAP Panel is indeed being discontinued. The new Terms of Reference will have to be approved by JCOMM-III. The Team approved those changes and requested the Secretariat to submit the proposed revised version of TORs to JCOMM-III for consideration and approval (***Annex XVIII***). (***action; Secretariat; asap***).

I-7.4 Status of ASAP Panel

I-7.4.1 The Team noted that the ASAP Panel would still formally exist until decided otherwise by JCOMM and, until JCOMM-III recommendations are approved by the following WMO Executive

Council (mid-2010) at the earliest. The ASAP Programme will continue to exist until decided otherwise by the WMO Executive Council. The Team agreed that the ASAP Task Team established at SOT-IV was an effective mechanism for running the ASAP Programme.

I-7.5 Status of the VOSClim and Satellite Telecommunication Systems Task Teams

I-7.5.1 The Team noted that Sarah North was stepping down from the Chair of the VOSClim and Satellite Telecommunication Systems Task Teams.

I-7.5.2 Considering the changing nature of the VOSClim Project with its integration as part of the wider VOS, and considering that data management was now becoming more important for the data processing and monitoring of VOSClim data, the Team decided to change the Task Team Terms of Reference accordingly. South Africa was invited to join the Task Team. The Team unanimously elected Alan Hall for Chairing the VOSClim Task Team.

I-7.5.3 The Team agreed that the Iridium Task Team should be merged with the Satellite Telecommunication Systems Task Team. The Team unanimously elected Pierre Blouch for Chairing the Satellite Telecommunication Systems Task Team.

I-7.5.4 The new agreed upon Terms of Reference and memberships of the SOT Task Teams are provided in ***Annex IV***.

I-8. Next Session of the SOT

I-8.1 The Team noted the kind offer from Australia to tentatively, host the next SOT meeting in Perth, in April or May 2011. The Team agreed to tentatively, accept the offer of hosting the next SOT Session as proposed by Australia.

V. National reports

V-1 Ms Gerie Lynn Lavigne (Meteorological Services Canada) chaired the National Reports session. Written reports were presented by Argentina, Australia, Brazil, Canada, Denmark, France, Germany, Greece, Hong-Kong-China, India, Italy, Japan, the Republic of Korea, Malaysia, New Zealand, Pakistan, Poland, Romania, Russian Federation, Singapore, South Africa, Spain, Sweden, Tanzania, Thailand, the Netherlands, United Kingdom, and the USA. Additionally, a written report was submitted by E-SURFMAR[1]. These reports[2], included in the SOT Annual Report for 2008 (JCOMM Technical Report No. 46) summarized all the relevant activities in each country for all ship-based observations, including: the national objectives, planned activities, mechanisms for coordination between participating national agencies, instrumentation, new developments, data management, associated R&D 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.

V-2 In addition, the following national presentations were made during the meeting:

- Australia, presented by Mr Graeme Ball (VOS, SOOP)
- Canada, presented by Ms Gerie Lynn Lavigne (VOS)
- France, presented by Ms Vinciane Unger (VOS), and Mr Mathieu Belbéoch (on behalf of Mr Loic Petit de la Villeon for SOOP, including XBT, pCO_2, and TSG)

1: EUMETNET is the Conference of European Meteorological Services. E-SURFMAR and E-ASAP are two operational programmes of the ground based EUMETNET Composite Observing System (EUCOS). Although E-ASAP is a mandatory programme, seventeen EUMETNET Members are participating in E-SURFMAR which is optional. E-SURFMAR (Surface Marine Programme) concerns the European VOS and Data Buoys. EUMETNET members are Austria, Belgium, Croatia, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Luxembourg, Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland, and United Kingdom.
2: ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-TR/J-TR-46-SOT-ANN-2008/national_reports.html

- Germany, presented by Mr Volker Weidner (VOS, and SOOP on behalf of Dr Birgit Klein)
- India, presented by Dr V.V. Gopalakrishna (SOOP)
- Italy, presented by Mr Franco Reseghetti (SOOP)
- Japan, presented by Mr Hiraishi Naotaka (VOS, SOOP, ASAP)
- New Zealand, presented by Ms Julie Fletcher (VOS)
- South Africa, presented by Mr Johan Stander (VOS, SOOP, and ASAP)
- UK, presented by Ms Sarah North (VOS, ASAP)
- USA, presented by Mr Robert Luke (VOS), and Dr Gustavo Goni (SOOP)

V-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 2008 (***action; Secretariat; asap***).

I-9. Review of the SOT-V Session report, action items and recommendations

I-9.1 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 XXI***.

I-10. Closure of the Session

I-10.1 The Chairperson congratulated the Team for the meeting's achievements. He thanked the participants of the meeting, his co-chairs, and the Secretariat for their support. The Secretariat Representative thanked the SOT Chairperson, the VOSP, and SOOPIP Chairpersons, and the participants of the meeting for their contributions to this Session and the activities of the SOT. The Fifth Session of the Ship Observations Team closed at 17:30 pm on Friday 22 May 2009.

ANNEX I

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ANNEX II

AGENDA

I(a). SOT-V COMMON SESSION I(a)

I-1. ORGANIZATION OF THE SESSION

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

II. SOT-V SESSION II - SCIENTIFIC AND TECHNICAL WORKSHOP, NEW DEVELOPMENTS

I(b). SOT-V COMMON SESSION I(b)

I.2. REPORTS BY THE SECRETARIAT, OPA COORDINATOR, SOT CHAIRPERSON AND SOT TECHNICAL CO-ORDINATOR

I-2.1 Report from the Secretariat
I-2.2 Report from the Observations Programme Area Coordinator
I-2.3 Report from the SOT Chairperson
I-2.4 Review of Action Items from SOT-IV
I-2.5 Report from the SOT Technical Co-ordinator

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 Observing Panel for Climate (OOPC)
- I-3.1.2 Use of VOS data in climate products
- I-3.1.3 Rolling Review of Requirements
- I-3.1.4 Platform/Instrument metadata requirements and META-T

I-3.2 Reports by associated programmes

- I-3.2.1 International Ocean Carbon Coordination Project (IOCCP)
- I-3.2.2 Shipboard Automated Meteorological and Oceanographic System Project (SAMOS)
- I-3.2.3 Global High-Resolution SST Pilot Project (GHRSST)
- I-3.2.4 Ferrybox Project
- I-3.2.5 SeaKeepers Society
- I-3.2.6 Alliance for Coastal Technologies (ACT)
- I-3.2.7 Proposed SCOR Panel on Merchant Marine Instrumented Oceanographic Surveys
- I-3.2.8 The Oceanoscientific Campaign

I-4. REPORTS AND RECOMMENDATIONS BY TASK TEAMS

I-4.1 Task Team on Satellite Communication Systems
I-4.2 Task Team on SOT Iridium Pilot Project
I-4.3 Task Team on ASAP
I-4.4 Task Team on VOS Recruitment and Programme Promotion
I-4.5 Task Team on Metadata for WMO-No. 47
I-4.6 Task Team on Coding
I-4.7 Task Team on Instrument Standards

I-4.8 Task Team on Call Sign Masking and Encoding
I-4.9 Task Team on VOSClim

III. SOT-V SESSION III - SIXTH SESSION OF THE VOS PANEL (VOSP-VI)

III-1. PROGRAMME REVIEW

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

III-2. PROGRAMME IMPLEMENTATION

III-2.1 VOS automation and electronic logbook software

III-2.1.1 Status of VOS automation

III-2.2 Report on the E-SURFMAR VOS Technical Advisory Group (VOS-TAG)
III-2.3 Port Meteorological Officers (PMOs)

III-2.3.1 Status of PMO global network

III-2.4 Monitoring tools

III-2.4.1 VOS quality monitoring tools, multi-recruit tool

III-2.5 Metadata and Reporting tools

III-2.5.1 VOS Pub-47 metadata generation tools

III-3. MONITORING AND DATA MANAGEMENT

III-3.1 Regional Specialized Meteorological Centre (RSMC), Exeter, VOS monitoring report
III-3.2 Real-Time Monitoring Centre (RTMC) for the VOSClim project monitoring report
III-3.3 ASAP QC Monitoring report
III-3.4 Global Collecting Centres (GCC) report on the VOS and VOSClim
III-3.5 Review of the Marine Climatological Summaries Scheme (MCSS)
III-3.6 VOSClim Data Assembly Centre (DAC) report

III-4. ISSUES FOR THE VOS

III-4.1 VOSClim – project status – results / implications for the wider VOS
III-4.2 IMO – report on WMO / IMO actions, progress on MSC circular, etc.
III-4.3 Proposed Ship ID for SOT
III-4.4 Technology challenges

III-4.4.1 AIS, LRIT
III-4.4.2 hg replacement
III-4.4.3 Solutions for lack of floppy drive in Inmarsat terminals

III-4.5 Review of VOS Classes

III-5. FUTURE WORK PROGRAMME AND IMPLEMENTATION ISSUES

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

III-6. ORGANIZATIONAL MATTERS

III-6.1 Review the Terms of Reference of the VOSP

IV. SOT-V SESSION IV - EIGHTH SESSION OF THE SOOP IMPLEMENTATION PANEL (SOOPIP-VIII)

IV-1. PROGRAM REVIEW

IV-1.1 Report by the SOOPIP Chairperson

IV-2. PROGRAM IMPLEMENTATION

IV-2.1 Review of Action Items from SOOPIP-VII
IV-2.2 Status of Current Sampling Program
IV-2.3 Review of XBT Transect Responsibilities
IV-2.4 JCOMM/SOT Pool of XBT Probes
IV-2.5 Thermosalinograph (TSG) Operations
IV-2.6 Oleander Project
IV-2.7 Argo

IV-3. MONITORING AND DATA MANAGEMENT

IV-3.1 Review of 2007 Surveys, Semestrial Reports and JCOMMOPS Data Base
IV-3.2 XBT and TSG BUFR Data Testing
IV-3.3 Global Temperature and Salinity Profile Programme (GTSPP)
IV-3.4 Global Ocean Surface Underway data Pilot Project (GOSUD)
IV-3.5 Global temperature data distribution by Coriolis

IV-4. ISSUES FOR THE SOOP

IV-4.1 Future Global Requirements: Evaluation of the XBT Network
IV-4.2 XBT Operational Platforms
IV-4.3 Monthly Reports on XBT code and data quality
IV-4.4 XBT Data Tracking
IV-4.5 Devil XBT Iridium Operations

IV-5. FUTURE WORK PROGRAMME

IV-5.1 Explanation of the Depth and Temperature Biases in XBTs
IV-5.2 Results from 3 XBT/CTD comparison tests in the Bay of Bengal and Arabian Sea
IV-5.3 One Year after the Miami XBT Fall Rate Equation Meeting: Status of knowledge
IV-5.4 Review of Terms of Reference
IV-5.5 Review of the membership of the SOOP
IV-5.6 Continuation of SOOP-VIII Action items and new Action Items

I(c). SOT-V COMMON SESSION I(c)

I-5. SUPPORT INFRASTRUCTURE

I-5.1 JCOMM in situ Observing Platform Support Centre (JCOMMOPS) and future Observing Programme Support Centre (OPSC)
I-5.2 Telecommunication facilities

I-5.2.1 Inmarsat and IMSO
I-5.2.2 EUMETSAT
I-5.2.3 Argos
I-5.2.4 Iridium

I-5.2.5 Review of satellite data telecommunication systems

I-5.3 WMO Integrated Global Observing Systems (WIGOS)

I-6. PROGRAMME PROMOTION, AND INFORMATION EXCHANGE

I-6.1 SOT Annual Report
I-6.2 Websites
I-6.3 Focal Point mailing lists
I-6.4 Publications and brochures

I-7. ORGANIZATIONAL MATTERS

I-7.1 Review of the SOT Management Team (including the role of the SOT Technical Co-ordinator)
I-7.2 Funding issues (SOT Technical Co-ordinator, Ship Consumables Trust Fund, ASAP Trust Fund)
I-7.3 Review the Terms of Reference of the SOT, VOSP, and SOOPIP
I-7.4 Status of ASAP Panel
I-7.5 Status of the Task Team on Satellite Communication Systems, and the Task Team on the Iridium Pilot Project

I-8. NEXT SESSION OF THE SOT

V. SOT-V SESSION V - NATIONAL REPORTS

I(d). SOT-V COMMON SESSION I(d)

I-9. REVIEW OF THE SOT-V SESSION REPORT, ACTION ITEMS AND RECOMMENDATIONS

I-10. CLOSURE OF THE SESSION

ANNEX III

ABSTRACTS OF PRESENTATIONS MADE AT THE TECHNICAL AND SCIENTIFIC WORKSHOP

During the fifth Session of the JCOMM Ship Observations Team (SOT)
Geneva, Switzerland, Monday 18 May 2009 (9h30 - 12h30)

New initiatives and/or new developments in shipboard meteorological or oceanographic instrumentation, observing practices, data management procedures, quality control and ocean products.

1. New developments / Updates in VOS Electronic logbook software - *By Naotaka Hiraishi, Japan Meteorological Agency (JMA), Japan*

New developments / Updates in OBSJMA for WIN

OBSJMA for WIN is a software application designed to assist in encoding marine meteorological observational data easily and accurately on Windows PCs. The Japan Meteorological Agency (JMA) has distributed it to Japanese VOS free of charge since September 2002.

In March 2009, the JMA started to distribute the latest OBSJMA for WIN Version 2.00.

OBSJMA for WIN Version 2.00 can work with Windows Vista OS. In addition, it has new added features including a more detailed pressure correction scheme for accurate reporting. The outlines of the upgrade will be described at the meeting.

2. New developments / Updates in SOOP software - *By Gustavo Goni, NOAA Atlantic Oceanographic and Meteorological Laboratory (AOML), USA*

2.1 New AOML visual quality control software

The Visual Quality Control (VQC, Figure) is a Graphical User Interface (GUI) developed at AOML Miami that allows a user to approve or reject XBT profiles that have not met the minimum specified standards of the Automatic Quality Control System. Accepted profiles are automatically sent to the GTS. When the operator rejects a profile, the data-flow process automatically receives a message not to place that profile in the GTS. AOML does a VQC for an average of several tens of profiles every month. This can vary dramatically if there are high-density cruises being done or communication problems. A useful advantage of the VQC is the real-time ability to recognize systemic and random problems with the XBT operations that are not identify by the automatic QC. Such problems could be electrical faults in the XBT hand-launchers, or bad weather carrying the XBT wires to contact the hull of the ship. The AOML VQC system is an upgrade of the previous VQC Matlab script used in Silver Spring. The upgrades include incorporating geographical position, proximity to profiles obtained by Argo floats in time or position, and an easy to use GUI. The VQC GUI provides the user with error envelopes corresponding to 5 and 10 standard deviations. Additionally, all flagged profiles in the queue are shown in a secondary graph to easily visually compare physical features. The GUI has user-friendly mouse enabled features such as zoom and profile selection. The system allows for introducing quality control flags, which will be useful once the BUFR format is implemented.

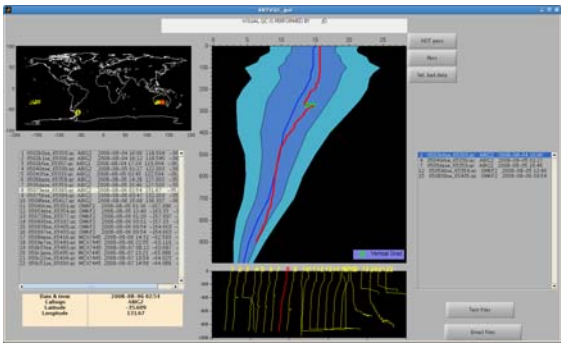


Figure: Screen shot of the new AOML Visual Quality Control (VQC) for XBT profiles. The main graph displays an envelope of 5 and 10 standard deviations, the climatology (blue line) and the XBT profile (red line).

2.2 Implementation of Iridium transmissions in SEAS XBT transects

Most XBT profiles from AOML SEAS operations are transmitted through the Thrane Standard Cunits. In a recent development, the AOML shows it is transmitting via the Iridium exclusively for the XBT and continuous TSG operations on the Oleander (AX32) using a direct Internet connection and SMTP e-mail.

2.3 Implementation of TSG transmission using Iridium in SEAS TSG operations

During 2008, the TSG Iridium transmission system was successfully tested in the M/V Explorer and on the M/V Oleander. The SEAS 2000 software was implemented for easy setup and requires no user input once initiated. The SEAS 2000 software contains a TSG Server (TSG data reader) module, a TSG Transmitter module and a Time Server module.

On these ships, the TSG Server, Transmitter and Time Server software modules reside on the SEAS 2000 computer in the bridge or tech room. The TSG instrument resides in the engine room and outputs data into the TSG junction box. The TSG Server module on the computer collects TSG data from the TSG junction box through a serial cable. An alternative setup would be that the TSG Server computer resides in the engine room with the TSG instrument and passes the TSG data to the TSG transmitter computer via serial or internet cables.

The TSG data is time position stamped in one of two ways. The TSG data could be time/position stamped with a GPS fed directly into the TSG junction box and thus the TSG Server reads in the TSG data with the time stamp. Alternatively, more typically an independent GPS is fed into the serial port of the SEAS 2000 computer and read by the Time Server module, which then time position stamps the TSG data.

Finally, the TSG Transmitter software module receives the time position stamped TSG data from the TSG Server (on the same computer or the engine room SEAS computer). The TSG Transmitter then transmits the data via Iridium at user-selected intervals.

3. VOS metadata tools - *By Graeme Ball, Bureau of Meteorology (BOM), Australia*

Over many years, the Australian Bureau of Meteorology has used paper forms to record VOS metadata at recruitment, and to update the metadata at subsequent ship visits. These metadata are then entered into a database from which a variety of reports, including WMO No. 47, is automatically generated.

Following the changes to WMO No. 47 in July 2007, the VOSClim Form 001, which the Bureau had been using, became ineffectual due to the requirement for additional metadata elements and a different metadata reporting order. The Australian Bureau of Meteorology, through its Marine Operations Group, subsequently developed a Word-based form that could be completed and submitted electronically by its contracted PMAs. Coincident with the changes to WMO No. 47 and the Bureau's intention of reporting its ship's metadata in XML, an Excel-based application was developed to produce the quarterly WMO No. 47 XML metadata exchange file.

The VOS Form VOSP002 and its companion metadata viewer, and the Pub47 XML Generator are all modelled extensively on the equivalent applications used routinely by the Australian Bureau of Meteorology.

4. E-SURFMAR VOS database (overview and demonstrations) - *By Jean-Pierre Kerserho, Météo-France, France*

The VOS metadata is essential for the daily monitoring, performance evaluation and calculation of financial compensations to E-SURFMAR members. A metadata database has therefore been developed to assist with this exercise. Available online, it allows easy management of the Pub. 47 fields. CSV and XML files can be uploaded or downloaded, and the metadata can be updated manually or through the VOSP002 form. The database manages MASK callsign records and permits digital images of the ships and instruments to be uploaded.

European VOS operators submit their updated metadata for addition to the database on a monthly basis. The database is then used to regularly provide WMO with Pub. 47 metadata for E-SURFMAR VOS (every quarter) and to provide JCOMMOPS with the MASK/REAL cross-reference list.

The presentation of the database includes a live online demonstration. Its characteristics and performances are illustrated through a few examples of use.

5. E-SURMAR specifications of AWS (list of recommendations for issuing specifications) - *By Henry Kleta, Deutscher Wetterdienst (DWD), Germany*

In 2008, E-SURFMAR established a task team on shipborne Automated Weather Stations (AWS). The task team is a sub-group of E-SURFMAR's VOS Technical Advisory group.

The main purpose of the task team is to define and agree specifications, which would be used in calls for tender for the procurement of basic and complex AWS used on observing ships recruited by E-SURFMAR participants (European meteorological services).

The task team went over existing systems, current developments, and requirements from participating national meteorological services (NMS), issues concerning the installation and maintenance of such systems, operating costs including amortization of the equipment as well as suitable sensors and communication systems. The possibility for a station to report visual observations (complex AWS) was considered as being optional for the basic AWS.

During the work of the task team, it became clear that the requirements of the participating NMS are covering a very wide range from a very simple AWS to a very complex AWS. Due to this, it was decided that it was not feasible to create one single set of specifications.

Instead, it was decided that a report be issued providing recommendations agreed by the team. These recommendations - based on the requirements of the participating NMS - are shown in the final report. In addition to those recommendations, some specifications are shown as example.

This final report is the subject of the presentation.

6. The Scientific analysis of VOS and VOSClim data (updated report) - *By David I. Berry, National Oceanography Centre (NOC), Southampton, UK, Bruce Ingleby, Met Office, Exeter, UK, and Elizabeth C. Kent, NOC*

The aim of this presentation is to highlight the continued importance of VOS and VOSClim data from a climate research perspective.

The presentation will commence with a review of recent progress made in climate research activities using VOS data, including climate assessments, air-sea interaction studies and satellite validation. Estimates of the uncertainty in gridded fields of the VOS observations will also be presented, demonstrating the impact of the loss of callsign information, and both the quantity and the quality of data on the uncertainty in data fields calculated from VOS.

This will be followed by a review of VOSClim and how it contributes to the wider VOS and the global climate observing system. Results of a recent comparison of observations and model output will also be given. The reports from VOSClim ships are shown to have fewer errors than from ordinary VOS for both air and sea temperatures. The improvements from automated weather systems will also be shown. A number of suggestions will then be made on how to increase the scientific exploitation of the VOSClim dataset.

7. VOS Quality Control Tools at Météo France (overview and demonstration) - *By Pierre Blouch, Météo France, France*

Since Meteo-France became responsible for the European Surface Marine Observations programme of EUMENET (E-SURFMAR), quality control tools developed for the buoys were extended to the ships. During the first few years, air pressure data reported by EUMETNET ships were monitored as a matter of priority. The quality of measurements reported by conventional VOS appears, on average, to be worse than that of the Automated Weather Stations. Human readings often introduce non-systematic errors on sea level pressure observations. Double correction of the pressure height of the barometer above the waterline is a common error, although TurboWin includes warnings to the observers.

Recently, the E-SURFMAR monitoring tools have improved, new features have been included and more parameters are now compared to model analysis. Humidity as well as wave height and period have been added. ECMWF analyses are now used in addition to those of Meteo-France (Arpege model) and a sea/land mask is now applied on all parameters except air pressure. Interpolations of model outputs at the locations of the ships are more representative of the conditions at sea. The height of the anemometer is also used (if present in the metadata) to bring the wind speed measured by the ship at the model level (10 metres) in a standard atmosphere, before comparison.

The presentation of the monitoring tools includes a live online demonstration. The characteristics and performances of the tools are illustrated through a few real-time cases.

ANNEX IV

TERMS OF REFERENCE OF THE SOT TASK TEAMS

Notes: the Task Team on coding no longer exists, and is replaced by an advisory group on table driven codes lead by Frits Koek, and includes the SOT, VOSP, SOOPIP, and ASAP TT Chairpersons. The Task Team on Iridium Pilot Project no longer exists, and is merged into the Task Team on Satellite Communication Systems.

Task Team on Metadata for WMO Publication No. 47 (TT-Pub47)

The Task Team shall:

1. regularly review the WMO Publication No. 47 (Pub47) metadata requirements and make recommendations as appropriate.

2. monitor the receipt of regular Pub47 updates at WMO from participating VOS members.

3. 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 (TT-Satcom)

The Task Team shall:

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

2. work closely with the DBCP Iridium Pilot Project,

3. continue to evaluate the operational use of Iridium Satellite data telecommunication technology for the real-time collection of VOS and SOOP data in support of the OBS, GOOS, GCOS, and Natural Disaster Prevention and Mitigation applications

4. continue to monitor the cost implications of Inmarsat satellite communications sent by Code 41,

5. review all relevant JCOMM Publications to ensure that they are kept up-to-date and comply with the Quality Management terminology,

6. report to the next SOT Session on any relevant issues/proposals.

Members: Members below, plus the following:

Any representatives of countries where LES accepting Code 41 are located

A representative of RA III.

Pierre Blouch (TT Chairperson, E-SURFMAR, and France)
Graeme Ball (Australia)
Julie Fletcher (New Zealand)
Naotaka Hiraishi (Japan)
Frits Koek (Denmark)
Robert Luke (USA)
Gerie Lynn Lavigne (Canada)
Michail Myrsilidis (Greece)
Sarah C. North (United Kingdom)
Derrick Snowden (USA)
Johan Stander (South Africa)

Task Team on VOS Recruitment and Programme Promotion (TT-VRPP)

The Task Team shall:

1. complete 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 'SOT Recruitment Presentation'.

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 2009 Marine Meteorological Services Monitoring Programme, and propose any amendments.

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 (E-SURFMAR, and France)
Sarah North (United Kingdom)
Volker Weidner (Germany)
Gerie Lynn Lavigne (Canada)
Johan Stander (South Africa)
Tom Rossby (URI, USA, advisor).

Task Team on Instrument Standards (TT-IS)

The Task Team shall:

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, and 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. perform intercomparisons as required by SOT Sessions.

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, and Australia)
Pierre Blouch (E-SURFMAR project manager)
Gerie Lynn Lavigne (Canada)
Julie Fletcher (Chairperson of VOSP)
Rudolf Krockauer (E-ASAP Programme Manager)
Sarah North (United Kingdom)
Derrick Snowden (USA)
Shawn Smith (SAMOS, USA)
Henry Kleta (Germany)
Vinciane Unger (France)
Elizabeth Kent (United Kingdom)
Gustavo Goni (USA)
Scott Woodruff (USA)
Johan Stander (South Africa)
Bruce Sumner (associated Member, HMEI)

Task Team on the VOS Climate implementation (TT-VOSClim)

The Task Team shall:

1. coordinate the provision of VOS Climate data and promote its availability to data users;

2. encourage VOS operators, wherever possible, to upgrade existing VOS to VOS Climate Standards;

3. revise VOS Climate ship information and documentation to reflect the integration of the VOS Climate Project into the wider VOS Scheme e.g. update the VOSClim document and promotional brochure, logo, website, and electronic logbook software;

4. review all relevant WMO Technical Regulation, and JCOMM Publications, and make recommendations to JCOMM and CBS as appropriate to ensure that they are kept up to date and reflect the SOT proposal to include VOSClim as a new class of VOS reporting ship as part of the VOS Scheme;

5. in liaison with the scientific advisers, monitor and report on the quality and added value of the observations, model parameters and metadata in the VOSClim datasets.

