World Meteorological Organization

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

SHIP OBSERVATIONS TEAM
SEVENTH SESSION

Victoria, Canada

22 to 26 April 2013

FINAL REPORT

2013

JCOMM Meeting Report No. 97

[page left intentionally blank]

WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

SHIP OBSERVATIONS TEAM
SEVENTH SESSION

Victoria, Canada
22 to 26 April 2013

FINAL REPORT

2013

JCOMM Meeting Report No. 97

NOTES

WMO AND IOC DISCLAIMERS

WMO Regulation 42

Recommendations of working groups shall have no status within the Organization until they have been approved by the responsible constituent body. In the case of joint working groups the recommendations must be concurred with by the presidents of the constituent bodies concerned before being submitted to the designated constituent body.

WMO Regulation 43

In the case of a recommendation made by a working group between sessions of the responsible constituent body, either in a session of a working group or by correspondence, the president of the body may, as an exceptional measure, approve the recommendation on behalf of the constituent body when the matter is, in his opinion, urgent, and does not appear to imply new obligations for Members. He may then submit this recommendation for adoption by the Executive Council or to the President of the Organization for action in accordance with Regulation 9(5).

Chair, Publications Board
World Meteorological Organization (WMO)
7 bis, avenue de la Paix
P.O. Box No. 2300
CH-1211 Geneva 2, Switzerland

Tel.: +(41 22) 730 84 03
Fax: +(41 22) 730 80 40
E-mail: Publications@wmo.int

IOC (OF UNESCO) DISCLAIMER

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariats of UNESCO and IOC concerning the legal status of any country or territory, or its authorities, or concerning the delimitation of the frontiers of any country or territory.

C O N T E N T S

EXECUTIVE SUMMARY

The Seventh Session of the JCOMM Ship Observations Team (SOT) was held in the conference room of the Harbour Towers Hotel in Victoria, Canada, from 22 to 26 April 2013 at the kind invitation of the Government of Canada, and Environment Canada.

As for previous SOT Sessions, a Technical and Scientific Workshop focusing on new initiatives and / or new developments in shipboard meteorological or oceanographic instrumentation, observing practices, data management procedures, and quality control and ocean products was organized during the first day of the meeting. 10 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 and addressed the SOT relevant priority activities of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) for the period 2012-2016. The Team noted that the implementation of WIGOS was now well underway, and it identified a number of WIGOS implementation activities where the Team could contribute, and urged its members to collaborate to as needed.

The Team noted the reports from the JCOMM Observations Programme Area Coordinator, the SOT Chair, and the SOT Technical Coordinator, and reviewed action items from the previous SOT Session. About 56% of the actions have been successfully completed, or addressed.

The Team reviewed requirements for ship-based observations in support of WMO and IOC Applications, including those the ocean related actions from the GCOS Implementation Plan. The Team noted some SOT related actions from the WMO Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP) and made recommendations accordingly.

The meeting reviewed the collaboration with associated programmes. Issues of common interest were discussed, including logistical aspects, and the sharing of the data. The Team agreed that there should be a concerted approach with the shipping industry between the various groups involved in the making of marine meteorological and oceanographic observations from ships. The Team noted that the World Ocean Council (WOC) could be a good mechanism to realize this concerted approach.

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

(i.) The Task Team on Satellite Communication Systems (TT-Satcom) recommended the design of a new communication system for conventional VOS based on their future FleetBroadband GMDSS terminals to replace Inmarsat-C Code 41;

(ii.) The Task Team on ASAP (TT-ASAP) invited other operators than E-ASAP to consider operating ASAP vessels in other areas that the North Atlantic Ocean;

(iii.) The Task Team on VOS Recruitment and Programme Promotion (TT-VRPP) decided to draft a new survey/questionnaire directed at the VOS observers and shipowners with a view to assessing the performance of VOS Scheme. The Team also concurred on the need to convene a fifth international Port Meteorological Officers (PMO) Workshop in Chile in 2014. It agreed that there was value of arranging a shipping industry forum to be held in conjunction with the next SOT-8 session

(iv.) The Task Team on Metadata for WMO Publication No. 47 (TT-Pub47) proposed new metadata fields and changes for the Publication (to be submitted to JCOMM-5);

(v.) The Task Team on Instrument Standards (TT-IS) recommended to complete the review of relevant sections of the WMO No. 8 Guide, and to submit those changes to CIMO as needed;

(vi.) The Task Team on Callsign Masking and encoding (TT-Masking) agreed with the principles of a universally accepted solution for the masking of VOS data (i.e. the ENCODE proposal) to be submitted to the WMO Commission for Basic Systems (CBS) although the governance for the management of private encryption keys will have to be refined. The meeting agreed that, while it was bound by previous decisions of the WMO Executive Council to proceed with the schemes for the time being, it should take stock of the current situation with regard to the

increasing amount of ship data now available publicly through other means than VOS GTS reporting (e.g. AIS, LRIT), and report this situation back to CBS, via the OCG, for a review of its decisions in this regard.

The Team decided to establish a new SOT Task Team on Training (TT-Training) chaired by Paula Rychtar (USA). It further decided to include working groups on (i) Publications, (ii) Automatic Weather Stations, and (iii) New Technology, as part of the SOT Task Team on Instrument Standards (TT-IS).

The Eighth Session of the Voluntary Observing Ship (VOS) Panel reviewed the status of the VOS fleet, including status of VOS automation, and trends in recent years, and considered proposals for the evolution of the fleet, in particular taking into account the upgrading of VOS to VOSClim standards, and the increasing demand for high quality observations to serve the needs of the developing Global Framework for Climate Service (GFCS). Despite the decreasing size of the international VOS fleet (number of ships is now less than half than the size it was a decade ago), the Panel was pleased to note a steady increase of the number of observations collected by VOS compared in the last decade. However, almost ninety percent of observations in 2012 came from just six national VOS fleets. Consequently there remained a need to increase the capacity of other countries that are seeking to implement VOS networks of their own, and to involve other countries that have large national merchant fleets but which currently have no established VOS fleet.

Recalling the Key Performance Indicator (KPI) for the VOSClim agreed at the previous SOT Session, whereby 25% of the global VOS fleet should be upgraded to VOSClim, the VOS Panel noted with appreciation that the target has been meet and exceeded (i.e. now 27%).The KPIs set at the previous session for (i) less than 3% of VOSClim class ships being flagged on the suspect list for air pressure, and (ii) 95% of VOSClim class observations to be received within 120 minutes have also been met. The Team recommended that VOS focal points and PMOs should make renewed efforts to upgrade all suitable 'Selected' VOS in their fleets to VOSClim standard at their next inspection. The Panel agreed that a new KPI should be introduced based upon ship classes that can realistically be upgraded to VOSClim without undue resource and cost implications: that at least 25% of the active international VOS Fleet registered on the E-SURFMAR[1] metadata database to be VOSClim Class by SOT-8.

The Panel discussed the role of the Port Meteorological Officers (PMO), and PMO activities and inspections, as well as the implications of VOS automation on their activities. In order to increase PMO awareness of different AWS system functionality the Panel recommended to the Team that consideration should be given to convening an international Shipborne AWS Workshop during the next intersessional period

The Panel agreed that the VOS Ancillary Pilot Project, which had been initiated as a consequence of requests by shipping companies for recruitment of ships to the VOS Scheme having to be turned down, should be continued until the next SOT session. It tasked the SOT Technical Coordinator to assist with regard to the development of the Pilot Project as needed.

The 10th Session of the Ship Of Opportunity Program (SOOP) Implementation Panel (SOOPIP) focused on the implementation status of recommended Expendable Bay Thermograph (XBT) network. SOOP Science Presentations reinforced the value of decadal time series of transects by demonstrating the application of XBT transect data to oceanographic research, including studies of Meridional Overturning Circulation and Meridional Heat Transport, monitoring of western boundary currents, and upper ocean heat content, leading to more than 40 publications annually in peer reviewed publications. Presentations also highlighted the value of XBT data analysis for the assessment of numerical models. The SOOP continues to support technology development through XBT Fall Rate Equation studies and climate quality XBT probe development and tests. The Panel noted the value of collaboration between SOOP and different programs that share the same deployment platforms, such as pCO2, XCTDs, TSGs, CPRs and Argo; and with panels that are geared towards carrying out observations through cargo ships, such as OceanScope and WOC. The

1 Surface Marine Operational Service of the EUMETNET (Grouping of European Meteorological Services) Economic Interest Group

Panel made recommendations to maintain and increase international collaboration and interaction with other programmes to improve real time data transmission through improved metadata and QC procedures. One of the priorities of SOOP will be to work with the new SOT Technical Coordinator (who is also the JCOMMOPS Ship Coordinator) to resume the creation of semestrial reports on the status of the network. The SOOPIP supported the XBT Science Team to implement a web site designed to present continuously updated information for XBT transects, and scientific products.

The Team reviewed the monitoring reports from (i) the Regional Specialized Meteorological Centre (RSMC) Exeter, acting as CBS Lead Centre for monitoring the quality of surface marine observations, (ii) the Real-Time Monitoring Centre RTMC) for the VOS Climate (VOSClim) data (also operated by the United Kingdom), (iii) the Global Collecting Centres of the United Kingdom and Germany, (iv) the Data Assembly Centre (DAC) for the VOSClim fleet (operated by the USA), and (v) the ASAP quality control monitoring reports from ECMWF and Météo France. Activities of the Global Temperature and Salinity Profile Programme (GTSPP), and the Global Ocean Surface Underway Data Pilot Project (GOSUD) were also discussed.

The Team discussed operational coding requirements and urged its Task Team on Table Driven Codes (TT-TDC) to speed the submission of SOT related BUFR template proposals to the CBS taking SOT requirements into account. The Team also concurred with the ETMC recommendations regarding the preservability of marine data.

The Team reviewed the requirements for the collection of SOOP, GO-SHIP, and ASAP metadata, and made some recommendations in this regard, in particular by requesting JCOMMOPS to play a stronger role.

The Team discussed the development of the Marine Climate Data System (MCDS) to the activities of the SOT, and noted that its development has been inspired by the delayed mode VOS data-flow system of the Marine Climatological Summaries Scheme (MCSS). Ship-based observation delayed mode data flow should not therefore be substantially impacted by the development of the MCDS.

The Team reviewed the first draft of the SOT Implementation Strategy produced by the SOT Chair in consultation with the VOSP and SOOPIP Chairs as well as the Secretariat. The Team proposed some adjustments to the implementation strategy, and requested the SOT Chair to finalize the Strategy on behalf of the Team in consultation with the VOSP and SOOPIP chairs, the OPA Coordinator, the Task Team Chair, and the Secretariat. The goal is to post the first version of the strategy on the SOT and JCOMM websites by mid-2013.

The meeting reviewed the operations of the JCOMM in situ Observations Programme Support Centre (JCOMMOPS), and future plans for its development according to the JCOMMOPS strategy developed by the OPA in collaboration with JCOMMOPS funding partners. The migration of JCOMMOPS to Brest, France was particularly discussed and encouraged. The Team also reviewed the operating budget of JCOMMOPS and made commitments in this regard.

The Team discussed information exchange, and reviewed programme promotion materials, including the SOT annual report, websites, mailing lists, and publications and brochures.

The Team reviewed of the SOT Management Team, and agreed on work priorities for the SOT Technical Coordinator. The Terms of Reference of the SOT were also reviewed. These will be further reviewed at the next SOT Session. The Team reviewed funding issues and status of the ASAP Trust Fund, and made recommendations accordingly.

National reports from 11 Members/Member States were presented during the Session (26 written reports were submitted).

The next Session of the SOT is tentatively planned to be held in South Africa in 2015.

[page left intentionally blank]

GENERAL SUMMARY OF THE WORK OF THE SESSION

1. ORGANIZATION OF THE SESSION

1.1 Opening of the Session

1.1.1 The seventh session of the JCOMM Ship Observations Team (SOT-VI) was opened by the chairperson of the Team, Mr Graeme Ball (Australia), at 0900 hours on Monday, 22 April 2013, in the conference room of the Harbour Towers Hotel, Victoria, Canada, and at the kind invitation of the Government of Canada, and Environment Canada.

1.1.2 Mr Al Wallace (Canada), Director, Meteorological Services of Canada, Pacific and Yukon region, Environment Canada, and DBCP Chairperson, also welcomed the participants to the Session and to Victoria on behalf of the Government of Canada.

1.1.3 On behalf of the Secretary-General of the WMO, Mr Michel Jarraud, and the Executive Secretary of the Intergovernmental Oceanographic Commission (IOC), the WMO Secretariat Representative, Mr Etienne Charpentier also welcomed the participants to the session, and to Victoria. He thanked the Canadian government and Environment Canada for organizing the SOT Session, and for the nice facilities offered for this event.

1.1.4 During the opening remarks, it was recalled that met-ocean applications provide the means to prevent, mitigate, and adapt to the impacts of ocean phenomena, weather, and climate on the environment and human activities in coastal regions and beyond. While useful to realize socio-economical benefits, met-ocean applications rely heavily on *in situ* and satellite meteorological and oceanographic observations. From that perspective, the role of the SOT is important to provide the ship-based observations required per the JCOMM Observations Programme Area (OPA) Implementation Goals. In addition, the WMO Integrated Global Observing System (WIGOS) and the Global Framework for Climate Services (GFCS) that is now developing are increasing the demand for high quality, documented, and traceable observations of known uncertainty, including historical data. The SOT is therefore expected to contribute to the implementation of both WIGOS and the GFCS by providing such data and addressing the key activities of the WIGOS Implementation Plan (WIP).

1.1.5 The SOT chairperson, Mr Graeme Ball, thanked the Canadian Government and Environment Canada for their support to the meeting, recalled the objectives of the SOT, and provided an overview of the SOT and of the goals for the meeting. Mr Graeme Ball indicated that key objectives for the meeting included the following:

(1) Review and approve the SOT Implementation Strategy;
(2) Promote VOS initiatives such as (1) the DBCP/VOS donation programme, (2) the VOS Ancillary Pilot Project, and (3) upgrading all suitable ships to the VOSClim class;
(3) Review the performance of the major ship-based networks against key metrics;
(4) Review the work and recommendations of the Task Teams, and consider the need for additional Task Teams and working groups;
(5) Review and assess enhancements to technology and data management;
(6) Further enhance international collaboration and cooperation; and
(7) Review the composition of the SOT Management Team.

1.1.6 The list of participants in the meeting is provided in Annex II.

1.2 Adoption of the Agenda

1.2.1 The SOT adopted its agenda for the session based on the provisional agenda with some changes. The adopted agenda is reproduced in Annex I.

1.3 Working Arrangements

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

2. SCIENTIFIC AND TECHNICAL WORKSHOP, NEW DEVELOPMENTS

2.1 Ms Paula Rychtar (USA), 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, and quality control and ocean products. Members of the Team were invited to report on systems and related technical developments relevant to SOT, either within their own services and operations or with which they have otherwise been directly involved.

2.2 The following presentations were made during the workshop:

(1) Overview of Canada's AVOS Network; presentation made by Chris Marshall (Canada);
(2) Stage of Higher Level Quality Control Software for Marine Met Data; presentation made by Gudrun Rosenhagen (Germany);
(3) Wireless XBT System developed by CSIRO; presentation made by Ann Thresher (Australia);
(4) Turbowin E-logbook demo and update; presentation made by Sarah North (United Kingdom);
(5) SEAS E-logbook demo and update; presentation made by Francis Bringas (United States);
(6) Data Acquisition Measurement Monitoring Meteorology HRDCP; presentation made by Nicholas Coyne (Germany);
(7) Assessing the health of the Marine Climate Observing System; presentation made by David Berry (United Kingdom);
(8) The use of ship observations in the creation of the marine forecast; presentation made by Al Wallace (Canada) on behalf of Mike Gismonde (Canada);
(9) The Oleander project; presentation made by Thomas Rossby (United States); and
(10) The E-SURFMAR metadata database: recent enhancements; presentation made by Pierre Blouch (France).

2.3 Based on these presentation and resulting discussions, the Team agreed on the following:

- There should be an effort of the Team to better integrate the interfaces amongst the various e-logbooks being used;
- Numerical studies have shown the negative impact of a reduced number of in-situ observations in climate studies, for example for sea level air temperature where the completeness of the observing system went down to about 40%, possibly due to the reduction of the number of VOS making air temperature measurements. It was recommended that the impact of observations obtained from ships of the VOS and SOOP be assessed for climate studies;
- Webex training for PMOs on the use of the E-SURFMAR database should be organized (***action; P. Blouch; end 2013***).

3. REPORTS BY THE SECRETARIAT, OPA COORDINATOR, SOT CHAIRPERSON AND SOT TECHNICAL CO-ORDINATOR

3.1 Report from the Secretariat (incl. relationship with IMO)

3.1.1 Forty-fifth Session of the IOC Executive Council

3.1.1.1 The IOC Secretariat representative reported on results on decisions made at the Forty-Fifth Session of the IOC Executive Council (EC-XLV[2]), 26-28 June 2012, Paris, France, which were related to the work of GOOS, JCOMM and of the SOT. The decisions and recommendations from the fourth Session of JCOMM (JCOMM-4, Yeosu, Republic of Korea, 23-31 May 2012) and the first meeting of the interim GOOS Steering Committee (iGSC-1, 20 - 22 June 2012, Paris, France) were endorsed by the IOC-EC (IOC Decision EC-XLV/Dec.3.2 II).