Members:

Alan Hall (TT Chairperson, USA)
Sarah North (United Kingdom)
Julie Fletcher (VOSP chairperson, New Zealand)
Representatives of participating countries (VOSClim focal points)
Representative of the VOSClim Real Time Monitoring Centre
Representative of DAC
Representatives of the GCCs
Scientific advisers

Task Team on Callsign Masking and Encoding (TT-Masking)

The Task Team shall:

1. oversee the implementation of **MASK, SHIP** 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)
Sarah North (United Kingdom)
WMO Secretariat representative

Task Team on the Automated Shipboard Aerological Programme (TT-ASAP)

The Task Team shall:

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

Members:

Rudolf Krockauer (TT Chairperson, E-ASAP, Chairperson)
Graeme Ball (Australia)
Naotaka Hiraishi (Japan)
Johan Stander (South Africa)
Sarah North (United Kingdom)
Any other country making ASAP soundings
Bruce Sumner (HMEI, associated Member)
Possible participation by POGO

SOOP Science Team (SOOPST)

The SOOP Science Team shall:

1. Provide scientific guidance to the SOOPIP on the implementation of the global XBT network;

2. Receive advice from CLIVAR panels and from international scientific teams on scientific issues associated with the monitoring of the upper ocean thermal structure;

3. Collaborate with the Argo Steering team, on the implementation of the upper ocean thermal network;

4. Collaborate with other teams involved in sustained ocean observations (such as the Ocean Topography Science Team, the Global Ocean Surface Underway Data Pilot Project , the Tropical Atlantic Circulation Experiment, the Tropical Moored Buoy Implementation Panel, OceanSites, etc.);

5. Periodically meet to discuss and communicate scientific and operational results obtained using the XBT global network;

6. Collaborate in the development of ocean systems experiments to evaluate and improve the design of the XBT network;

7. Provide regular reports to the SOT on its work.

Membership: the SOOPIP Chairperson will propose the membership during the intersessional period with preferred participation from the following individuals:

Isabelle Ansorge (South Africa)
Moly Baringer (USA)
Tim Boyer (USA)
Silvia Garzoli (USA)
Gustavo Goni (USA)
Victor Gouretski (Germany)
Sydney Levitus (USA)
Christophe Maes (New Caledonia)
Gary Meyers (Australia)
Robert Molinari (USA)
Franco Reseghetti (Italy)
Giles Reverdin (France)
Dean Roemmich (USA)
Derrick Snowden (USA)
Charles Sun (USA)
Sebastiaan Swart (Africa)
Alexander Sy (Germany)
Ann Thresher (Australia)
Susan Wijfels (Australia)

ANNEX V

STATUS OF VOS USING (NON-AWS) ELECTRONIC LOGBOOK SOFTWARE

Country	E-Logbook type	Number of Ships as at 31 December					
		2002	**2004**	**2005**	**2006**	**2007**	**2008**
Australia	TurboWin	33	41	50	51	64	61
Croatia	TurboWin	3	4	3	7	7**	7**
Denmark	TurboWin	-	-	-	32	0	Finished
France	TurboWin	-	7	6	7	10	4
Germany	TurboWin	315	412	556	600	709	730
Greece	TurboWin	2	0	0	0	1	3
Hong Kong	TurboWin	-	-	1	2	2	2
India	TurboWin	-	21	28	33	33**	33**
Japan	OBSJMA1.01	-	49	61	70	74	95
Netherlands	TurboWin	200	259	198	195	193	195
New Zealand	TurboWin	0	12	15	22	20	19
Singapore	TurboWin	-	-	2	3	1	1
South Africa	TurboWin	5	5	8	8*	8	14
Sweden	TurboWin	-	-	-	-	-	1
United Kingdom	TurboWin	82	104	147	241	261	286
United States	SEAS	353	439	447	622	129	344
TOTALS		**993**	**1353**	**1522**	**1893**	**1512**	**1795**

* Data from 31/12/2005 ** Data from 31/12/2006

ANNEX VI

STATUS OF VOS AUTOMATED OBSERVING SYSTEMS (AWS)

Country	Type of AWS (at 31/12/2008)	Method of Comms	Manual Entry Facility	Number of Ship equipped with AWS as at 31 December						Plans
				2002	2004	2005	2006	2007	2008	
Australia	Vaisala Milos 500	Inmarsat C (Data Mode)	Yes	9	11	10	8	9	9	3 new AWS
Canada	AVOS – AXYS Technologies	Inmarsat C Iridium	Yes	13	14	14	39	41 1	45 1	8 AVOS, 4 with Iridium
Denmark	BATOS	Inmarsat C (Data Mode)	Yes	-	-	-	2	See EUMETNET		
EUMETNET	BATOS BAROS	Inmarsat C (Data Mode) Iridium SBD	Yes No					5 0	5 4	3 BATOS 10 BAROS
France	BATOS Mini BATOS MINOS BAROS	Inmarsat C (Data Mode) Inmarsat C (Data Mode) Argos Iridium	Yes No No No	19	30 1 6	39 2 7	45 3 8	48 3 8 1	54 1 7 -	7 BATOS
Germany	Vaisala Milos 500	Meteosat	No	23	21	21	17	18	17	
Ireland	Vaisala Milos	Meteosat	No	1	1	1	1 **	1**	1	

Japan	Koshin Denki Kogyo Co., Ltd (Japan) Ogasawara Keiki Seisakusho Co (Japan) Nippon Electric Instrument Inc. (Japan) Brookhaven National Laboratory (USA) JRCS MFG. Co. Ltd (Japan)	Inmarsat Inmarsat Inmarsat C Inmarsat C Inmarsat F	Some No Some Yes No	13	12	13	9 3 4 1	9 1 5 1 1	9 1 5 1 1	
New Zealand	Sutron 9000RTU mSTAR-SHIP	MTSAT GPRS Cell	Yes No	1	1	1	1	1 1	1 1	1 mSTAR-SHIP
Norway	AWS	-	Some	-	-	17	17	18	16	
Russia	GM6	Inmarsat C	Yes	-	38	38 *	38 *	38*	38*	
South Africa	Vaisala Milos 520	Inmarsat C	Yes	-	-	1	1 **	1	1	2 planned
Spain	Vaisala Milos	Inmarsat C	Yes	1	1	1 *	1	1	1	
United Kingdom	Automet MINOS –GP MINOS-GPW BATOS AVOS MILOS/MAWS Metpod MetOcean Deck Buoy	Inmarsat Argos Argos Inmarsat C (Data Mode) Inmarsat Iridium Iridium Iridium	No No No Yes Yes Yes No No	1 - - - 	1 - - - 	1 1 1 - 	1 2 2 1 	1 6 3 1 	0 5 1 3 1 - 1 2	Redeploy in 09 3 MINOS-GP 1 MINOS-GPW 1 BATOS 1 MILOS/MAWS 1 Metpod 2 Buoys on deck
United States	SEAS-AutoImet	SEAS	Some	-	3	3 *	0	3	41	
TOTALS				**81**	**140**	**171**	**204**	**226**	**270**	**48 AWS planned for 09**

ANNEX VII

RSMC EXETER MONITORING REPORT

1.1 The Met Office (RSMC Exeter) Continues to produce monitoring lists of suspect ship observations each month, which are sent to the WMO Secretariat. Since 2005, they have also been available via the Met Office web site[1].

1.2 A recent example of the on-line VOS suspect list for January 2009 is shown in Annex A. (N.B. During 2008, the Met Office introduced password protection to its web site, but it is straightforward to obtain a login and password to gain access to the site by following the online instructions.). The current monthly monitoring criteria are shown in Annex B and the Team is invited to confirm that they continue to be set at the correct levels.

1.3 The Met Office also produces monthly lists of monitoring statistics for all VOS. To maintain up to date lists of ships, the Met Office has recently started to download the latest Pub47 meta-data for European and Australasian fleets from the E-SURFMAR metadata database web site. The Team is asked to note that it would be helpful to the Met Office if the latest Pub47 metadata for all country's VOS fleets were available for download from this site, considering the rather late updates to the WMO Pub 47 meta-data (at the time of writing the WMO Pub47 list was 11 months out of date).

1.4 The lists of VOS monitoring statistics available on the Met Office web site have been modified since SOT-IV to remove the country identifier for those ships with unique masked call signs (the ship name is also omitted). The Team is invited to consider whether these lists are satisfactory or whether the unique masked call sign should perhaps be replaced with the original call sign (and the ship name reinstated?). The Team is invited to note that since SOT-IV a facility has been added to download the VOS statistics as an MS Excel file.

1.5 Timeliness information for VOS reports received at the Met Office is also available from the web site[2].

1.6 An example for January 2009 is also shown in Annex C where the upper graph shows that the majority of ship reports continue to be received promptly, with over 60% received within 30 minutes and 90% within 90 minutes of the observation time (an early data cut-off time for operational NWP is 90 minutes after analysis time). Timeliness information for individual ships is also available from the website and an extract is shown at Annex D.

1.7 The (Japanese) SHIP masking scheme implemented in December 2007 prevents the Met Office from monitoring individual Japanese and some US ships. Since SOT-IV, the Met Office has set up special collection of the data with real call-signs from JMA's FTP server, but currently this data is not available for monitoring purposes as it has not been routed into the Meteorological database due to staff shortage and issues concerning its security. Consequently, the Team is invited to note that to ensure, that the monitoring of VOS does not suffer further, the Met Office (RSMC Exeter) would prefer countries adopting a masking scheme to choose one that assigns a unique identifier for each ship,

1.8 The Met Office has recently set up a scheme for ranking the UK VOS fleet in terms of quantity, timeliness and quality of reports from each ship, to assist in presenting awards to the best performing ships. The scheme is detailed in Annex E and the Team is invited to consider whether it would be suitable for wider use amongst other VOS fleets and, if so, whether the parameters used are set at appropriate values. [If the team is supportive of this proposal, the VOS performance rankings could also be made available via the website.]

1 : http://www.metoffice.gov.uk/research/nwp/observations/monitoring/index.html
2 : http://www.metoffice.gov.uk/research/nwp/observations/monitoring/marine/TOR/index.html

ANNEX A OF ANNEX VII

MET OFFICE ON-LINE VOS SUSPECT LISTS FOR JAN 2009
(first page)

SEARCH Met Office GO

► Home ► Research ► NWP ► Observations ► Observation Monitoring ► Surface Marine Monitoring ► VOS MMR ► Pub47 Suspects

NWP | Climate | Seasonal forecasting | Atmospheric processes | Oceanography | Projects | The stratosphere

Pub47 VOS Suspects for Jan 2009

Links
Observation Processing
Observation Types
Quality Control
Observation Monitoring
News
News releases
Contact
Contact us

To view the suspect threshold for each variable and statistic, hover your cursor over the relevant column. Please note that the bias and standard deviation statistics listed below exclude observations having gross errors.

PRESSURE (hPa)

CTRY CODE	SHIP NAME	CALL SIGN	TOTAL	GE (%)	BIAS	SD	Graph
CA	SAMUEL RISLEY	CG2960	216	100	0.0	0.0	QC plot
DE	CAP SAN MARCO	ELZA9	23	0	4.2	1.6	QC plot
DE	CMA CGM OCEANO	A8IT6	39	0	5.9	1.3	QC plot
DE	CONTI GERMANY	A8MQ3	75	0	5.0	1.5	QC plot
DE	LARCH ARROW	V2BR5	31	0	-6.4	1.1	QC plot
DE	MONTE AZUL	DFTH2	45	0	-6.4	1.9	QC plot
DE	MSC GEMMA	DBUT	26	8	5.5	2.3	QC plot
DE	RIO DE JANEIRO	DDID2	54	0	-4.8	2.2	QC plot
MY	TENAGA DUA	9MSM	36	6	-4.6	3.2	QC plot
RU	IVAN SUSANIN	UCJL	27	0	-5.6	2.5	QC plot
US	ALBEMARLE ISLAND	C6LU3	35	0	5.5	1.5	QC plot
US	HUGO N	HPNV	130	48	-8.7	5.2	QC plot
US	LNG ARIES	V7BW7	44	0	4.4	1.2	QC plot
US	LNG CAPRICORN	V7BW8	47	0	4.5	2.0	QC plot
US	NORWEGIAN JEWEL	C6TX6	22	0	-6.8	1.8	QC plot
US	POLAR STAR	8PPK	45	24	7.7	3.9	QC plot
US	TALISMAN	LAOW5	22	32	4.0	3.1	QC plot
US	TYCO DURABLE	V7DI8	32	0	7.1	1.2	QC plot

TEMPERATURE (deg C)

CTRY CODE	SHIP NAME	CALL SIGN	TOTAL	GE (%)	BIAS	SD	Graph
DE	COSCO LONG BEACH	A8HG2	32	0	5.1	2.3	QC plot
SE	ATL CONVEYOR	SCKM	39	0	-4.5	5.2	QC plot
US	BRUCE	WWU8	103	32	3.6	3.4	QC plot
US	NORWEGIAN JEWEL	C6TX6	22	9	-10.7	2.1	QC plot

WIND SPEED (m s-1)

CTRY CODE	SHIP NAME	CALL SIGN	TOTAL	GE (%)	BIAS	SD	Graph
AU	NORTHWEST SANDERLING	VNVZ	49	0	-5.7	3.3	QC plot
DE	HANJIN YANTIAN	DDYZ2	95	1	5.6	3.7	QC plot
DE	HEINCKE	DBCK	344	0	-5.2	2.2	QC plot
DE	LILY OLDENDORFF	A8AY3	49	14	8.3	3.5	QC plot

ANNEX B OF ANNEX VII

MONITORING CRITERIA FOR PRODUCING MONTHLY MARINE SUSPECT LISTS

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	:Standard Deviation of difference of observation 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 direction 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:

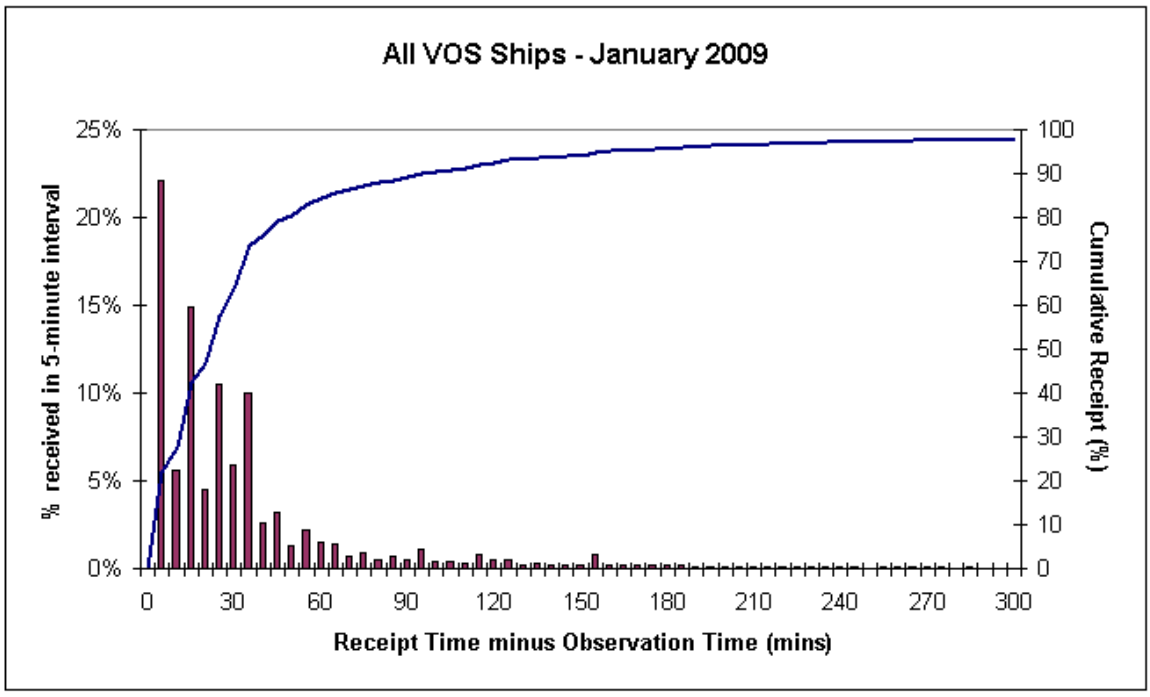
1.Bias	>=	4 hPa	(pressure)
	>=	5 ms^{-1}	(wind speed)
	>=	30 degrees	(direction)
	>=	4 ^oC	(air temperature)
	>=	15%	(relative humidity)
	>=	3 ^oC	(SST)
2.SD	>=	6 hPa	(pressure)
	>=	80 degrees	(direction)
	>=	6 ^oC	(air temperature)
	>=	25%	(relative humidity)
	>=	5 ^oC	(SST)
3.PGE	>=	25	

N.B. Observations of wind direction are only included in the wind direction statistics if the observed OR background wind speed > 5 ms^{-1}…

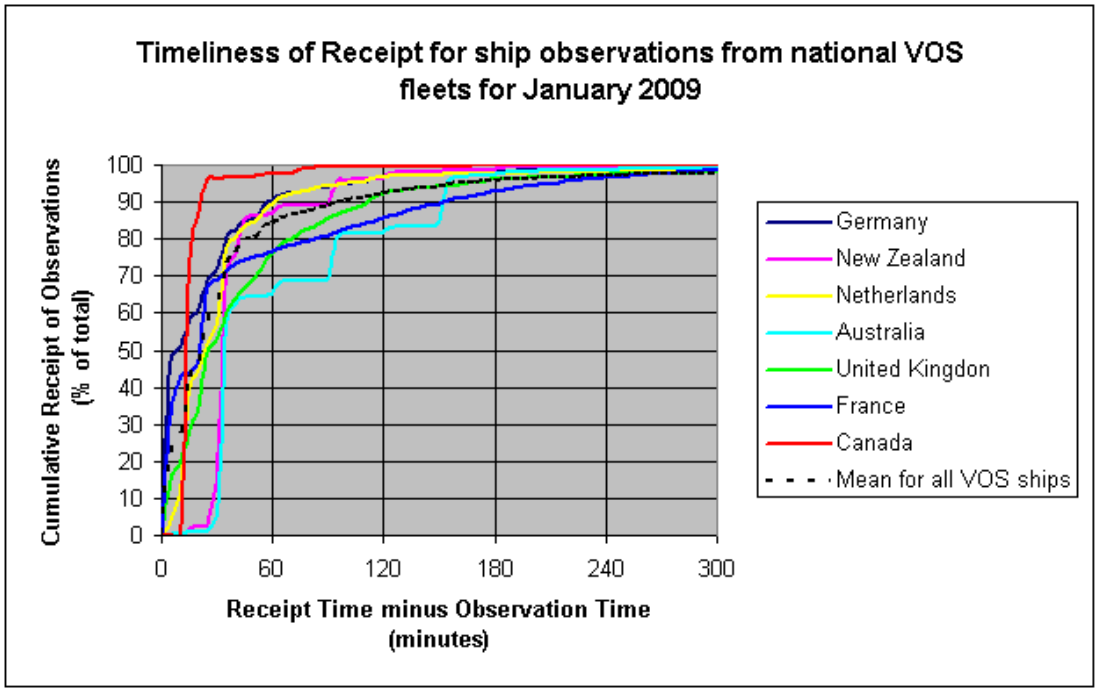
_____

ANNEX C OF ANNEX VII

TIMELINESS OF VOS OBSERVATIONS RECEIVED AT THE MET OFFICE (UK), JAN 2009



The timeliness of observations from some of the individual national fleets involved in VOS are also presented below.



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ANNEX D OF ANNEX VII

Pub47 Time of Receipt Statistics by SHIP for January

CTRY	CALLSIGN	NAME	Observations	N<30	N<60	N<120	N>360	Average (R-O) (mins)
	B2M0038		24	3	22	24	0	33.8
	B2M1297		13	0	10	13	0	39.0
	B2M1303		6	0	5	6	0	41.7
AU	VJD2969	ABURRI	5	0	1	3	0	97.4
AU	9KKS	AL KUWAIT	58	2	15	24	10	174.1
AU	9KWH	AL MESSILAH	70	3	22	29	19	210.9
AU	9KWP	AL SHUWAIKH	18	1	10	16	1	66.2
AU	PHIN	AMAZONEBORG	20	1	16	19	0	45.0
AU	2ALD3	ANL WANGARATTA	37	2	37	37	0	32.3
AU	9V7548	ANL WARRAIN	3	0	1	3	0	71.0
AU	2AJU5	ANL WYONG	19	1	11	16	0	59.9
AU	V2BJ5	ANL YARRUNGA	227	17	220	221	0	36.2
AU	IBGF	BECRUX	6	0	4	5	0	52.7
AU	A8OK5	CAP BIANCO	6	2	5	5	1	116.0
AU	C4PN2	CAP BON	44	1	17	30	0	85.8
AU	DCGL2	CAP SARAY	56	43	55	56	0	17.3
AU	V7FN7	CAPE DELFARO	31	4	25	28	0	53.6
AU	V7CZ6	CAPE DELGADO	16	1	16	16	0	31.8
AU	V7IA5	CAPE MORETON	23	2	22	23	0	36.3
AU	J7AV7	CAPITAINE COOK	15	2	15	15	0	31.9
AU	A3BN5	CAPITAINE TASMAN	1	0	1	1	0	31.0
AU	5WDC	FORUM SAMOA II	26	2	25	26	0	33.3
AU	VMGO	GOLIATH	1	0	0	0	0	151.0
AU	ELTS6	GOONYELLA TRADER	112	10	86	110	0	42.4
AU	VROB	HIGHLAND CHIEF	226	16	219	222	0	35.4
AU	VNVR	IRON YANDI	228	17	221	224	0	35.3
AU	3EPI6	KAMAKURA	12	1	12	12	0	32.2
AU	V2OM6	KIMBERLEY ROSE	21	0	18	21	0	42.6
AU	VRRD	KOKOPO CHIEF	35	3	32	35	0	35.1
AU	FHZI	L\'ASTROLABE	674	18	225	441	0	27.8
AU	VMAL	LINDESAY CLARK	40	1	38	39	0	35.8
AU	ONDB	LOWLANDS PROSPERITY	30	0	27	28	0	42.2
AU	V2OW2	MSC FRISIA	37	1	11	24	0	97.2
AU	VNVZ	NORTHWEST SANDERLING	49	6	38	46	0	45.9
AU	VNVG	NORTHWEST SANDPIPER	14	0	13	14	0	35.4
AU	ZCAS2	NORTHWEST SEAEAGLE	23	4	21	21	0	41.7

ANNEX E OF ANNEX VII

SCHEME FOR RANKING VOS SHIPS BY QUANTITY AND QUALITY OF REPORTS

1. The scheme analyses a year's worth of data for each ship, considering the following variables: pressure (P), wind speed (Spd), wind direction (Dir), air temperature(T), relative humidity (RH), log(visibility) (Vis) and sea surface temperature (SST). It then produces a score for each ship, with the lowest score being the best, based on the number of reports received (NumObsScore), their quality (QualityScore) and their timeliness (TorScore).

2. The numbers of reports received (NumObs) are 'capped' to limit the influence of any of the very high numbers from automatic stations, then the scheme calculates a score for the number of reports. Firstly the NumObs values are inversed to give low (good) scores to ships with high numbers of reports and vice-versa: NumObsInv = MAX(NumObs) – NumObs. Secondly, so that ships with below average numbers have scores greater than 1.0, and vice-versa, we set NumObsScore = NumObsInv / MEAN(NumObsInv).

3. The quality scores for each variable are based on observation minus background (O-B) values and the following three statistics:

(i) MeanScore = (Absolute value of mean O-B) / VariableLimit

(ii) SDScore = (Standard Deviation of O-B) / VariableLimit [where the following VariableLimit values are used, based on Met Office reject list thresholds: P = 2.0hPa, Spd = 3.0m/s, Dir = 40^{o}, T = 3.0 ^{o}C, RH = 15.0%, Log(Vis(m)) = 1.0, SST = 3.0^{o}C.]

(iii) GEScore = (Number of Gross Errors) / (Mean number of Gross Errors)

(N.B. For ships with 100% gross errors, the Mean and SD scores are set to the worst in the set.)

The above scores are capped at values of 2.0, then the quality score is created for each variable:
QualityScore = (MeanScore + SDScore + GEScore) / 3

4. Time of receipt (ToR) scores are produced from yearly totals for the following ToR categories: Reports received within 30 minutes, 30-60 mins, 60-120 mins, 120-360 mins and after 360 mins. Each ship is given a score that is the sum of the following numbers of points multiplied by the numbers of observations in each category:

points_30 = 0.0, points_60 = 30.0, points_120 = 75.0, points_360 = 225.0, points_after = 345.0.

(These scores are just the values of the mid points of the ranges minus the mid-point of the first range (15 minutes) to make the best score zero. 'points_after' has just been set to 360-15, as the range is unbounded.)

The ToR scores are then divided by the scores the ships would have received had all of their observations been received between 60 and 120 minutes, i.e. we are suggesting that observations should really have been received within two hours and that observations received later than that are less useful to NWP.

The ToR scores are also capped at 2.0.

5. Originally, the NumObsScore, QualityScore and TorScore were combined with weights of 0.5, 0.25 and 0.25, respectively; however, after discussion with some of the UK PMOs it was decided to give less weight to ToR and NumObs and more weight to the Quality score. Consequently, weights of 0.4, 0.4 and 0.2 have now been set for NumObs, Quality and ToR, respectively.

For ships that do not report certain variables the scores are set to the worst score for that variable (usually 2.0). Then the scheme combines the scores for each variable using the following relative weightings: P = 2.0, Spd = 1.0, Dir = 0.6, T = 1.0, RH = 0.6, Vis = 0.4, SST = 1.0.
These weightings are estimates of the relative importance of each variable to the NWP models and their values may require further tuning.

ANNEX VIII

REPORT BY THE TASK TEAM ON VOLUNTARY OBSERVING SHIPS CLIMATE SUBSET PROJECT (VOSCLIM) PROJECT

(report submitted by Sarah North, Chairperson of the VOSClim Task Team)

Introduction

1. The VOSClim project is now operationally mature with many of the obstacles identified at previous sessions of the SOT having been overcome. Levels of ship participation set by the SOT have been met and the data flow processes are now operating as required with the relevant datasets readily available to users via the project website

2. However, whilst the implementation phase of the project has now been completed, there has been limited progress with the evaluation stage, which is intended to demonstrate the added value of the VOSClim datasets.

3. This report addresses the key issues assigned to the Team in its Terms of Reference and identifies the key areas where progress has been made since SOT IV. Taking into account work undertaken by the ETMC and the new cross-cutting (ETMC-SOT) Task Team on Delayed Mode VOS Data (TT-DMVOS), the report invites the SOT to consider carefully how the project should develop in the future, so that it can help to raise the climate quality of data from the wider VOS, and thereby contribute to the Global Climate Observing System (GCOS). In this respect, the Task Team believes that the time is now right to extend the good practice established for VOSClim ships to the wider VOS community and invites the SOT to consider the most appropriate means of achieving this objective.

4. The following supporting documents are appended to this report

Annex 1 Task Team current Terms of Reference
Annex 2 VOSClim Project Status Report
Annex 3 Report by Scientific Advisers to the Project
Annex 4 Overview of Current Project Status
Annex 5 Status of actions agreed at SOT III & SOT IV
Annex 6 The future of the VOSClim project

ANNEX 1 OF ANNEX VIII

Terms of Reference of the SOT Task Team on VOS Climate Project
(as adopted at SOT-IV)

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 learnt from the 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 (RTMC) —hosted by the UK Met Office
Representative of the Data Assembly Center (DAC) —hosted at the NOAA National Climatic Data Center (NCDC)
Representatives of the Global Collecting Centres (GCCs)
Scientific advisers

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ANNEX 2 OF ANNEX VIII

VOSCLIM PROJECT STATUS REPORT

1. VOSClim Ship Participation & Recruitment

1.1 At SOT-IV (April 2007) it was noted that the initial target of 200 ships participating, which was set at the outset of the project, had been achieved and a new target of 250 ships set.

1.2 The Task Team is pleased to report that this revised target has now also been met and at the end of 2008, the number of ships reported as actively participating in the project stood at 255, representing ships recruited by ten participating countries. Table 1 below shows the growth in participation since SOT III (March 2005). An update on the current status will be given at the SOT-V meeting

Country	Number of VOSClim ships at SOT III	Number of VOSClim ships at SOT IV	Number of VOSClim ships at SOT V *(at February 2009- to be updated at meeting)*
Australia	**10**	**12**	**10**
Canada	**14**	**40**	**47**
France	**6**	**23**	**25**
Germany	**11**	**22**	**32**
India	**21**	**22**	**22**
Japan	**5**	**5**	**5**
Netherlands	**1**	**19**	**37**
New Zealand	**0**	**1**	**1**
UK	**33**	**62**	**59**
USA	**12**	**12**	**17**
TOTALS	**113**	**218**	**255**

Table 1: Contribution of ships to VOSClim by country

1.3 To ensure that the project data can be monitored by the RTMC, it is essential that recruitments, withdrawals and call sign/name changes be notified promptly to the DAC (and to the RTMC) so that the participating ship list can be kept up to date. The team is therefore pleased to report that previous problems with updating the ship list on the website, reported at SOT IV, have now been resolved. Furthermore, the format of the ship list has been revised since SOT IV to show additional information such as former ship names and call signs. Full details of participating ships are maintained on the project website at http://www1.ncdc.noaa.gov/pub/data/vosclim/vosclimshiplist.xls.

1.4 There has been a marked increase in the number of ships equipped with shipborne AWS systems participating in the project (notably those ships recruited by France and Canada) and approximately one third of the project ships now carry AWS. Although this has resulted in an increase in data volume it, perhaps means that the scope of participation is not as representative of the wider VOS as originally intended – although there is a wide variety of different ship types involved in the project, including research ships, container ships, bulk carriers, cruise ships and ferries.

1.5 The number of manually reporting VOSClim ships has also grown gradually since SOT IV and notably Germany, the US and the Netherlands have increased the size of their VOSClim fleets.

1.6 The need for Port Met Officers to routinely, inspect VOSClim ships has resulted in ships mostly being drawn from the regular liner trades, such as container ships, and relatively fewer ships operating on variable charter trades, such as oil tankers. However as the nature of shipping is highly dynamic there have been cases where ships routes have changed with little notice, making routine inspections impossible. Inspection details for VOSClim ships are only maintained on a national basis and are not available at a central location.

1.7 Resource pressures felt by national met services, and reported previously at SOT IV, appear to have had only a small impact on the availability of Port Met Officers to inspect VOSClim ships. However, the growing migration to using Automatic Weather Stations is inevitably having an impact on the range of observed parameters available in the VOSClim datasets. Such problems are also a pressing issue for the wider VOS community and will need to be addressed by SOT in the coming years

2. Electronic Logbooks and AWS software

2.1 As identified in the 2008 GCC report there continues to be a significant number of ships that are effectively 'self recruiting' and submitting observations with the additional delayed mode VOSClim IMMT elements. This is typically due to the use of electronic logbooks such as TurboWin, which is used on the majority of manually reporting project ships, and which easily permits officers to upgrade their reports to VOSClim standards (i.e. by ticking the VOSClim check box). Whilst a warning message was added to TurboWin Version 4 to try to prevent this practice the Task Team maintains the view that such self recruited ships do not impact on the value of the VOSClim datasets - provided that it is recognised that the only ships officially recruited to the project are those which have been formally notified to the DAC and are listed on the project website. Indeed the additional data provided by self-recruited ships should not be discouraged given the proposed extension of VOSClim standards to all VOS [see separate discussion at *Annex 6*].

2.2 The need to compare the algorithms associated with these different electronic logbook software systems (OBSJMA, TurboWin, SEAS) was identified at the outset of the project and the Team is pleased to note that the intercomparison of electronic logbook software will have resolved many of these potential inconsistencies. However, given the increased use of proprietary AWS software (AVOS, BATOS, and MILOS etc) it is considered that a similar intercomparison study should be undertaken for these systems to ensure consistency of data

2.3 The latest version of the TurboWin software, due to be released in early 2009, will include password protection for its metadata module - as changes to metadata should preferably be made by the Port Meteorological Officer rather than by the observers themselves. Some flexibility may however need to be exercised for ships that do not routinely return to a homeport and where inspections can be years apart. In all cases, however, it is the responsibility of the recruiting country to vet all metadata before making submissions to WMO Pub. 47.

3. Real Time Data

3.1 The transmission of VOSClim ship observations from the RTMC to the project DAC continues to operate in accordance with the project requirements. Reports from manually reporting VOSClim ships are typically transmitted in WMO Ship GTS Code (FM 13) via Inmarsat C, whilst an increasing number of automatically reporting ships send their reports via national centres using data compression to reduce transmission costs.

3.2 The RTMC 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 and, since July 2002, has been routinely transferring this data in BUFR code to the project DAC, forming what is referred to as the "BUFR" dataset. Furthermore, the RTMC has also been making back-up copies of the data available to the DAC via the Met Office's external FTP server. A more detailed RTMC report will be included in the Met Office's RSMC report submitted under agenda item SOT-V/III-3.

3.3 The DAC also makes available a second "GTS" dataset based on NCDC GTS data, which has

not been transformed into the BUFR format and retains the original FM 13 message data.

4. Delayed Mode Data

4.1 The delayed mode observations from VOSClim ships (including the additional IMMT project code groups) recorded in electronic logbooks (from manually reporting ships) are typically downloaded by visiting Port Meteorological Officers on a recommended three monthly basis. Minimum quality control procedures are then applied to the collected delayed mode datasets before being sent to the two Global Collecting Centres (located in Hamburg and Edinburgh). Having checked the data quality flags, and clarified any problems bilaterally, the GCCs have been sending the delayed mode data to the DAC on a quarterly basis since March 2003. Problems reported at the previous sessions have now been overcome and this "GCC" dataset is now available to users via the DAC website.

4.2 Further details of the delayed mode VOSClim data contributions will be included in the 2008 GCC report submitted under agenda item SOT-V/III-3.4. The number of VOSClim observations being submitted to the GCCs remains generally good although submissions were only received from nine of the ten participating countries. In total 48583 observations were received from VOSClim ships in 2008 amounting to 6% of the total submissions received by the GCCs (the same proportion as in 2007)

4.3 Although the IMMT-3 format (which permits QC flags to be applied to the additional project elements) formally came into use in 2006 it is understood that some VOSClim contributing members are still having problems with sending their data in the newer format and one member has been unable to submit any data. In addition the IMMT element for SLL (maximum deck cargo height) reported by new generation container ships has created problems for application of MQCS. Consequently, the current limiting height of 32 m has had to be increased to 40m, following agreement by the ETMC.

4.4 In accordance with discussion in the TT-DMVOS, the way in which the VOSClim data is distributed was changed in July 2008 so that the complete quarterly dataset containing VOSClim data is now despatched by the GCCs to the Responsible Members and to the Project DAC. Accordingly the DAC now takes ownership for calculating the quarterly statistics for the number of VOSClim observations with and without the additional elements, and the number of observations from unlisted ships (refer to SOT-V/III-3.4 for further details).

5. Metadata Collection & Recruitment/Update forms

5.1 Although, the majority of project participants are now collecting metadata in accordance with the latest format prescribed for WMO Publication No. 47 (i.e. Version 03 introduced in July 2007), it is regretted that the availability of updated metadata to users on the WMO website continues to be extremely poor, with the WMO website not having been updated since the 2nd Quarter of 2008 (at time of writing this report). However, in the case of E-SURFMAR recruited project ships this metadata is now also maintained on the new E-SURFMAR metadata database, with monthly updates provided by contributing project members. (Metadata from other project countries is also made available on this database.)

5.2 VOSClim metadata is now collected in exactly the same Pub. 47 format as used for normal VOS, although PMO's are requested to take additional digital images showing the location and exposure of instruments and to make schematic drawings of the ships arrangements. At SOT III it was agreed that these could 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) while at SOT IV the WMO Secretariat was requested to investigate whether such photographs could be stored together with Pub. 47 Metadata on the WMO website. The outcome of this action is awaited.

5.3 As a consequence of the introduction of Metadata Format Version 03 in July 2007, it was decided to recommend that a new Form VOSP002 should in future be used for the recruitment and collection of metadata for VOSClim ships. To ensure accurate completion of this form it was further recommended that Port Met Officers take a copy of the latest Metadata Format Version 03 with them

when inspecting VOSClim ships. Copies of Form VOSP002 and Metadata Format Version 03 are available for download from the project website (via a link to the form on the VOS website).

5.4 However, the availability of a separate metadata module within TurboWin has greatly simplified the collection of metadata for several VOSClim ship operators, as it automatically encodes the metadata into Pub. 47 format (XML or delimited). Because it is maintained in electronic format at source it can be easily verified and maintained by, visiting Port Met Officers while on board and then downloaded for subsequent ingestion into national databases and submission to WMO. This therefore brings into question the need to additionally fill in hard copy VOSClim recruitment/update forms, as it represents a duplication of effort for some project members (especially as VOS operators may require national inspection forms to be completed as well). This could explain why some Port Met Officers appear reluctant to recruit new project ships. It is suggested, therefore, that the requirement to additionally fill in a hardcopy of form VOSP002 should rest with the individual VOSClim ship operators concerned - however, the Task Team would not wish to appear to be preventing use of this excellent hardcopy form by both VOS and VOSClim members who find it advantageous. The important points to remember are that it is essential that the required metadata is collected and updated at regular intervals and that records of the inspections and visits made by Port Meteorological Officers are maintained and archived.

5.5 The use of the TurboWin module also affords the opportunity for downloaded metadata to be routinely transmitted back to VOS and PMO focal points, which could be particularly useful for ships that are trading on a worldwide basis and are out of the reach of the Port Met Officers. In this respect, consideration is currently being given to, whether TurboWin should include a timed facility, linked to the computer time, to remind observing officers to download all their TurboWin log files at routine intervals (e.g. quarterly or six monthly) and return them to their recruiting VOS focal points. (This would be particularly helpful to keep abreast of changes to ship's call signs.)

6. Monitoring Statistics

6.1 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 made available to the DAC via the Met Office external FTP server.

6.2 Problems reported at SOT IV concerning the availability of the monitoring statistics on the project website have now been overcome, and they are now readily available to VOSClim focal points and PMO's, who are encouraged to take early remedial action to resolve any monitoring problems.

7. Project Website

7.1 The project website [http://www.ncdc.noaa.gov/oa/climate/vosclim/vosclim.html] is maintained by the DAC, and acts as the main focal point for the project, providing users with easy access to the necessary data.

7.2 The website design and layout was improved in 2006 and further minor improvements have been made since SOT IV. Previous metadata information on the website has now been removed and a direct link to the Pub. 47 website has been added. A link has also been made to the new inspection Form VOSP002 which is now recommended for use by VOSClim ship operators, and which replaces the previous project recruitment/update form. The ship list on the website has been amended to include former ship names and call signs, and details of when masked call signs were adopted. A large number of digital images for ships recruited by the UK, US and Australia are included on the website and a link is made to the images of project ships recruited by the Netherlands available on the KNMI website at http://www.knmi.nl/vos/vosclim/.

7.3 The Team is pleased to report that previous problems with maintaining the information on the project website up to date have now been overcome due to the addition of additional staff resource at NCDC (i.e. with particular thanks to the efforts of Eric Freeman who has been promptly updating the website when requested).

7.4 A separate report by the DAC will be made under agenda item SOT-V/III-3.6.

8. Project promotion – Project Brochure & Project Newsletter

8.1 It was recognised at the last session that the revision of the project brochure was not an urgent task, but agreed that it would eventually need to be revised to reflect changes such as the increased target for participating ships

8.2 In view of the need for SOT to agree the future form and direction of the project at the current session, and the possibility of extending the project to wider VOS programme, the Task Team has taken no action on this item since the last session

8.3 Copies of the project brochure are now in short supply, although pdf copies are downloadable for printing from the project website and from the TurboWin electronic logbook

8.4 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. Unfortunately, resource limitations have prevented further copies of the newsletter from being issued, although articles on the progress of the project have been included in publications such as NOAA's Mariners Weather Log, the Ocean Views newsletter issued by the Australian Bureau of Meteorology, and the KMNI Marine Information Bulletin.

9. Project Certification

9.1 Following discussion at the last session it was decided to discontinue the VOSClim Certificate of Appreciation (intended for presentation, unsigned, to ships observers) and concentrate solely on the VOSClim Certificate of Participation (for presentation, signed, to participating ships). This would help reduce the proliferation of certificates being issued to observing ships. Copies of the VOSClim Certificate of Participation are available for pdf download from the project website.

10. Masked Call signs

10.1 The masking of ship call signs in response to security concerns, and its implications for data monitoring, is being addressed separately by the Task Team on Call Sign Masking and Encoding. However, this issue continues to have implications for the success of the VOSClim Project, especially if national met services adopt non-unique masked 'SHIP' solutions with data release time restrictions.

10.2 Notwithstanding, the masking issue does not appear, so far, to have had a major impact on the availability of project data or on its ability to be monitored in real time. Although the E-SURFMAR AWS systems that are contributing to the project are uniquely masked this has not been done for security purposes, but to assist efficient operation of the E-SURFMAR programme. However, it should be noted that these AWS ships are listed on the VOSClim website under their real call signs, and not under the masked call signs that are used for their real time transmissions. In the case of the Japanese ships that contribute to the project it is understood that because they are government research ships they are not subject to the non-unique SHIP masking system being used for merchant Japanese (and a few US) ships that send their observations via Yamaguchi LES.

10.3 The planned introduction of a lookup database of Mask Vs Real call signs on the JCOMMOPS website (WMO Letter to Permanent Representatives dated 26 January 2009 refers) will greatly assist the real time monitoring centre to ensure ongoing monitoring of project observations. However, the non-unique SHIP call sign system in use for Japanese ships and a lesser number of US ships continue to present problems for the RTMC as highlighted in the Met Office RSMC/RTMC report submitted under agenda item SOT-V/Doc. III-3

ANNEX 3 OF ANNEX VIII

REPORT BY SCIENTIFIC ADVISERS TO THE VOSCLIM PROJECT

1. The three overlapping VOSClim datasets (BUFR, GTS, and GCC, as discussed in *Annex 2*) are now readily available from the project website, all conveniently unified into the International Maritime Meteorological Archive (IMMA) format (Woodruff 2007), but unfortunately, no analysis has been possible using them in the period since SOT-IV. This highlights the need to make the VOSClim datasets an integral part of the scientific DataStream to improve accessibility to scientists, and initial efforts along these lines linked to ICOADS (Worley et al. 2005, http://icoads.noaa.gov) are discussed below.

2. An important study using the observation/model comparison methodology of VOSClim has been carried out recently at the Met Office, but using the full marine dataset for 2007-8 which is available internally at the Met Office (Ingleby 2009). This study showed, for example, that differences between the Met Office NWP model winds and ship visual winds showed a strong country-to-country variation and clearly shows the effect of bias in air temperatures caused by solar heating of the ship (e.g. Berry and Kent 2005). Ingleby (2009) demonstrated that ships in VOSClim without AWS reported air temperatures with smaller RMS differences than those of the remainder of VOS reports. VOSClim humidity observations were also better than average, but little difference was seen for pressure observations. The Ingleby study was carried out on over 2500 ships and clearly shows the advantage of making the associated model parameters routinely available with all ship reports, and of extending this to other observation types such as moored buoys, rigs and drifters. The delayed mode information available as part of the VOSClim dataset, which includes relative wind speed and direction, would have helped in diagnosing whether or not the true wind speed had been calculated correctly. It seemed likely that in some cases, this was not done properly, but no definite conclusions could be drawn.

3. The full availability of the VOSClim datasets now needs to be advertised to the scientific community, and mechanisms for doing this will be investigated and implemented. It is clear from the Ingleby study that the extension of the VOSClim model data and additional parameters to all VOS would be advantageous. Meanwhile, to ensure the widest take-up by the scientific community, the existing VOSClim datasets should be made readily available together with ICOADS, which is widely used for climate research. Data from the three VOSClim datastreams are now starting to flow regularly to ICOADS (which also uses the IMMA format), and the possibility of merging these with ICOADS in the most effective manner will be investigated. With the support of UK NOCS, selected Pub. 47 metadata are already periodically merged with ICOADS for the entire VOS (currently back to 1973) utilizing an extensible “attachment” feature of the IMMA format. Additional IMMA attachments could potentially be defined, for example, to store unique data from the three VOSClim datastreams and, as appropriate, combine them via report compositing. In the longer-term, it is also hoped that additional and timelier integration can be achieved within the modernisation of the delayed mode and real time dataflow, including linkages with ICOADS, as proposed by TT-DMVOS (see *Annex 6* and SOT-V/III-3.5).

References

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ANNEX 4 OF ANNEX VIII

OVERVIEW OF CURRENT VOSCLIM PROJECT STATUS

Element of VOSClim Project	Implemented?	Status
Recruitment	Yes	Initial target of 250 ships met. (expansion of project to be considered at SOT V)
Real time data exchange	Yes	Data transfer to DAC working with backup FTP transfer now implemented (BUFR template not ideal for data exchange).
Metadata availability	Partly	Metadata often only available with significant delay. Availability of digital imagery not fully resolved
Delayed mode data exchange	Mostly	IMMT data available on DAC website- but some countries not making quarterly submissions MQCS-V being implemented by [most] contributing members.
Monitoring	Yes	Monthly statistics for full range of variables being produced by RTMC and sent to DAC. (Mechanisms for logging monitoring follow up actions not fully resolved though)
Project Promotion	Partly	Brochure available but may need updating. Project document needs updating Newsletter and articles issued Certification being issued
VOSClim website	Yes	Website updated in 2006 and now being routinely kept up to date
VOSClim Datasets	Mostly	Real time and delayed mode data streams now working and data added to website Metadata still not promptly available
Scientific Analysis	Partly	Data sets not being fully exploited despite data now being available on the website (despite interest expressed by scientific community). Scientific journal papers have been published using VOSClim dataset. Some comparison of VOS and VOSClim reports made at SOT-IV Scientific and Technical Workshop.

ANNEX 5 OF ANNEX VIII

STATUS OF VOSCLIM ACTIONS AGREED AT SOT III & SOT IV

1. Status of action items from SOT IV relating to VOSClim

II-4.5	To provide VOSClim uncertainty maps and time series of uncertainty	TT/VOSClim	For presentation at Technical Workshop
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	Done/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	*Done*
IV-3.2.6	To provide details of remedial actions taken to the DAC by email	PMOs	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	*Done/Ongoing* (i) Done (ii) Done? (iii) Done (iv) Done
IV-3.7.1	To consider how many observations are needed from the VOSClim yearly	TT/VOSClim	For presentation at Technical Workshop
IV-3.7.1	To investigate whether the VOSClim photographs could be stored with Pub47 Metadata	Secretariat (WMO)	Not done - To be confirmed
IV-3.7.1	To revise the VOSClim brochure	TT/VOSClim	*Not Done*
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	Done (Project ships are those notified to the DAC and included in the ship list)
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	Part Done (time delay now on sailwx.info)
I-6.3.7	To consider adopting VOSClim best practices more generally under the VOS scheme	TT/VOSClim	For further consideration at SOT V

2. Status of action items from SOT III relating to VOSClim

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 Storage of images not resolved yet
III-B/1.3.3	Increased recruitment of VOSClim ships.	VOSClim operators, VOS operators who have yet to contribute	Ongoing/Done (targets achieved)
III-B/2.1.2	RTMC 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	Ongoing/Partly 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 (needs updating again)
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	Ongoing
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	Done
III-B/2.2.2	Mechanisms for simplifying data delivery between RTMC and the DAC, such as ftp, to be considered	DAC and RTMC	Done
III-B/2.2.2	DAC to simplify data delivery to users using ftp site.	DAC	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/ Part done
III-B/2.3.3	France to attempt to revise the BATOS system.	France	Done (BATOS now reports IMMT3)
III-B/3.1.1	Since the lack of delayed mode, data for the VOSClim project is a problem, as interim measure VOSClim operators are to provide raw data from the data entry software direct to the Scientific Advisers.	VOSClim operators	Done (delayed mode data flow now working)
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 (i.e. at MARCDAT-II in 2005 when a

			number of scientists agreed to contribute to analysis of the VOSClim dataset)
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	Part Done
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	Done
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	Mechanism for dataset maintenance considered in Appendix F
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	Done (delayed mode data flow to DAC now working)
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 taking 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 6 OF ANNEX VIII

THE FUTURE OF THE VOSCLIM PROJECT

(Note - the VOS Panel under SOT agenda item III-4.1 will also consider this aspect of the Task Team report separately)

1. The following discussion paper outlines the general views of the Task Team for the future of VOS Climate Observations taking into account the three overarching issues assigned to the Team, as follows (but with item b updated from *Annex 1* to reflect the current situation with three distinct datasets available from the DAC)

(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) ***Are the high-quality datasets a valuable resource? If so, how should they be updated operationally, including possibilities for integration of overlapping data receipts?***

(c) ***How can the lessons of VOSClim be used to improve data quality in the wider VOS?***

DISCUSSION

2. In considering the future need for the VOSClim Project and its implications for the wider VOS, the Task Team has taken into account the following key factors, which will impact on its future evolution -

(a) Although the number of ships has now achieved the target levels set by SOT, the volume of project data being collected is far less than had originally been hoped for, and is insufficient to permit the required level of scientific scrutiny

(b) From 2012 all GTS international data exchange between National Met Services will be required to use either BUFR or CREX table driven formats. The latest VOS BUFR templates include all the current VOSClim elements and should permit additional elements to be included with less difficulty. Previous CBS restrictions on making amendments to the WMO Ship code will no longer apply once the alphanumeric codes have been superseded, although any code amendments will still need to be approved formally through CBS in what can be a lengthy process.

(c) Recruitment of project ships has been made a far simpler process with the increased use of electronic logbooks such as TurboWin, which include a Pub. 47 metadata module. This therefore offers the opportunity to widen the current participation to all manual VOS with minimal effort.

(d) The expected rapid growth in the use of shipborne AWS systems is likely to give rise to a variety of different transmission mediums and formats for sending coded observations e.g. hexadecimal, compressed binary, and other proprietary codes. While the volume and quality of observations is likely to increase, the range of parameters will be limited to those that can be measured without manual input. The future focus is therefore likely to be targeted at NWP forecast requirements, and often at the expense of providing the full range of observed elements traditionally provided by VOS.

(e) PMO resources to inspect and maintain the traditional manually reporting VOS are under significant pressure, and with the introduction of AWS systems it is anticipated that there is likely to be an increased requirement for technical skills

(f) The work of the TT-DMVOS is expected to have an impact on the future VOSClim data flow. In particular, their proposals for a revised GCC data flow involving both real time and delayed mode Global Collecting Centres feeding the data into a WIS data server and thence on to the ICOADS will need to be considered.