3.1.1.2 The Team noted that the IOC Executive Council noted a continuing commitment to GOOS and the further development of operational oceanography and sustained observations. The IOC Executive Council made note of the key role of JCOMM in supporting operational oceanography programmes. The IOC Executive Council emphasized the need for IOC contributions to the success of these programmes.

3.1.1.3 Noting the staffing changes in JCOMMOPS and the IOCCP, the IOC Executive Council highlighted concerns about the potential permanence of the 'temporary' transfer of staff to other institutions such as WMO, and Member States were encouraged to contribute resources in order to maintain the Commission's capacity and strength in ocean science, services and observations.

3.1.1.4 The Executive Secretary reaffirmed GOOS as a priority for IOC, and noted the outcome of the meeting of the recently created interim GOOS Steering Committee (iGSC), held in Paris, from 20 to 22 June, 2012. Concerns were expressed about the geographic balance of the new GOOS Steering Committee. The Executive Secretary pointed out that the group was close to geographic balance, exceeded gender balance goals, had an appropriate scientific and technical discipline balance, and most importantly was committed to working with all GOOS Regional Alliances.

3.1.2 Sixty-fourth Session of the WMO Executive Council

3.1.2.1 The WMO Secretariat representative reported on the outcome of the sixty-fourth Session of the WMO Executive Council (WMO EC-64, Geneva, Switzerland, 25 June - 3 July 2012)[3]. In particular, the Team noted the following decisions of EC-64 and urged its members to take them into account when developing their activities in support of the Team (***action; Team members; ongoing***):

- The Council noted that the updated JCOMM Observations Programme Area Implementation Goals as presented to the fourth JCOMM session are fully responding to the requirements of WMO Application Areas (in particular climate monitoring, NWP, and ocean applications), and requested Members to consider contributing to the achievement of these goals, as well as to support the JCOMM in situ Observing Programme Support Centre (JCOMMOPS).
- The Council noted the initiative to develop a Marine Climate Data System (MCDS) that will fully address the requirements of the Global Framework for Climate Services (GFCS). It requested Members to contribute to the MCDS developments by providing appropriate infrastructure to ensure the flow of operational and research marine meteorological and oceanographic data through the MCDS centres, as well as to contribute data to the MCDS according to the agreed standards, and assist in data rescue activities.

2 http://www.ioc-unesco.org/index.php?option=com_oe&task=viewEventRecord&eventID=697
3 https://sites.google.com/a/wmo.int/ec-64-main-page/

3.1.3 JCOMM Activities

3.1.3.1 The Secretariat reported briefly on activities under or associated with JCOMM that had taken place since SOT-6, and were of direct interest to the Team. Of primary interest, the Team noted the relevant outcome of the Fourth Session of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), Yeosu, Republic of Korea, 23-31 May 2012.

SOT contribution to JCOMM OPA priority activities for 2012-2016

3.1.3.2 The Team agreed with the following regarding the JCOMM Observations Programme Area (OPA) priority activities for this JCOMM intersessional period (2012-2016):

a) Implementation of WIGOS: The Team agreed again to respond to the Legacy Recommendations of the JCOMM Pilot Project for WIGOS as agreed at the previous SOT Session (see paragraph 10.2 of SOT-6 Final Report);

b) Requirements setting, and priorities: The Team recalled that it is committed to respond to the goals sated in the JCOMM Observations Programme Area (OPA) Implementation Goals (OPA-IG), as stated in the draft SOT Implementation Strategy (see item 10). The Team is also contributing to the WMO Rolling Review of Requirements, and responding to the Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP[4]);

c) Global observing effort with more contributors: The Team is encouraging more partners to joint its activities, and contribute to the SOT implementation effort; the SOT Capacity Building activities (PMO workshops, “Buddy” and VOS donation programmes) are also meant to bring new partners from developing countries in the area of ship observations.

d) New ocean observing platform types: The Team is looking at using new technologies (e.g. AWS systems onboard ships; autolaunchers; TSG, pCO_2), and is collaborating with other groups for the deployment of existing and new types of instruments from ship (e.g. drifters, Argo floats, surface wave gliders, etc.). The cooperation with the World Ocean Council will also bring new opportunities for the recruitment of new vessels to participate in the activities of the SOT.

e) Synergies: The Team is a strong supporter of the JCOMMOPS, including through financial contributions. JCOMMOPS is a key resource for developing synergies between observing systems to exploit the potential of joint deployment opportunities, and to foster a common approach to sensor development and best practices. The SOT Tasks Teams, and Pilot Projects also play a key role in this regard.

f) Pilot Projects: The Team is supporting establishment of pilot projects which are meant to explore new ocean sensor, ocean observing platform, and data telecommunication technologies, promote the most cost-effective use of the existing resources, and optimal use of potential synergies between various observing systems (e.g. in situ // satellite integration with the HRSST Pilot Project). The Team is encouraging a more pro-active approach of its members for promoting such pilots. The Team also noted the Resolution from the third DBCP Capacity Building workshop for countries of the Western Indian Ocean region (Mombasa, Kenya, 16-20 April 2012) to establish an SOT Pilot Project to act as co-operative venture among countries within the Indian Ocean to enhance the provision of marine meteorological and oceanographic data in support of a diversity of national, regional and global programmes. The Team

4 http://www.wmo.int/pages/prog/www/OSY/Publications/EGOS-IP-2025/EGOS-IP-2025-en.pdf

designated Ali Mafimbo (Kenya) to lead this Pilot Project, set up a Steering Team tasked to develop a workplan for the Pilot Project, and to report at the next SOT Session on the outcome (***action; Ali Mafimbo; SOT-8***). The draft white paper and embryo workplan is provided in Annex XVI.

g) Capacity building: The Team is committed to develop partnerships between developed countries and developing countries, and organize PANGEA[5] type capacity building activities, including training workshops (e.g. international PMO workshops) on implementation of ship-based observation programmes, and data use.

h) Standards and best practices: The Team is committed – through its Task Team on Instrument Standards (see item 6.5) – to review the requirements for documenting standards and best practices regarding the making of ship-based observations, including the review of the Technical Regulations as documented in the relevant WMO and IOC Publications. The Team also invited its members to make use of the Regional Marine Instrumentation Centre (RMIC[6]) facilities in their respective regions to ensure traceability of marine meteorological and oceanographic observations (***action; SOT members; ongoing***).

i) Data & metadata exchange: The Team is committed to collect and share instrument/platform metadata concerning observations made from ships (see items 6.4 and 9.3).

SOT contribution to JCOMM DMPA priority activities for 2012-2016

3.1.3.3 The Team agreed with the following regarding the JCOMM Data Management Programme Area (DMPA) priority activities for this JCOMM intersessional period (2012-2016):

a) Ocean Data Standards: The Team (i) invited its members to review ocean data standards submitted through the JCOMM-IODE Ocean Data Standards Process (ODS[7]) (***action; SOT members; ongoing***).

b) IODE Ocean Data Portal: The Team invited its members holding ship observation data sets to provide the corresponding discovery metadata in the appropriate search standard ISO 23950, and discovery metadata standard ISO 19115, and make them available through the WMO Information System (WIS) or the IODE Ocean Data Portal (ODP) (***action; Team members; ongoing***).

c) Marine Climate Data System (MCDS): The Team invited its members to follow the development of the MCDS closely (see for example the final report of the 4th Session of the ETMC), and make sure that delayed mode and historical ship data will comply with the requirements of the MCDS. Team members, may also consider collaborating with the ETMC through participation in its Task Team on the MCDS so that the SOT requirements are also considered in these developments (***action; SOT members; ongoing***).

d) Instrument/Platform metadata: See item (i) under paragraph 3.1.3.2 above.

e) Marine Climatology workshops (CLIMAR[8], MARCDAT[9]): The Team invited its members to consider participating at the CLIMAR and MARCDAT workshop once planned.

5 Partnership for new GEOSS Applications - http://www.jcomm.info/pangea-concept
6 There are currently two RMICs in Mississippi, USA for RA-IV, and in Tianjin, China for RA-II and the Asia Pacific region. Plans are underway to establish an RMIC for RA-I in Casablanca, Morocco.
7 http://www.oceandatastandards.org/
8 CLIMAR: JCOMM Workshop on Advances in Marine Climatology; next workshop is tentatively planned in 2014
9 MARCDAT: International workshop on Advances in the Use of Historical Marine Climate Data; next workshop is tentatively planned in 2016

3.1.3.4 The Team agreed to include the above perspectives regarding the JCOMM Observations (OPA) and Data Management (DMPA) Programme Area priority activities for this JCOMM intersessional period (2012-2016) into the SOT Implementation Strategy (***action: SOT chair; asap***).

Rigs and Platform metadata

3.1.3.5 The Team recalled that at its sixth Session It had requested the TT-Pub47, the ETMC, and the DBCP Task Team on Moored Buoys to coordinate between themselves in liaison with the DMCG and make sure that the requirements for Rigs and Platforms metadata and for automated systems installed on offshore platforms in particular are well considered. As a result of those discussions, the DBCP took over full responsibility for all types of Rigs and Platforms reporting meteorological and/or oceanographic measurements, and for all related aspects, and the DBCP Terms of Reference have been updated accordingly in 2012. The Team also acknowledged that the fourth Session of JCOMM urged the Team and the OPA in general to continue to investigate all possible means to recruit to additional ocean observing platforms (including Rigs and Platforms operated by the offshore industry).

Integration of data management centres

3.1.3.6 The Team noted that through Recommendation 2, JCOMM-4 strongly supported the development of the new Marine Climate Data System (MCDS) by 2020 to eventually replace the current Marine Climatological Summaries Scheme (MCSS). It viewed the MCDS as an opportunity to better integrate existing WMO and IOC data infrastructures serving the requirements for climate applications, including climate services, and provide for the required high quality marine meteorological and oceanographic climate data. JCOMM-4 requested ETMC in close cooperation with the International Oceanographic Data and Information Exchange (IODE) of the IOC and the Ocean Data Portal (ODP) Task Team of the IODE/JCOMM Expert Team on Data Management Practices (ETDMP), and other appropriate partners such as the ICSU World Data System (WDS) to review and update the MCDS strategy (as proposed by the Hamburg 2011 workshop), and to develop an implementation plan (including performance indicators for participating centres) for achieving the Vision for a new MCDS.

JCOMM in situ Observations Programme Support Centre (JCOMMOPS)

See item 11.1.

3.1.4 WMO Integrated Global Observing System (WIGOS)

WIGOS Implementation

3.1.4.1 The Secretariat reported on the recent development with regard to the WMO Integrated Global Observing System (WIGOS), in particular with regard to the implementation of WIGOS per decisions of the WMO Sixteenth Congress (Geneva, Switzerland, 16 May – 3 June 2011). The Team noted that the WIGOS framework Implementation Plan (WIP) drafted by the Inter-Commission Coordination Group on WIGOS (ICG-WIGOS) has been approved by the Sixty-Fourth Session of the WMO Executive Council (Geneva, Switzerland, 25 June – 3 July 2012). It identified a number of implementation activities where the Team could contribute, and urged its members to collaborate as needed (***action; Team members; 2016***). See also item (a) under paragraph 3.1.3.2 regarding the SOT response to the legacy recommendations of the JCOMM Pilot Project for WIGOS per JCOMM-4 guidance and priority activities.

WMO-IOC Regional Marine Instrument Centres (RMICs)

3.1.4.2 The Team recalled that two Regional Marine Instrumentation Centres (RMICs) have been established in USA (for Regional Association IV) and in China (for the Asia Pacific region). It

further noted with appreciation that efforts to establish another RMIC for the Regional Association I (Africa) in Casablanca, Morocco, are well underway, and a JCOMM Marine Instrumentation Workshop planned in Casablanca in mid 2013. In addition, JCOMM-4 urged Members/Member States to offer RMIC facilities in other regions, especially within Regional Association III (South America), Regional Association V (Southwest Pacific), and Regional Association VI (Europe), and to collaborate with the existing RMICs. The Team invited its members to use the existing RMIC facilities to ensure traceability of ship-based observations.

International forum of Users of Satellite Data Telecommunication

3.1.4.3 The Team noted recent developments with regard to the establishment of an international Forum of users of satellite data telecommunication systems (Satcom Forum). A preparatory workshop was held in Toulouse, France, from 23 to 27 April 2012. The workshop agreed that the current Argos Joint Tariff Agreement (JTA) should eventually operate as an independent operating sub-group of the future Forum. The workshop reviewed the draft Terms of Reference of the Satcom Forum and drafted operating principles of the Satcom Forum, including governance, roles and responsibilities of the Satcom Forum Chair, and Executive Committee, frequency of meetings, reporting procedures. The Team also noted that a first *ad hoc* Forum workshop is planned in late 2013. It invited its members to participate at this workshop once announced.

3.1.5 Global Framework for Climate Services (GFCS)

3.1.5.1 The meeting noted the recent developments with regard to the Global Framework for Climate Services (GFCS), and the outcome of the Extraordinary Session of the World Meteorological Congress (Cg-Ext.(2012)), which was held in Geneva from 29 to 31 October 2012.

3.1.5.2 The Team noted that Global Framework for Climate Services will bring together providers of climate services, researchers and users to make sure that the information provided by meteorologists and climate scientists is understandable and relevant to climate-sensitive activity. The initial focus will be on improved service delivery for disaster risk reduction, health, water management, agriculture and food security.

3.1.5.3 The Team noted that the development of the Marine Climate Data System (MCDS) by the ETMC in collaboration with the IODE will be one important element of JCOMM's contribution to the GFCS.

3.2 Report from the Observations Programme Area Coordinator

3.2.1 The JCOMM Observations Programme Area (OPA) coordinator Candyce Clark (USA) recalled that the Implementation Goals for the OPA are based on the WMO-IOC-UNEP-ICSU Global Climate Observing System (GCOS) Implementation Plan for Climate (GCOS-IP), and 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. She reported that the global system has remained about 62% complete for several years, as measured against the implementation targets identified in the GCOS IP; and that new resources will be necessary to advance system-wide implementation in deployment of data buoys, profiling floats, tide gauge stations, ship-based systems, and other platforms such as gliders. Ms Clark complemented SOT in strengthening the connections between the operational meteorological and oceanographic communities. As well, it is critical that science goals help drive the implementation of the operational programs. To sustain and expand the current observing system OCG needs the help of SOT to document the variety of uses of the data.

3.2.2 The Team recalled that its contribution to this global observing system comes from the Voluntary Observing Ship (VOS) scheme, including the VOS Climate (VOSClim) part and from the

Ship of Opportunity Programme (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 these fleets provides the platforms of opportunity necessary for deployment of the drifting arrays, and support a range of underway measurements. Metrics to clearly measure progress are important to sustaining an integrated observing system, and are being automatically incorporated into the JCOMM Observing System Monitoring Center (OSMC). Ms Clark reported that VOSClim and the SOOP Implementation Panel (SOOPIP) are commended for progress made in this area, and are encouraged to continue in this effort, especially to align with the Framework for Ocean Observing (FOO) focus on Essential Ocean Variables (EOV). The development of metrics for the VOS fleet and GO-SHIP programme is also encouraged. The importance of two different kinds of metrics was discussed and associated with actions for the SOT Panels (both actions are also applicable to all OCG panels/teams):

(i) The OCG Observing System Status Chart is a high level summary of how well JCOMM is meeting GCOS targets based on numbers of instruments. While some of these targets were defined by translating science requirements for temporal and spatial sampling, with assumptions on instrument failure rates and non-uniform distributions to numbers of instruments required, others were not so well argued;
(ii) Action: Each Panel of SOT to revisit the targets identified in this Chart, update if necessary, and to provide the needed logic to justify these targets.

3.2.3 GCOS-IP (2010 update) contains a number of specific actions, with performance indicators, that SOT Panels are charged to address. The Team requested each Panel of SOT to report an appropriate metric that demonstrates how well they are meeting the GCOS performance indicator (***action; SOOPIP & VOSP Chairs; Aug. 2013***).

3.2.4 The GOCS-IP and the Framework for Ocean Observations (the basis for GOOS) is based variable-based (Essential Climate and Ocean Variables). Each ECV/EOV is measured by a complementary suite of observing networks. Working with OOPC, the OCG will need to define a consistent reporting mechanism to combine the information across the observing platforms.

3.2.5 Ms Clark recalled that an important element of the observing system is the technical support from the JCOMM *in situ* Observations Programme Support Centre (JCOMMOPS, agenda item 11.1). While financial support for JCOMMOPS remained fragile and fragmented, the establishment of a pilot project that combines the technical coordinator function with activities dedicated to securing and coordinating vessels for deployment was considered a significant achievement. The Team warmly welcomed Mr Martin Kramp (JCOMMOPS) in this capacity and highly commended Mr Mathieu Belbeoch (JCOMMOPS) for his tireless pursuit to both make this happen and for his support to JCOMMOPS. The Team agreed that additional contributions are necessary to continue this success.

3.2.6 The Team noted that the Fourth Session of JCOMM (JCOMM-4, May 2012, Yeosu, Republic of Korea) called on the OPA to proactively engage and establish dialogue with requirements-setters to set realistic priorities; recruit additional Members / Member States as well as ocean observing communities and industry fora to contribute to the observing system; develop pilot projects for new sensors and synergies between observing system elements; continue capacity development activities; and encourage and document observing and data management standards and best practices.