3. Having considered these factors the Task Team and its scientific advisers, have come to the conclusion that there is a need for the additional IMMT code groups reported by VOSClim ships to be

requested (as soon as feasible) from all VOS ships. Moreover, as these parameters are currently only reported in delayed mode, it is considered that work should begin on ensuring that these parameters can increasingly be made available in real time.

4. Accordingly, the Task Team considers that it is now time to end the 'project' status of VOSClim and to start applying the benefits learned to the wider VOS. Upgrading, whenever possible, existing VOS to VOSClim standards will help to ensure the future availability of climate quality marine data.

5. Consequently, rather than developing the project into a separate long-term operational programme as was originally suggested at its outset, it is recommended that VOSClim should be fully integrated within the existing VOS Scheme as separate category of VOS. In liaison with the Task Team on WMO Pub, 47 metadata, the Task Team considered that that this could be achieved, as least in part, by introducing a new type of meteorological ship into WMO Pub. 47 (e.g. by adding 'Selected VOS Climate Ship' as a new type for the field vsslM and in associated table 2202). Detailed proposals in this respect, including proposals on how to distinguish VOSClim ships fitted with AWS systems will be included in the report of the Task Team on Metadata for WMO Pub No 47. In addition, it was suggested that a flag could be added to the delayed-mode IMMT format to indicate whether a given ship is officially part of the VOSClim project. Having made these changes VOS operators could then be strongly encouraged to upgrade their existing Selected VOS to the VOSClim standard.

6. One of the key achievements of the VOSClim project is the process whereby all relevant datasets (i.e. real time data and associated model output data, delayed mode data, and metadata) are made available at a single location, and unified into the IMMA format (see *Annex 3*) to be compatible with the International Comprehensive Ocean-Atmosphere Data Set (ICOADS; http://icoads.noaa.gov/). Although it took longer than originally anticipated to establish this data flow, it is now in place and climate researchers can easily gain ftp access to the data from the VOSClim website. It is proposed that the aim now should be to apply the principle of this data flow to the whole VOS, but with modifications to also eventually align it with long-term data management proposals currently under consideration by TT-DMVOS (see *Annex 3* and SOT-V/III-3.5). The resultant VOSClim datasets are already starting to flow regularly to ICOADS with an IMMA flag indicating ships identified as members of the VOSClim project. It is suggested that ICOADS, with support from UK NOCS (and contingent on agreement with the Met Office RTMC, NCDC DAC, and other involved organizations) should also investigate populating the model and VOSClim attachments historically (back to 2000). Model parameters are already associated with all GTS reports by the RTMC, but only the VOSClim subset is currently forwarded to the DAC, and extending this to all ships (including the model information historically, as feasible, and possibly extended to buoys and other non-ship data types) could be highly beneficial scientifically.

7. One of the additional tasks assigned to the Task Team at SOT IV was to review all relevant JCOMM Publications to make sure they are kept up to date. Consequently, SOT is invited to note that the proposal to start upgrading all VOS to encompass VOSClim standards is likely to require amendments to the following publications

- WMO No 471, WMO Guide on Marine Meteorological Services (Chapter 6 - The WMO Voluntary Observing Ships' Scheme)
- WMO No. 544, WMO Manual on the Global Observing System (GOS) (section 2.3.3 Sea Stations which makes references to selected, supplementary, and auxiliary)
- WMO No. 488, WMO Guide to the Global Observing System (GOS) (section 3.2.1.3.3 Mobile sea stations which defines selected, supplementary, and auxiliary, and criteria for recruiting VOS; there is also section 3.7 dealing with climatological stations although these are basically land stations but a note could be added to refer to VOSClim)
- JCOMM TD No.4, The Voluntary Observing Ships Scheme – A Framework Document

8. Upgrading existing VOS to VOSClim standards will provide an impetus for VOS operators to ensure that they collect the full suite of metadata for all VOS in accordance with WMO Pub. 47, together with the supporting digital images and ship profile plans that are currently collected for VOSClim ships. In

addition, it will help to ensure that VOS are equipped with the calibrated instruments needed to collect high quality observations.

9. Subject to acceptance of the above proposals the SOT is invited to revise the Task Teams Terms of Reference, in particular by deleting para 4 and by introducing a new task to ensure that the data management aspects are addressed and aligned with the long-term proposals currently under consideration by TT-DMVOS.

10. As the project can now be considered as being operationally mature it is recommended that the leadership of the project should now be revisited, noting that the current project leader intends to step down at SOT-V.

ANNEX IX

REPORT BY THE REAL TIME MONITORING CENTRE (RTMC) OF THE VOSCLIM

1 The Met Office, as the VOSClim RTMC, continues to produce monthly suspect lists and monitoring statistics for all project ships. At SOT-IV, it was agreed to increase the bias limit for suspect relative humidity from 10% to 12%, which the RTMC implemented in June 2007. The full monitoring criteria are given in Annex X, and the Team is invited to confirm that these values are set correctly. Since SOT-IV, the RTMC has continued to update its list of ships from that maintained on the VOSClim website.

2 The Met Office RTMC continues to transfer VOSClim ships' observations and the associated co-located model data to the DAC. Since SOT-IV, the RTMC has started putting a backup copy of the daily VOSClim BUFR data onto the Met Office's operational external FTP server so that it is available for the DAC to access, in case of problems with the GTS data.

ANNEX X

MONITORING CRITERIA FOR VOSCLIM 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 (%)	**12.0**	**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 considered a 'gross error'.

ANNEX XI

REPORT BY THE E-SURFMAR VOS-TAG

Submitted by Pierre BLOUCH – E-SURFMAR Programme Manager

I. Background

1. E-SURFMAR is an optional programme of the ground based EUMETNET Composite Observing System (EUCOS). It is responsible for surface marine observations, including VOS and data buoys. EUMETNET is the Conference of European Meteorological Services. Seventeen countries out of the 24 EUMETNET members are currently participating in E-SURFMAR.

2. E-SURFMAR objectives are to coordinate, optimize and progressively integrate the surface marine observations within the operational EUCOS framework. EUCOS' present aim is to optimize the ground observing system to improve short-range forecasts over Europe. However, E-SURFMAR is also supporting VOS activities outside the EUCOS area of interest, and contributes to other applications such as nowcasting and climatology.

3. The E-SURFMAR programme is funded through participant contributions, which are based on their respective Global National Incomes (GNI). The programme was a subject of a comprehensive study, carried out in 2004, which defines its broad design and objectives. The study will be revised in 2009-2010.

II. Data availability

1. E-SURFMAR is coordinating the activities of about 50% of the VOS in the world. In 2008, EUMETNET ships reported 59% of world VOS observations, approximately, compared with 50% in 2006. The increase is mainly due to the increased use of Batos Automatic Weather Stations which now report hourly observations instead of 3-hourly ones, previously. This has been possible without any increase of the communication costs thanks to the use of data compression.

2. In 2008, the number of manned observations reported by European VOS ships remained stable in the North Atlantic, but increased significantly elsewhere. This encouraging result is due in part to increased collaboration between European PMOs. The three European countries, which provide the most numerous manned VOS reports – Germany, United Kingdom and the Netherlands –, increased their numbers by 14%, 24% and 40% respectively when compared to 2007.

3. Globally, EUMETNET ships reported 320,000 manned and 424,000 automated observations in 2008. The number of automated observations has been higher than those of manned VOS since 2007.

III. Automation

1. E-SURFMAR participants are operating different ship borne Automated Weather Stations (AWS):

(a) France is operating about 50 Batos stations (complex AWS reporting through Inmarsat-C, 43 active at the beginning of 2009) and 7 Minos (simple AWS reporting through Argos);

(b) Germany is operating about 15 Milos stations (complex AWS reporting through Meteosat DCP) and 3-4 ships data loggers. Plans exist to renew these stations soon;

(c) UK evaluated a few different types of AWS: Automet, AVOS, Batos, Deck Drifter, MetPod and Minos. Six Minos, two deck drifters and one MetPod were operating at the beginning of March 2009. A Vaisala MAWS system is also being evaluated;

(d) Norway is using 3 AWS stations based on a QLC-50 system;

(e) Spain is operating a Milos station (not in operation at the beginning of 2009).

2. In addition, five Batos stations funded by E-SURFMAR were installed on board VOS contributed by member National Meteorological Services (NMS): UK, Ireland and Denmark. Further stations of that kind will be installed in 2009.

3. Twelve Baros stations reporting only hourly pressure measurements through Iridium SBD have been built since the SOT-IV meeting. A first prototype of a Baros station was installed by Meteo-France on a trawler from October 2007 to August 2008. It successfully reported 4690 observations before being removed when the trawler was sold. By the beginning of March, three Baros AWS were in operation on E-ASAP ships and eight others were ready to be installed. AWS are suitable on upper air E-ASAP ships to assist with data targeting exercises: operators may rapidly check where their ships are. When all E-ASAP ships have been equipped with Baros systems, consideration will be given to installing them on ships plying in southern European sea areas, in particular in the Mediterranean Sea.

4. The Met Office is also testing a simple AWS called MetPod. Currently, the AWS reports hourly measurements of air pressure, air temperature and air humidity through Iridium SBD, although it can also report wind speed and direction and has the flexibility to report additional parameters if required.

5. In 2008, E-SURFMAR established a task team on AWS. The main purpose of this team was to define and agree specifications, which could be used in calls for tender for the procurement of basic and complex AWS for use on observing ships recruited by E-SURFMAR participants. The team met twice in 2008 and had its final meeting prior to SOT-IV. A report on the Teams work will be made available.

IV. Data communication

1. Considerable work has been undertaken since SOT-IV by the E-SURFMAR programme. The SOT Task Team on Satellite Communications gives details into the report. This work includes:

- A “half compression” data technique, which had been developed to reduce the size of the manned observation reports, sent through Inmarsat-C and so, their transmission costs. The functionality to code such reports was made available in the TurboWin electronic logbook software produced by KNMI. The technique has been successfully tested on several ships. However, by the beginning of January 2009, only one French ship (TBWFR02), producing 180 observations per month in average, was still using this system;
- The operational use of Inmarsat-C Data Reporting service for Batos AWS systems (~55 stations) and of Iridium SBD on other AWS;
- The development of a data processing chain at Meteo-France will be able to convert Inmarsat-C compressed or “half compressed” data as well as Iridium data from ships and buoys into FM13-SHIP and FM18-BUOY messages. The production of FM96-BUFR reports should start in April 2009. The processing software is made freely available to any NMS that would wish use it (Free Software License CeCILL).

2. More than 90 European VOS are now using masked GTS identifiers, which are different from their ITU, assigned REAL callsigns. The identifiers take the form “tttccnn” where: “ttt” is the type of station, “cc” a country code and “nn” an increment. Although they are used as a mask, they also assist greatly the day-to-day monitoring of the fleets.

IV. VOS metadata

1. Since the VOS metadata is essential for daily monitoring, performance evaluation and calculation of financial compensations to E-SURFMAR members, a metadata database has been

developed. Available online, it allows an easy management of the Pub. 47 fields. CSV and XML files can be uploaded or downloaded, and the metadata can also be updated manually or through the VOSP002 form. The database also manages MASK callsign records and permits digital images of the ships and instruments to be uploaded.

2. European VOS operators submit their updated metadata for addition to the database on a monthly basis. The database is then used to regularly provide WMO with Pub. 47 metadata for E-SURFMAR VOS (every quarter) and JCOMMOPS with the MASK/REAL cross-reference list. BoM and NZWS have also agreed to make their VOS metadata available in the E-SURFMAR metadata database.

3. The E-SURFMAR database will be adapted in the near future so that it can also complete FM96-BUFR reports built with the raw VOS data with suitable metadata such as the height of the anemometer and the method of obtaining the SST.

V. Compensations and fundings

1. Since E-SURFMAR started in 2003; financial compensation is paid every year to VOS operators for the observations carried out by their ships. In 2009, 0.24 € will be paid for each manned observation and 0.07 € for each automated measurement.

2. Compensation is also paid to those National Meteorological Services who bear the communication costs. In 2009, about 0.16 € should be paid for each report sent by a conventional VOS and 0.05 € for each report sent by an AWS. The share of compensations between the operators and NMSs are based on the observations carried out in the previous year.

3. In 2007, the E-SURFMAR programme also funded the adaptation of an AIS ship tracker tool – Royal Dirkswager Ship2Report system – to assist European PMOs to keep track of VOS movements within Northern European waters. In 2008, the programme also financially supported KNMI for their work on the development of the TurboWin program.

VI. Data monitoring and data quality

1. Since the E-SURFMAR design study was carried out, air pressure data reported by EUMETNET ships have been monitored as a matter of priority. The quality of measurements reported by conventional VOS still appears, on average, to be worse than those of the AWS reports. Human readings often introduce non-systematic errors on sea level pressure observations. Double correction of the pressure height of the barometer above the waterline is still a common error, although TurboWin includes warnings to the observers about this issue.

2. Since 2007, the E-SURFMAR monitoring tools have been improved. New features include:

(a) More parameters are now compared to model analysis. Humidity as well as wave height and period have been added;

(b) ECMWF analysis are now used in addition to those of Meteo-France (Arpege model);

(c) A sea/land mask is now used on all parameters except air pressure. Interpolations of model outputs at the locations of the ships are more representative of the conditions at sea;

(d) The height of the anemometer is now used (if present in the metadata) to bring the wind speed measured by the ship at the model level (10 metres) in a standard atmosphere, before comparison.

3. Monitoring tools for VOS (and data buoys) are available at *http://www.meteo.shom.fr/qctools/*. They are not restricted to EUMETNET platforms.

VII. Meetings and Web sites

1. The 6th VOS-TAG meeting was be held on 14-15 May at WMO Headquarters in Geneva

2. E-SURFMAR public web pages may be seen at *http://www.eumetnet.eu/*
and *http://www.eucos.net/* (choose “EUCOS networks” then “E-SURFMAR” in the left menu)
Working area (password protected): *http://esurfmar.meteo.fr/wikisurf-wa/*

ANNEX XII

REPORT BY THE TASK TEAM ON ASAP

(report provided by Rudolf Krockauer, Chairperson of the ASAP Task Team)

1. Introduction

The number of ships, which routinely provide upper air soundings on the GTS throughout the year, is about 20 worldwide. Occasionally there are some research vessels, which perform soundings during certain research campaigns. However, these activities are usually limited to some weeks.

There are only two significant ASAP programmes: The European programme E-ASAP with 12-16 ships in 2007-2008 and the Japanese programme with 5 ships. The Japanese ASAP stations are operated on research vessels. E-ASAP is the only programme worldwide which is based on a fleet of commercial vessels (except 2 ships). Therefore the report of the ASAP Task Team is focused on E-ASAP.

2. Basics

Following key differences to land based radiosonde stations shall be pointed out:

- Almost all ASAP, systems in the E-ASAP fleet are installed on commercial container vessels. The ships sail with 15-20 knots (producing strong turbulences at the launcher) and undergo heavy vibrations from the machinery (thus shortening the lifetime of the technical equipment). Routine maintenance is limited to short berthing times in the port.
- Transmission of sounding data to the NMS is only possible through satellite communication. Satellite communication is generally less reliable than land based cable connections.
- On merchant ships, ASAP systems are operated by, members of the ships crews, not by professional observers. Skill and experience depend on the respective operator/crew member.
- Japanese ASAP ships are research vessels of the JMA (Japan Meteorological Agency) and Japan Agency for Marine-Earth Science and Technology (JAMSTEC). Since skilled staff operates the stations there are less problems than in the E-ASAP fleet.

3. E-ASAP fleet

Table one shows a list of 16 stations, which were in operation in the beginning of 2007. 10 out of 16 stations (ASEU-, ASDE-, and ASGB01) are operationally managed by E-ASAP. The NMS's of France (ASFR-), Denmark (ASDK-), Iceland (ASIS01), and Spain (ASES01) manage the other stations. The naming convention of the stations in the E-ASAP fleet is as follows:

Char	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

This unambiguous naming convention could also be applied to other ASAP stations without the risk of name conflicts. Further, it prevents the unwanted identification of the ships on the internet.

Table 1: Ships in the E-ASAP fleet in Jan 2007

Station	Line service	Sounding equipment
ASEU01	Houston – East Coast US – Northern Europe	The 20' container launcher is equipped with a Vaisala DigiCORA III (MW21). The second mate and third mate usually carry out launches.
ASEU02	Houston – East Coast US – Northern Europe	The 20' container launcher is equipped with a Vaisala DigiCORA III (MW21). The second mate and third mate usually carry out launches.
ASEU03	Western Mediterranean – Montreal	The 10' container launcher is equipped with a Vaisala DigiCORA III (MW21). Two cadets on board usually carry out launches.
ASEU04	Western Mediterranean – Montreal	The 10' container launcher is equipped with a Vaisala DigiCORA III (MW21). Two cadets on board usually carry out launches.
ASEU05	Western Europe – Halifax – Caribbean	The 10' container launcher is equipped with a Vaisala DigiCORA III (MW21). The master, chief mate and second mate usually carry out launches. The container is installed on a special rack.
ASDE01	Northern Europe – East coast US	The 20' container launcher is equipped with a Vaisala DigiCORA III (MW21). Almost all crew-members are involved in launching operations.
ASDE02(*)	No dedicated route	The 20' container launcher is equipped with a Vaisala DigiCORA III (MW21). A skilled observer of Deutscher Wetterdienst DWD carries out launches.
ASDE03	Houston – East Coast US – Northern Europe	The 20' container launcher is equipped with a Vaisala DigiCORA III (MW21). The second mate and third mate usually carry out launches.
ASDE04	Northern Europe - Caribbean	The 20' container launcher is equipped with a Vaisala DigiCORA III (MW21). The master and the chief mate usually carry out launches. The container is installed on a special rack due to limited space on deck.
ASGB01	Montreal – Northern Europe	The 10' container launcher is equipped with a Vaisala DigiCORA III (MW21). Two cadets on board usually carry out launches. There is a deck launcher, which is used when the conditions are unfavourable for container launches.
ASDK01	Denmark – West coast Greenland	The 10' container launcher is equipped with a Vaisala DigiCORA III (MW21).
ASDK02	Denmark – West coast Greenland	The 10' container launcher is equipped with a Vaisala DigiCORA III (MW21).
ASFR1	North West Europe – French West Indies	The ship is equipped with a deck launcher and MODEM SR2K sounding system in the wheelhouse. The electricians usually carry out launches.
ASFR2	North West Europe – French West Indies	The ship is equipped with a deck launcher and MODEM SR2K sounding system in the wheelhouse. The electricians usually carry out launches.
ASIS01	Iceland - East coast US	The 10' container launcher is equipped with a

Station	Line service	Sounding equipment
		Vaisala DigiCORA III (MW21). The container is installed on a special rack.
ASES01(**)	Off Mauretania and Canary Islands	The 10' container launcher is equipped with a Vaisala DigiCORA III (MW21).

(*) The research vessel FS METEOR (ASDE02) does not operate on fixed routes and is not bound to the EUCOS area of interest (70W-40E, 10N-90N).

(**) The hospital ship ESPERANZA DEL MAR (ASES01) follows the Spanish fishing fleet.

The number of stations declined from 16 in January 2007 to 12 in December 2008. Reasons were decisions by the shipping companies to take the ships out of the North Atlantic line service.

In June 2007 the ship SKOGAFOSS (ASAP station ASIS01) was sold and moved to another service. The Icelandic Met Services did not succeed to find the shipping company Eimskip could provide a replacement ship since no ship.

=> ASIS01 terminated ASAP operations in June 2007.

In July 2008 the charterer of the ship EWL CENTRAL AMERICA II (ASAP station ASEU05) went bankrupt and the North Atlantic line service was terminated without notice while the ship was off the coast of Guatemala. The ship entered a new charter as feeder ship in the Caribbean without any further Atlantic crossings. It was decided to remove the ASAP container and remaining helium cylinders from board in Kingston (Jamaica). The 10ft container unit was shipped to Germany and received in Hamburg in September. After complete refurbishment, the station ASEU05 was installed on the ship ATLANTIC COMPANION. The ship is a sister ship of the ATLANTIC COMPASS (ASAP station ASDE01) on the same line service Northern Europe – East coast US.

=> ASEU05 was successfully transferred to a replacement ship.

In October the ship manager at Maersk US informed that the SeaLand ships SL Performance (ASAP station ASEU01), SL Achiever (ASAP station ASEU02), and SL Motivator (ASAP station ASDE03) have to terminate all ASAP operations. The SL Performance and SL Achiever were serving the North America – Mediterranean route at the time. In November, both 10ft container units were discharged from the ships in Algeciras (Spain) and brought to Hamburg by overland transport. According to the ship manager, the SL Motivator is to be scrapped. Therefore, the 20ft container unit was removed from the ship in Bremerhaven (Germany) and brought to Hamburg in November. No replacement ships could be found so far.

=> ASEU01, ASEU02, and ASDE03 terminated ASAP operations in Oct/Nov 2008.

Figure 4 shows some photographs of the ASEU05 launcher before and after re-installation.

Figure 1: ASEU05 before and after refurbishment (upper left and upper right) and at installation on board the ATLANTIC COMPANION (lower left and lower right).

The E-ASAP fleet is to be extended by three stations in 2009:

- The Danish Met Service procured a GRAW sounding system (Graw Radiosondes GmbH & Co. KG., Germany). This is in line with the goal of E-ASAP to encourage competition on the market. So far, only Vaisala (Vaisala Oyj, Finland) and MODEM (France) are represented as suppliers of radiosondes and sounding systems in the E-ASAP fleet. The third Danish ASAP station ASDK3 commenced launching operations in Feb 2009 and serves the route Denmark – West coast Greenland.
- Meteo France will put two further stations into operation later in 2009. Both stations shall be equipped with MODEM sounding systems and will serve the route North West Europe – French West Indies.

4. Performance of the E-ASAP fleet

The performance of the ASAP stations is included in the national and E-ASAP SOT ASAP reports. Figure 2 shows the distribution of bulletins in 2008 on a 2x2° grid without interpolation.

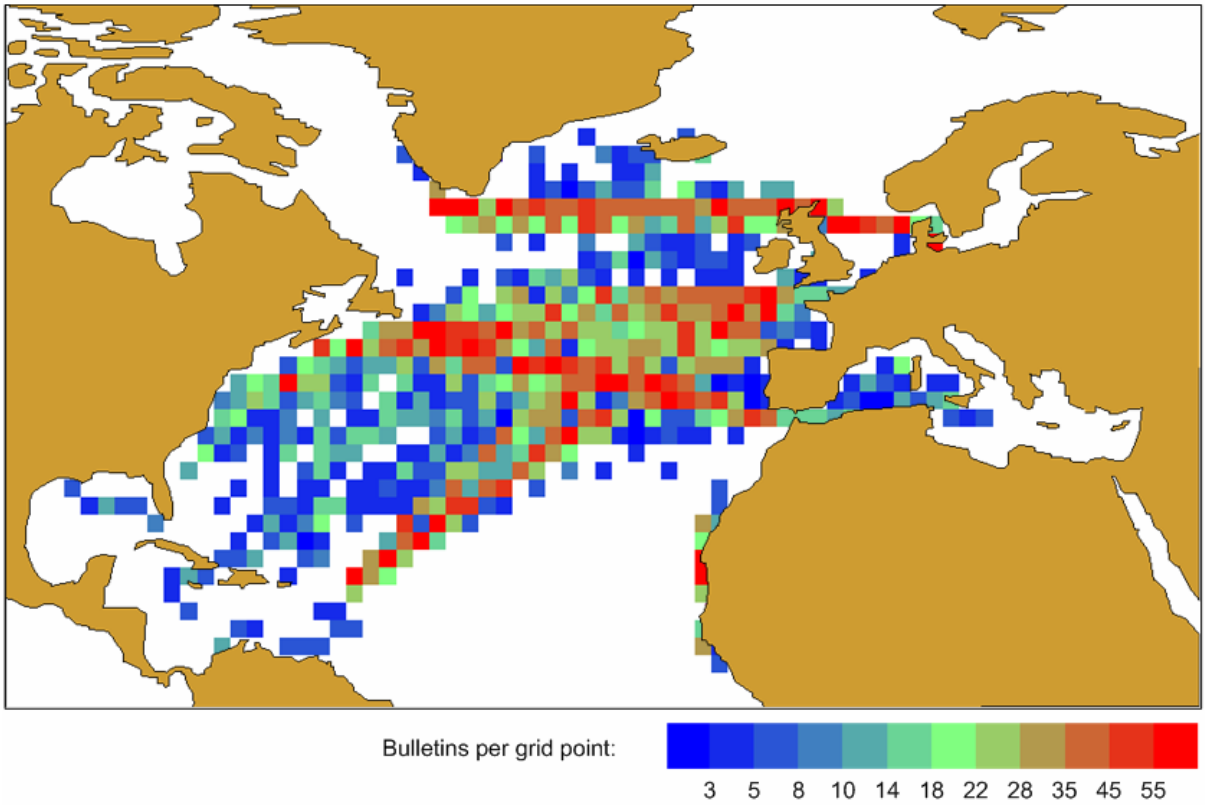

Figure 2: Distribution of TEMP-SHIP bulletins in 2008 on a 2x2° grid without interpolation.

The distribution demonstrates the main trading lines of the participating container vessels. The individual performances differ widely from month to month and from ship to ship. Mean average over all stations is 19 soundings per month. Total number of soundings on the GTS was 3476 in 2008. Taking into account the total number of launches on board of the ships and received soundings on the GTS, the average GTS/Launches ratio is 84%. This is an improvement to previous years and was mainly achieved through better satellite communication. Nonetheless, several ships showed GTS/Launches ratios of < 75%. Unfortunately, many operators on board the container ships do not sufficiently check the proper automatic transmission of the data after the balloon is successfully launched.

The specific targets for timeliness, availability, and quality were not all achieved. There are many reasons for not achieving the targets. This shall be demonstrated with the example of the timeliness of the station ASDE04: The total average timeliness HH+100 for the station ASDE04 is 92% against the target of 95%. Figure 3 shows the timeliness from Jan-Dec 2008.

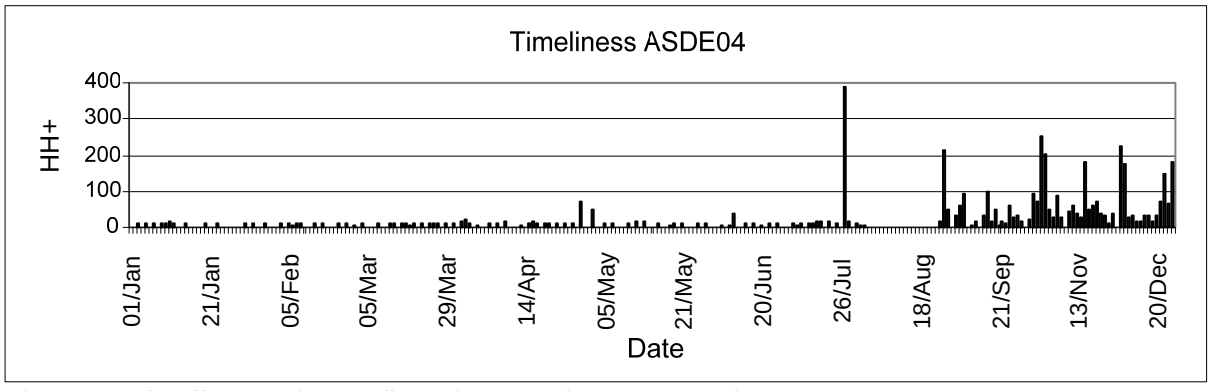

Figure 3: Timeliness of soundings from station ASDE04 in 2008.

In the period from Jan-Aug the timeliness target HH+100 was achieved to 99%. It is obvious that the timeliness decreased since September. The analysis of the problem was hampered by

the fact that the ship does not call in ports with E-ASAP maintenance. Several actions were taken to improve the satellite communication. Eventually it turned out that the operators on board had changed and the new operator did not inflate the balloons properly to save helium. Thus, the ascent rate of the balloons was significantly less than 4-5 m/s and the soundings terminated very late.

5. Satellite communication and data format

Improving the satellite communication is one of the challenging technical tasks of E-ASAP. Most ship observations (SYNOP and TEMP-SHIP) are transmitted via Inmarsat-C. However, transmissions via Inmarsat-C are expensive and limited to short data volumes. A low cost transmission system is required to transmit binary high-resolution BUFR data.

The first Iridium transmission system was installed on the ATLANTIC COMPASS (ASDE01) in July 2008.

Figure 4 shows the timeliness of the station ASDE01 before (96% within HH+100) and after (100% within HH+100) replacement of Inmarsat-C by Iridium.

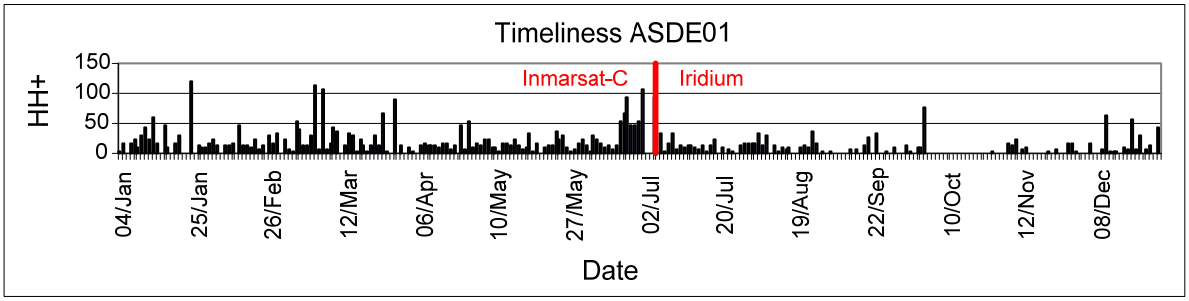

Figure 4: Timeliness of soundings from station ASDE01 in 2008.

The Vaisala DigiCORA software is ready to create high-resolution BUFR data. Thus, the station ASDE01 was configured to create BUFR with levels at 10 sec intervals. The files are transmitted over Iridium. The purpose of the 10 sec interval is to have file sizes of less than 20 Kbyte to keep the transmission time short. Additionally to the four TEMP-SHIP parts, two BUFR files are transmitted per sounding:

- sounding data from surface to 100 hPa, and
- sounding data from surface to burst height.

6. Japanese ASAP fleet

Table 2 shows a list of the Japanese ASAP ships. The JMA routinely operates ASAP stations on four research vessels in the western north Pacific and seas adjacent to Japan. JAMSTEC operates a station on an oceanographic research vessel in variable areas based on its research purpose. The average ratio of GTS/Launches is more than 98%.

Ship name	Area	Sounding equipment
Ryofu Maru/JMA	North Pacific	Semi-automatic Container is equipped with GPS/Vaisala RS92-SGP.
Kofu Maru/JMA	Seas adjacent to Japan	Semi-automatic Container is equipped with GPS/Vaisala RS92-SGP.

Seifu Maru/JMA	Seas adjacent to Japan	Semi-automatic Container is equipped with GPS/Vaisala RS92-SGP.
Chofu Maru/JMA	Seas adjacent to Japan	Semi-automatic Container is equipped with GPS/Vaisala RS92-SGP.
Mirai/JMA	Variable areas	Semi-automatic Container is equipped with GPS/Vaisala RS92-SGP.

7. Risks

Unexpected termination of ASAP operations due to changes in the ship services etc. is a permanent risk. In 2008, this happened four times. Main impact of the current economic crisis is the shortening of charter contracts between shipping companies and the flexibility of line services. This implicates that many ship managers are reluctant to agree on their participation, if the ASAP activities are limited to long-term line services in certain regions like the North Atlantic.

Furthermore, many new ships have very limited free deck space to host an ASAP container launcher, even if it is a 10ft container. Open deck launchers provide better flexibility to be installed on board. In this case, less space on deck is required and the electronic equipment is installed inside the ship (e.g. wheelhouse). Figure 5 shows the open deck launcher, which is, installed on board the French ASAP ships.

Figure 5: Open deck launcher

A further risk is the shortage of helium on the world market. There are no options to store sufficient reserves at E-ASAP premises or in the ports of call. If helium cannot be delivered to the ship in time, then the ship will sail without re-supplies.

8. Conclusion

The conditions to involve merchant vessels in ASAP operations have significantly deteriorated due to the global financial crisis, which came up in 2008. The shipping industry reacts with shorter charter contracts and reduced line services. The limited space on board can partly be overcome by choosing open deck launchers instead of container launchers. However, long time services are essential for regional programmes like E-ASAP. Installation and de-

installation require financial and managerial efforts, which are not worth for line services of less than six month.

An impact study of Met Norway in 2007 showed a significant positive impact from the E-ASAP network on the NWP results in Europe. A worldwide ASAP programme would have more options to find participating ships since the sailing routes are not bound to specific regions. However, this requires clear agreements on the financing (taking into account the uneven spatial distribution of soundings and possible changes in the sailing routes) and management (in case that technical maintenance has to be transferred to other countries due to changed sailing routes).

ANNEX XIII

PROPOSED CRITERIA[1] FOR UPGRADING SELECTED VOS TO VOS CLIMATE SHIPS

- Observations should be [proven to be] of good [high] quality;
- Observations should be submitted on a regular basis – [ideally] [at least 300 observations per year];
- The additional VOSClim elements [must] be available in the delayed mode observation, [and if possible should also be available in the real time message];
- [Real time observations should be submitted in a timely fashion and within forecast model cut off times];
- Meteorological Instruments should be in compliance with WMO Pub 8 standards etc and be routinely checked, replaced or re-calibrated to maintain data quality;
- Instruments and sensors should be well exposed and supported by digital images or basic drawings of the arrangements. Exposure should not adversely impact on the quality of the observations;
- Metadata records should be maintained up to date in accordance with the latest version of WMO Pub 47, and should be submitted by National Met Services to WMO at quarterly intervals [together with the associated digital images required for VOSClim ships];
- Delayed mode IMMT log files containing the additional VOSClim elements should be downloaded from manually reporting ships, and from AWS systems, at routine intervals [Ideally not exceeding every [6] months];
- Manually reporting ships [should] [must] be equipped with a suitable electronic logbook capable of coding and logging the delayed mode VOSClim elements;
- VOSClim ships fitted with AWS systems [should] [must] be capable of logging [or, If possible, transmitting] the additional delayed mode VOSClim elements;
- All visual and measured elements currently prescribed in the ship code message (FM-13) should be included, whenever possible;
- National Met Services [shall] ensure that delayed mode IMMT data containing the additional VOSClim elements is quality controlled and submitted to the GCC's on a quarterly basis;
- PMO Inspections of VOSClim ships should ideally be undertaken on a less than six monthly interval.

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1 : These are for guidance only and have been incorporated into the class definitions.

ANNEX XIV

JCOMM EXPERT TEAM ON SEA ICE (ETSI) POSITION ON SEA-ICE CODING

1. Within the WMO, the JCOMM Expert Team on Sea Ice (ETSI) is responsible for development and update of the regulatory material related to sea ice services. The ETSI vision of the existing WMO/IHO sea ice regulatory publications providing standards for sea ice parameters coding and presentation as a part of sea ice observations and ice charting significant for operational (safety and efficiency of ice navigation, offshore activities, etc) as well as climatological (sea ice as essential climate variable) tasks (sea ice standards) (IAW-I, June 2008) includes the following documents:

a) The WMO Sea-ice nomenclature (WMO-No. 259, provided in English /French/ Russian/Spanish, first published in 1971 with latest additions and corrections introduced in 2004, provides the standards for sea ice terminology and sea ice parameters coding (coding tables and scales) as well as a presentation on ice charts. Closely related is the "WMO Sea Ice terminology for the Baltic Sea" in 11 Baltic countries languages. An electronic version of the nomenclature is available and can be found at the following web address: http://www.aari.nw.ru/gdsidb/XML/nomenclature.asp.

b) JCOMM Technical Reports– SIGRID-3: a Vector Archive Format for Sea Ice Charts (WMO/TD-No. 1214), and

c) Ice Chart Colour Code Standard (WMO/TD-No. 1215), both finalized and published in 2004, extend the WMO Sea-Ice Nomenclature by providing standards for ice chart coding and presentation. Both exist in electronic format (.pdf, .doc) at JCOMM services and JCOMM main web-site.

d) The special WMO publication No. 574 "Sea-Ice Information Services in the World" (the latest 3rd version was published by the WMO Secretariat in March 2007). Document gives summaries for sea ice as natural phenomenon, ice observing methods and informational systems, and includes a comprehensive description of the products and services currently provided by all national ice services (Northern and Southern Hemispheres). In 2008, it was made available (.pdf) in electronic format at JCOMM services web-site).

e) The Manual on Marine Meteorological Services (WMO-No. 558), Volume I, Part I (4.2.9 Model SI – sea-ice information – charts), had been updated accordingly by the JCOMM-II and now requests that "*The "International System of Sea-Ice Symbols (WMO-No. 259, Volume III) and the "Ice Chart Colour Code Standard" (WMO/TD No. 1214) should be used. The Sea ice climatological information should be provided using SIGRID gridded and vector archive formats for sea ice charts (i.e., WMO-No. 716, WMO-No. 792 and WMO/TD-No. 1214)*."

f) Common abbreviations list for NAVTEX messages related to sea ice. The ETSI-III strongly endorsed the use of plain text; however, recognizing the need for brevity and clarity for marine communications recommended that the Swedish Ice Service review the additional abbreviations for the MSI related to sea ice. However, the BALTICO MEETING 2008 noted that the Ice information on NAVTEX has been reduced to only contain plain text information or information in Baltic Code about routines for ships reporting to the Baltic Sea Ice-breaking Services and information about current restrictions in Ice-class and engine power. Information about the ice extension and thickness is available on Internet (www.smhi.se/icechart) and is transmitted on VHF and MF.

g) The S-57 standard for Electronic Navigation Charts (ENC) until 2007 did not fully support presentation of marine meteorological parameters (including sea ice and icebergs). To this effect, the ETSI established a formal relationship (November 2005) with the IHO TSMAD (Transfer Standard Maintenance and Application Development Working Group) on the ownership of the Ice Objects register within the ENC. In March 2007 after harmonization with

the WMO Sea Ice Nomenclature, the ETSI-III adopted the "Ice Objects Catalogue" (based on the Canadian Ice Service version 3.0) as a formal joint WMO/IHO document, which is now used as a model for ice objects register. Catalogue exists in electronic form as a table at the IHO website. Relationship between WMO Sea Ice Nomenclature and Ice Objects Catalogue is defined as "*Ice Objects catalogue represents the subset of the WMO Sea Ice Nomenclature being at the same time a driving force for amending sea ice Nomenclature with an intention of including the navigators' feedback in the future*".

2. The ETSI acknowledged and accepted the following three sets of requirements for sea ice observations and services developed during the period of 2003-2007 by the International Ice Charting Working Group (IICWG) in collaboration with the ETSI, GCOS SST & SI, as well as other national experts:

- "Observational Requirements for Key Ice Features/Optimum Future Value" (from "Ice Information Services: Socio-Economic Benefits and Earth Observation Requirements"; prepared for the Group on Earth Observation (GEO) and Global Monitoring for Environment and Security (GMES), September 2007, http://nsidc.org/noaa/iicwg/IICWG8_2007/presentations/IICWG_Socio_Economic_Benefits_Oct_2007.pdf);

- "National Operational Ice Information Requirements" (from "An International Collaborative Effort towards Automated Sea Ice Chart Production", www.nsidc.org/noaa/iicwg/presentations/IICWG_white_paper_final.doc, also included in the ETSI-II Session Report);

- "Summary of Current/Planned Capabilities and Requirements for Space-based Remote Sensing of Sea Ice and Iceberg Parameters" and "Summary of Current/Planned Capabilities and Requirements for lake and river ice parameters" (from: "IGOS Cryosphere Theme - Report of the Cryosphere Theme Team", version 1.0r4, 13 March 2007, source: http://stratus.ssec.wisc.edu/cryos/documents.html).

3. In this respect, the ETSI recommends all references to the model of sea ice observations (scope of essential parameters and their coding) be consistent with the stated documents, in particular 1a and 1b, to consider following approach to amending the corresponding sections in IMMT-3 format and other documents reporting sea ice observations:

59	105	Ct_iCt_i	Total concentration of sea ice	~~WMO code table 0639~~ SIGRID-3 code table 4.1
xx	xxx	Ca_i Ca_i	Partial concentration of first thickest ice	SIGRID-3 code table 4.1
xx	xxx	Sa_iSa_i	Stage of development of first thickest ice	SIGRID-3 code table 4.2
xx	xxx	Fa_iFa_i	Form of first thickest ice	SIGRID-3 code table 4.3
xx	xxx	Cb_iCb_i	Partial concentration of second thickest ice	SIGRID-3 code table 4.1
xx	xxx	Sb_iSb_i	Stage of development of second thickest ice	SIGRID-3 code table 4.2
xx	xxx	Fb_iFb_i	Form of second thickest ice	SIGRID-3 code table 4.3
xx	xxx	Cc_iCc_i	Partial concentration of third thickest ice	SIGRID-3 code table 4.1
xx	xxx	Sc_iSc_i	Stage of development of third thickest ice	SIGRID-3 code table 4.2
xx	xxx	Fc_iFc_i	Form of third thickest ice	SIGRID-3 code table 4.3
xx	xxx	Sn_iSn_i	Stage of development of ice thicker than Sa but with concentration less then 1/10	SIGRID-3 code table 4.2
xx	xxx	Sd_iSd_i	Stage of development of any remaining class of ice	SIGRID-3 code table 4.2
xx	xxx	Fp_iFp_i	Predominant form of ice	SIGRID-3 code table 4.3
xx	xxx	Fs_iFs_i	Secondary form of ice	SIGRID-3 code table 4.3
xx	xxx	Dp	Dynamic processes	SIGRID-3 code table 4.5
~~60~~	~~106~~	~~S_i~~	~~Stage of development~~	~~WMO code table 3739~~
61	107	b_ib_j	Ice of land origin form and size	WMO code table 0439 SIGRID-3 code table 4.13
~~62~~	~~108~~	~~D_i~~	~~True bearing of principal ice edge~~	~~WMO code table 0739~~
~~63~~	~~109~~	~~z_i~~	~~Present ice situation and trend of conditions over the preceding three hours~~	~~WMO code table 5239~~
xx	xxx	IiIiXiXi	Optional sea ice variable identifier and its value	SIGRID-3 code table 3.3, code tables 4.6 – 4.11

…	…	…	…	…
xx	xxx	IiIiXiXi	Optional sea ice variable identifier and its value	SIGRID-3 code table 3.3, code tables 4.6 – 4.11

Alternatively, SIGRID-3 strings may be proposed for coding sea ice parameters.

ANNEX XV

PROPOSED RESPONSIBILITIES AND DUTY STATEMENT FOR THE ARGO/SOT AND DBCP/OCEANSITES TECHNICAL COORDINATORS

1) Argo and SOT Technical Coordinator position Proposed updated Duties and responsibilities

1.1 Under the general supervision of the Executive Secretary of the IOC of UNESCO, acting in close collaboration with the Secretary General of WMO, and under the guidance from the Co-Chairmen of the Argo Steering Team, and the Chairman of the Ship Observation Team (VOS, SOOPIP), the incumbent is responsible for the international technical coordination of Argo and SOT programmes.

1.2 The Technical Coordinator runs the Argo Information Centre (AIC) as part of the JCOMM in-situ observing Platform Support Centre (JCOMMOPS) and will assist as appropriate in the implementation of the Global Ocean Observing System (GOOS), and will:

- assist in the **planning**, **implementation** and **operations** of the observing systems
- develop **synergies** between observing systems
- **monitor** and **evaluate** the performance of the networks
- encourage **cooperation** between communities and Member States
- encourage **data sharing**
- assist in **data distribution** on the Internet and the GTS
- relay users **feedback on data quality** to platforms operators
- provide **technical assistance** and **user support worldwide**
- act as a **clearing house** and **focal point** on all programmes aspects

1.3 60% of the time will be spent on Argo related issues, 30% on SOT and 10% on JCOMMOPS.

Duties and responsibilities
a) Provide international technical coordination for Argo and SOT.
b) Inform Member States about deployment of floats, which might drift into their Exclusive Economic Zones (EEZ) according to IOC Resolution XX-6. Cooperate with the IOC/ABE-LOS group in the implementation of the Resolution XX-6. Provide reports to Member States as requested.
c) Develop and maintain as appropriate Argo, SOT websites. Develop and maintain a web based information and real-time monitoring system alert Member States on the status of the status of floats entering their EEZ and inform them how to access float information. Assist with deployment strategies and undertake performance evaluation.
d) Through direct contacts with potential users in Member States, advertise the Argo and SOT programmes, encourage use of float data, and foster participation of new Member States in the programmes.
e) Assist when requested with the development of cooperative arrangements for float deployment, retrieval of beached instruments and operations on ship based observing platforms.
f) Through direct contact with program managers, observing platform operators, data telecommunication providers, data assimilation centres, WMO and IOC, oceanographic and meteorological institutions, assist as appropriate in the implementation of a global system, including standardization, for the distribution of data for assimilation by oceanographic and coupled oceanographic/meteorological models.
g) Assist in the implementation of real-time and delayed-mode quality control procedures.
h) Promote the flow of Argo and SOT data to their designated archives.
i) Act to resolve any issues arising between observing platforms operators, manufacturers, data telecommunication providers, data assimilation centres, quality

control and archiving agencies, WMO and IOC, etc.
j) Act as a clearinghouse for information on all aspects of Argo and SOT observing platform data use.
k) Prepare documents for, participate in and report to the regular meetings of Argo, SOT and JCOMMOPS, and represent these groups at other relevant technical meetings, both inside and outside WMO and IOC, as required.
l) Provide regular status maps and reports to Argo, SOT and JCOMM communities.
m) Administer, develop and maintain the JCOMMOPS Centre. Work in conjunction with the DBCP/OceanSITES TC on JCOMMOPS related issues.
n) Develop and maintain JCOMMOPS Information and Communication System including its database (in particular platforms, metadata), GIS, website(s), mailing lists, etc.
o) Promote an improved international dialogue between oceanographers and meteorologists, and between research and operational communities.

2) Proposed updated DBCP and OceanSITES Technical Coordinator Position Duties and responsibilities

2.1 Under the general supervision of the Executive Secretary, IOC, acting in close collaboration with the Secretary General of WMO, and under the technical guidance from the Chairman of the Data Buoy Cooperation Panel (DBCP, www.dbcp.noaa.gov), and the Co-Chairs of the OceanSITES Program and through direct contact with observing platform operators, data telecommunication providers, and data assimilation centres, the coordinator will assist in the implementation and operations of a global system. The incumbent will therefore have the following duties and responsibilities. Observing platforms below refer to drifting buoys, moored buoys in the high seas.

2.2 As part of the JCOMM in-situ observing Platform Support Centre (JCOMMOPS), the DBCP/OceanSITES Technical Coordinator will assist as appropriate in the implementation of the Global Ocean Observing System and will:

assist in the **planning**, **implementation** and **operations** of the observing systems
develop **synergies** between observing systems
monitor and **evaluate** the performance of the networks
encourage **cooperation** between communities and Member States
encourage **data sharing**
assist in **data distribution** on the Internet and the GTS
relay users' **feedback on data quality** to platforms operators
provide **technical assistance** and **user support internationally**
act as a **clearing house** and **focal point** on all programme aspects

2.3 70% of the time is spent on DBCP related issues and 30% on OceanSITES coordination.

Duties and responsibilities DBCP and OceanSITES
a) Provide technical assistance and support to the DBCP, OceanSITES (Science Team and Data Management Team) and other DBCP Action Groups
b) Manage contact details for DBCP and OceanSITES participants and user groups and email distribution lists within these contacts.
c) Assist in collection and distribution in real time of quality observational platform data for operational meteorology and oceanography, as well as for research purposes. Assist in promoting and facilitating the insertion of observing platform data into the Global Telecommunications System (GTS) or into appropriate data distribution systems and permanent archives.

d) Assist with the development of cooperative arrangements for buoy deployment and maintain information on buoy deployment opportunities and strategies. Liaise with other related programs to increase integration of data access and resources (such as real time data sharing and ship time)
e) Through direct contact with potential users in member states, advertise the DBCP and OceanSITES programme. Encourage use of observing platform data and active participation by new member states in these, and related programmes. Act as a clearinghouse for information on all aspects of observational platform metadata; maintain DBCP web sites and brochures.
f) Act to resolve issues arising between observational platform operators, manufacturers, data telecommunication providers, data assimilation centres, quality control and archiving agencies, WMO and IOC.
g) Assist in the development, implementation, and management of quality control procedures for observing platform data; assist in relaying feed-back quality information from data users to platform operators, and in particular monitor and maintain DBCP "quality control guidelines"
h) Assist in and develop systems for collection of metadata for data buoys and OceanSITES platforms.
i) Compile and produce monthly monitoring products to the DBCP, OceanSITES and JCOMMOPS communities. Suggest and produce additional products as requested or needed
j) In liaison with the OceanSITES community (Science Team, Data Management Team and Member Institutions and platform/site operators) proactively seek and identify new sites; compile, standardise and update documentation (Metadata Catalogue, Whitepapers, Programme web pages and maps); monitor data flow and data formats; and assess network success and requirements
k) Assist in standardization of instrumentation, data formats, and operational procedures
l) Work alongside the Argo Technical Coordinator to develop and maintain the JCOMMOPS database, Geographical Information System and web based monitoring system.
m) Promote an improved international dialogue between oceanographers and meteorologists, and between research and operational communities
n) Prepare documents for, participate in and report to the regular meetings of the DBCP, OceanSITES and JCOMM. Develop meeting reports and documents as required. Assist in arranging OceanSITES meetings as required. Represent these groups at other relevant technical meetings, both inside and outside WMO and IOC, as required.

3) OceanSITES Project Office Terms of Reference:

The Terms of Reference of the OceanSITES Project Office Team are available from the following document:

http://www.jcommops.org/FTPRoot/OceanSITES/documents/OceanSITES%20Project%20office.doc

ANNEX XVI

CONTRIBUTIONS TO THE DBCP/SOT TRUST FUND FOR 2009
(as reported in the final report of the 25th DBCP Session)

Country	JCOMMOPS	DBCP	SOT	JTA	Comment
Australia	USD 16,200				
Canada	CAD 25,000				CAD 25,000
CLS				USD 15,000	USD 15,000 for the JTA Chairperson
E-SURFMAR		EUR 40,000			Belgium, Croatia, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden and the United Kingdom
Germany			USD 5,000		Contribution for SOOPIP
India		USD 3,000			
New Zealand	USD 2,400				NZ to confirm that their contribution is for JCOMMOPS as a whole
South Africa		USD 4,500			
United States		USD 80,000	USD 25,000		Contribution made to the IOC

Note: Statements of account by WMO and IOC are provided in the DBCP annual reports for 2007 and 2008.