3.2.7 JCOMM-4 also made specific requests to support GO-SHIP and continue dialogue with other ship-based activities such as those associated with the World Ocean Council. The Team also noted the combined JCOMM, GOOS Steering Committee, and IODE effort to improve interoperability and consistent data management for all OCG observing networks, including real-time, quality control, metadata collection, and climate quality archive issues, Bob Keeley (Canada) is assessing the current system and making recommendations, taking into account existing community data; the Team requested its members to reply to his queries (***action; SOT members; SOT-8***).

3.2.8 Further discussions and specific recommendations and actions were addressed during specific agenda items.

3.3 Report from the SOT Chairperson

3.3.1. Mr Graeme Ball reported on the activities of the SOT Chairperson during the intersessional period, as well as some key activities of the Team. He also paid tribute to Ms Julie Fletcher (MSNZ), the former Chair of the VOS Panel, who passed away at the beginning of 2013 from a short illness. He expressed his gratitude to the work of the Secretariat and the Chairs of the SOOPIP and VOSP, in particular Ms Sarah North for stepping in as the interim VOSP Chair. He also thanked the Meteorological Service of Canada for hosting the Seventh session of the Ship Observations Team.

3.3.2. Mr Ball particularly noted the work of the Task Team on Callsign Masking and Encoding, especially Mr Scott Woodruff (NOAA) and Mr Etienne Charpentier (WMO), for preparing the **ENCODE** proposal to JCOMM-4. He also noted the work of the Task Team on Metadata for WMO Publication 47 for preparing the Pub47 proposal to JCOMM-4. Mr Ball reported that the first proposal was noted by JCOMM-4, which requested the SOT to finalise it as soon as possible through the Commission for Basic Systems (CBS). He was pleased to announce that the second proposal was subsequently approved by JCOMM.

3.3.3. Mr Ball also thanked the remaining Task Teams for their diligence in addressing the important ongoing activities during the intersessional period. He also thanked the Team for their continuing efforts, often under increasing resource pressures, to maintain their national programs in support of SOT.

3.3.4. Mr Ball noted a range of key activities he was involved in during the intersessional period, including: (1) assisting with the drafting of the SOT Implementation Strategy, (2) the appointment of the JCOMMOPS Ship Coordinator / SOT Technical Coordinator (SOT TC), (3) development of the VOS Ancillary Pilot Project, (4) updating WMO No. 8 in collaboration with the VOSP Chair to incorporate the observing practices contained in the FM-13 SHIP code, (5) .recommending the appointment of Ms Sarah North as the interim VOSP Chair, (6) maintaining the VOS website, (7) discussion with GHRSST and (8) a key role in the planning of SOT-7.

3.3.5. Mr Ball attended the following international meetings during the intersessional period: (1) informally representing SOT at DBCP-27, Geneva, Switzerland, September 2011, (2) formally representing SOT at the Extreme Seas Project Meeting, Geneva, Switzerland, October 2011 and (3) informally representing SOT at DBCP-28, Fremantle, Australia, September 2012.

3.3.6. The meeting agreed to establish an *ad-hoc* Working Group, as part of the Task Team on Instrument Standards, to develop the requirements for SST and related variables from ships in consultation with GHRSST (see agenda item 5.2.4 for details).

3.3.7. The meeting decided on the following action items:

(i) To maintain the list of international Port Meteorological Officers in **Find-a-PMO** (***action; SOT Chair; ongoing***);

(ii) To continue to maintain the VOS website (***action; SOT Chair; ongoing***).

3.4 Report from the SOT Technical Co-ordinator (SOT TC)

3.4.1 The new Ship Coordinator, Martin Kramp, who joined JCOMMOPS in February 2013 after a six-month recruitment period and several years of prior preparation, presented himself to the Team. He thanked all involved parties for their confidence in him, and is enthusiastically looking forward to working with the community. The Team noted that while the Ship Coordinator is working in principle on a part-time basis (i.e. one third) as SOT Technical Coordinator (SOT TC), that in practical terms most of the Ship Coordinator's work is effectively benefiting the SOT.

3.4.2 The SOT TC reported that the main achievement of his predecessor, Mathieu Belbéoch, in the last intersessional period with regard to SOT, was to fund and recruit a new dedicated Ship Coordinator, who could deliver in particular the level of support the SOT deserves. The Team acknowledged that whilst further support to SOT by the former SOT TC had thereby been rather limited, the continuous flow of SOT-relevant data into the JCOMMOPS structure had always been maintained and allows now to create in short time missing maps and statistics.

3.4.3 The SOT TC presented a draft work plan with deliverables and deadlines for his Ship Coordinator position for the period from February to December 2013, which had already been reviewed by the chairs of the SOT programs and panels, GO-SHIP, the OPA Coordinator and the Secretariats of WMO/IOC. The Team finalized and endorsed the plan later under item 13.2.

3.4.4 The Team noted that the SOT TC met during the week preceding SOT-7, with SOOP and GO-SHIP (co-) chairs in Miami (AOML) and Seattle (PMEL), in order to receive guidance and to define a couple of products and procedures, in particular for the production of the SOOP survey, technical coordination for GO-SHIP and related metadata needs.

3.4.5 Mr. Kramp reported that his predecessor is gradually transferring necessary knowledge to him. In particular, the Team noted with appreciation that the production of standard maps has been resumed and will now take place on the usual monthly basis. He presented the SOT network status.

3.4.6 The Team took note that new innovative tools and services are under development at JCOMMOPS (naturally taking into account SOT needs) and that a new dedicated website is under construction. The SOT TC invited the SOT, VOSP, and SOOPIP Chairs to agree on priorities (QC mechanism, monitoring products, etc.) and provide guidance to the SOT TC accordingly. With the launch of the new JCOMMOPS Information System, the content of all dedicated program pages will be updated.

3.4.7 The Team noted that one of the first actions of the new SOT TC was the creation of a report on innovative volunteer ships. Mr. Kramp reported on very promising partnerships he had either taken over from his predecessor or initialized himself since his arrival. The SOT TC emphasized the importance of some sailing events and associations could play across all programs supported by JCOMMOPS. The concerned vessels could gather (i) ocean data (SOOP) and (ii) atmospheric data (VOS), but also (iii) deploy instruments at sea (Argo, DBCP) and (iv) are accompanied by excellent communication potential. The SOT TC had organized several meetings with confirmed or potential new partners and the report was presented by the Argo TC at AST14 in March 2013.

3.4.8 The SOT TC reported that all mailing lists have been updated following the information on jcomm.info. The Team concurred with the following recommendations from the SOT TC:

(i) to work rather with JCOMMOPS mailing lists in the future than with the web forms presently proposed on jcomm.info;
(ii) to follow with the lists exactly the structure on jcomm.info;
(iii) to provoke the transmission of a logfile to the SOT TC by ANY profile change on jcomm.info; and

(iv) to send the individual jcomm.info profile status to all users yearly for validation.

4. REVIEW OF ACTION ITEMS FROM SOT-6

4.1 The Secretariat reviewed the list of action items from the sixth Session of the SOT, Hobart, Australia, April 2011. The meeting noted that about 57% 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). The actions items that still require the Team's attention are listed in Annex III.

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

5.1 Requirements for ship-based observations

5.1.1 GCOS / GOOS / WCRP Ocean Observing Panel for Climate (OOPC)

5.1.1.1 The Team noted that the IOC through Resolution XXVI-8 'Strengthening and Streamlining GOOS' decided to recommit the IOC to a Global Ocean Observing System (GOOS) that is a holistic system of global, regional and coastal observations and products. The GOOS governance will be aligned with the OceanObs'09 working group's Framework for Ocean Observing oriented to an Essential Ocean Variable approach.

5.1.1.2 At the first interim GOOS Steering Committee meeting, held in June 2012 (iGSC-I), the committee reaffirmed the importance of Ocean Observations Panel for Climate (OOPC) to the past and future GOOS and approved the OOPC as a component of GOOS, sharing co-sponsorship with GCOS and WCRP.

5.1.1.3 Following the IGSC-I, the OOPC was able to continue activities which had been suspended pending the reorganization of GOOS. Katherine Hill has been employed as OOPC Programme Officer and resides with the GCOS office at WMO in Geneva. The former OOPC chair, Eric Lindstrom, has stepped down to concentrate on his position as chair of the GOOS Steering Committee. Pending confirmation by sponsoring bodies the OOPC co-chairs for the next term will be Dr. Mark Bourassa, Florida State University, and Dr. Toshio Suga, Tohoku University.

5.1.1.4 Anticipated actions for next term of OOPC include an Upper Ocean Thermal Review (UOT), which will follow up on improvements to XBT fall rate errors, Argo pressure corrections and the planned CLIVAR's Global Synthesis and Observation Panel historical temperature project. The UOT will likely impact the planned Tropical Pacific Observing System Workshop which will be concerned with continuity of the TAO/TRITON array and other equatorial observation systems used over the past thirty years.

5.1.1.5 The Team noted that per JCOMM-4 decision, JCOMM will continue to rely on OOPC for observing requirements for climate, as expressed through implementation plan of GCOS and GOOS. JCOMM-4 called upon OOPC to revisit the requirements for upper ocean thermal observations. Meanwhile, the Team reaffirmed its decisions at the last SOT Session regarding its response to the GCOS 2010 Implementation Plan, and reflected in paragraph 5.1.1.6 of the final report of SOT-6.

5.1.2 Rolling Review of Requirements update

5.1.2.1 The Team discussed latest developments with regard to the WMO Rolling Review of Requirements (RRR), stressing on non-climate requirements. It noted the most recent version of the Statement of Guidance for Ocean Applications[10].

5.1.2.2 The Team noted that the new Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP[11]) has now been approved by the Commission for Basic Systems at its fifteenth Session (CBS-15, Jakarta, Indonesia, 10-15 September 2012). The Team further noted JCOMM-4 decisions related to the WMO RRR, in particular urging Members/Member States to make sure that all ocean observations related actions which are part of the EGOS-IP should be properly addressed once the new EGOS-IP is approved by the WMO Executive Council (in principle EC-65 in 2013). The Team particularly noted the following SOT related actions from the EGOS-IP:

- Action No. 49 recommending NMSs, and NMHSs (in collaboration with companies operating commercial ships, RAs, JCOMM, CBS and CAS) to maintain and optimize the existing ASAP network over the North Atlantic, and develop similar programmes for the North Pacific and the Indian Ocean;
- Action No. 51 recommending Port Meteorological Officers (PMOs), NMSs, NMHSs and other NWP monitoring centres (in collaboration with companies operating commercial ships) to improve the quality of ship observations by more regular interactions with the NWP monitoring centres and more regular checks on the instruments onboard;
- Action No. 58 recommending NMSs, NMHSs, and national oceanographic institutions (in collaboration with JCOMM, international organizations and companies operating ships of opportunity, CBS and CIMO) to improve timely delivery and distribute high vertical resolution data for sub-surface temperature from Ships/XBT (for ocean and weather forecasting purposes).

5.1.2.3 The Team invited its members to take the following into account when planning their national ship observation programme activities (***action; SOT members; ongoing***):

i. To make sure that the gaps identified in the Statement of Guidance for Ocean Applications are taken into account;
ii. To address all ocean observations related actions of the EGOS-IP, and actions No. 49, 51, and 58 in particular;
iii. To make precipitation measurements from ships whenever possible;

5.1.2.4 The Team noted that Germany and SAMOS are making precipitation measurements from research vessels, but the quality and cost-effectiveness of those measurements remains to be investigated. The Team also agreed that making such measurements from merchant vessels in a cost effective way was not practicable. The Team requested the Secretariat to provide feedback to the Contact Point for Ocean Applications regarding the difficulty to make precipitation measurements from ships, and the need to update the SOG for ocean applications accordingly (***action; Secretariat; asap***). The Team also requested the OCG to discuss the need for precipitation measurements over the ocean, and to make recommendations on how to possibly address them (***action; C. Clark; Aug. 2013***).

10 http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-Ocean.doc
11 http://www.wmo.int/pages/prog/www/OSY/Publications/EGOS-IP-2025/EGOS-IP-2025-en.pdf

5.2 Reports by associated programmes

5.2.1 International Ocean Carbon Coordination Project (IOCCP)

5.2.1.1 Maciej Telszewski (Director, IOCCP) provided a written report on the activities of the International Ocean Carbon Coordination Project (IOCCP[12]) and its intersection with the SOT. The Team noted that due to the IOC financial crisis, the Project office headquarters was relocated to the Institute of Oceanology of Polish Academy of Sciences (IO PAS) in Sopot, Poland beginning 1 April 2012.

5.2.1.2 The Surface Ocean CO_2 Atlas (SOCAT[13]) project, initiated by the International Ocean Carbon Coordination Project, SOLAS and IMBER in April 2007, has realised the first public version of SOCAT (version 1.5) on 14 September 2011. The latter includes 6.3 million surface water CO_2 measurements from 1851 voyages in the global oceans, including the Arctic Ocean and coastal seas, between 1968 and 2007. An ambitious time table for SOCAT version 2 is being realized with data submission cut-off date on 31 December 2011. Regular (every 1-2 years), future updates to SOCAT are envisaged.

5.2.1.3 The Team noted that the Framework for Ocean Observations (FOO) envisioned a biogeochemical observing panel led by the IOCCP. Specific items relevant for ocean carbon and biogeochemistry science were presented to the Team. These involve active collaboration with other seagoing practitioners. The IOCCP took on some coordination tasks for a wider range of biogeochemical parameters, in particular oxygen and nutrients. The IOCCP feels that it is well placed to incorporate coordination of nutrients and oxygen observations into its mission.

5.2.1.4 The Team noted efforts by IOCCP to coordinate international efforts to document the status and progress of ocean acidification in open-ocean and coastal environments, and to understand its drivers and impacts on marine ecosystems. The IOCCP together with the NOAA Ocean Acidification Program, the Global Ocean Observing System, the Integrated Ocean Observing System, and the University of Washington supported the initial GOA-ON International Workshop (University of Washington, 26-28 June 2012) which proposed an integrated global observing network for both carbon and ocean acidification that addresses the requirements of nations affected by this emerging environmental problem in response to societal needs. The workshop report will provide the strategy for the observing system for review and vetting and hopeful support by the member countries. The second workshop will be held in St. Andrews, Scotland, United Kingdom from 24 to 26 July 2013.

5.2.1.5 The Team recognized that biogeochemical ocean time-series represent one of the most valuable tools scientists have to characterize and quantify ocean fluxes of elements as well as accompanying biogeochemical processes, and understand their links to changing climate.

5.2.1.6 The IOCCP and the Ocean Carbon & Biogeochemistry (OCB[14]) Program convened an international ocean time-series workshop 28-30 November 2012 at the Bermuda Institute for Ocean Sciences (BIOS). With a focus on sampling, standardization, nomenclature and data reporting, and quality assurance and control (QA/QC) protocols, the workshop compared established methods and developed a consensus ranking of methods (optimal/good/acceptable) for each parameter. In the interest of improving internal consistency within individual time-series as well as data inter-comparability across multiple time-series, the workshop highlighted ongoing community inter-comparison activities and devised simple, low-cost experiments to assess the efficacy of current sampling and analytical protocols. Outcome of the workshop is available on the workshop web portal[15] which will be gradually transformed into a web-based global network of

12 http://www.ioccp.org/
13 http://www.socat.info/
14 http://www.us-ocb.org/
15 http://www.whoi.edu/website/TS-workshop/

shipboard biogeochemical time-series that will include detailed information about parameters being measured and methods being used at each time series.

5.2.1.7 A more efficient and better coordinated network of surface ocean carbon observation platforms including voluntary observing ships and research ships remains one of the key objectives for IOCCP. To achieve a sustained, scientifically robust and cost efficient ocean carbon observing system, stronger implementation ties with other global observation programs, such as GOOS, GCOS, DBCP and Argo, are being developed.

5.2.1.8 The IOCCP decided (during its Seventh SSG meeting) to strengthen its potential for coordination in Sensors and Instruments aspects of marine carbon observations, and added a dedicated panel member in the SSG.

5.2.1.9 Regarding SOT-6 action item no. 27[16], the Team noted that the IOCCP SSG members representing the wider marine biogeochemistry observing community recognize that real-time T/S data transfer could help other communities with their data needs. The IOCCP SSG agreed that real-time T/S transmissions could be arranged providing that the interested party(ies) i.e. data users, would support, technically and financially an implementation process. As with many aspects of biogeochemical research, T/S data transmission would have to be supported from research grants and as such transmission is not directly relevant for marine biogeochemistry, one cannot expect that funding agencies would positively consider potential increase.

5.2.2 Shipboard Automated Meteorological and Oceanographic System (SAMOS) Project

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

5.2.2.2 The SAMOS initiative focuses on meteorological and near-surface oceanographic data collected by the scientific instrument system (a SAMOS) permanently installed on individual R/Vs. The SAMOS data centre at the Florida State University (FSU) has recruited 31 U.S.-operated and 3 international R/Vs (up from 26 and 2, respectively, at SOT-VI). Limited recruitment of additional U.S. university-operated vessels is underway through the Rolling Deck to Repository[17] project. SAMOS data are routinely collected and distributed via the web[18].