ANNEX XVII

ASAP TRUST FUND STATEMENTS OF ACCOUNT FOR 2007 AND 2008

1) ASAP TRUST FUND STATEMENT OF ACCOUNT FOR 2007

World Meteorological Organization
Organisation météorologique mondiale

Secrétariat
7 *bis*, avenue de la Paix – Case postale 2300 – CH 1211 Genève 2 – Suisse
Tél.: +41 (0)22 73081 11 – Fax: +41 (0)22 73081 81
wmo@wmo.int – www.wmo.int

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ASAP Trust Fund
Statement of income and expenditure
For the period 1 January to 31 December 2007
Amounts in Swiss Francs

1. Balance of fund at 1 January 2007	47,875
2. Expenditure	-
3. Balance of fund at 31 December 2007	47,875

Certified correct:

Luckson Ngwira
Chief, Finance Division

20 March 2009

2) ASAP TRUST FUND STATEMENT OF ACCOUNT FOR 2008

World Meteorological Organization
Organisation météorologique mondiale

Secrétariat
7 *bis*, avenue de la Paix – Case postale 2300 – CH 1211 Genève 2 – Suisse
Tél.: +41 (0)22 730 81 11 – Fax: +41 (0)22 730 81 81
wmo@wmo.int – www.wmo.int

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ASAP Trust Fund
Statement of income and expenditure
For the period 1 January to 31 December 2008
Amounts in Swiss Francs

1. Balance of fund at 1 January 2008	47,875
2. Expenditure	-
3. Balance of fund at 31 December 2008	47,875

Certified correct:

Luckson Ngwira
Chief, Finance Division

20 March 2009

ANNEX XVIII

CHANGES PROPOSED BY SOT-V TO THE TERMS OF REFERENCE OF THE SHIP OBSERVATIONS TEAM (SOT)

The Ship Observations Team shall:

1. Review and analyze requirements for ship-based observational data expressed by relevant existing international programmes and/or systems 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 the planning activities of the appropriate observing system experiments and major international research programmes as the specialist group on observations based onboard ships, including Voluntary Observing Ships (VOS), Ships-Of-Opportunity (SOO), ships from the Automated Shipboard Aerological Programme (ASAP), and research ships;

9. Seek new opportunities for deploying various kinds of measuring devices as recommended by the relevant panels 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

SOOPIP coordinates the installation and deployment of instrumentation from Ships of Opportunity that travel in fixed transects, and in particular coordinates the implementation of regional and basin-wide that measure physical, chemical and biological parameters, such as XBTs, TSGs, CPR, etc.

Their Terms of Reference are to:

a. Review, recommend on and, as necessary, coordinate the implementation of specialized shipboard instrumentation and observing practices dedicated, but not limited, to temperature and salinity measurements;

b. 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;

c. Ensure the distribution of available program resources to ships to meet the recommended sampling network in the most efficient way;

d. Ensure the transmission of data in real time from participating ships; ensure that delayed mode data are distributed in a timely manner [within 24 hours of the observations] to data processing centers;

e. Maintain, through the SOT Coordinator, appropriate inventories, monitoring reports and analyses, performance indicators and information exchange facilities;

f. Provide guidance to the coordinator in supporting the SOOP;

g. Prepare annually a report on the status of SOOP operations, data availability and data quality

h. Provide aid to serve as a platform for other observational programs;

i. Maintain close communications with the scientific community to continue making observations made by SOOP useful data sets;

j. Support the formation of a SOOP Science Team dedicated to meet and discuss in periodic basis results and ongoing research performed with XBT observations

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 transition of ships from VOSClim project status to the VOSClim Class within the VOS, and encourage other suitable ships to be upgraded to the VOSClim class;

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

ANNEX XIX

INTERCOMPARISON OF ELECTRONIC LOGBOOK RECOMMENDATIONS FROM THE SOT TASK TEAM ON INSTRUMENT STANDARDS

The Task Team proposes that Recommendations numbers 1, 2, 4, 5 and 6 from the original report be accepted, and that Recommendation No.3 regarding swell be extended to cover all swell coding options as described below.

1. That all E-Logbook software report Dewpoint to one decimal place.

2. That the algorithm for calculating dewpoint be standardised between E-Logbooks.

3. Swell coding:

   (1) When swell 'not determined' = 3//// 4//// 5////. Recommendation is to omit the 3, 4 and 5 groups in the coded observation.

   (2) When 'no swell' i.e. calm sea = 30000 40000 50000. Recommendation is to code 30000 and omit the 4 and 5 groups in the coded observation. By inference, if the 3 group is reported as 30000 then the 4 and 5 groups **must** be 40000 and 50000 respectively, in which case they provide no useful additional information.

   (3a) When confused swell (plus confused height and period) = 399/// 4//// 5////. Recommendation is to omit the 5 group in the coded observation.

   (3b) When confused swell (height and period estimated) = 399// 4xxxx 5////. Recommendation is to omit the 5 group in the coded observation. Note: x = valid data

   (4) Coding of 1 swell = 3xx// 4xxxx 5////. Recommendation is to omit the 5 group in the coded observation. Note: x = valid data

   (5) Coding 2 swells = 3xxxx 4xxxx 5xxxx. Recommendation is to code all groups. Note: x = valid data

4. That TurboWin and SEAS software implement a QC check to correlate the reported wind speed with wind wave height.

5. That all E-Logbook software provide more on-screen information to aid in the selection of the correct code figures for Visibility (VV) and Height of base of lowest cloud (h) when the ranges and heights are at the boundaries of the levels. Refer to WMO manual on Codes (WMO No 306) FM13-XII Ext. SHIP. For VV refer to WMO code table 4377 and note that if the distance of visibility is between two of the distances given, the code figure for the smaller distance shall be reported. For h refer to WMO code table 1600 and note that a height exactly equal to one of the values at the end of the ranges shall be coded in the higher range.

6. That SEAS and TurboWin prompt for the entry of ship speed if it is not entered.

ANNEX XX

STATUS OF ACTION ITEMS FROM SOT-IV

Are indicated in yellow those action items that will be reviewed under agenda item I-2.4, and presented by the secretariat;
Are indicated in light blue those action items that will be reviewed under agenda item I-2.5, and presented by the SOT Technical Coordinator;
Are indicated in orange those action items that will be reviewed under agenda item I-4.1, and presented by the chairperson of the Task Team on Satellite Communication
Are indicated in blue those action items that will be reviewed under agenda item I-4.3, and presented by the Chairperson of the Task Team on ASAP
Are indicated in cyan those action items that will be reviewed under agenda item I-4.4, and presented by the Chairperson of the Task Team on VOS Recruitment and Programme Promotion
Are indicated in green those action items that will be reviewed under agenda item I-4.6, and presented by the Chairperson of the Task Team on Coding
Are indicated in dark yellow those action items that will be reviewed under agenda item I.4.7, and presented by the Chairperson of the Task Team on Instruments
Are indicated in dark blue those action items that will be reviewed under agenda item I-4.9, and presented by the Chairperson of the Task Team on VOSClim
Are indicated in dark green those action items that will be reviewed under agenda item III-1.2, and presented by the Chairperson of the VOS Panel
Are indicated in magenta those action items that will be reviewed under agenda item IV-1.2, and presented by the Chairperson of the SOOP Implementation Panel

Reviewed at agenda item, by	No	Item	Action	By	Deadline	Status	Comment
I-2.4, General Review, Secretariat	4	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	Done	Done
I-2.4, General Review, Secretariat	7	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	Done	Contacts made with FerryBox colleagues at NOCS; agreed on setting up a data transfer from the line Portsmouth-Spain but for the moment no effective data transfer has been done. Contacts made with Norwegian colleagues from NIVA and they also agreed on providing data to GOSUD. Data transfer must be also set up. GOSUD held its meeting in June. Mr Colijn has been informed through mailing list about the meeting.
I-2.4, General Review, Secretariat	8	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-07	Pending	Pending. There has been no high level WMO-IMO-ICS meeting since Feb 2007. Sarah North supplied a 'Generic Design Standards' document to WMO in Dec 2007
I-2.4, General Review, Secretariat	15	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	Done. Received annual report	Letter sent to Russian Federation together with request for input for SOT annual report for 2008

I-2.4, General Review, Secretariat	16	IV-2.1.1.11	To help for having the SOT requirements considered by the manufacturing industry	HMEI (Bruce Sumner)	SOT-V	Ongoing	Any requirements received from SOT are immediately passed to all the manufacturers who are members of HMEI. Also passed on are reports of SOT and other JCOMM meeting, and reports and requests from members of SOT. For instances, Robert Luke has contacted HMEI on several occasions with requests for assistance. In addition, HMEI is cooperating with the WIGOS Pilot Project for JCOMM and solutions being explored in this context.
I-2.4, General Review, Secretariat	17	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	ok USA	USA: done (increasing training materials)
I-2.4, General Review, Secretariat	18	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	ok USA	USA: Done
I-2.4, General Review, Secretariat	19	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	ongoing	DMCG created Task Team on Table driven codes including with representation from SOT, ETMC.
I-2.4, General Review, Secretariat	20	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	used by NZ, Aus	Australia and New Zealand are using it. Contrary to European NMHSs, they have asked that non-active vessels do not appear in the database and, of course, they keep full control over the submission of quarterly data to WMO.

I-2.4, General Review, Secretariat	22	IV-2.3.2.5	To liaise with USA regarding organization of the Fourth International PMO Workshop in 2009	Secretariat (WMO); USA	Early 2009	Postponed	Postponed to 2010 due to lack of funding in 2009
I-2.4, General Review, Secretariat	23	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	ok USA	USA: concur
I-2.4, General Review, Secretariat	24	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 (STCW) convention) ensures adequate training in the modern observational practices	SOT Members	SOT-V	No action	
I-2.4, General Review, Secretariat	25	IV-2.4.1.6	To routinely use the JCOMMOPS QC relay tool for reporting on systematic errors	RSMC, Exeter; Quality monitoring centres	Ongoing	Done	Done. RSMC now routinely (usually weekly) use the JCOMMOPS QC relay tool to report ships with systematic and other errors. Some feedback has been received at the Met Office when errors have been corrected by PMOs on inspection of the ships concerned
I-2.4, General Review, Secretariat	30	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	Progress	Some progress on the development of the tool; should be extended to other countries; Netherlands, France, Germany, and UK use it.
I-2.4, General Review, Secretariat	31	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	Done	Done
I-2.4, General Review, Secretariat	33	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	Started	This was instigated with the 'suspect' list for May 2007

I-2.4, General Review, Secretariat	35	IV-3.3.8	To avoid masking the delayed mode data using SHIP	VOS Operators	Ongoing	Addressed	USA: US VOS masked ships delayed mode data is being sent to NCDC & ICOADS in their "REAL" form. NCDC should continue to provide archive data as GCC. JMA observations (even if originating into GTS as SHIP from NWSTG - are responsibility of JMA for inclusion into climate archives.
I-2.4, General Review, Secretariat	36	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	Done	The project ship list has been consistently maintained and updated as the DAC is notified of new recruits, withdrawals, call sign/ship name changes, etc. Links have also been added to many VOS sites. It is highly encouraged that participating VOS operators check the links page at http://www.ncdc.noaa.gov/oa/climate/vosclim/links.html and provide any additional VOS web addresses to be included on the VOSClim website.
I-2.4, General Review, Secretariat	37	IV-3.5.6	To produce the TT-DMVOS project plan	TT/DMVOS	Aug-07	Done	Done
I-2.4, General Review, Secretariat	38	IV-3.5.9	Not to mask the delayed mode data	VOS Operators	Ongoing	Addressed	USA: Only possible delayed mode data would be from ships who have requested that their observations be NEVER released publicly. Of course, in this case, that data would not be shared with NCDC or ICOADS anyway so. See also IV-3.3.8 above.
I-2.4, General Review, Secretariat	39	IV-3.5.11	To consider attending the CLIMAR-III workshop, Gdansk/Sopot/Gdynia, Poland, 6-9 May 2008	SOT Members	May-08	Done	Some SOT Members attended the meeting (e.g. Brazil, Canada, Croatia, Germany, Israel, Poland, USA, UK)

I-2.4, General Review, Secretariat	42	IV-3.7.1	To investigate whether the VOSClim photographs could be stored with Pub47 Metadata	Secretariat (WMO)	End 2007	Not done	No resources available at this point for making required developments
I-2.4, General Review, Secretariat	44	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	ongoing	USA: still being discussed with AOML (Derrick) on feasibility & costs)
I-2.4, General Review, Secretariat	46	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	partly done	NCDC has considered and is prepared to make changes to processing in the event that an agreement is made to differentiate between VOSClim and non-VOSClim ships reporting VOSClim elements. This is currently taking place for the GCC delayed-mode observations, based on the project ship list
I-2.4, General Review, Secretariat	47	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	Done	Three main sites made developments to control display. Areas of possible piracy are managed to restrict access to sensitive information.
I-2.4, General Review, Secretariat	48	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	Done	USA: Done

I-2.4, General Review, Secretariat	52	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	ok but no feedback received	No information on electronic devices, in particular devices to replace mercury temperature measurement instruments, has been received from SOT. However when such information is received, HMEI has a very effective dissemination mechanism to ensure such information is passed to all members in a very timely manner, and that member responses are collected/collated and passed back to SOT very quickly. In addition, HMEI is cooperating with the WIGOS Pilot Project for JCOMM and solutions being explored in this context.
I-2.4, General Review, Secretariat	53	IV-4.4.11	To conduct Intercomparison 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	Not done	USA: none received to date
I-2.4, General Review, Secretariat	57	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	Done	Done. RSMC now routinely (usually weekly) use the JCOMMOPS QC relay tool to report ships with systematic and other errors. Some feedback has been received at the Met Office when errors have been corrected by PMOs on inspection of the ships concerned

I-2.4, General Review, Secretariat	60	IV-5.1.3	To investigate whether SAMOS could become a participant of the US VOS	R. Luke; SAMOS	SOT-V	Ongoing	Have been coordinating efforts with Shawn Smith for SAMOS reports. Some ships already providing information in real time. Others are awaiting test & evaluation of NOAA SHIP AutoImet ship observations before we expand to assume a more complete real time data process. The SAMOS data is already available for climate studies.
I-2.4, General Review, Secretariat	68	V-2.3.3	PX-81, Honolulu - Coronel (Chile). 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 (report back to SOOPIP Chairperson)	Secretariat (IOC);	asap	Still investigating	Japan to Honolulu line could be operated but it is difficult to find a ships.
I-2.4, General Review, Secretariat	69	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	Done	Birgit Klein - 14/1/2009 : talked to Eberhard Fahrbach and he saw no problem in finding people to carry out the work but had no resources in the AWI to supply the XBTs.
I-2.4, General Review, Secretariat	70	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	Ongoing	The British Antarctic survey drops XBTs from 60 degrees South to Halley station, and data are reported on GTS.
I-2.4, General Review, Secretariat	71	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	Done	Deep blue and fast deep autolaunchers

I-2.4, General Review, Secretariat	77	V-2.6.5	To host documentation once the real-time QC standards are defined for XBT profiles	JCOMMOPS	End 2007	Done	Done. (i) Added 3 new links on the front page to direct users to the relevant materials, being prepared within NODC; and (ii) Updated the Best Practices and Publications page. http://www.jcommops.org/soopip/publications.html
I-2.4, General Review, Secretariat	84	V-5.2.3	To coordinate procedures for near-real-time insertion of salinity data on GTS	IOCCP; AOML	End 2007	Ongoing	Some underway salinity data are inserted on GTS from 70 ships; 48 of them are SeaKeepers; 15 ships are from NOAA; plus two crew ships and some cargo ships.
I-2.4, General Review, Secretariat	86	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	Unknown	
I-2.4, General Review, Secretariat	87	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	Unknown	

I-2.4, General Review, Secretariat	89	VI-1.1.14	To provide guidance and 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	Done	Fourth WMO Workshop on the Impact of Various Observing Systems on NWP, Geneva, Switzerland, 19-21 May 2008 addressed Radiosondes impact. Global wind profiles remain the more important information to observe, at least relatively to the current GOS where the temperature profiles can be indirectly observed by satellite sounders or GPS radio-occultation. Radiosondes in general contribute to the large-scale forecast skill at short and medium-range at a level of 6 hours to 12 hours in the NH and tropical regions, and a few hours to 6 hours in the SH. Radiosondes are relatively more important for regional models than for global models; isolated profiles of wind and temperature (from Radiosondes, AMDAR…) are crucial for NWP
I-2.4, General Review, Secretariat	90	VI-3.1.1.3	To investigate availability of materials showing the need for Radiosondes data in the Southern Hemisphere and in the North Pacific for satellite calibration	ECMWF (Antonio Garcia-Mendez)	End 2007	More info needed	
I-2.4, General Review, Secretariat	91	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	Done	

I-2.4, General Review, Secretariat	92	VI-3.1.2.7	To investigate feasibility and to produce the proposed special study special studies on the dissemination of the TEMP-SHIPs	Météo France (Gérard Rey)	asap	Ongoing	Because of the recent problems with Goonhilly LES and the route via the station of Aussaguel LES of some messages, some transmission procedures between Aussaguel and Météo-France had to be changed (provider proposing to switch from Telex to e-mail). Meteo France will investigate the results of the backup procedure and propose feedback. Switched to e-mail mode, but no lost messages were noticed and this became lower priority. Asked France-Telecom to send a proposal for an ftp backup (still outstanding).
I-2.4, General Review, Secretariat	93	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	Done	Done
I-2.4, General Review, Secretariat	98	VI-6.6.4	To discuss the details and practicalities of the Australian reimbursement from the ASAP Trust fund	Secretariat (WMO); Australia	asap	done	Done
I-2.4, General Review, Secretariat	99	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	Partly done	Partly done; awaiting next update of WMO Publication 47
I-2.4, General Review, Secretariat	100	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	Not done	No resources available at this point for making required developments

I-2.4, General Review, Secretariat	101	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	Not satisfactory	WMO doing its best but there are resource issues preventing this to be effective
I-2.4, General Review, Secretariat	103	I-5.2.1.3	To provide the Secretariat with additional questions to ask Inmarsat if needed	SOT Members	SOT-V	Done	No additional question received
I-2.4, General Review, Secretariat	105	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	Ongoing	Sarah North representing WMO Ship Observations Team (SOT) in the work of the IMO Correspondence Group on AIS binary messages. United States Coast Guard recently approved phase two of this project to have selected buoys the capability of transmitting warning messages. This phase has not yet been initiated at this time. Phase three is still to contain the two- way communications aspect and there is not any word on funding allocation or even extended discussions at this time.
I-2.4, General Review, Secretariat	107	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	Ongoing	Addressed at the META-T meeting, Sept 2008
I-2.4, General Review, Secretariat	108	I-6.2.1.4	To work with the TT-DMVOS to update the delayed mode exchange format	META-T	asap	Ongoing	In progress; addressed by META-T (Geneva, 16-17 Sept 2008) and TT-DMVOS meetings (Gdynia, Poland, 10 May 2008)

I-2.4, General Review, Secretariat	114	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	Done	Done
I-2.4, General Review, Secretariat	115	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	Done	Done
I-2.4, General Review, Secretariat	118	I-8.5.1	To consider contributing to the Ship Consumables Trust Fund administered by the WMO	SOT Members	Ongoing	No contribution	No contribution made to the trust fund
I-2.4, General Review, Secretariat	119	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	Done	Included in JCOMM-III preparatory documentation
I-2.5, SOT TC	1	II-4.1	to provide the results of the XBT Recorder Inter-comparisons study on the SOOPIP web site	SOT TC	Aug-07	Done	Done, waiting input from AOML. NOAA is still finalising the Paper for publication, but some information is referenced under XBT Fall Rate equations on the front page, from NODC. This paper should be ready by May and will appear on the NODC bibliography as referenced on the SOOPIP website: http://www.nodc.noaa.gov/OC5/XBT_BIAS/xbt_bias.html
I-2.5, SOT TC	29	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-07	Partly done	Partly done. VOS Several links added to http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/monitoring >> Quality >> Ship Based Observations. SOOPIP Information updated on http://www.jcommops.org/soopip/publications.html for CSIRO and AOML

I-2.5, SOT TC	32	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	Done	Done 2/2009. Comparison between www.jcomm.info and sot@jcommops.org, pmo@jcommops.org etc completed. Should be done again in May
I-2.5, SOT TC	73	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	Partly done	Partly done. References added to the SOOPIP Publications page: For SIO (updated 2006) http://www.jcommops.org/soopip/publications.html#IMPL
I-2.5, SOT TC	78	V-3.1.5	To investigate the possibility of streamlining the SOOP survey report with increasing web links	SOT TC	SOT-V	Done	Done. Direct links added to the SOOP Indicators application instead of including all of the HTML content in the report.
I-2.5, SOT TC	80	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	Not done	Not done. This will be assessed in lead up to OceanObs09.
I-2.5, SOT TC	88	VI-1.1.9	To investigate the issue of JCOMMOPS hosting and maintaining an online ASAP metadata database	SOT TC	SOT-V	Ongoing	In progress. http://www.jcommops.org/sot/asap-monitoring.html
I-2.5, SOT TC	95	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-07	Ongoing	In progress. Contacted Sarah North to receive the list
I-4.1, Chair TT-Satellites	102	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	No additional feedback	No other questions have been forthcoming from the TT (yet)
I-4.1, Chair TT-Satellites	104	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	Done	Done. Progress to be reported at SOT-V

I-4.3, Chair TT-ASAP	94	VI-3.1.2.10	To investigate the issue of issue of standardizing TEST ASAP reports and to make proposals	TT/ASAP	End 2007	Done	Rudolf Krockauer - 15/1/2009: It is assumed that test soundings should only be transmitted to the GTS if they are real data and worth of being distributed. Generally, there are rather few soundings, which are not operational. Most of the TEST soundings were created by the E-ASAP test station at DWD in Hamburg (see also the End-to-end report of the ASAP data dissemination performance 2008, Meteo France) to check and/or configure the system. This station was renamed to ASDE09, following the E-ASAP naming scheme, which is "AS" for fixed 'ASAP' prefix, + "DE" for 2 char country code, + "09" for number. According to the naming scheme, ASDE09 can be identified as German station. All test soundings provided valuable data and were transmitted to the GTS. The proposal for test soundings is -1- Only real data of good quality shall be transmitted to the GTS. -2- A fixed station name shall be used for test stations (preferably according to the E-ASAP naming scheme to avoid name conflicts)

I-4.3, Chair TT-ASAP	96	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	Ongoing	Rudolf Krockauer - 15/1/2009: No ASAP container launcher was reported to be free for research campaigns. Nonetheless, there are some comments: (i) The Shelf-basin exchange campaign of the Research Vessel R/V KNORR (Woods Hole Oceanographic Institution) in October 2008 was supported by E-ASAP by providing Radiosondes, balloons, and helium. 32 soundings were received around Iceland; and (ii) In March/April 2009 the German Research Vessel MARIA S. MERIAN will conduct a 3-week research campaign around the Cape Verde Islands in the Atlantic. The vessel will be equipped with an fully functional ASAP container (station ASDE03) which had to be removed from board the Sealand Motivator due to changes in the line service. However, the efforts to install and de-install ASAP containers on board should not be underestimated. In case of the MARIA S. MERIAN the Research Institute MARUM in Bremerhaven, not by E-ASAP, pays all costs for transportation of the container to Dakar (Senegal), installation on board of the ship, de-installation after 3 weeks and return to Germany. Both research campaigns are supported by E-ASAP (by providing Radiosondes, balloons, helium) since the soundings are in the area of interests of E-ASAP (on behalf of 24 European Met Services). Basically, accommodating ASAP containers on board of Research Vessels depends on where, how long, and who pays the costs.

I-4.3, Chair TT-ASAP	97	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	Unknown	USA: N/A as US does not support ASAP at this time.
I-4.4, Chair TT-VRPP	9	I-4.1.5	To consider producing a VOS training video	TT/VRPP	SOT-V	No progress	No progress
I-4.4, Chair TT-VRPP	58	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	Ongoing	PMO-IV possibly organized in 2010 in RA-III or RA-IV
I-4.4, Chair TT-VRPP	59	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	Done	Document submitted to AOPC. Rolling review of Requirements and Statements of Guidance for global NWP, regional NWP, and Synoptic Meteorology express the need for surface pressure observations, (Surface pressure observations are important to anchor the model surface pressure). AOPC-14 (April 2008) acknowledged the detailed reports from the WMO Secretariat and Dr Elizabeth Kent and colleagues on VOS and VOSClim issues. AOPC reaffirmed the great value of the VOS datasets for climate studies. This type of observation remains a key component of the climate observing system. The Panel stressed the need to maintain the operations of the VOS programme and adequate delivery of VOS data to international data centres.

I-4.6, Chair TT-Codes	6	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	Sep-07	Ongoing	Issue being addressed by the DMCG Task Team on Table Driven Codes
I-4.6, Chair TT-Codes	106	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	Ongoing	Considered at the META-T meeting in Sept 2008. Derrick Snowden (META-T Chair) & Robert Luke discussed this in March 2009
I-4.6, Chair TT-Codes	109	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	Ongoing	Issue being addressed by the DMCG Task Team on Table Driven Codes
I-4.6, Chair TT-Codes	112	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	Ongoing	Issue being addressed by the DMCG Task Team on Table Driven Codes
I-4.7, Chair TT-Instruments	5	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	Done	Done. Electronic Log book comparison is complete and will be included i TT - Inst report. The dew point calculation information has been forwarded to ETMC for their review
I-4.7, Chair TT-Instruments	113	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	Ongoing	Still under review.