5.2.2.3 The SAMOS initiative continues routine acquisition and quality control of data from R/Vs operating throughout the world's oceans, including areas well outside normal shipping lanes. All data are provided in "real-time" free of any restrictions or holds via web services. At present, these data are not distributed via the GTS. Although, a draft plan of action was developed between the SAMOS, SOT, and VOSP chairs and the U.S. VOS program manager to place SAMOS data on the GTS, regrettably, little action was possible since the SOT-6 because of continued funding reductions. Mr Smith presented an analysis of data received at the U.S. National Climatic Data Center via the GTS for vessels recruited to SAMOS. The Team requested the U.S. VOS coordinator to contact NOAA and U.S. university research vessels not presently transmitting via GTS to recruit them as VOS (or VOSClim as appropriate) (***action; US VOS; asap***).

5.2.2.4 The Team noted that collecting and updating instrumental metadata for research vessels continues to be a problem. Although initial discussion occurred between the SAMOS chair and the U.S. VOS coordinator, no action has been taken regarding leveraging the port meteorological officer (PMO) network in the U.S. to help with metadata collection during visits to R/Vs participating

16 IOCCP to consider making commitments to permit the transmission of Temperature and Salinity data of IOCCP ships from ship to shore, and requested Maciej Telszewski to bring this information to the IOCCP and provide feedback to the SOT Chair on practical steps that might then be taken to permit this collaboration

17 http://www.rvdata.us

18 http://samos.coaps.fsu.edu

in SAMOS. SAMOS personnel continue to visit recruited R/Vs to collect instrumental metadata and digital photos as resources allow. NOAA continues to be proactive with metadata collection, developing a database to capture instrumental metadata for all NOAA R/Vs and training personnel to routinely update these metadata. A continuing problem on R/Vs is that the crew may record their VOS observation using either the ship's NMS-provided instruments or the SAMOS, and the source instrumentation of the observation is not routinely transmitted with VOS reports.

5.2.2.5 The SAMOS data centre continues to contribute to educational initiatives targeting marine technicians working on R/Vs. In partnership with NOAA's Earth System Research Laboratory, the SAMOS data centre created a professional development short-course for in-service marine technicians that focuses on best practices and techniques for collection of marine meteorological observations on R/Vs to support ocean, atmosphere, and climate research. The short-course has been presented to marine technicians on three occasions since 2011 and course materials for each session are available on the web[19].

5.2.2.6 In support of the JCOMM ETMC, the SAMOS data centre continues to develop a catalogue of digital R/V observations that may not be readily available in delayed-mode climate archives. The most recent version of the catalogue is available in Annex H of the "ICOADS Marine Data Rescue" document available on the web[20]. The SAMOS data centre is also working to provide a subset of SAMOS observations collected since 2005 for inclusion in release 2.6 of the ICOADS. In addition to supporting ETMC, the SAMOS chair is an acting member of the SOT Task Team on Instrument Standards (TT-IS) and the JCOMM Cross-cutting Task Team on the Marine Climate Data System (MCDS).

SAMOS activities relevant to SOOP

5.2.2.7 The Team recalled that in 2009, the SAMOS data centre began routine collection and evaluation of water temperature, conductivity, and salinity data from all recruited vessels equipped with a thermosalinograph (or salinometer). Automated range checks from the GOSUD quality control guide have been implemented and visual quality control is completed for all NOAA vessels. Recent application of these quality controlled water data to validate ocean models has resulted in an increased demand by the research community for quality processed underway ocean observations (i.e., pCO_2, turbidity, fluorescence, dissolved oxygen, chlorophyll, and dissolved oxygen). Providing these values through the SAMOS program would require development and implementation of standardized automated quality control procedures. The Team requested its members as well as SOOPIP members to identify and define a set of standard quality control procedures for underway thermosalinograph (and additional flow through sensor) data (***action; TT-IS & SOOPIP; SOT-8***). As resources allow, the SAMOS data centre would then implement these procedures as part of our routine quality control system.

5.2.3 Global Ocean Ship-Based Hydrographic Investigations Programme (GO-SHIP)

5.2.3.1 Bernadette Sloyan (CSIRO, Australia) presented a report on the Global Ocean Ship-Based Hydrographic Investigations Programme (GO-SHIP), and activities undertaken in 2012 and 2013. The Team noted that GO-SHIP has now completed a global reoccupation of the GO-SHIP hydrographic sections. The global reoccupation was completed in a 10 year time-frame beginning in the Atlantic in 2003 and finishing in 2013 with the completion of the high latitude Southern Ocean Indian section. The international community is now planning the next decadal global repeat.

5.2.3.2 The Team also noted with appreciation that GO-SHIP is also providing financial support to the JCOMMOPS Ship Coordinator's position. The latter, amongst other duties is also acting as SOT Technical Coordinator. Indeed, over the last 3 years, GO-SHIP has demonstrated that without global coordination for planning and implementation of sections, significant gaps and duplications arise, and most sections do not measure the full suite of core variables. The duties of the GO-SHIP

19 http://samos.coaps.fsu.edu/html/mtshortcourse.php
20 http://icoads.noaa.gov/reclaim/pdf/marine-data-rescue.pdf

Coordinator include (i) maintaining regular communication with national points of contacts to keep abreast of developing plans for hydrographic sections; (ii) providing up-to-date information on GO-SHIP voyages activities to CCHDO for update of tables and reference map and GO-SHIP web site; and (iii) liaising with CCHDO and other data repositories to ensure data delivery to data centres.

5.2.3.3 In March-April 2012, the international committee undertook a survey of usage of repeat hydrography observations. The survey was distributed to the GO-SHIP email list and in general there was a reasonable response. While this survey has proven useful, GO-SHIP must improve the program visibility and highlight its importance as a component of the global ocean observing system to maintain national science funding. One way to do this is to track usage of data. It has been suggested to maintain a database of customers (research, operations centres, …) who use the data.

5.2.3.4 The Team noted that priority activities for the GO-SHIP include (i) the planning of the next global occupation of Hydrographic sections, (ii) increasing the visibility of the program, and (iii) tracking data usage and uptake for continued support of research funding.

5.2.4 Group for High-Resolution SST (GHRSST)

5.2.4.1 The Team noted a written report on the activities of the Group for High-Resolution SST (GHRSST[21]) submitted by Dr Gary K Corlett (United Kingdom), GHRSST Project Coordinator. The Team recalled that GHRSST is the international expert group for the provision and application of the highest quality Sea Surface Temperature (SST) data to global user and research communities. GHRSST offers a suite of global high-resolution SST products, operationally, in near-real-time, on a daily basis. To maintain the high quality of the various SST products it is essential that the Group has access to in situ ocean surface data provided by a range of accurate instruments located on diverse platforms, over a wide range of climate conditions. Drifting and moored buoys provide a wealth of surface data, but lack repeated calibration (at least for drifters) and provision of the important metadata required for accurate validation of the GHRSST products. These latter requirements can only be provided by instruments on research vessels and ships of opportunity.

5.2.4.2 The Team noted that the GHRSST Science Team has appointed Dr Helen Beggs (Australia) to be its point of contact with the SOT. Since SOT-6, GHRSST activities relating to ship measurements of SST have been focussed in two areas (i) recommendations for non-radiometric SST measurements; and (ii) standardisation of ship-borne radiometric SST measurements.

5.2.4.3 The Team recalled that it had requested advice on future data transmission resolution for ship measurements. Following feedback from GHRSST in this regard, the Team recommended its members to take into account the following recommendations from GHRSST (***recommendation***):

- Reporting resolution of 0.01K for SST;
- Consider providing non-radiometric SSTs to an accuracy of 0.05K whenever possible and in lieu of engine intake sensors (prone to artificial warming of the measured seawater), encourage commercial vessel owners to install calibrated hull-temperature sensors mounted on the inside of a ship's hull as documented in Beggs et al. (2012);
- For XBT data, the GHRSST is recommending to achieve the following:

XBT Element	***Resolution***	***Accuracy***
Time	5 minutes	5 minutes
Latitude/Longitude	0.005^0	0.005^0
Depth (in top 10 m)	0.1 m	0.5 m
SST	0.01 ^{0}C	0.05^0C

21 https://www.ghrsst.org

5.2.4.4 The Team noted that the provision of reference IR radiometric SSTs has advanced since the last SOT meeting through the establishment of the international network for ship-borne IR radiometry meant for providing standardised protocols and procedures for taking IR radiometric measurements at sea. GHRSST is developing a guide on best practices (radiometer design, calibration, mounting on ships, uncertainty derivation, intercomparison, CF compliant NetCDF data format), which will be available via the project website[22] in due course.

5.2.4.5 In addition to reference quality measurements of skin SST, with quantified uncertainties per measurement, GHRSST is also developing additional capability for existing radiometers that could potentially provide marine air temperature at an equivalent level of accuracy to SST. This capability would lead to an accurate measurement of air-sea temperature difference using a single sensor with SI-traceable calibration.

5.2.4.6 The Team noted the recommendations from GHRSST to the fourth Session of the JCOMM Observations Coordination Group (OCG-4, Hobart, Australia, 18-20 April 2011) regarding the provision of in situ observations to GHRSST, and invited its members to take them into account (***action; SOT members; ongoing***). These are reproduced in Annex XVII.

5.2.4.7 Regarding SOT-6 Action No. 39, the Team noted that the GHRSST supported the formation of an *ad hoc* GHRSST/SOT working group to better define requirements for measurements of SST and ancillary variables from ships, and to identify new opportunities that may assist with a more uniform coverage of the global oceans. GHRSST proposed Helen Beggs (Bureau of Meteorology, Australia), Werenfrid Wimmer (University of Southampton, UK) and Viva Banzon (NOAA NCDC, USA) as members of the *ad hoc* working group. The Team nominated Mr Graeme Ball (Australia, representing the VOS) and Loïc Petit de la Villeon (France, to represent the SOOP) to be part of the working group as SOT representatives.

5.2.4.8 Mr. Shawn Smith informed the Team that the Atmospheric Radiation Measurement (ARM) program in the U.S. is presently operating a suite of radiation and atmospheric sensors on the 272 m container vessel *Spirit.* The *Spirit* is making regular transects between Los Angeles and Hawaii. The present sensor deployment will run from October 2012 – September 2013. Of interest to SOT would be the efforts to measure radiometric SST and a range of cloud parameters using automated remote sensing systems on a container vessel. More details can be found on the web[23]. Mr. Smith communicated with Dr. R. Michael Reynolds (USA) who is supporting the radiometric SST on the Spirit and Dr. Reynolds noted that the Spirit is not equipped with hull contact or intake SST. However, Dr. Reynolds noted that they have completed comparisons between radiometric SST and other in-situ SST methods on other vessels and is willing to share those results with SOT. Mr. Smith will forward Dr. Reynolds contact details to the SOT chair **(*action; S. Smith; May 2013*)**. The working group on GHRSST is asked to contact Dr. Reynolds as needed to obtain information relevant to GHRSST activities **(*action; SOT-GHRSST WG; TBD*)**.

5.2.4.9 The Team noted that guidance on the siting of radiometers on commercial vessels is provided in the best practices document “Guidance for the use of IR radiometers in the field for derivation of skin sea surface temperature”, available from the web[24]. Guidance on best practises for non–radiometric ship-based SST measurements is provided in (Beggs et al., 2012).

5.2.4.10 The Panel recommended the continuation of support of other programmes such as GHRSST, pCO2, and SAMOS.

5.2.5 World Ocean Council

5.2.5.1 Mr Holthus, CEO, World Ocean council (WOC) reported via teleconference on the activities of the WOC since SOT-6. He was joined in the teleconference by Eric Lindstrom (USA)

22 http://www.issibern.ch/teams/satradio/
23 http://www.bnl.gov/envsci/arm/magic/
24 http://www.issibern.ch/teams/satradio/

who also reported on the outcome of the WOC Sustainable Ocean Summit (22-24 April, Washington DC), and side meetings. Mr Holthus recalled that the WOC is the international, cross-sectoral business leadership alliance on "Corporate Ocean Responsibility". The WOC brings together a range of ocean industries, e.g. shipping, oil/gas, fisheries, aquaculture, renewable energy, tourism, insurance, etc. to collaborate in working towards a shared goal of healthy and productive seas and their sustainable use and stewardship by a responsible ocean business community.

5.2.5.2 Since the last SOT meeting, the WOC has followed through on efforts to catalyze an international, multi-sectoral system for engaging ocean industries in coordinated contribution to data collecting, sharing and use. As agreed at the last SOT, the WOC has acted as an advocate for JCOMM and its sampling programmes to ocean industries.

5.2.5.3 The WOC has initiated development of the "Smart Ocean/Smart Industries" (SO/SI) program and working group, co-chaired by Maersk, Marinexplore and a major oil company. In partnership with IOC, the WOC convened the first SO/SI workshop at the IOC in Paris on 12-13 December 2011. This brought together representatives from shipping, oil and gas, marine technology and other sectors to meet with scientists, government agencies, and inter-governmental organizations, including JCOMM. The report is available on the web[25]. To foster and coordinate progress towards the goal of scaling up voluntary observations by industry, the workshop proposed creating a SO/SI Steering Committee consisting of both the industry leaders interested in advancing observations from ships and platforms and key scientific, government and intergovernmental organizations engaged in observation efforts. The WOC is moving forward in consultation with JCOMM, IOC and the GOOS Committee Co-chairs to create the SO/SI Steering Committee.

5.2.5.4 The WOC SO/SI seeks to create the institutional basis, continuity and supporting secretariat for advancing a coordinated, global approach to observations. This will learn from/build on ships of opportunity programs and create a program to engage a range of industries in ocean observations at a whole new scale, i.e. major fleets of vessels and offshore platforms participating in long term, integrated data collection.

5.2.5.5 The SO/SI seeks to expand voluntary observations to more than commercial shipping, to other kinds of vessels as well as a range of types of platforms and infrastructure, and beyond water column characteristics to a wide range of ocean and climate parameters. The WOC SO/SI seeks to provide a comprehensive framework for voluntary observations by industry that can grow over the years.

5.2.5.6 The scope of the WOC SO/SI framework creates considerable opportunities for synergies and economies of scale through a cost effective, efficient coordinating platform for scaling up, optimizing and building on existing programs as well as fostering new ones. There are also a growing number of marine technology firms that are joining the WOC, and many more that are interested in the SO/SI, which bodes well for collaborative efforts to develop cost-effective.

5.2.5.7 The Team agreed with the following recommendations and actions:

(i) The Team invited its members to consider nominating themselves to GOOS as prospective members of the WOC joint industry/science SO/SI Steering Committee in order to ensure that there is adequate participation from governments and international agencies in this committee (***action; SOT members; asap***);

(ii) The Team requested the Task Team on VOS Recruitment and Programme Promotion (TT-VRPP) to work with the WOC to develop a list of key companies involved in voluntary observations (***action; TT-VRPP; Jul. 2013***);

25 http://www.oceancouncil.org/site/smart_ocean.php

(iii) The Team invited the WOC to work with the SOT to help recruit ships for participating in the VOS, SOOP, or ASAP, and to liaise with the Chair of the TT-VRPP in this regard (***action; WOC; ongoing***);

(iv) The Team invited the WOC to assist the Task Team on Instrument Standards (TT-IS) in order to facilitate the design of ships, other vessels and other offshore facilities (e.g. aquaculture, wind farms) that would make the installation of marine meteorological and oceanographic instrumentation easier; it invited the WOC to facilitate acceptance of generic ship design by shipping companies so that they can assist in this regard through classification societies and IMO (***action; WOC; SOT-8***);

(v) The Team invited the WOC to assist the Task Team on Satellite Telecommunications Systems (TT-Satcom) to explore how to best achieve cost effectiveness and cost efficiencies for voluntary observation and data telecommunication costs (***action; WOC; SOT-8***).

5.2.5.8 The Team agreed to assist the WOC by providing input through the SOT TC for the preparation of inventories of observation programmes and instrument types (***action; SOT TC; SOT-8***).

5.2.6 Scientific Committee on Oceanic Research (SCOR) Working Group 133 "OceanScope"

5.2.6.1 Tom Rossby (USA) presented a report on the recent activities of the Scientific Committee on Oceanic Research (SCOR) Working Group 133 "OceanScope" of the Scientific Committee on Oceanic Research (SCOR) and the International Association for the Physical Sciences of the Oceans (IAPSO). He recalled the OceanScope vision[26]:

"In partnership with the maritime industries we will develop an integrated approach to observation of the global ocean on a regular and long-term basis as an essential component of, and contribution to, the Global Ocean Observing System (GOOS). This activity, 'OceanScope' will equip commercial ships with fully automated unattended instrumentation to accurately measure and report upon the currents and the physical, chemical and biological characteristics of the water column throughout the world ocean. The freely distributed data generated will be a fundamental resource for understanding the climatic state and health of our planet."

5.2.6.2 Dr Rossby presented the main outlines of the OceanScope concept, and the opportunities it opens up in terms of observation, scalability, and innovation. The Team noted that the initial phase of OceanScope would focus on the North Atlantic for several reasons including already established activities, the strong call for improved observation, and the willingness of industry to assist in developing this capability. The Team further noted that discussions are underway to determine how best to implement an industry-based ocean monitoring capability.

5.2.6.3 The Team agreed that there should be a concerted approach with the shipping industry between the various groups involved in the making of marine meteorological and oceanographic observations from ships. Through this approach, one could seek either new specific regulations through the International Maritime Organization (IMO), or the development of best practices with the representatives of the maritime industry such as the International Chamber of Shipping (ICS). The Team noted that the World Ocean Council (WOC) could be a good mechanism to realize this concerted approach.