I-4.7, Chair TT-Instruments	116	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	Not done	Inadvertently overlooked. Will begin collating information asap.
I-4.9, Chair TT-VOSClim	2	II-4.5	to provide VOSClim uncertainty maps and time series of uncertainty	TT/VOSClim	End 2007	Not done	Not yet done, but should be available for SOT-V
I-4.9, Chair TT-VOSClim	41	IV-3.7.1	To consider how many observations are needed from the VOSClim yearly	TT/VOSClim	End 2007	Not done	Not yet done, but should be available for SOT-V
I-4.9, Chair TT-VOSClim	45	IV-3.7.1	To revise the VOSClim brochure	TT/VOSClim	Mid 2008	Delayed	Decision whether to revise the brochure should be delayed until consideration of VOSClim best practices at SOT-V
I-4.9, Chair TT-VOSClim	117	I-6.3.7	To consider adopting VOSClim best practices more generally under the VOS scheme	TT/VOSClim	SOT-V	Ongoing	Will outline this issued in the VOSClim Task-Team report, with reference to the proposed changes to GCC data flows and ET-DMVOS plans. To be discussed at SOT-V.
III-1.2, Chair VOSP	3	II-4.5	To include VOS ships providing good quality data in the VOSClim provided that appropriate metadata are made available	VOS Operators	Ongoing	USA ok	USA: US VOS still continuing to increase its VOSCLIM recruitment (albeit slowly)
III-1.2, Chair VOSP	10	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	Unknown	
III-1.2, Chair VOSP	11	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	Done	Done

III-1.2, Chair VOSP	12	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-Jul-07	USA done	USA: Done
III-1.2, Chair VOSP	13	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	USA done	USA: Done
III-1.2, Chair VOSP	14	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	USA done	USA: Done
III-1.2, Chair VOSP	21	IV-2.2.4	Interested Members to contact Pierre Blouch to obtain copies of the half compressed data transmission software	VOSP Members	Ongoing	France only	Only Météo-France is using the software but they have very few conventional vessels as almost 100% of the French fleet is automated.
III-1.2, Chair VOSP	26	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	USA done	USA: done

III-1.2, Chair VOSP	27	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	Done	Done
III-1.2, Chair VOSP	28	IV-2.4.1.6	To provide a summary of corrective actions by email to the VOSClim RTMC	PMOs; VOS Focal Points	Ongoing	SOT5	To be reported at SOT-V
III-1.2, Chair VOSP	34	IV-3.2.6	To provide details of remedial actions taken to the DAC by email	PMOs	Ongoing	SOT5	To be reported at SOT-V
III-1.2, Chair VOSP	40	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	USA ok	USA: Done
III-1.2, Chair VOSP	43	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	Ongoing	E-SURFMAR (50% of the VOS fleet) ready for submitting metadata for European VOS or providing access rights to RSMC for the E-SURFMAR metadata database. USA: Need to research this a bit longer

III-1.2, Chair VOSP	49	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	Considered; then stopped	Météo-France does not recommend using this application anymore and it is about to be removed because it is based on WMO Pub47 which is not always up to date. However, E-SURFMAR database can be used to that end at least for the European, Australian, and New Zealand vessels (recorded in this database). An SQL query can easily be written for listing all multiple recruited ships. There are none on 16/1/2009. PMOs are invited to check the database if a vessel they are planning to recruit is not already recorded in the database and recruited by another country. All NMHSs, including non-European are encouraged to use this application in read/write mode to optimize the query of multiple recruited ships. USA: Done
III-1.2, Chair VOSP	51	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	USA ok	USA: concur - all mercury is/being removed form US VOS vessels
III-1.2, Chair VOSP	54	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	USA ok	USA: in queue to be completed

III-1.2, Chair VOSP	55	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	USA ok	USA: concur
III-1.2, Chair VOSP	56	IV-4.5.6	To implement appropriate quality control checks in e-logbooks	VOSP Members	SOT-V	USA ok	USA: Done
III-1.2, Chair VOSP	61	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	Unknown	USA: concur
III-1.2, Chair VOSP	62	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	USA ok	USA: okay - will comply as much as feasible
III-1.2, Chair VOSP	63	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	Done	Done
III-4.4, Chair VOSP	50	IV-4.4.7	To aim at phasing out the future supply of mercury thermometers to observing ships	VOS operators	Ongoing	USA ok	USA: Ended that process in 2002.
IV-1.2, Chair SOOPIP	64	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	No contribution	No contribution made to the trust fund

IV-1.2, SOOPIP	**Chair**	65	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	Unknown	
IV-1.2, SOOPIP	**Chair**	66	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	Ongoing	The Palmer seems to be relegated to the South American side for the near future, with the demise of the Gould - NSF has decided not to renew the Gould's contract past May. Glenn Pezzoli has just returned from upgrading the Palmer's XBT computer while in Punta Arenas for the Revelle (Argo), and she isn't intending to cross the Pacific back to NZ anytime soon (thru 2010). SIO hopes that changes. Glenn has heard rumours that NSF might be re-considering its decision to cut the Gould loose. If they reverse this decision that may free up the Palmer to resume support transects to McMurdo. Glenn is beginning to look into what vessels might be calling McMurdo and other stations that side, for Argo deployments there (not XBT). Glenn will inform SOT-V if any of these look like good candidates for XBTs. If anyone knows of any such ships that are good for Argo, he would really like to hear from them.

IV-1.2, SOOPIP	**Chair**	67	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 non-stop (report back to SOOPIP Chairperson).	Glenn Pezzoli; Toshifumi Fujimoto	asap	Ongoing	There may be a few wood chip carriers calling HNL onward to Chile on occasion, but this is at the bottom of our list. Must check with the HNL agents. There was the odd ship calling for bunkers but it seemed a one-off. Replacing our ships going off trade, consolidating our work in the Indian ocean, and restoring p50 is our highest priority. Once SIO gets that sorted then SIO will look to re-starting p05. P81 HNL-Chile might follow that if SIO still has the resources.
IV-1.2, SOOPIP	**Chair**	72	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	Unknown	
IV-1.2, SOOPIP	**Chair**	74	V-2.5.5	To send a certificate of appreciation to the ship of IX08	SOOPIP chairperson	asap	Unknown	
IV-1.2, SOOPIP	**Chair**	75	V-2.5.5	To insert the data from IX08 into the GTS	Gopalakrishna; Gustavo Goni	asap	Ongoing	Despite efforts, IX-8 line (Bombay - Mauritius) could not be resumed (cabin accommodation not provided due to intense Piracy Problem in the East African Coastal region). Hence, NIO could not put the XBT data on GTS. However, the XBT data collected in the Bay of Bengal IX-14 is being sent to AOML with in 30 days after collection for GTS insertion. NIO is constantly in touch with various shipping companies and requesting placement to resume IX08. More detail to be provided at SOT-V.

IV-1.2, SOOPIP	**Chair**	76	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	Ongoing	Ann Gronell Thresher (15/1/2009): The Argo QC procedures aren't directly applicable in many cases to the XBT data (impossible speed, digit rollover, stuck value, density inversion, grey list, temperature sensor drift...) but some are (impossible date/time/location tests, gradient tests, spike test...) so I'll work on a manual that incorporates these tests as well as any more I can think of and send it for review.
IV-1.2, SOOPIP	**Chair**	79	V-3.1.5	To provide ongoing feedback to the TC on the usefulness of the SOOP survey report	SOOPIP Members	asap	Unknown	
IV-1.2, SOOPIP	**Chair**	81	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	Unknown	
IV-1.2, SOOPIP	**Chair**	82	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	Unknown	
IV-1.2, SOOPIP	**Chair**	83	V-4.1.7	to serve on the organizing committee for an Upper Ocean Review	Gustavo Goni	2009	Done	Liaising with organizing committee
IV-1.2, SOOPIP	**Chair**	85	V-5.2.3	To urge IOCCP to release salinity data to data archives in a timely manner	SOOPIP Chairperson	asap	Ongoing	See action V-5.2.3

IV-1.2, SOOPIP	**Chair**	110	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	Ongoing	New template discussed at the XBT fall rate workshop; AOML has been encoding/decoding XBT and TSG BUFR bulletins using ad-hoc templates. Some preliminary tests made with NCEP and AOML files could be decoded successfully. AOML's work is now focusing on integrating the BUFR encoding tasks within their operational framework. AOML will provide additional details about this work at SOT-V
IV-1.2, SOOPIP	**Chair**	111	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	Unknown	

ANNEX XXI

ACTION LIST / WORKPLAN

SOT WORKPLAN FOR THE NEXT INTERSESSIONAL PERIOD

1) Action items arising form the SOT common sessions

No.	Ref.	Action item	By	Deadline
1	I-2.1.6	to contribute to feeding the JCOMM extreme wave database events when such events are observed by data buoys and are recorded by Team Members	SOT members	ongoing
2	I-2.1.7	To provide input to the DMCG chairperson for the Oceanographer's and Marine Meteorologist's Cookbook for Submitting Data in Real Time and In Delayed Mode	Technical Co-ordinator	asap
3	I-2.2.6-(i)	Review the appropriate sections of the Progress Report on the Implementation of the Global Observing System for Climate in Support of the UNFCCC 2004-2008 (available at gcos.wmo.int) for technical errors related to their panels	Panel Chairpersons	20 June 2009
4	I-2.2.6-(ii)	Review and provide comments on draft JCOMM Catalogue of Standards and Best Practices	Panel Chairpersons	1 July 2009
5	I-2.2.6-(iii)	Review and provide comments to OPA Coordinator on draft An Oceanographer's and Marine Meteorologist's Cookbook for Submitting Data in Real Time and in Delayed Mode	Panel Chairpersons	1 July 2009
6	I-2.5.6-(i)	The Team invited its members to suggest information for the news section of JCOMMOPS website and provide feedback on re-developments of JCOMMOPS websites, particularly the Quality Information Relay Tool	SOT members	ongoing
7	I-2.5.6-(iii)	The new JCOMMOPS website should include new SOT and SOOPIP sites with better usability and consistency, plus an integrated Quality Information Relay tool (with up-to-date Publication 47 data) and an application to browse Callsign Masking information (both password protected)	JCOMMOPS	SOT-VI
8	I-2.5.6-(iv)	to routinely review the maps showing data sparse areas (drifting buoys, Argo floats) in order to assess if any deployment opportunities can be identified	SOT members	ongoing
9	I-2.5.6-(v)	to provide any deployment opportunities to the Technical Coordinators at JCOMMOPS using support@jcommops.org	SOT members	next meeting
10	I-3.1.1.4	Panel Chairs in liaison with their Panel members to review the appropriate sections of the Progress Report on the Implementation of the Global Observing System for Climate in Support of the UNFCCC 2004-2008 – e.g. for technical errors related to their panels - and provide comments as appropriate	Panel Chairpersons	20 June 2009

11	I-3.1.4.6-(i)	to liaise during the next intersessional period with the META-T Steering Team	TT Pub47 & TT-DMVOS	SOT-VI
12	I-3.1.4.6-(ii)	to respond to the META-T Users Survey	D. Snowden, M. Belbéoch, H. Viola, J. Trinanes	SOT-VI
13	I-3.1.4.6-(iii)	to go to marinemetadata.org and register as a user and participant in META-T to monitor project status	SOT members	SOT-VI
14	I-3.1.4.6-(iv)	to liaise with the relevant VOS operator community to determine if the current average FM-13 message distributed on the GTS is populated completely. Additionally, obtain lists of the actual fields transmitted to shore by the three electronic logbooks	META-T	SOT-VI
15	I-3.1.4.6-(v)	electronic logbook developers to consider adding the functionality to transmit periodic Admin messages containing all known category 1 and 2 metadata (META-T website will include the list of desired fields)	e-logbook developers	SOT-VI
16	I-3.1.4.6-(vi)	SOOP Operators to consider reintroducing the collection of meteorological observations as part of a regular XBT message	SOOPIP members	ongoing
17	I-3.1.4.6-(vii)	SOT members consider joining META-T	SOT members	SOT-VI
18	I-3.1.4.6-(viii)	Pub47 should be updated more regularly and pushed to the META-T server(s) as soon as possible	TT Pub47	SOT-VI
19	I-3.1.4.6-(ix)	SOT members to consider to volunteer hosting additional META-T servers	SOT members	SOT-VI
20	I-3.2.1.6	JCOMMOPS to assist and act as a focal point on an enhanced the collaboration between the SOT and the IOCCP regarding ship recruitment	JCOMMOPS	ongoing
21	I-3.2.2.4	to participate in the development of related training programs and materials	SOT members	SOT-VI
22	I-3.2.2.5(-iv)	to follow up in liaison with Mr Smith an SAMOS data and metadata issues	R. Luke, S. Smith	SOT-VI
23	I-3.2.3.3	to collaborate with GHRSST in the view (i) to make additional radiometric skin SST measurements from ships	SOT members	ongoing
24	I-3.2.3.3	(i) to better characterize the uncertainties of non-radiometric SST measurements from existing ship data (this can be done using GHRSST data), and (ii) to collaborate with GHRSST to better define requirements for measurements of SST from ships	TT-IS	SOT-VI
25	I-3.2.3.3	GHRSST to use the information on the type of measurement for the SST (e.g. bucket, intake) as reported in GTS reports in order to provide feedback on the quality of the measurements made using the different methods used	GHRSST	SOT-VI
26	I-3.2.8.4	JCOMMOPS to discuss the issue of using race boats for the deployment of drifters or Argo floats from data sparse regions (e.g. Southern Ocean) with SailingOne and, if agreeable to investigate in what conditions this could be realized	JCOMMOPS & SailingOne	SOT-VI
27	I-4.1.5	to clearly consider the real time collection of satellite data in support of SOOP	TT Satcom	SOT-VI
28	I-4.1.7	VOS operators, whenever possible, to encourage their manually reporting VOS, to consider moving to the use of email to send their weather reports in lieu of using Inmarsat Code 41 (but subject to individual ship-owners being willing to absorb the costs)	VOS operators	ongoing

29	I-4.1.8	to communicate any changes regarding LES Ids to the WMO Secretariat for updating the list maintained there	TT Satcom	ongoing
30	I-4.1.9	individual VOS operators to make the LES ID changes known to their VOS fleets	VOS operators	ongoing
31	I-4.1.12	to update the list of LES on the WMO web site according to the updated list presented by the Task Team	Secretariat	asap
32	I-4.1.12	a new column should be added to the list to clarify which national met services are incurring the costs	TT Satcomm	asap
33	I-4.1.13	to undertake a further review to determine the actual costs currently be faced by individual members in order to help guide future decisions about reducing the Inmarsat cost burden	TT Satcomm	asap
34	I-4.1.14	Code 41 list in WMO Publication 9 Volume D should be revised to reflect the updated list of LES that accept Code 41 messages. Details should be promulgated by WMO to all VOS operating countries listed WMO Publication No 47	Secretariat	end 2009
35	I-4.1.15	A review should be undertaken of relevant GTS bulletins for ship observations as listed in WMO Volume C1 (Catalogue of Meteorological Bulletins)	Secretariat	end 2009
36	I-4.1.16	to invite members to check the accuracy of their entries in WMO Volume C1 to ensure that all ship observations are circulated on the GTS irrespective of the hour that they are sent or the geographical area they are sent from	Secretariat	asap
37	I-4.1.18	other National Met Services that host LES to consider circulating similar information via the JCOMMOPS mailing lists	relevant NMHSs	ongoing
38	I-4.3.7	South Africa is investigating keeping the upper air system on the S A Agulhas provided the international funding will be made available to assist with this programme. Interested SOT members are invited to contact Mr Stander directly	SOT members	SOT-VI
39	I-4.4.4-(i)	to make small modifications to items 1, 3, and 5 of the current Terms of Reference of the Task Team on Recruitment and Programme Promotion	Secretariat	asap
40	I-4.4.4-(ii)	WMO, in support of PMO activities, commit to holding an International PMO Meeting (PMO-IV) in 2010	WMO Secretariat	early 2010
41				
42	I-4.4.5	Input from SOOP is required for the generic ship design document and invited the SOOPIP Chairperson, Dr Gustavo Goni to contribute before the next SOT Session	SOOPIP Chairperson	July 2009
43	I-4.4.5	to submit the generic ship design to IMO	WMO Secretariat	asap
44	I-4.5.4-(iii)	To forward Pub47 submissions to JCOMMOPS and E-SURFMAR	WMO Secretariat	asap
45	I-4.6.3	SOT members requesting changes or additions to BUFR tables (definitions or templates) should consult the SOT representative on the DMPA TT-TDC (Frits Koek) or JCOMMOPS, who can relay the SOT input to the DMPA Task Team on Table Driven codes (TT-TDC)	SOT members	ongoing

46	I-4.6.5-(i)	The results of the work on VOS/BUFR need to be passed to the DMPA TT-TDC. – VOS representatives on the Task Team and VOS members, JCOMMOPS – before next WMO IPET-DRC meeting (no date set)	Frits Koek & DMPA TT-TDC	asap
47	I-4.6.5-(ii)	The XBT BUFR template needs to go through a final review by the Task Team and SOOPIP/GTSPP representatives before being re-submitted for validation to the IPET-DRC through the DMPA TT-TDC	Frits Koek & DMPA TT-TDC	next IPET-DRC meeting
48	I-4.6.5-(iii)	to forward SOT related Master Table 10 requirements from ocean forecasting system operators (GODAE) including ecosystem modellers, and other appropriate user communities to the DMPA TT-TDC	Frits Koek & DMPA TT-TDC	next IPET-DRC meeting
49	I-4.6.5-(iv)	requirements for XCTD data to be included in the Table Driven Code Forms should be assessed in liaison with SOOPIP/GTSPP representatives.	Frits Koek & DMPA TT-TDC	next IPET-DRC meeting
50	I-4.6.5-(v)	Requirements for reporting ice conditions in BUFR should also be considered.	Frits Koek & DMPA TT-TDC	next IPET-DRC meeting
51	I-4.7.7	After ETMC approval by email before the end of June 2009	S. Woodruff	30 June 2009
52	I-4.7.7	members in charge of E-logbook developments to implement required changes	e-logbook developers	asap
53	I-4.7.9-(1)	WMO Secretariat to contact the ISO TC 8/SC 6 group and address the issue of changing the ISO 10596 proposed standard	WMO Secretariat	asap
54	I-4.7.9-(2)	SOT national focal points to coordinate nationally with their ISO/TC or SC representative to ensure proposed changes are incorporated	SOT NFPs	asap
55	I-4.7.11	to continue its efforts regarding developing high quality best practices for the VOF with the goal of publishing them as a JCOMM Technical Report, and report at the next SOT meeting	TT-IS	SOT-V
56	I-4.7.13	to continue to update their equipment information and Instrumentation standards (including Automated Weather Stations (AWS)) to the Task Team on Instrument Standards	SOT members	ongoing
57	I-4.7.14	SOT members developing and maintaining e-logbooks to preserve the source code of historical versions of e-logbook systems	SOT members developing e-logbooks	ongoing
58	I-4.8.2-(vii)	Upgrading of the JCOMMOPS system to provide a secure REAL vs. MASK database solution should be completed by the end of June 2009	JCOMMOPS	30 June 2009
59	I-4.8.4	members to have their PMOs nominated as focal points for accessing the JCOMMOPS database of MASK vs. REAL	SOT members	ongoing
60	I-4.9.2	SOT members to upgrade, wherever possible, all their existing VOS to VOSClim standards	SOT members	ongoing)
61	I-4.9.5	the requirement for Port Met Officers to additionally fill in the new hardcopy recruitment/update form (VOSP002) could be waived for those ships where the required Pub 47 metadata is collected on board using electronic logbooks such as TurboWin	PMOs	ongoing
62	I-4.9.6	to ensure that the Pub 47 metadata available on the WMO website is regularly updated, or alternatively to consider a more appropriate method of	Secretariat	asap

		hosting the metadata so that it is readily available to users of the project datasets		
63	I-4.9.8	to undertake an intercomparison study of the algorithms associated AWS observation coding software, in order to resolve any potential inconsistencies	TT-IS	SOT-VI

64	I-5.2.3.2	SOOP operators interested in testing Argos-3 to make direct contacts with CLS	SOOP operators	SOT-VI
65	I-5.3.6-(i)	to keep under review WMO Publications No. 544, 488, and 8 and make proposals through the WMO Secretariat and the JCOMM Focal Point on CIMO matters if necessary	TT-IS	ongoing
66	I-5.3.6-(ii)	Implementing those WIGOS agreed upon Best Practices and standards, and in particular, to provide the ship platform / instrument metadata to Pub 47, JCOMMOPS, META-T servers, and the ODASMS as appropriate	SOT members	ongoing
67	I-5.3.6-(iii)	Contributing to the development of specialized and / or regional marine Instrument Centres or assist candidate instrument centres as appropriate	Members	mid-2009
68	I-5.3.7	to check the WIGOS Pilot Project for JCOMM implementation plan and identify how they could practically contribute to the Pilot Project	SOT members	ongoing
69	I-6.1.3	to comment and provide feedback to the SOT Chairperson regarding the format of the National Report	VOSP, SOOPIP, ASAP TT Chairpersons	asap
70	I-6.2.1.8	to provide on a yearly basis text files of SOOPIP metadata from the JCOMMOPS database	JCOMMOPS	ongoing
71	I-6.2.4.4	to encourage marine observers to provide reports suitable for adding to the Marine Observers Log	SOT members & PMOs	ongoing
72	I-6.3.2	to create mailing lists for each of the SOT Task Team	JCOMMOPS	asap
73	I-7.2.1.3	DBCP to record the SOT TC mission expenses as a separate line item	DBCP	DBCP-25
74	I-7.2.1.3	to negotiate with the DBCP Chairperson the amount that should be allocated to the proposed “SOT TC mission” line item, as well any funds that might be transferred to the Argo Trust Fund at IOC to compensate for the resulting deficit of support that Argo is receiving form its Technical Coordinator	SOT Chairperson	asap
75	I-7.2.2.2	to consider contributing to the JCOMM Trust Fund of consumables, which is administered by the WMO	SOT members	ongoing
76	I-7.3.1	to submit the proposed revised version of TORs to JCOMM-III for consideration and approval	Secretariat	asap
77	V-3	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 2008	Secretariat	asap

2) Action items arising from the VOS Panel Session

No.	Ref.	Action item	By	Deadline
78	III-1.1.8	to collection information in support of the VOS programme, showing how the VOS data are being used and add value to a number of applications, or how they impact final products, and to provide the information to the VOSP chairperson	VOSP members	SOT-VI
79	III-2.1.1.5	NMHS operating VOS AWS to make arrangements to ensure that all observations, including hourly observations are inserted onto the GTS for global dissemination	NMHS	ongoing
80	III-2.1.1.6	to provide details of VOS Automation to VOS Panel Chairperson if their data required updating	NMHS	ongoing
81	III-2.1.2.3	to remove the copy of the FM13-SHIP report automatically generated by the TurboWin software from the display at the bottom of the page in order to prevent it from being used to manually copy and send the report	F. Koek	asap
82	III-2.2.6	E-SURFMAR to communicate the results of the impact study once available to the VOSP chairperson	P. Blouch	SOT-VI
83	III-2.3.1.3	to consider organizing PMO-IV as a priority on Capacity Building	WMO Secretariat	asap
84	III-2.4.3	NMHSs 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	SOT members	ongoing
85	III-2.4.7	monitoring centres to report problems regarding VOS data through the QIR	monitoring centres	ongoing
86	III-2.5.1.3	members to use the VOS Pub-47 metadata generation tools within their own NMS as appropriate	SOT members	ongoing
87	III-3.1.3	E-SURFMAR to make sure that the required metadata for all VOS fleets are made available for download from this site	ESURFMAR	asap
88	III-3.1.4	the unique masked call-sign should be replaced in the VOS monitoring statistics with the original call-sign (and the ship name also reinstated)	RTMC	asap
89	III-3.1.8	the Met Office to circulate rankings through the JCOMMOPS mailing lists with a view to providing them on an annual basis on the UK Met Office website	UK MetOffice	asap
90	III-3.1.8	to consider the value of the proposed performance ranking system and to advise the Met Office if they considered that the parameters used were appropriate	VOS operators	end 2009
91	III-3.1.8	to consider performance rankings when issuing awards to their individual VOS fleets	VOS operators	ongoing
92	III-3.4.3	to join the VOSClim so their observations can be contributed	SOT members	ongoing
93	III-3.4.4	to ensure that the information is properly coded for automated stations	SOT members	ongoing
94	III-3.4.5	data to be submitted to the GCCs un-masked and when no longer sensitive	SOT members	ongoing
95	III-3.5.5	to address by email the issue of VOSClim and AWS classification and report to the VOSP Chairperson on implication before the end of June 2009	S. Woodruff	30 June 2009

No.	Ref.	Action item	By	Deadline
96	III.3.5.6-(ii)	To endorse recommendations, planned for JCOMM-III (from ETMC/TT-DMVOS/GCCs) for relatively minor revisions to the International Maritime Meteorological Tape format (IMMT-IV) and Minimum Quality Control Standards (MQCS-VI), with implementation of the new versions proposed for data collected as from 1 January 2011	Secretariat	SOT-VI
97	III.3.5.7-(i)	Action 1: Investigate appropriate archiving format(s) at the GCCs taking into account the IMMT format and the modernized International Maritime Meteorological Archive (IMMA) format (offering greater flexibility and direct compatibility with ICOADS) , TT-DMVOS	GCCs	Aug. 2009
98	III.3.5.7-(ii)	Action 2: SOT members invited to discuss the proposed new TT-DMVOS data flow and provide feedback to TT-DMVOS via the GCCs	SOT members	Aug. 2009
99	III.3.5.7-(iii)	Action 3: SOT invited to provide views on the proposed development of a Higher-level QC (HQC) standard, and modernized climatological summary products to replace the outdated Marine Climatological Summaries (MCS). Also suggest how products will be served to users, e.g., through RMs, ICOADS, and the WIGOS Pilot Project; including the role of Geographical Information Systems (GIS)	SOT members, TT-DMVOS, TT-MOCS	Aug. 2009
100	III.3.5.7-(iv)	Action 4: Discuss the desirability of new names to replace the data flow and MCS components of the outdated “MCSS” terminology	SOT members, TT-DMVOS, TT-MOCS	Aug. 2009
101	III-3.6.5.1	only unmasked GCC and BUFR observations should be made available to the DAC, even if that means delaying BUFR observations	GCCs & RTMC	ongoing
102	III-3.6.5.1	to not mask the VOSClim ships real time data, and to provide for the REAL callsign in the delayed mode data	VOSClim operators	ongoing
103	III-3.6.5.2	To notify of new recruits to the DAC immediately upon initiation of the new vessel	SOT members	ongoing
104	III-3.6.5.5	VOSClim participants to submit the IMMT data to the GCCs	VOSClim operator	ongoing
105	III-3.6.5.6	to upgrade as many ships as possible to VOSClim class	VOS operators	ongoing
106	III.4.1.4	VOS Operators should be encouraged to apply this criteria and that, whenever possible, they should be requested to make determined efforts to upgrade their existing VOS to VOSClim standards in order to help ensure the future availability of climate quality marine data	VOS operators and PMOs	asap & ongoing
107	III.4.1.4	VOS operators and Port Met Officers should start applying the criteria at Annex XIII to determine which manually reporting ships or AWS ships are suitable for upgrading to VOSClim standards	VOS operators and PMOs	asap & ongoing
108	III-4.1.5	to ensure the continued flow of the necessary VOSClim data streams including, in particular, the ongoing availability of the associated forecast model values	RTMC	asap
109	III.4.1.7	The Panel asked the UK Met Office and US NCDC to confirm that, in the light of the expected increase in VOSClim data volume, they would remain	UK Met Office RTMC and NCDC DAC	asap