26 From SCOR/IAPSO report: http://www.scor-int.org/Publications/OceanScope_Final_report.pdf

5.2.6.4 The Panel recommended that SOOPIP will partner with OceanScope to support OceanScope activities, including to hold an Oleander workshop.

5.2.7 Ferrybox

5.2.7.1 The Team reviewed a written report from Wilhelm Petersen (Centre for Materials and Coastal Research – HZG, Germany) on the status of the Ferrybox project and recent achievements.

5.2.7.2 The Team recalled that the FerryBox[27] concept has been developed as a partnership between scientists and the companies operating ferries in waters around the world. Many of the systems have been developed to support the requirements for both scientific and marine management data. The Team noted that:

- FerryBox systems reached a state of maturity;
- FerryBox systems are cost-effective monitoring tools for surface waters with high resolution in space and time;
- New sensor developments can be easily implemented allowing the extension to more biogeochemical related parameters;
- FerryBox systems can play a role in the implementation of the European Union Marine Strategy Framework Directive (MSFD);
- Within Europe all FerryBox data (at least Temperature and Salinity) are centrally stored and are available in near-real time (MyOcean and EMODnet);
- Sustainable funding is still an issue: most activities are temporary activities mainly on the basis of research money.

5.2.7.3 The Team agreed with the following recommendations:

(i) Shipping and other companies are encouraged to support FerryBox activities as an active contribution to protect the marine environment;
(ii) The installation of FerryBox systems should be taken into account together with other systems when discussing generic ship design for building new merchant ships ready for making marine meteorological and oceanographic observations (see also agenda items 6.3 and 6.5);
(iii) Fostering the collaboration between SOOPIP (with regard to XBT/XCTD) and FerryBox activities on the same vessels enabling combination of high resolution surface oceanographic measurement combined with Temperature and Salinity profiles, provided this is for recommended XBT transects on ships not already equipped with TSG;
(iv) Encouraging the collaboration between carbon ocean research groups and FerryBox activities; and
(v) Promoting sustainable funding for long-term observations.

5.2.8 Other associated programmes

5.2.8.1 OceanoScientific® Programme

5.2.8.1.1 The SOT TC reported briefly on the status of the *OceanoScientific® Programme*. The aim of the programme is to collect and transmit scientific data from the ocean-atmosphere interface from aboard sailing vessels. The *OceanoScientific®* System (OSCS) has been designed in cooperation with French institutions such as IFREMER and Météo France, and allows for the reporting of at least twelve marine meteorological and oceanographic variables. Several test campaigns in the Atlantic Ocean, the North Sea, and the Arctic have been organized since 2009. A new test campaign for measurements between Cape Horn and Cape of Good Hope aboard the

27 http://www.ferrybox.org

three-masted barque EUROPA has started in 2013. The OSC Systems is planned to be used on all types of vessels over fifteen meters long. As of the southern hemisphere summer of 2013/2014, scientific expeditions carrying the OSCS will be carried out every year between Cape Town around Antarctica.

6. RECOMMENDATIONS BY THE TASK TEAMS

6.1 Task Team on Satellite Communication Systems

(the Terms of Reference & membership of the Task Team are detailed on the JCOMM web site[28])

6.1.1 The Chairperson of the SOT Task Team on Satellite Communication Systems (TT-SatCom), Mr Pierre Blouch (Météo-France), reported on the activities of the Task Team during the last intersessional period and follow-up actions from SOT-6.

6.1.2 The Team noted that a comprehensive statistics scheme was established to monitor the use of the various satellite data telecommunications systems used by the VOS to report their observations ashore, thanks to the prST communication types entered into Pub47 by VOS operators (SOT-6 Action 39). Results showed that Iridium SBD is now the main communication system used by VOS (about 25% of all observation reports in 2012). By contrast, at least 36% of visual observations were sent through Inmarsat-C “Code 41” during the same year (15% of all ship observations).

6.1.3 The TT-SatCom was informed of the future withdrawal of the GMDSS Inmarsat-C terminal onboard ships. Data safety services will eventually switch to new FleetBroadband terminals. This, development combined with the obsolescence of FM13 messages, implies that the procedure presently used to report observations from conventional VOS must be totally revised. The Team agreed that the termination of the “Code 41” service could have negative impacts on VOS programs in some countries. The Team noted that contacts with IMSO and Inmarsat have been initiated in this regard.

6.1.4 Mr Blouch presented the recent improvements made on E-SURFMAR binary ship-to-shore dataformats. Since SOT-6, modifications have been brought to dataformat #100 to take into account requirements from the JCOMM Expert Team on Marine Climatology (DMPA/ETMC) and to allow the transmission of oceanographic measurements in real time. E-SURFMAR decided to use this dataformat for Shipborne Automated Weather Stations (S-AWS) exclusively and to design a new dataformat (#101) for conventional VOS.

6.1.5 E-SURFMAR dataformats are not restricted to a given communication system. They represent a compromise between FM13-SHIP messages which cannot be used for many parameters now required by users and FM94-BUFR messages which are not compressed enough (communications would be too expensive).

6.1.6 The meeting made the following recommendations:

(i) The TT-SatCom Term of Reference number 2 should be removed as the DBCP Iridium-PP has ended;

(ii) A new term of reference should be inserted with regards to the design of a new communication system for conventional VOS based on their future FleetBroadband GMDSS terminals to replace Inmarsat-C Code 41;

(iii) VOS operators are requested to consider adopting the E-SURFMAR dataformat for their S-AWS fleets or to propose alternative formats if necessary;

28 http://www.jcomm.info/sot-tt-satcom

(iv) VOS operators and PMOs should carefully enter information in the prST field in their Pub47 metadata;

(v) VOS operators are requested to invite shipmasters (and ship owners) to report their observations by emails or web if they wish (if observations can be sent immediately).

6.1.7 The meeting decided on the following action items:

(i) TT-SatCom to closely work with Inmarsat Safety Services team and IMSO to propose a new method for conventional VOS to report their observations ashore using the GMDSS FleetBroadband terminals (***action; TT-SatCom; SOT-8***);

(ii) E-SURFMAR to closely work with DMPA/ETMC to define a binary ship-to-shore dataformat (#101) to be used by conventional VOS in the future (***action; E-SURFMAR; end 2013***);

(iii) TT-SatCom to continue to monitor the ways used by VOS and SOOP ships to report their observations ashore and to report the results during SOT sessions (***action; TT-SatCom; SOT-8***).

6.2 Task Team on ASAP

(the Terms of Reference & membership of the Task Team are detailed on the JCOMM web site[29])

6.2.1 The SOT Task Team Chairperson on ASAP, Mr Rudolf Krockauer (DWD, Germany), reported on the activities of the Task Team during the last intersessional period and follow-up actions from SOT-6. His report focused on the EUMETNET[30] EIG[31] ASAP (E-ASAP) as E-ASAP is the only programme worldwide which is based on a fleet of commercial vessels (except two research ships and one hospital ship).

6.2.2 ASAP monitoring issues are discussed under the VOS Panel session in agenda item 9.1.5. ASAP Trust Fund issues are discussed under agenda item 13.3.

6.2.3 The meeting made the following recommendations:

(i) ASAP operators are invited to address and fix the position errors that sometimes appear in ASAP reports;
(ii) Other operators than E-ASAP are invited to consider operating ASAP vessels in other areas that the North Atlantic Ocean.

6.3 Task Team on VOS Recruitment and Programme Promotion

(the Terms of Reference & membership of the Task Team are detailed on the JCOMM web site[32])

6.3.1 The Chair of the Task Team on VOS Recruitment and Programme Promotion, Ms Sarah North (United Kingdom) reported on the activities of the Task Team during the last inter-sessional period.

6.3.2 The meeting made the following recommendations:

29 http://www.jcomm.info/sot-tt-asap
30 EUMETNET EIG is the Grouping of European Meteorological Services. E-SURFMAR (Surface Marine Operational Service) and E-ASAP are two operational services of the EUMETNET Observation Programme. Although participating in E-ASAP is mandatory, nineteen EUMETNET Members only are participating in E-SURFMAR which is optional. E-SURFMAR concerns the European VOS and Data Buoys.
31 Economic Interest Grouping
32 http://www.jcomm.info/tt-vrpp

(i) That the Terms of Reference (no 7) of the Task Team should be amended to read

'*Develop a new survey/questionnaire directed at the VOS observers and shipowners with a view to assessing the performance of VOS Scheme and identifying issues that need to be addressed by the SOT. Review proposed content of the 2013 Marine Meteorological Monitoring Survey, and propose amendments as necessary'.*

(ii) the Terms of Reference (no 3) of the Task Team should be amended to read

'Progress the generic pre-installation design recommendations with a view to developing 'best practices' guidance that can be used by shipowners when ordering new ships, liaising with the ICS, WOC, IMO, WMO Secretariat, IACS etc., as appropriate'.

(iii) That Port Met Officers should help to ensure that the 2013 Marine Meteorological Monitoring Survey is widely distributed to observing ships to ensure a representative response from the VOS fleets

(iv) That the VOS website should be the main access point for newsworthy articles and should include a link to the articles maintained on the E-SURFMAR website

(v) That SOT should approve the proposed content for the revised VOS brochure

(vi) That the SOT TC should be responsible for ensuring that the VOS Brochure is maintained up to date in future , acting in liaison with the VRPP Task Team

(vii) That the final revised VOS brochure should be circulated to the PMO, VOS and SOT mailing lists in pdf format, with a recommendation that it should replace any existing copies

(viii) That a new VOS Poster should be developed

(ix) That the VOSClim DAC website should in future focus solely on providing access to the VOSClim data sets, as well as photographs of all VOSClim vessels and certificate presentations.

(x) The VOS website should in future provide the primary access point for information related to VOSClim Class Ships

(xi) That the VOSClim ship list currently held on the DAC website should be discontinued and that in future the E-SURFMAR metadata database should provide the main repository for active and inactive VOSClim ships

(xii) That the JCOMM Catalogue of Practices and Standards[33] should be used by the SOT to determine which JCOMM Publications need to be reviewed to ensure that they are up to date.

(xiii) The Team to approve a change to the membership of the Task Team to:

Add

- Ms Annina Kroll (Germany)
- Ms Paula Rychtar (USA)

Remove

33 http://bestpractice.iode.org/

- Mr Volker Weidner(Germany)
- Ms Julie Fletcher (New Zealand)

6.3.3 The meeting decided on the following action items:

(i) The Chair of the Task Team to liaise with the ETMSS Secretariat and keep the Task Team informed of relevant developments concerning the 2013 MMM Survey (***action; TT-VRPP Chair and WMO/ETMSS Secretariat; SOT-8***);

(ii) The Task Team to draft a new survey/questionnaire directed at the VOS observers and shipowners with a view to assessing the performance of VOS Scheme for (***action; TT- VRPP Chair; SOT-8***);

(iii) The SOT Chair to include a link to the E-SURFMAR articles on the VOS website (***action; SOT Chair; asap***);

(iv) The US VOS Focal Point to consider the potential for widening the scope of the Mariners Weather Log to encompass international VOS activities (***action; US Focal Point; SOT-8***)**;**

(v) VOS Focal Points and PMOs are encouraged to submit suitable newsworthy articles, and PMOs are encouraged to make suitable copies available to visiting VOS (***action; VOS Focal Points; ongoing***);

(vi) SOT TC to provide the SOT Chair with updated JCOMMOPS global network maps for inclusion in the SOT recruitment presentations (***action; SOT TC; asap***);

(vii) The SOT Chair to update the SOT recruitment presentation on the VOS website when a list of the required changes is available. (***action; SOT Chair; asap***);

(viii) Task Team Members to propose amendments to the SOT recruitment presentation and to supply suitable new digital images for inclusion in the presentation. (***action; TT –VRPP members; asap***);

(ix) SOT TC to undertake the final editorial review of the VOS Brochure in liaison with the Task Team (***action; SOT TC; end 2013***);

(x) The Chair of the Task Team to circulate the final revised brochure to the PMO, VOS and SOT mailing lists (in pdf format) and to KNMI with a view to inclusion in the TurboWin program and AMVERSEAS. (***action; TT –VRPP Chair; Jan 2014***);

(xi) The WMO Secretariat and SOT Chair to consider whether funding could be made available to publish hardcopies of the VOS Brochure (***action; WMO Secretariat & SOT Chair; end 2013***);

(xii) E-SURFMAR to investigate the possibility of recording the issue of SOT Certificates in the E-SURFMAR database (***action; E-SURFMAR; end 2013***);

(xiii) VRPP Chair and SOT Chair to review the content of the Quick Reference Guides and to send copies of the revised text to the Task Team for approval (***action VRPP Chair and SOT Chair; end 2013***);

(xiv) VRPP Chair to prepare an initial draft of a VOS Poster for circulation to the Task Team **(*action; VRPP Chair; end 2013***);

(xv) Task Team to investigate the potential of using social media sites to promote the VOS with a view to making future recommendations to SOT (***action; VRPP Task Team; SOT-8***);

(xvi) Task Team to investigate the potential for using video for promoting the VOS and for training observers (***action; VRPP Task Team; SOT-8***);

(xvii) The Team requested the Task Team to assist on how to progress the Generic Design Recommendations in the light of recent developments e.g. discussions with ICS and WOC initiatives (see agenda item 5.2.5) (***action; TT-VRPP & WMO Secretariat; SOT-7***);

(xviii) SCOR to keep the Task Team informed of any discussions they might have with ICS or the marine industries that impact on the design requirements (***action; SCOR; SOT-8***);

(xix) ICOADS, in liaison with the VOSClim DAC, to make the delayed mode VOSClim data and call sign fully available in ICOADS. (***action; DAC and ICOADS; asap***);

(xx) WMO Secretariat to forward the approved VOSClim certificate to the SOT Chair for posting on the VOS website and subsequent advice to the SOT, PMO and VOS mailing lists (***action; WMO Secretariat; asap***);

(xxi) The VOSClim DAC to review the content of the DAC website in view of decisions taken by the Task Team (***action; VOSClim DAC; end 2013***);

(xxii) SOT TC to remove the VOSClim mailing list from the JCOMMOPS website (***action; SOT TC; asap***);

(xxiii) SOT Chair to undertake minor revision to the VOS Framework Document so that it includes links to latest JCOMMOPS global maps and information on VOS numbers (***action; SOT Chair; end 2013***);

(xxiv) SOT Chair to add links to the WMO Publications listed in this report to the VOS Website (***action: SOT Chair; end 2013***);

(xxv) DAC to remove the project Ship List from the DAC website (***action; DAC; April 2014***);

(xxvi) VRPP Chair to send email to PMO and VOS mailing lists to advise that in future any changes to their VOSClim fleets should be made to their WMO Pub 47 lists (by submission to WMO or by updating E-SURFMAR Metadata database). VOSClim Ship operators to continue to separately notify the DAC of such changes until April 2014 (***action; VRPP Chair; Apr. 2014***);

(xxvii) The Team concurred on the need to convene another international PMO Workshop and requested the Secretariat and the SOT Chair investigate feasibility and possibly to take steps for organizing the Fifth PMO workshop in Chile in 2014 (***action; WMO Secretariat & SOT Chair; SOT-8***). In light of the likely limited financial resources to be made available by the Secretariat in support of the event, the Team further requested its members to take steps to assure that financial assistance for the participation of their PMOs at the workshop will be provided from national sources (***action; SOT members; 2014***);

(xxviii) The Team agreed that there was value of arranging a shipping industry forum to be held in conjunction with the next SOT-8 session, and requested the

Secretariat in liaison with the SOT Chair to investigate feasibility and possibly proceed in this regard (***action; SOT Chair & Secretariat; SOT-8***);

(xxix) Mr Shawn Smith offered to present a poster at the next Oceanscience meeting in 2014 (***action; S. Smith; 2014***).

6.4 Task Team on Metadata for WMO-No. 47

(the Terms of Reference & membership of the Task Team are detailed on the JCOMM web site[34])

6.4.1 The Chair of the Task Team on Metadata for WMO Publication No. 47 (TT-Pub47), Mr Graeme Ball (BOM, Australia), reported on the activities of the Task Team during the last intersessional period and follow-up actions from SOT-6.

6.4.2 The meeting made the following recommendations:

(i) The Team to endorse the new metadata element **sstP** – Sea Surface Temperature reporting practice. The element will share the existing Code Table 2003 with **tscale**;

(ii) The Team to endorse the new metadata element **humC** - Last calibration date of the electronic humidity sensor;

(iii) The Team to endorse changing the plain language fields of **logE** (name and version of the electronic logbook software), **awsP** (name and version of the AWS processing software) and **awsC** (name and version of the AWS data entry console software) to Code Tables with associated footnotes;

(iv) Members are encouraged to use the descriptors in the non-mandatory lists maintained at E-SURFMAR for **logE**, **awsP** and **awsC** until such time that these elements are officially changed to Code Tables;

(v) The Team to approve the addition of new elements to Code Table 1901 – Method of obtaining Sea Surface Temperature:

TSG - Thermosalinograph or thermosalinometer,
XBT - Expendable bathythermograph and
RDIT - Remote Digital Immersion thermometer;

(vi) VOS Program Managers to actively seek to recruit ships that regularly report their BBXX on the GTS that are not already members of a national VOS fleet or self-recruited as an Ancillary VOS vessel;

(vii) The Secretariat to remind VOS Focal Points, national VOS Program Managers and Port Meteorological Officers to provide additional information as a footnote whenever OT (Other) is selected from a Pub47 Code Table;

(viii) The Team to approve a change to the membership of the Task Team to:
Add:
- Dr David Berry (United Kingdom)

6.4.3 The meeting decided on the following action items:

(i) The Task Team to submit a proposal to JCOMM-5 (later than SOT-8) of recommended changes affecting the structure of WMO No. 47 (***action; TT-Pub47; 2016***);

34 http://www.jcomm.info/sot-tt-pub47

(ii) The Task Team to update the Pub47 XML Generator Tool to Pub47 version 04 specifications (***action; TT-Pub47; 1 June 2013***);

(iii) E-SURFMAR to provide VOS Program Managers with the list of ships that regularly report on the GTS but are not members of a national VOS Fleet or self-recruited as an Ancillary VOS vessel (***action: E-SURFMAR; 1 June 2013***);

(iv) E-SURFMAR to maintain the non-mandatory list of descriptors for logE, awsP and awsC, and to make the location of these list available to VOS Focal Points and VOS Program Managers (***action: E-SURFMAR; 1 June 2013***).

6.5 Task Team on Instrument Standards

(the Terms of Reference & membership of the Task Team are detailed on the JCOMM web site[35])

6.5.1 The Chair of the Task Team on Instrument Standards (TT-IS), Mr Henry Kleta (DWD, Germany), reported on the activities of the Task Team during the last intersessional period and follow-up actions from SOT-6.

6.5.2 The Team noted the following achievements of the Task Team since SOT-6:

- The TT-IS has compiled 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; and

- Relevant sections of the WMO No. 8 Publication (CIMO Guide) have been reviewed by the Task Team.

6.5.3 Regarding the ToR No. 3 for the TT-IS to prepare a JCOMM Technical Report containing this information, to be made widely available through relevant web sites (JCOMM, JCOMMOPS, VOS, DBCP, SOOP, and SOT), the Team noted that it would be more feasible to create an online version only, that can be changed easier and quicker.

6.5.4 The Team noted that a real intercomparison of AWS systems (systems operating side by side) is not feasible.

6.5.5 The meeting made the following recommendations:

(i) The Team recommends that instead of preparing a JCOMM Technical Report 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, to prepare dedicated WebPages on the JCOMMOPS website listing such procedures; and
(ii) Listing instrumentation used in the national reports for the SOT annual report.

6.5.6 The meeting decided on the following action items:

(i) The SOT Chair to update the templates for national reports for the SOT annual report to allow the reporting of instrumentation (***action; SOT Chair; end 2013***);
(ii) The TT-IS to complete the new JCOMM TR No. 63, Recommended Algorithms for the computation of marine meteorological variables (***action; TT-IS; end 2013***); and
(iii) The TT-IS to complete the review of relevant sections of the WMO No. 8 Guide, and to submit those changes to CIMO as needed (***action; TT-IS & SOT Chair; asap***).

35 http://www.jcomm.info/sot-tt-is

6.6 Task Team on Call Sign Masking and Encoding

(the Terms of Reference & membership of the Task Team are detailed on the JCOMM web site[36])

6.6.1 The Chair of the Task Team on Call Sign Masking and Encoding, Mr Graeme Ball (BOM, Australia) reported on the activities of the Task Team during the last intersessional period and follow-up actions from SOT-6.

6.6.2 The meeting made the following recommendations:

(i) The Team to approve a change to the membership of the Task Team to:

Remove:

- Ms Julie Fletcher (New Zealand)
- Mr Mathieu Belbeoch (JCOMMOPS)
- DBCP/SOT Technical Coordinator

Add:

- SOT Technical Coordinator (JCOMMOPS)
- Dr David Berry (United Kingdom)
- Security Adviser (TBA);
- Mr Chris Marshall.

(ii) Members are encouraged to maintain the MASK details of their ships in the E-SURFMAR VOS Metadata Database as an alternative to submitting their quarterly advices to JCOMMOPS;

(iii) E-SURFMAR to continue to provide JCOMMOPS with a list of current **MASK** details on a daily basis.

6.6.3 The meeting discussed the draft proposal detailed in Annex XIX, which outlines the **ENCODE** solution, including the development of encryption and decryption keys, on the basis of techniques based on symmetric (secret-key) algorithms, as well as the proposed governance for the management of encryption methods and keys. The meeting invited Members implementing SHIP masking schemes to review the proposed governance for the management of encryption keys, and provide feedback to the TT-Masking (***action; Japan, USA, Canada; 15 May 2013***). The Team agreed with the algorithms and BUFR descriptors proposed for the masking of ship's identification, and requested the TT-Masking to submit this part of the proposal to the CBS Inter-Programme Expert Team on Data Representation Maintenance and Monitoring (IPET-DRMM) through the Task Team on Table Driven Codes (TT-TDC) (***action; TT-Masking; asap***).

6.6.4 The Team requested the ETMC to provide guidance regarding the masking of delayed mode data with the view to archive the data with the real callsign (***action; ETMC; end 2013***).

6.6.5 Following the discussion on progress with ship call-sign masking and encoding schemes, David Meldrum (OPA vice chair) reminded the meeting that much ship data was in fact freely available in the public domain, and that open access to these data would not be restricted by the proposed schemes. In particular, Mr Meldrum noted the following Internet resources, all of which had come on line since the initial request by CBS to implement call-sign security:

i) Open access to raw observational data circulating on the GTS. A number of NMHSs allowed these data to be downloaded in real time from their telecommunications gateways. While this was in line with WMO Resolution 40 on free and open exchange of data, it was a relatively new departure and allowed ship tracks to be plotted without difficulty;

36 http://www.jcomm.info/sot-tt-masking

ii) Public websites displaying data originating from the GTS. Open access to raw GTS data had encouraged the emergence of sites[37] that plotted and listed these data, alongside the ship's call-sign;

iii) The increasing rollout of the ship Automatic Identification System (AIS). This system, initially designed for coastal traffic management and navigational safety, obligated ships above 300 GRT to carry an AIS transponder. Numerous websites[38] plotted global AIS data, allowing vessels to be tracked, their call-signs displayed, and voyage data inspected and downloaded (see Figure 1 below);

iv) The emergence of Satellite AIS (S-AIS). Although never envisaged initially for AIS, a number of satellite systems were now in place or being developed to interrogate vessels' AIS transponders in the open ocean. Subscription services were now available that allowed near-real-time access to these data.

6.6.6 In consequence, the view might be taken that, realistically, the call-sign masking and encoding schemes were now more or less superfluous, at least from the point of view of ship security.

6.6.7 The meeting agreed that, while it was bound by previous decisions of the WMO Executive Council to proceed with the schemes for the time being, it should take stock of the current situation with regard to the increasing amount of ship data now available publicly, and report this situation back to CBS, via the OCG, for a review of its decisions in this regard (***action; SOT Chair; Sep. 2013***).

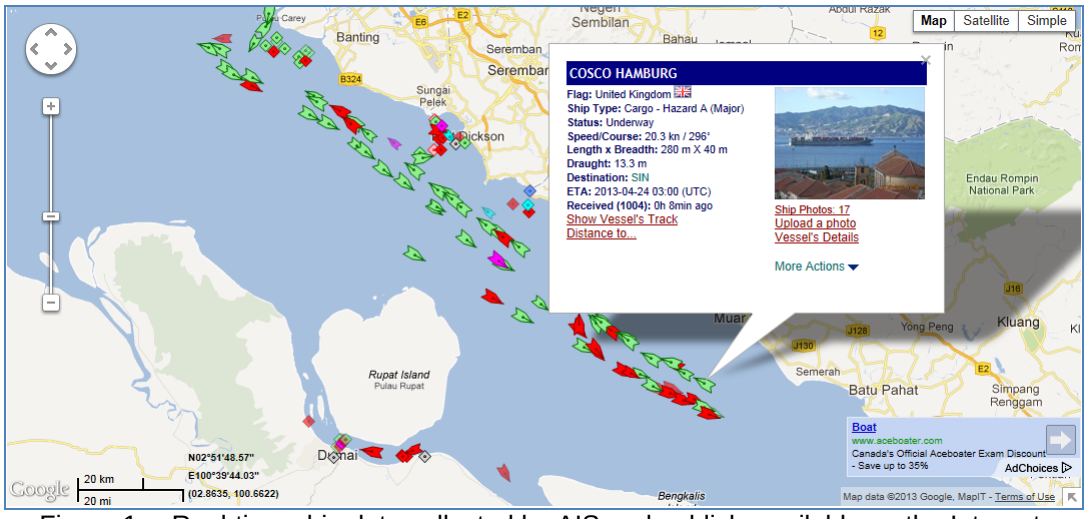


Figure 1: Real-time ship data collected by AIS and publicly available on the Internet.

6.6.8 Meanwhile, the Team therefore agreed on the following action items:

(i) The Secretariat to contact the International Chamber of Shipping and check whether the reporting of un-masked VOS observations via the GTS (with some of those positions ending-up on public websites) was still an issue (***action; Secretariat; SOT-8***);

(ii) Japan was invited to investigate (i) whether the positions of their recruited VOS are also publicly available through AIS or LRIT reporting; and (ii) with the shipping companies whether the reporting of un-masked VOS observations via the GTS continues to be an issue (***action; Japan; SOT-8***); and

(iii) USA to investigate whether there are additional issues from their perspective (***action; USA; SOT-8***).

37 e.g. www.sailwx.info
38 e.g. www.marinetraffic.com

6.7 Establishment of new Task Teams

6.7.1 The Team discussed opportunities to establish new task teams, and agreed on the following:

- To include the following working groups as part of the SOT Task Team on Instrument Standards (TT-IS):
  - A Working Group on Publications to be chaired by Henry Kleta (Germany);
  - A Working Group on Automatic Weather Stations to be chaired by Henry Kleta, and include Sarah North (UK), Shawn Smith (USA), Paula Rychtar (USA), and a representative of Canada (TBD) in its membership; and
  - A Working Group on New Technology to be chaired by Shawn Smith (USA).
- To establish a new SOT Task Team on Training (TT-Training) with Paula Rychtar (USA) as Chair, and Graeme Ball (Australia), Sarah North (UK), Francis Bringas (USA), and Ben Lemon (Canada) as members.

6.8 The updated Terms of Reference and membership of the SOT Task Teams, together with those of the new Task Team on Training are reflected in Annex V.

7. EIGHTH SESSION OF THE VOS PANEL (VOSP-8)

7.1 Programme review

7.1.1 Report by the VOSP Chairperson

7.1.1.1 The Voluntary Observing Ship (VOS) Panel (VOSP) Chairperson, Ms Sarah North (United Kingdom), opened the eighth Session of the VOS Panel. She reported on activities undertaken during the last intersessional period by her predecessor, Ms Julie Fletcher (New Zealand) during the period April 2011 to September 2012, and by herself during the period January 2013 to April 2013.

7.1.1.2. Ms North commented that the VOS scheme was going through a period of considerable change with several VOS operators deciding to substantially increase the level of automation of their ships and, in parallel, reducing the size of their manually reporting fleets. This would inevitably have an impact and the number of manually reporting ships actively participating in the Scheme was already in decline. Whilst the quality and number of observations was set to rise with the automatic systems transmitting hourly data, the range of parameters was likely to decrease with fewer observers reporting the traditional visual elements.

7.1.1.3. The financial pressures being experienced by National Meteorological Services in recent years were also having an impact on the ability to fully resource and re-supply observing ships with the instruments necessary to make and transmit their observations. On a cost per observation basis it could be substantially cheaper and cost effective to maintain an automatic fleet.

7.1.1.4. As a consequence of such changes it was also likely that the traditional Port Meteorological Officers role would change to reflect the growing need for technical skills to maintain and repair automated systems. This in turn would have an impact on the availability of traditional PMOs to inspect ships recruited by overseas VOS operators.

7.1.1.5. Despite these pressures the VOSP Chair reported that the availability of pressure observations continued to rise year on year. Similarly the number of ships recruited to VOSClim class continued to rise, although more effort was needed in this area to ensure a sufficient volume of observations to permit meaningful climate studies. The VOS chair was pleased to report that the KPI targets set at the last session had been met.

7.1.1.6. In discussing this issue the VOSP Chair suggested that there was a need to develop smarter metrics to accurately assess the quality of the observed parameters at both the national and international level. For instance, bearing in mind that air pressure Root Mean Square (RMS) values for automatic systems were currently substantially better that those being reported by manual observers, she proposed that such information on air pressure quality should be made available to future SOT sessions in order to help determine the most appropriate instruments to be used and the best practices to follow (***action; RSMC; SOT 8***).

7.1.1.7. Because the nature of traditional PMO and VOS operations is undergoing change the VOS Chair suggested that more clearly defined metrics were needed in order to be able to analyse the true status of the VOS Scheme. In this respect she proposed that the VOS component of the annual SOT reports should be enhanced to capture more information on Port Meteorological Officer (PMO) inspection activities and to distinguish clearly between the number of manned and automated observations. The report could also be used to capture information on the transmission systems used for sending manual VOS observations e.g. the numbers of ships using email or Code 41. Such changes combined with the recent appointment of a new SOT TC at the JCOMM *in situ* Observations Programme Support Centre (JCOMMOPS) opened up the possibility of compiling metrics and graphs which would allow the SOT community to have a clearer snapshot of the actual status of the VOS thereby assisting with strategies for the future evolution of VOS operations. The Panel agreed with the proposal that the VOS report should be revised in readiness for the 2013 Report (***action; VOSP & SOT Chairs; SOT TC; Nov. 2013***).

7.1.1.8. In addition to compiling metrics based upon the annual national VOS reports there was a need to have up to date maps showing the monthly network status, density and geographical distribution of VOS, VOS Climate (VOSClim) and Automatic Weather Station (AWS) observations in order to be able to better target the efforts of VOS operators in the future. It was noted that JCOMMOPS were already developing such improved tools for the VOS community and it was hoped that these would soon be available on a permanent JCOMMOPS web page (***action; SOT TC; asap***).

7.1.1.9. The VOSP Chair also reported that the level of information being reported in the 2012 annual VOS reports was very variable, and encouraged VOS Focal points to endeavour to assign time to complete the 2013 reports to the best of their ability, including information that could be of interest to their VOS colleagues in other countries (***action; VOS Focal Points; Mar. 2014***).

7.1.1.10. Although take up of the Ancillary Pilot Project had so far been very slow the VOSP Chair suggested that it offered an opportunity to significantly enhance the volume of marine observations, particularly in data sparse areas, although it was recognized that the quality of observations was likely to suffer as a consequence. Whilst having an Ancillary self-monitoring support fleet would reduce the pressure on PMO resources it would still need some oversight to ensure it is operating in accordance with the expected standards. The SOT TC could have a role to play in this regard e.g. checking that metadata is being collected and that the companies concerned are providing feedback on data quality. *[This will be further considered under agenda item 7.3.1]*

7.1.1.11. The VOS Chair also stressed the need to recruit VOS to fill data voids. One notable such area was the Southern Oceans and Antarctica. Traditionally only a few research ships were providing consistent data in such areas and there were limited opportunities for recruitment and inspection of other ships operating in this area. In this respect the Panels attention was drawn to the website maintained by the Scientific Community on Antarctic Research (SCAR) Expert Operational Meteorology in the Antarctic[39], which lists the names and call signs of ships that are known to have made meteorological observations in Antarctica during the 2012/13 season. In addition the website lists ships, yachts and launches that are known, or suspected, to have visited Antarctic waters but which didn't submit any weather observations. The VOS Chair encouraged the

39 http://www.antarctica.ac.uk/met/jds/met/SCAR_oma.htm

VOS Panel Focal Points to make determined efforts to recruit ships that operate in these waters to the VOS Scheme or to consider installing AWS systems on suitable ships (***action; VOS FPs and PMOs; ongoing***).

7.1.1.12. Another initiative that had potential to enhance observations in data sparse areas was the VOS Drifter donation programme which aimed to encourage the development of new VOS programmes based in developing countries Although take up to this programme had been initially disappointing some new opportunities had recently arisen, particularly in connection with the Pacific Partnership 2013 Mission. *[A status report on this initiative will be made under agenda item 7.2.7]*

7.1.1.13. The VOSP Chair reported that the range and capability of VOS quality monitoring tools had continued to improve over the last few years making it much easier for PMOs to provide prompt feedback to observers. However there remained scope for further improvements. In particular there was scope to redevelop the JCOMMOPS Quality Information Relay (QIR) feedback mechanism which was under-utilised at present. The SOT TC was invited to consider how this system, and its interface, could be improved as a feedback service to report systematic coding or transmission problems (***action; SOT TC; end 2013***).

7.1.1.14. The VOSP Chair also suggested that this was an appropriate time to further the aims of the VOS within the International Maritime Organisation (IMO). Recent developments within IMO to develop an e-navigation strategy was likely to open up the possibility of meteorological data being integrated more closely with ships systems, such as the use of Automatic Identification System (AIS) to transmit meteorological observations.

7.1.1.15. The meeting made the following recommendations:

(i) That the template for VOS national annual reports should be revised to include PMO activity information and other metrics that will be helpful in monitoring VOS performance and formulating future SOT decisions (***action; VOSP & SOT Chairs, SOT TC; Nov. 2013***); and

(ii) That the SOT TC should oversee the performance of the Ancillary VOS (e.g. checking that metadata is being collected and that the companies concerned are providing feedback on data quality) so that a decision can be made on the need for a new Ancillary Class at SOT-8 (***action; SOT TC; end 2013***).