No.	Ref.	Action item	By	Deadline
		committed to continue to support the functions of the VOSClim RTMC and the VOSClim DAC respectively, and to provide the necessary associated data (e.g. monitoring statistics, co-located model values etc.)		
110	III-4.1.10	to coordinate updating of relevant WMO Publications as well as JCOMM TR No. 4 in liaison with the SOT and VOSP chairpersons, and the Task Team on VOSClim	Secretariat	SOT-VI
111	III-4.2.4	to investigate the option of establishing PMO offices in the Arctic region and discuss with maritime companies as appropriate	SOT members	SOT-VI
112	III.4.3.6-(iii)	That WMO sets a date for introducing the scheme, having first consulted with IMO, NMSs, monitoring centres, DACs and other processing centres to ensure their ability to handle a seven-digit identifier as the call sign	WMO Secretariat	end 2009
113	III.4.3.6-(iv)	That WMO advises PRs that existing practices and procedure for (1) WMO No. 47, and (2) call sign masking, are unaffected by the introduction of the scheme	WMO Secretariat	end 2009
114	III.4.3.7	to trial a few ships using the IMO identification number to verify if the observations are delivered through the real-time system. Results should be reported to the VOSP Chairperson	UK+DE+NZ+AU+JP+US	31 July 2009
115	III-4.4.3	to monitor the AIS situation with respect to using it to send meteorological data in the future	S. North	SOT-VI
116	III-4.4.3	to circulate the AIS document to the SOT mailing list	S. North	asap
117	III-4.4.6	to comply with national regulations regarding mercury use and assess the options to replace mercury thermometers on their VOF in the future	SOT members	asap
118	III-4.4.7	to become familiar with other transmission methods, such as, an email.	PMOs	ongoing
119	III-4.4.8	VOS operators and PMOs to provide ships with clear instructions on how to send data via an email	PMOs	ongoing
120	III-4.4.8	NMHSs receiving observations by this method or by non-LES, methods to ensure that the reports are inserted onto the GTS for global distribution	NMHSs	ongoing
121	III-4.4.9	to investigate whether a single email address could be used by ships to send VOS observations to a single shore data processing centre	TT Satcom	SOT-VI
122	III.4.5.9	to liaise with the Secretariat, and appropriate JCOMM and CBS Expert Teams in view to realize the VOSClim and AWS integration in the VOS fleet and implement the resulting required changes to the following publications	TT VOSClim & TT-IS	asap
123	III.4.5.10	to define guidelines for instrument certification, and inspection for inclusion as an annex in a future revised version of JCOMM TD No. 4	TT-IS	SOT-VI
124	III.4.5.10	to assist with regard to promoting ISO standards for the certification of meteorological and oceanographic instruments	TT-IS	SOT-VI
125	III-5.1.4	to develop procedures for submitting a subset of SAMOS observations via the GTS	S. Smith	asap

3) Action items arising from the SOOPIP Session

Implementation				
No.	**Ref.**	**Action item**	**By**	**Deadline**
126	IV-2.2.8	to identify which recommended transects (later taking into account the recommendations coming from OceanObs'09) were not being implemented, that the Chairperson identify the reasons, and that the two together explore how to help these institutions	Technical Coordinator and SOOPIP Chairperson	ongoing
127	IV-2.2.9	to inform the Technical Coordinator on a quarterly basis of their deployment plans	all SOOPIP members	quarterly
128	IV-2.2.10	to provide regular updates to the Technical Coordinator of the list of ships operating XBT transects, for the maintenance of a centralized database or list	all SOOPIP members and Technical Coordinator	ongoing
129	IV-2.2.11	to continue efforts to accomplish recruitments in transects that were not carried out	SOOPIP Chairperson and all SOOPIP members	ongoing
130	IV-2.4.3	to consider contributing to the Trust Fund for consumables	all SOOPIP members	ongoing
131	IV-3.1.15	to identify additional funding to support the Technical Coordinator	all SOOPIP members	ongoing
Transmission				
132	IV-2.2.4	all institutions operating XBT transects and TSGs to transmit data in real time or near-real-time onto the GTS, or to request the assistance of the chair to do so	All SOOPIP members	ongoing
133	IV-2.2.6	IRD/Noumea, with the assistance of Ifremer and/or AOML to transmit XBT transect data in real-time onto the GTS	Technical Coordinator, L. Petit de la Vileon, Chair	immediate
134	IV-2.2.7	to identify institutions and operators that are not currently transmitting XBT and GTS data in real time (see also IV-3.6.3)	Technical Coordinator and SOOPIP Chairperson	ongoing
135	IV-2.5.6	to request that the TESAC code table include TSGs as a defined recorder type, to allow transmission on the GTS under this format	Technical Coordinator	immediate
136	IV-4.2.2	to upgrade the SEAS software to correctly report salinity from xCTD drops (problem identified for PX37)	AOML	end 2009
137	IV-4.2.7	explore the possible use of Argos-3 for data transmission	SOOPIP Chairperson, D. Snowden, J. Trinanes, C. Ortega	SOT-VI
Monitoring				
138	IV-2.3.3	to update the table of transect responsibilities periodically	SOOPIP Chairperson, with contact with all SOOPIP members	once yearly
129	IV-2.5.8	to clearly separate the XBT/XCTD and TSG networks as separate contributions to SOOP, in order to raise the visibility of TSG observations in particular	Technical Coordinator and GOSUD	September 2009
140	IV-3.1.7	to agree on how to define sampling indicators to ensure they accurately reflect the goals of each transect (i.e. some have lower time sampling goals). The Technical Coordinator is asked to monitor sampling indicators on a bimonthly basis.	Technical Coordinator and SOOPIP Chairperson	end 2009
141	IV-3.1.8	to investigate discrepancy in indicators of almost contiguous transects, such as for PX11 and IX22	Technical Coordinator	end 2009
142	IV-3.1.9	to provide input to the SOT Technical Coordinator on a timely fashion in order for the	all SOOPIP members	ongoing

		results of the annual survey for the previous year to be provided early in the year		
No.	**Ref.**	**Action item**	**By**	**Deadline**
143	IV-3.1.10	to review formatting of code description in WMO FM63 to clarify use of D….D or 99999 A1bwnbnbnb rather than its current formatting which implies D….D or 99999, followed by A1bwnbnbnb	Technical Coordinator, to distribute to all SOOPIP members and other XBT operators putting profiles on the GTS	JCOMM-III
144	IV-3.1.13	to provide feedback on the SOOPIP and JCOMMOPS websites and reports, particularly if it would be useful for new reports or content to be developed. In addition, specifically to comment on the usefulness of the Monthly SOOP BATHY report, and indicate whether this report shall be discontinued or changed.	all SOOPIP members, feedback to JCOMMOPS	ongoing
145	IV-3.6.3	to generate a plot of missing delayed-mode data in order to identify the institutions that need to contribute. And to explore how to help these institutions	Technical Coordinator and Chairperson; with GTSPP and GOSUD for plot	ongoing
146	IV-3.6.4(i)	to implement the unique ID algorithm presented by Sun, to submit the delayed-mode data to the GTSPP	all SOOPIP members	SOT-VI
147	IV-3.6.4(ii)	to clearly document the CRC algorithm	Paul Chinn/GTSPP	as soon as possible
148	IV-4.4.6	to evaluate the differences of the currently available XBT monthly reports (JCOMMOPS, AOML, ISDM), to investigate if collaborative work would be more effective	Technical Coordinator, M. Ouellet, J. Trinanes	SOT-VI
Data Management				
149	IV-3.6.2	to recommended the establishment of a common data format for real-time XBT profiles	D. Snowden	SOT-VI
150	IV-3.6.5	to establish and document homogeneous quality control steps for real-time use, probably similar to those used for Argo profiling floats, plus a few additional steps	SOOPIP Chairperson, TECHNICAL COORDINATOR, C. Sun, T. Boyer, L. Petit de la Vileon	SOT-VI
151	IV-3.6.6	to establish and document homogeneous quality control steps in delayed-mode data, probably similar to those used for Argo profiling floats, plus a few additional steps	SOOPIP Chairperson, TECHNICAL COORDINATOR, C. Sun, T. Boyer, L. Petit de la Vileon	SOT-VI
152	IV-3.6.7	to identify the different delayed-mode databases currently available and their differences to aid users on when to use them	Technical Coordinator, C. Sun, T. Boyer, SOOPIP Chairperson	SOT-VI
153	IV-2.5.7	to explore any implications of reporting TSG data in TESAC format on the entire data stream, and to the BUFR template	Chair, Trinanes, Petit de la Vileon, Viola, Bringas	ongoing
154	IV-3.2.4	to determine the values of the GTSPP quality flag table to include global and depth specific entries to be used in BUFR tables	SOOPIP Chairperson, Technical Coordinator, J. Trinanes, D. Snowden, F. Bringas, C. Sun, L. Petit de la Vileon	end 2009
155	IV-3.2.5	to solicited other agencies, in addition to NOAA/NCEP, to participate in the test to decode BUFR XBT and TSG messages	all SOOPIP members	asap
156	IV-3.2.6	to provide input to the META-T Pilot Project, the SOT-TC or the DMPA TT-TDC on the metadata requirements for thermosalinograph data	all SOOPIP members with expertise in TSG data or operational systems	asap

157	IV-3.4.7	to clarify the roles of GOSUD and SOOP in the TSG network, suggesting SOOP focuses on implementation and GOSUD on data	SOOPIP Chairperson, Technical Coordinator, L. Petit de la Vileon, S. Smith	end 2009
158	IV-4.4.5	to make AOML data quality reports available to JCOMMOPS	F. Bringas	ongoing
Applications and Science				
No.	**Ref.**	**Action item**	**By**	**Deadline**
159	IV-2.2.5	to investigate if FR profiles are really needed and if they are currently being used	SOOPIP Chairperson, Technical Coordinator	ongoing
160	IV-2.5.4	to check with major modelling centers whether TSG data are assimilated, and if not, question the reasons for not including the data	all SOOP TSG operators, follow up by Technical Coordinator	immediate
161	IV-2.5.5	to identify if there are other observations (pCO_2, CPR, ADCP, etc.) that could benefit the operational community if they are transmitted on the GTS	SOOP members to report to SOOPIP Chairperson	ongoing
162	IV-2.6.4	to explore the connection between SCOR/IAPSO and SOOP	Chairperson, Technical Coordinator, via T. Rossby	immediate
163	IV-2.6.5	to submit an article in BAMS (or similar publication) about ocean observations made by the investigators supporting the implementation of ADCP, CPR, pCO_2, XBTs and TSG, in the Oleander	Chairperson	immediate
164	IV-2.7.7	to identify potential areas of collaboration with SeaKeepers and Ferryboxes	Chairperson and Technical Coordinator	ongoing
165	IV-4.1.5	to provide feedback to Gustavo Goni on the draft Community White Paper	all SOOPIP members	*1 August 2009*
166	IV-4.1.6	to ensure SOOP efforts are recognized by the appropriate OceanObs'09 CWPs, and that SOOP is referenced as SOOP and not VOS	SOOPIP Chairperson	1 September 2009
167	IV-5.3.5.1	to identify facilities for fall-rate tests for near-surface ocean conditions, potentially at Ifremer, US Stennis Center, etc.	SOOPIP Chairperson	immediate
168	IV-5.3.5.2	to trace older technical reports that address the fall rate equation of XBT probes	*F. Reseghetti*	*ongoing*
169	IV-5.3.5.3(i)	to Approaching Sippican for the results of their FRE experiments	SOOPIP Chairperson, Technical Coordinator, HMEI, co-President JCOMM	as soon as possible
170	IV-5.3.5.3(ii)	to Approaching Sippican for making them an active participant in the FRE experiments	SOOPIP Chairperson, Technical Coordinator, HMEI, co-President JCOMM	as soon as possible
171	IV-5.3.5.3(iii)	to Approaching Sippican for encouraging donation of the XBT probes for these experiments	SOOPIP Chairperson, Technical Coordinator, HMEI, co-President JCOMM	as soon as possible
172	IV-5.5.3	to hold a scientific workshop focused on XBTs, held for 1-1.5 days in conjunction with the SOOPIP meetings. This might require different arrangements such as parallel sessions for the SOT panels to accommodate.	SOOPIP Chairperson and Secretariat	SOT-VI preparations
New technology				

173	IV-4.2.8	to stay abreast of how Identify how new technologies can aid SOOP, such as self-contained XBT launchers, alternative transmission options, underway CTDs, etc.	Technical Coordinator	ongoing
SOOP visibility				
174	IV-1.1.5	to maintain an updated SOOPIP web page, containing recent SOOP activities as requested by the SOT and SOOPIP chairs	Technical Coordinator	ongoing
175	IV-1.1.6	to finalize the XBT bibliography, and create a TSG bibliography, both for posting on the web site	SOOPIP Chairperson (bibliography), Technical Coordinator (to post)	September 2009

ANNEX XXII

ACRONYM LIST

ACC	ASAP Co-ordination Committee
ACT	Alliance for Coastal Technologies
ADCP	Acoustic Doppler Current Profiler
AIC	Argo Information Centre
AIS	Automatic Identification System
AMDAR	Aircraft Meteorological Data Relay
AMVER	Automated Mutual-Assistance Vessel Rescue System
AOPC	Atmospheric Observations Panel for Climate (GCOS/WCRP)
AOML	NOAA Atlantic Oceanographic and Meteorological Laboratory (USA)
ASAP	Automated Shipboard Aerological Programme
ASAPP	Automated Shipboard Aerological Programme Panel
AVOS	Automatic Voluntary Observing Ship
AWS	Automatic Weather Station
BATHY	Bathythermograph report
BAROS	Simple shipboard AWS (Météo France)
BATOS	Automatic shipboard data acquisition and transmission system (Météo France)
BBXX	GTS FM-13 SHIP report
BOM	Bureau of Meteorology (Australia)
BUFR	Binary Universal Form for Representation of Meteorological Data
BSH	Bundesamt für Seeschifffahrt und Hydrographie
BUOY	Report for Buoy Observations (GTS)
CBS	Commission for Basic Systems (WMO)
CCG	Canadian Coast Guard
CCl	WMO Commission for Climatology
CDIAC	Carbon Dioxide Information Analysis Centre
CDMP	Climate Database Modernization Program (NOAA)
CEO	Chief Executive Office
CIMO	Commission for Instruments and Methods of Observation (WMO)
CLIMAR	JCOMM Workshop on Advances in Marine Climatology
CLIVAR	Climate Variability and Predictability (WCRP)
CLS	Collect Localisation Satellites
CM	Contributing Member (of the MCSS)
CMC	Canadian Meteorological Centre
CMM	WMO Commission for Marine Meteorology (now merged into JCOMM)
CNRS	French National Centre for Scientific Research
COCOS	EU Carbon Observing System Coordination
COSYNA	Coastal Observing System for Northern and Arctic Seas
CPO	NOAA Climate Program Office
CPR	Continue Plankton Recorders
CRC	Cyclical Redundancy Check
CSIRO	Commonwealth Scientific and Industrial Research Organization (Australia)
CSV	Comma Separated Value
CTD	Conductivity-temperature-depth probe
CWP	Community White Papers
DAC	Data Assembly Centre
DBCP	Data Buoy Cooperation Panel (WMO-IOC)
DCPC	Data Collection or Production Centres (of WIS)
DCS	Data Collection System
DMCG	JCOMM Data Management Coordination Group
DMPA	JCOMM Data Management Programme Area
DWD	Deutscher Wetterdienst (Germany)
E-ASAP	EUMETNET ASAP
E-SURFMAR	EUCOS Surface Marine Programme

ECMWF	European Centre for Medium-Range Weather Forecasts
ECV	Essential Climate Variable
EMODNET	European Marine Observation and Data Network
ENCODE	Specific masking of the ship's identification within GTS reports using a non-repeating encoded ship's identification
ENSO	El Niño Southern Oscillation
ET	Expert Team
ETCCDI	CLIVAR / CCl / JCOMM Expert Team on Climate Detection and Indices
ET-DRC	CBS Expert Team on Data Representation and Codes
ETMC	JCOMM Expert Team on Marine Climatology
ETMSS	JCOMM Expert Team on Maritime Safety Services
ETSI	JCOMM Expert Team on Sea Ice
ETWS	JCOMM Expert Team on Wind Waves and Storm Surges
EU	European Union
EUCOS	EUMETNET Composite Observing System
EUMETNET	The Network of European Meteorological Services
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
FP	Framework Programme
FR	Frequently Repeated
FRE	Fall Rate Equation
FRX	Frequently Repeated line
FSU	Florida State University
FTP	File Transfer Protocol
GCC	Global Collecting Centre (for the MCSS)
GCOS	Global Climate Observing System
GDAC	Global Data Access Centre
GHRSST	Group for High-Resolution Sea Surface Temperature
GIS	Geographical Information Systems
GLOSS	Global Sea Level Observing System
GMDSS	Global Maritime Distress and Safety System
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
GOS	Global Observing System (WWW)
GOSUD	Global Ocean Surface Underway Data Pilot Project (of IODE, JCOMM)
GO-SHIP	Global Ocean Ship-based Hydrographic Investigations Panel
GTS	Global Telecommunication System (WWW)
GTSPP	Global Temperature Salinity Profile Programme
HD	High Density
HDX	High Density line
HMEI	Association of Hydro-Meteorological Equipment Industry
HNMS	Hellenic National Meteorological Service
HQC	Higher-level QC
HRDCP	High Rate Data Collection Platforms
HTTP	Hypertext Transfer Protocol
IACS	International Association of Classification Societies
IAPSO	International Association for the Physical Sciences of the Oceans
ICOADS	International Comprehensive Ocean-Atmosphere Data Set
ICS	International Chamber of Shipping
ICSU	International Council for Science
ID	Identification Number
IFREMER	Institut Francais de Recherche pour l`Exploitation de la Mer
IHO	International Hydrographic Organization
IMMA	International Maritime Meteorological Archive
IMMT	International Maritime Meteorological Tape
IMO	International Maritime Organization
IMSO	International Mobile Satellite Organization
INSU	Institut National des Sciences de l'Univers (France)

IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOCCP	International Ocean Carbon Coordination Project
IODE	International Data and Information Exchange (IOC)
IOOS	Integrated Ocean Observing System (USA)
IPET-DRC	CBS Inter-Programme Expert Team on Data Representation and Codes
IRD	Institut de recherche pour le développement (France)
ISDM	Integrated Science Data Management (Canada)
ISO	International Organization for Standardization
ISO/TC	ISO Technical Committee
ITU	International Telecommunication Union
JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
JCOMMOPS	JCOMM *in situ* Observing Platform Support Centre
JJVV	GTS FM 63-XI Ext. BATHY report
JMA	Japan Meteorological Agency
KNMI	Royal Netherlands Meteorological Institute
LES	Land Earth Station (Inmarsat)
LRIT	Long Range Identification and Tracking of Ships
MAN	JCOMM Management Committee
MASK	Specific masking of the ship's identification within FM-13 GTS reports using a unique repeating identification number
MCS	Marine Climatological Summaries
MCSS	Marine Climatological Summaries Scheme
MES	Mobile Earth Station
META-T	Water Temperature Instrument/Platform Metadata Pilot Project
MMI	Marine Metadata Interoperability
MQCS	Minimum Quality Control Standards
MSC	IMO's Maritime Safety Committee
MSC	Meteorological Services Canada
MSG	METEOSAT Second Generation
MSI	Maritime Safety Information
NDBC	National Data Buoy Center (NOAA)
NCDC	National Climatic Data Center (NOAA)
NCEP	National Centers for Environmental Prediction (NOAA)
NEFSC	Northeast Fisheries Science Center (NOAA)
NetCDF	Network Common Data Form
NGO	Non-Governmental Organization
NMS	National Meteorological Service
NMHS	National Meteorological and Hydrological Service
NOAA	National Oceanic and Atmospheric Administration (USA)
NOC	National Oceanography Centre, Southampton (UK)
NODC	National Oceanographic Data Centre
NSF	National Science Foundation (NSF)
NWS	National Weather Service (NOAA)
NWP	Numerical Weather Prediction
NWPC	Numerical Weather Prediction Centre
OceanObs	International Conference for the Ocean Observing System for Climate
OceanSCOPE	A Working Group of the SCOR and IAPSO
OceanSITES	OCEAN Sustained Interdisciplinary Timeseries Environment observation System
OCG	Observations Coordination Group
ODAS	Ocean Data Acquisition Systems
ODASMS	ODAS Metadata Service
ODP	Ocean Data Portal
OOPC	Ocean Observation Panel for Climate (of GOOS, GCOS, WCRP)
OPA	JCOMM Observations Programme Area
OPSC	Observing Programme Support Centre
OSMC	Observing System Monitoring Centre

PIRATA	Pilot Research Moored Array in the Tropical Atlantic
PMO	Port Meteorological Officer
Pub47	WMO Publication No. 47, International List of Selected, Supplementary and Auxiliary Ships
PR	Permanent Representative (of a country with WMO)
PSAFS	Portable Seagoing Air-sea Flux Standard
PTT	Platform Transmitter Terminal
QC	Quality Control
QIR	Quality Information Relay
REAL	FM-13 GTS report where the ship's identification (the call sign) is not masked
RM	Responsible Members (of the MCSS)
RNODC	Responsible National Oceanographic Data Centre
RNODC/DB	Responsible National Oceanographic Data Centre for Drifting Buoys
RRR	WMO Rolling Review of Requirements
RTMC	VOSClim Real Time Monitoring Center
RSMC	Regional Specialized Meteorological Centre
R/V	Research Vessel
SAC	Special Access Code
SAMOS	Shipboard Automated Meteorological and Oceanographic System
SAR	Synthetic Aperture Radar
SAWS	South African Weather Service
SBD	Short Burst Data
SC	Subcommittee
SCADA	Supervisory Control And Data Acquisition
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"
SIO	Scripps Institution of Oceanography
SISMER	French Oceanographic Data Centre
SOCAT	Surface Ocean CO_2 Atlas Project
SOG	Statement of Guidance
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
SOOPST	SOOPIP Science Team
SOT	Ship Observations Team
SOT-TC	SOT Technical Coordinator
SSS	Sea Surface Salinity
SST	Sea Surface Temperature
SURA	Southeastern Universities Research Association
TAO	Tropical Atmosphere Ocean array of moorings in the equatorial Pacific Ocean
TC	Technical Coordinator
TD	Technical Document
TEMP-SHIP	Upper-level temperature, humidity and wind report from a sea station
TESAC	Temperature, Salinity and Current Report
TGBM	Tide gauge benchmark
TIP	Tropical Moored Buoy Implementation Panel
TOR	Terms of Reference
TRACKOB	Code for reporting marine surface observations along a ship's track
TSG	Thermosalinograph
TSK	Tsurumi-Seiki Co., Ltd.
TT-ASAP	SOT Task Team on the Automated Shipboard Aerological Programme
TT-DMVOS	SOT/ETMC Task Team on Delayed Mode VOS Data
TT-IS	SOT Task Team on Instrument Standards

TT-Masking	SOT Task Team on Callsign Masking and Encoding
TT-Pub47	SOT Task Team on Metadata for WMO Publication No. 47
TT-Satcom	SOT Task Team on Satellite Communications Systems
TT-VOSClim	SOT Task Team on the VOS Climate standards
TT-VRPP	SOT Task Team on VOS Recruitment and Programme Promotion
TT-IS	SOT Task Team on Instrument Standards
TT-MOCS	ETMC Task Team on Met/Ocean Climatological Summaries
TT-TDC	DMPA Task Team on Table Driven Codes
UK	United Kingdom of Great Britain and Northern Ireland
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	UN Framework Convention on Climate Change
URL	Universal Resource Locator
USCG	US Coast Guards
VAR	Iridium Value Added Reseller
VOF	Voluntary Observing Fleet
VOS	Voluntary Observing Ship
VOSP	Voluntary Observing Ship Panel
VOSClim	Voluntary Observing Ships Climate Subset Project
VTS	Vessel Traffic Services
WCC-3	Third World Climate Conference
WCRP	World Climate Research Programme (WMO/IOC/ICSU)
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization
WOAP	WCRP Observations and Assimilation Panel
WOCE	World Ocean Circulation Experiment
WRAP	Worldwide Recurring ASAP Project
WWNWS	World-Wide Navigational Warning Service
WWW	World Weather Watch (WMO)
XBT	Expendable Bathythermograph
XCTD	Expendable conductivity-temperature-depth probe
XML	Extensible Markup Language
YOTREPS	Plain language reports from yachts