7.1.1.16 The Team invited VOS operators to check that email systems are not rejecting observations un-necessarily (***action; VOS operators; asap***).

7.1.2 Report on VOS issues from the E-SURFMAR Expert Team

7.1.2.1 Mr Pierre Blouch (France) reported on the activities by E-SURFMAR - the EUMETNET[30] EIG[31] Operational Service for Surface Marine Observations -, and in particular on its VOS Expert Team. Nineteen European NMS are financially contributing to the service which is still optional.

7.1.2.2 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-6. In particular:

(i) The progress in the procurement of Shipborne Automated Weather Stations (S-AWS) having specifications commonly defined by E-SURFMAR participants. A call for tender was issued in 2012 by the EIG. A manufacturer was chosen. Three prototypes will be ordered in 2013. They will be tested at the beginning of 2014. Then, participants will be able to purchase series (see section 7.2.5);

(ii) The deployment of the « half compression » technique by KNMI on their conventional VOS (35 active by the end in February 2013). This technique allows to save communication costs (also discussed under section 6.1);

(iii) The improvement of ship-to-shore dataformat #100 in close cooperation with the JCOMM Expert Team on Marine Climatology (DMPA/ETMC). Several requirements were taken into account. This format is devoted to S-AWS. Another dataformat (#101) will be designed for conventional VOS;

(iv) The proper functioning of the E-SURFMAR metadata database which is continuously improved. Regularly updated by E-SURFMAR participants, it is also fed by Pub47 metadata submitted to WMO by non-European NMS. Thanks to that, the database is permanently up-to-date. On a daily basis, Pub47 metadata are extracted and made available on a public FTP site for active VOS as well as for active and non-active VOSClim; and

(v) Mr Blouch reminded that the E-SURFMAR metadata database is open to any PMO or VOS operator in the world who would use it (even in read-only mode). In addition to Pub47 metadata (including digital images), the database handles mask identifiers, inspection reports and ship's contact details and give access to several internal or external monitoring tools (e.g. quality controls and ship's tracking). A MASK-REAL cross-reference list is also extracted every day and made available to JCOMMOPS. An online demonstration of the database was presented during the SOT Science and Technical Workshop.

7.1.2.3 The meeting noted again 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.

7.1.2.4 The meeting invited VOS operators to check the GHRSST requirements for SST measurements, investigate feasibility and costs, and inform the SOT-GHRSST working group accordingly (***action; VOS operators; SOT-8***).

7.2 Programme status and implementation

7.2.1 VOS status, trends and developments

7.2.1.1 The Panel reviewed the status of the VOS fleet, including trends in recent years, and considered proposals for the evolution of the fleet, in particular taking into account the upgrading of VOS to VOSClim standards, and the increasing demand for high quality observations to serve the needs of the developing Global Framework for Climate Service (GFCS).

7.2.1.2 The Panel noted that there were 29 countries listed as having a total of 3,359 active VOS on the E-SURFMAR database (based on figures extracted on 7 March 2013). Of this total the number of ship recruited to each VOS class was as follows;

1,979	Selected
627	Supplementary
305	VOSClim
191	Auxiliary
109	VOSClim AWS
68	Selected AWS
57	Supplementary AWS
0	Auxiliary AWS
8	Ancillary
15	Other

In terms of ship numbers the size of the international VOS fleet was now less than half than the size it was a decade ago (in 2002 there were 6,896 VOS).

7.2.1.3 In considering the distribution of VOS classes in relation to VOS recruiting country, the Panel noted that there were several countries with ships listed in the E-SURFMAR metadata database from which no observations had been received in 2012. In addition there were several countries that had reported large numbers of VOS and yet very few of these ships were actively submitting observations. The Panel recognised that while there may be good reasons for such discrepancies e.g. use of masked call signs, ships only recruited to submit delayed mode data etc., there were clearly several ships that needed to be made inactive on the database. With a view to ensuring that the E-SURFMAR and WMO metadata records are maintained as accurate as possible, the Team agreed that such discrepancies should be raised with the VOS operating countries concerned (***action; SOT TC; SOT-8***).

7.2.1.4 Despite the decreasing size of the international VOS fleet, the Panel was pleased to note that in 2012 more than 1.80 million observations were received from recruited VOS that are identified as active on the E-SURFMAR metadata database. This represented an increase from 1.67 million observations in 2011, and more than a threefold increase over the last decade. Whilst this was therefore a very positive growth year on year, the Panel noted, however, that almost ninety percent of observations in 2012 came from just six national VOS fleets. Consequently there remained a need to increase the capacity of other countries that are seeking to implement VOS networks of their own, and to involve other countries that have large national merchant fleets but which currently have no established VOS fleet.

7.2.1.5 The Panel further noted that a further ~228,415 observations were received under the anonymous call sign ‘SHIP’ and a further ~118,418 observations were received from ships not recognized as having been recruited by a particular national VOS operator. Consequently a total of approx 2.14 million observations were actually received in 2012 of which approximately 16% were from unidentified ships. VOS Focal Points were therefore encouraged to check the list of unidentified ships on the database and to ensure that the metadata for these ships is recorded in their WMO Pub 47 submissions, as well as on the E-SURFMAR metadata database (***action; VOS FPs; ongoing***).

7.2.1.6 The Panel reviewed the maps and graphs prepared by JCOMMOPS showing VOS status, coverage and parameters reported and encouraged JCOMMOPS to make these products more readily available via the JCOMMOPS website rather than via ftp links at present, and to ensure that they are routinely updated. (***action; SOT TC; SOT-8***).

7.2.1.7 In order to make reasoned judgements about the future strategy for evolution of the VOS observing networks, the Panel considered that there was a need for more detailed metrics and graphs. For example the information contained in the annual VOS national reports could be extracted and displayed in a format that would enable the SOT and VOS focal points to assess observing trends and to compare data availability and quality. The Panel recommended that such metrics should be compiled by the SOT TC, in liaison with the Panel Chair and the TT on VRPP, and made available on the JCOMMOPS website (***action; VOSP Chair & SOT TC; SOT-8***).

7.2.2 VOSClim status, and upgrading of ships to VOSClim standard

7.2.2.1 The Panel noted that taking into account all VOS Classes (listed in paragraph 7.2.1.2), VOSClim and VOSClim AWS ships amount to just over 12% of the total global fleet (an increase of just 3% since the last SOT session).

7.2.2.2 The Panel further noted that 779,400 observations were received and processed from VOSClim registered ships by the Global Collecting Centres during 2012, and that this represented

49% of data received - the largest number of received VOSClim observations since collection began in 2003.

7.2.2.3 The Panel recalled that at the last SOT session a KPI target was set for 25% of the global active VOS to be upgraded to VOSClim class by SOT-7 (the global active VOS being defined as the number of VOS registered in WMO Pub 47 and reporting at least once per month). Although a total of approximately 2150 ships had submitted at least one report during 2012, the average monthly number was currently approximately 1480 ships. Consequently on this monthly basis the percentage of ships that had been upgraded to VOSClim standard had therefore reached 27%. However, analysis of observations received from the VOS and VOSClim class ships at the UK Met Office (based upon ships that had submitted more than 5 pressure reports per month) indicated that, on average over the year, the figure was nearer to 22%. On balance the Panel therefore considered that the KPI target had been achieved, but agreed that the KPI should continued to be measured until SOT-8 **(*action; VOSClim FP & RTMC; SOT-8***). In considering this issue, The VOSP Chair reported that initial analysis of the real time data suggested that 17% of observations carried out by conventional VOS in 2012 were from VOSClim ships (declared in the E-SURFMAR metadata database) and that 45% of automated observations were from automated VOSClim ships.

7.2.2.4 The Panel was pleased to note that the KPI set at the last session for less than 3% of VOSClim class ships being flagged on the suspect list for air pressure had also been met. However in view of the decisions taken at this session to tighten the VOSClim monitoring criteria the Panel agreed that the KPI should continue to be measured until SOT-8 **(*action; RTMC; SOT-8***).

7.2.2.5 The KPI set for 95% of VOSClim class observations to be received within 120 minutes had also been achieved. The Panel agreed that this KPI should continued to be measured and reported to SOT-8 **(*action; RTMC; SOT-8***).

7.2.2.6 The Panel reminded the VOS operators that at SOT-6 it had also been agreed that a reporting KPI criteria for an ‘active’ VOS should be set at 20 observations per month. In this respect the Panel noted that from the annual ranking list for 2012 produced by the UK Met Office, 43.2% of VOS ships (1192 out of 2756) reported an average of at least 20 pressure reports per month, while 93.7% reported at least one pressure per month on average. VOS Focal points were encouraged to monitor compliance of their national fleets with this criteria **(*action; VOS FPs; ongoing***).

7.2.2.7 In considering the KPIs the Panel recognized that it was ambitious to expect VOS Operators to upgrade all classes of existing VOS to VOSClim standards. For instance it was unrealistic to expect VOS operators to upgrade all Auxiliary class ships which use their own instruments for making observations. Similarly it was unrealistic to expect Supplementary AWS ships to be upgraded as such ships have no facility to take manual observations unless the ships officers are additionally recruited to perform manual observations and provided with the necessary electronic logbook software.

7.2.2.8 However the Panel agreed that upgrading ‘Selected’ ships to ‘VOSClim’ standard would require only limited effort by the Port Meteorological Officers, especially where ships are equipped with TurboWin electronic logbook software. Taking into account that Selected VOS amounted to almost 60% of the VOS fleet and the preference expressed by the VOSClim scientific advisers that enhanced VOSClim parameters should be collected for as many VOS as possible, the Team recommended that VOS focal points and PMOs should make renewed efforts to upgrade all suitable 'Selected' VOS in their fleets to VOSClim standard at their next inspection (***action; PMOs & VOS FPs; ongoing***).

7.2.2.9 The Panel agreed that a new KPI should be introduced based upon ship classes that can realistically be upgraded to VOSClim without undue resource and cost implications. The Panel therefore recommended that a new KPI should be introduced as follows:

- That at least 25% of the active international VOS Fleet registered on the E-SURFMAR metadata database to be VOSClim Class by SOT-8 (***action; VOS Operators; SOT-8***).

7.2.2.10 Although there had been a steady year on year growth in the number of ships recruited to VOSClim class the VOSClim scientific advisers had advised that the current volume of VOSClim data was too small to form a climate quality data set (sampling errors would currently dominate any fields produced and the benefit of the high quality observations would be lost).

7.2.2.11 To further encourage the growth of collection of enhanced delayed mode VOSClim data the Panel proposed that Selected VOS that that are using TurboWin software should be encouraged to self-recruit This would only require a small change to the TurboWin station data and wouldn't incur any significant extra effort for the observers when compiling their observations. The Panel were generally of the view that such self recruiting ran counter to the concept of VOSClim which aimed to develop a higher quality climate subset of VOS observations from the best performing ships. Nevertheless the Panel agreed that Port Meteorological Officers could select VOSClim on the TurboWin program provided that;

- the ships concerned continue to be listed in the WMO Pub 47 metadata as 'Selected' ships i.e. until such time as they meet all the other requirements for VOSClim class;
- it is recognised and acknowledged by those investigating the dataset that not all ships supplying the additional VOSClim data are in fact VOSClim ships; and
- there is no inference made to correlate the number of ships supplying the additional VOSClim data to the size of the actual VOSClim fleet.

In considering this issue it was suggested that Turbowin could be amended to remove the option to select VOSClim in the station data as a means to increase the availability of VOSClim elements (***action; KNMI; asap***).

7.2.2.12 The Panel also recognised that the requirement for VOSClim ships to be inspected at less than six monthly intervals was presenting an obstacle for good quality ships that trade globally. In addition, because the availability of PMO resources was diminishing in several countries it was becoming increasingly difficult to meet this criteria. Whilst the Panel agreed that the definition of a VOSClim class ship (in WMO Pub 47 Table 2202) remained valid the Panel considered that the criteria could be relaxed where ships are remotely vetted at regular intervals by PMOs to ensure that they maintain VOSClim standard. The VOS Chair undertook to prepare a proposal on how remote vetting should be conducted and to circulate this to VOS focal points for consideration and with a view to possible approval at the next session (***action; VOSP Chair; SOT-8***).

7.2.2.13 The Panel noted that, for a variety of reasons, there were often differences between the list of VOSClim ships recorded on the DAC website, and those recorded on the E-SUFMAR Metadata database. A common reason was due to changes in call signs not being advised early enough, or a backlog of VOSClim recruits/changes being notified to the DAC after the event. Occasionally some ships had also continued to use their old call signs in their electronic logbooks after the change had been made. In early March 2013, a total of 430 active VOSClim Class ships were recorded on the DAC website compared to 414 recorded on the E-SURFMAR metadata database. These differences were recently addressed by the VOSClim DAC and the E-SURFMAR Programme team and figures are now in close harmony.

7.2.2.14 The Panel recalled that at the last session the VOSClim Focal Point was requested to consider whether the E-SURFMAR database could be used for obtaining the list of VOSClim ships. In this regard a link to the E-SURMFAR database, and to the relevant E-SURFMAR ftp listing, had already been added on the DAC website so that climate users could continue to have access to accurate VOSClim ship lists. The Panel noted that whilst the Task Team on VOS Recruitment and Programme Promotion had agreed that the DAC website should be discontinued, this could take some time. In the interim, the Panel reminded the VOS operators to ensure that the DAC were also

notified of any changes to VOSClim ships when updating their metadata on the E-SURFMAR metadata database, or when submitting metadata lists to WMO (***action; VOS FPs; ongoing***).

7.2.2.15 The Panel recognised that keeping two separate VOSClim lists represented a duplication of effort for VOS Focal points and PMOs, especially when large national VOSClim fleets are involved. The Panel recommended that the E-SURFMAR metadata database should be the main listing for ships recruited to VOSClim class and that the existing Excel VOSClim ship list on the DAC should be deleted (***action; DAC; asap***).

7.2.2.16 The Panel agreed with this recommendation although the Panel recognised that there were potential resource implications for how the DAC processes the ship lists in future. The Panel requested the VOSClim DAC and the E-SURFMAR Programme team to harmonise the two listings and to advise the SOT Chair when this work is completed so that the information can be disseminated to VOS focal points and PMOs via the JCOMMOPs mailing lists (***action; SOT Chair; end 2013***).

7.2.2.17 To ensure the accuracy of the VOSClim metadata, the Panel strongly urged VOS Focal Points to ensure that the metadata for their national VOSClim fleets is maintained up to date in the E-SURFMAR database, or is regularly submitted in Pub47 format. The Panel also urged the VOS Focal Points to check the accuracy of historical VOSClim recruits to ensure that no metadata is omitted. In particular, the Panel requested the VOS focal points to check that the digital imagery and drawings required for both active and inactive VOSClim ships is up to date in the E-SURFMAR metadata database (***action; VOS Focal Points; ongoing***). The need to update metadata listings as soon as possible after upgrading ships to VOSClim Class was also stressed, to ensure that data is readily available to climate users.

7.2.2.18 The Panel recognised that it was difficult for VOS operators to keep abreast of changes to call signs arising from changes of flag/owners, and VOS focal points often had to rely on being notified by the ships officers. In this respect, the Panel noted that call signs were registered with the International Telecommunications Union (ITU) and suggested that an approach might be made to the ITU to obtain more accurate information on call sign changes. (***action; VOS Panel Chair; SOT-8***).

7.2.2.19 The Team recalled its request made under agenda item 3.2 to each Panel of SOT to report an appropriate metric that demonstrates how well they are meeting the GCOS performance indicator.

7.2.2.20 The Team requested the ETMC to assess the value of the delayed mode VOS data, and propose related metrics (***action; ETMC; SOT-7***).

7.2.3 Electronic logbook software

7.2.3.1 Mr Hing.Yim Mok (Hong Kong, China) reported on the status of e-logbooks. There are three main types of electronic logbook currently in use on VOS – OBSJMA developed by the JMA, SEAS developed by NOAA, and TurboWin developed by KNMI in cooperation with E-SURFMAR. Information on the known status of e-logbooks installed on VOS is given in Annex XII, Table 2.

7.2.3.2 The Panel noted that OBSJMA was now being upgraded and the new version 3.00 would be released by the end of March 2014. The new version will be operating on Japanese and English Windows XP/Vista/7/8. It will allow coding in IMMT-V format and also the swell coding recommended by the SOT and ETMC. New error notification messages will be provided to help users avoid common errors.

7.2.3.3 The Panel reviewed the status of its work to increase the number of e-logbooks, thereby avoiding the need for traditional hardcopy logbook data to be manually digitised. The Panel noted although there had been a gradual increase in the number of ships reporting use of electronic

logbook software between 2003 and 2008, in recent years the number based on SOT reports had been relatively stable, and had not increased in the last year. This was possibly a reflection of the gradual decline in VOS ship numbers in recent years.

7.2.3.4 The Panel noted that Version 9.0 of the AmverSEAS program was now ready to be used and could be downloaded from the web[40] together with the installation and setup information. Earlier versions of SEAS were no longer being supported. The Panel was pleased to note that the latest version of SEAS was able to generate IMMT-IV formatted messages so that the software was now VOSClim compliant. In addition it had the capability to generate metadata reports which could be transmitted in binary format, and could also be used to recruit Ancillary Pilot Project ships using the recruiting country 'Not Assigned'.

7.2.3.5 The Panel noted that Version 5.0 of the TurboWin program had been released in 2012. To help to reduce position or quadrant errors a new mapping tool was now included in the software to store and display observation positions. The software also permits IMMT-4 data storage and allows VOSClim ships to be entered as a separate class. It was now also suitable for use by Ancillary Pilot Project ships.

7.2.3.6 The Panel noted that, by default, ships recruited by the Netherlands would in future be using a compressed code form to compile and transmit their TurboWin weather reports. This necessitated the use of a new three figure Inmarsat Special Access Code dedicated to the Netherlands VOS. Other European VOS operators were also being encouraged to move over to this system to help reduce the currently unfair cost burden borne by the small number of NMS that host SAC 41 Land earth stations.

7.2.3.7 The Panel further noted that seven VOS were now successfully using the web-based TurboWeb software which allows ships with internet access and suitable bandwidth to send their observations direct to the TurboWeb server maintained by KNMI. The advantage of the system is that any updates to the software can be done remotely thereby avoiding the need for ships officers or visiting Port Meteorological Officers to install new versions on the ships computers. In the not too distant future it was expected that further development of the TurboWin software would be discontinued in favour of the TurboWeb based approach.

7.2.3.8 In considering the electronic compilation and transmission of observations, the Panel noted that "mobile-based" applications for Android hand-held and tablet platforms were being developed that have the potential capability to be used for weather reporting. The Panel considered that such systems could help to enhance data collection and agreed that such initiatives should be monitored and VOS Focal Points kept informed of developments (***action; VOSP Chair; SOT-8***).

7.2.4 Status of VOS automation

7.2.4.1 The Panel Chairperson reported on the present status of VOS Automation. According to VOS national reports received in 2012 there were now 20 countries with AWS systems installed on their VOS amounting to approximately 336 shipborne AWS systems. In the last couple of years this number has been largely unchanged. Information on the reported status of known shipborne AWS installed on ships, and derived from annual VOS reports, is included in Annex XII, Table 1.

7.2.4.2 However, in contrast, the Panel noted that only 234 AWS systems had been recorded in the E-SURFMAR database (figures March 2013). The Panel therefore encouraged the VOS Focal Points to ensure that metadata for their automated VOS ships is maintained up to date in the E-SURFMAR metadata database, and in their WMO Pub 47 submissions (***action; VOS Focal Points;ongoing***).

40 http://www.aoml.noaa.gov/phod/goos/seas/amverseas_software.php

7.2.4.3 Although at least half the AWS systems currently installed have a computer facility to manually add the traditional visual observations to the measured automated observations, this is often not being done by the observers. Linking AWS systems to recognised electronic logbook displays, such as TurboWin, may help overcome this problem in the future. The Panel requested the VOS Focal points to encourage the officers on such ships to add visual observations (***action; VOS Focal Points; ongoing***).

7.2.4.4 In considering this issue, the VOS Panel Chair reported that several major VOS operators now had plans to automate their national fleets and to substantially reduce the number of manually reporting VOS, concentrating on VOSClim quality ships. Some national VOS operators were also advising their intention to withdraw all manually reporting VOS in the near future. Such developments therefore had serious implications for the future of the VOS Scheme and continuity of the climate records.

7.2.4.5 The Team recommended that as part of the national reporting for the SOT annual report, the AWS systems should be classified according to the type of measurements they are making. The Team requested the Technical Coordinator to consult with the Canada, the Netherlands, Japan, the Netherlands, and the USA and propose a classification (***action; SOT TC; end 2013***), and the SOT Chair to take the proposed classification into account when preparing the templates for national reports (***action; SOT Chair; end 2013***).

7.2.5 E-SURFMAR S-AWS developments

7.2.5.1 Henry Kleta (Germany) reported on the extensive work that had been undertaken by E-SURFMAR members to develop detailed design specifications and recommendations for a new E-SURFMAR Shipboard AWS system (S-AWS). Discussions had taken into account the varying requirements of the individual E-SURFMAR members and it had eventually been decided to develop an autonomous system requiring no intervention form the ships staff during routine operation. The system would primarily consist of a Basic Observing Unit (BOU) consisting of a processing unit, a satellite position system and a two way satellite communication system providing global coverage. A service unit would allow a PMO or technician to check and configure the system, while a Land Based Monitoring Facility would enable shore based staff to configure the system remotely.

7.2.5.2 The Panel noted that tendering documents for the new S-AWS system were issued in June 2012 and following detailed evaluation of the tenders it had been decided to establish a Framework Agreement with the winning bidder ‘Sterela’. The Framework agreement is signed by the EUMETNET[30] EIG[31] and will last 7 years. Under the agreement participating E-SURFMAR members will eventually be able to purchase the S-AWS systems through national contracts. Expressions of interest to purchase as many as 300 E-SURFMAR S-AWS had already been received from several European National Meteorological Services (notably Germany, France and the Netherlands).

7.2.5.3 Sterela will initially build three prototype S-AWS systems that will be subject to intensive scrutiny and a 6 month in-situ trial period on board participating members’ ships. These prototypes will be ordered in 2013 and, subject to satisfactory trials beginning in 2014 it is hoped that the first operational systems would be ready to roll out by the end of that year.

7.2.5.4 The Team agreed that there was a need to develop common guidelines on the criteria to be used regarding when to block data from Iridium transmission. It requested the ETMC to make a proposal in this regard to be submitted to the next SOT Session (***action; ETMC Chair; SOT-8***).

7.2.6 PMO activities and inspections - implications of automation

7.2.6.1 The Panel discussed the role of the Port Meteorological Officers (PMO), and PMO activities and inspections, as well as the implications of VOS automation on their activities.

7.2.6.2 The fact that many National Meteorological Services are in the process of automating their fleets was already having an impact on the PMO role and the skills required. Whereas the traditional PMO role had required inspection and training skills combined with practical seagoing experience, there was now an increasing requirement for technical or engineering competencies.

7.2.6.3 However, the Panel recognized that the level of skill required largely depended on the type of AWS system being installed. In the case of simple autonomous AWS systems which require minimal interface with the ships infrastructure or systems a PMO could simply replace the whole unit with a new one, and return the faulty one for repair ashore. Whereas a complex integrated AWS system connected to the ships power supply and systems (e.g., Gyro compass), and requiring cabling to sensors (e.g. SST sensor in engine room) either required PMOs with greater technical ability, or required shore based technicians to visit to maintain and repair the system. This inevitably had logistic, resource and cost implications.

7.2.6.4 The Panel also recognised that there was a wide variety of AWS systems currently being used by VOS operators, with a corresponding variety of data formats, transmission systems, sensor types etc. Each system therefore called for specialist knowledge and experience. This inevitably makes it difficult for traditional PMOs to perform inspections of, or maintain, AWS systems on overseas VOS that may be visiting their ports. Nevertheless the traditional PMO competencies would still be needed for complex AWS systems that employ a visual display on the bridge and require ships officers to manually add the visual observed elements (e.g. waves, swell, weather, cloud types/heights etc) to the measured automated observations compiled by the AWS.

7.2.6.5 The Panel recognized that in order to verify the quality of the AWS data a PMO would still need to use transfer standard instruments to check the accuracy of the AWS sensor output, but may now also need to be equipped with an internet enabled notebook to connect to the AWS systems configuration port, or to go on line to check the quality of the parameters that are automatically being transmitted and routed to the GTS. In the absence of training in the various types of AWS in use, there were therefore clear limitations on the ability of traditional PMOs to inspect AWS systems.

7.2.6.6 In order to increase PMO awareness of different AWS system functionality the Panel recommended to the Team that consideration should be given to convening an international Shipborne AWS Workshop during the next intersessional period. This would not only afford a knowledge transfer opportunity for technicians but could also be used as a training workshop for PMOs to gain a basic understanding of the capability and operation of different AWS systems now being used on VOS. In a wider context there may also be merit in inviting shipowners and AWS manufacturers to such a workshop (***action; SOT Chair, WMO Secretariat;SOT-8***).

7.2.6.7 The Panel considered the limitations of the current national and international inspection forms (e.g. VSOP001- Report of Inspection to Foreign VOS) for inspecting shipborne AWS system while in service. In addition, the Panel recognized that prior to installation of a shipborne AWS system there was often a need to arrange a pre-installation site inspection to consider the suitability of a proposed host ships arrangements e.g. power supply, exposure, installation location, satellite visibility, proximity of other transmission systems/aerials etc.. The Panel therefore recommended that consideration should be given to developing new ‘Shipborne AWS – VOS’ inspection, and site inspection forms (***action; TT-VRPP & SOT Chair;SOT-8***).

7.2.6.8 The Panel recognized, that to some extent, the use of shipborne AWS challenged the ‘voluntary’ nature of the VOS Scheme, especially as shipowners were often required to sign

contractual agreements or Memorandums of Understanding prior to installing shipborne AWS systems of their vessels.

7.2.7 VOS Donation Programme

7.2.7.1 The Panel recalled that the concept of a drifter donation programme was initiated at the Fourth International Port Meteorological Officer Conference (PMO-IV Orlando, 8-10 December 2010) as a means to assist developing countries to establish national VOS programmes. The VOS Drifter Donation Programme (VOS-DP) was subsequently developed as a joint DBCP/SOT initiative with clearly defined criteria. Under the VOS-DP a 'deck' drifting buoy would be installed on suitable ships - in effect acting as an autonomous AWS. Details on the conditions that must be met in order to be eligible to receive a drifter, which would be donated by the Global Drifter Program (GDP), are available on the web[41].

7.2.7.2 Unfortunately whilst the programme is well defined and documented, the VOS-DP Programme Evaluation Committee (PEC) has received very limited response from interested developing countries. Moreover one potential drifter recipient country had reported that, despite determined efforts, it had been very difficult to find any ships willing to participate.

7.2.7.3 Despite this disappointing response to the program a recent opportunity had recently arisen in connection NOAA's planned support for the Pacific Partnership 2013 mission. The Pacific Partnership initially began as a global response to the 2004 Indian Ocean tsunami, and the widespread goodwill and cooperation that resulted, formed the genesis of Pacific Partnership's mission to proactively deliver humanitarian assistance from the sea. The Panel therefore considered that the VOS-DP would make a good fit with the objectives of the mission and help to fill a traditionally data sparse area.

7.2.7.4 The Panel proposed that the Port Meteorological Officer in Hawaii should act as the 'buddy' PMO for the Polynesian islands involved in the mission (Samoa, Tonga, Guam, Nouméa, Marshall Islands, Kiribati, Solomon Islands), although it has yet to be formally agreed who should act as the National Contact Point for Donations in this area. Efforts are now being made to source suitable ships, to collect the necessary metadata and to start setting up the local VOS programme. Once this has been done, and the recipient country is ready to receive the drifter, the Hawaii PMO will notify the chair of the VOS-DP Evaluation Committee (PEC) accordingly. A positive response by the PEC will result in a drifter being provided free of charge by the Global Drifter Programme (GDP), who will also pay the shipping and data telecommunication costs.

7.2.7.5 The Panel noted that another area where the VOS-DP could possibly become involved was in the Western Indian Ocean Region, where it has been proposed that an SOT Pilot Project should be established to recruit a pool of local VOS with a view to enhancing data availability.

7.2.7.6 The Panel noted that the WMO Secretary General had recently written (on 8 February 2013) to all WMO Permanent Representatives formally inviting developing countries to consider whether they could initiate a local VOS programme by participating in the VOS-DP. Developed countries were also invited to consider whether they could contribute by donating drifter units.

7.2.7.7 In considering this issue the VOS Chair also invited the Panel to consider the potential for extending the programme to include low cost autonomous Automatic Weather Stations that are currently being developed and used by several VOS operators. These systems could either be entirely independent of the ships systems (e.g. using solar power) or solely require connection to the ships power supply.

7.2.8 The meeting made the following recommendations:

41 http://www.wmo.int/pages/prog/amp/mmop/JCOMM/OPA/SOT/documents/DBCP-SOT-Drifter-Donation-for-VOS.pdf

(i) That a new KPI target should be introduced to aim for least 25% of the active international VOS Fleet registered on the E-SURFMAR metadata database being recorded as VOSClim Class by SOT-8 (***action; VOS Operators; SOT-8***);

(ii) That consideration should be given to convening an International Shipborne AWS Workshop;

That consideration should be given to developing new 'Shipborne AWS – VOS' inspection and site inspection forms.

7.3. Issues for the VOS

7.3.1 VOS Ancillary Pilot Project

7.3.1.1 The VOS Chair, Sarah North, reported on the background to the VOS Ancillary Pilot Project. She explained that the concept had been initiated as a consequence of requests by shipping companies for recruitment of ships to the VOS Scheme having to be turned down. There were several reasons for this including:

- Ships operating worldwide without a home port made it difficult to ensure the supply and regular inspection of the meteorological instruments, and training for the observers;
- As a consequence of increasing automation several NMS were planning reductions to the manually reporting VOS fleets;
- A reduction in the number of Port Meteorological Officers available internationally to inspect such ships; and
- Financial constraints meant that many NMS were having to restrict the supply of calibrated instruments to those ships that they can ensure will produce the required number and quality of observations.

7.3.1.2 Recognizing that turning ships away from the VOS scheme ran counter to the intent of the VOS Scheme and IMO Circular MSC.1/Circ.1293, it was proposed by SOT Task Team on VOS Recruitment and Programme Promotion (TT-VRPP) to establish a new VOS 'Ancillary' class that could enable the VOS community to respond quickly to such requests from shipping companies.

7.3.1.3 The meeting noted that the need to be able to respond to potential offers from shipping companies for ships to be recruited had been given added impetus by the Extreme Seas meeting (Geneva 4-6 October 2011) and the WOC meeting (Paris, December 2011).

7.3.1.4 Following further consideration by the TT-VRPP it had been decided to establish a new VOS Ancillary Pilot Project to enable such ships to join the global VOS without the constraints of being a part of a national VOS Fleet. Details of how the Project operates are published on the VOS Website[42].

7.3.1.5 Details of the new project were subsequently circulated to the VOS and PMO JCOMMOPS mailing lists on 19 December 2011 together with an invitation to VOS operators to consider recruiting ships to the new Ancillary Class.

7.3.1.6 Under the VOS Ancillary PP ships are supplied with the latest TurboWin software, and report in real time. The parent shipping company is responsible for providing the metadata required for WMO Pub47 and is also responsible for ensuring data quality and for maintaining and inspecting the meteorological instruments that they supply.

42 http://www.bom.gov.au/jcomm/vos/projects.html

7.3.1.7 It was noted that on 1 March 2013 only 8 ships had been recorded in the E-SURFMAR metadata database as having been recruited to the VOS Ancillary class. These ships are listed in Appendix B of SOT-7 Document No. 7.3.1 together with information on the number of observations that were received in 2012. No ships have been recruited to the VOS Ancillary AWS sub class.

7.3.1.8 The meeting further noted that 5 of these 8 these Ancillary ships had submitted observations under their assigned ITU call signs during 2012, amounting to 1629 observations. One of the Ancillary ships had additionally submitted a further 334 observations under a masked call sign – making a total of 1963 observations from 6 ships during 2012. Appraisal of the quality of the observations from these ships using the scoring system developed by the RSMC Exeter indicated that quality was generally good and that the Ancillary fleet albeit small was actually performing to a higher standard than some national VOS fleets.

7.3.1.9 It was unclear whether quality monitoring checks were being carried out by the shipping companies that had volunteered Ancillary class ships, or whether such monitoring information was being routinely fed back to the ships observers. It was considered therefore that the SOT TC/JCOMMOPS Ship Coordinator would have a key role to play in ensuring Pilot Project functions correctly and, in particular, in ensuring that the available QC tools are being used by participating companies and ships in order to ensure data quality. Similarly it was considered that the SOT TC/JCOMMOPS Ship Coordinator should help to ensure that the minimum metadata required for Ancillary ships is correctly entered into the E-SURFMAR Metadata database.

7.3.1.10 Although Ancillary Pilot Project ships are currently only required to report in real time, it was recognized that the use of TurboWin software would also permit the data to be logged in delayed mode. However because the data from such ships might prove to be of questionable quality this could potentially increase the workload of the GCCs and would also have consequences for the climate record. Similarly because Ancillary ships would not be assigned to any specific recruiting country this could introduce additional complications. The GCCs were therefore invited to confirm whether they wished to receive this Ancillary VOS data and, if so, how it would be processed.

7.3.1.11 Because relatively few ships have so far been recruited to the Ancillary class the meeting felt that it was difficult to draw clear conclusions at this time without a more representative sample of participating ships. Furthermore, recognizing that the number of VOS withdrawals was likely to increase in the next few years as NMSs increasingly automate their VOS fleets, the meeting considered that the Ancillary Pilot project should continue until SOT-8 when a final decision on the value of the VOS Ancillary class will be taken.

7.3.1.12 It was noted that if SOT-8 subsequently decides to introduce the new VOS Ancillary class then the proposal would need to be submitted to JCOMM-V (2017 or 2018) for formal approval unless it is possible to permit an intersessional fast track approval procedure (e.g. whereby the JCOMM Co-President, acting on behalf of the Commission, and with supporting written evidence, could bring forward the changes that would need to be made to WMO No. 471, WMO Pub 47, etc.).

7.3.1.13 In considering the need to support ships that wish to observe as Ancillary class ships the meeting noted that in 2011, the UK Met Office, supported by the Royal Meteorological Society, had launched a new Weather Observations Website (WOW) for land based amateur observers[43]. Consideration was being given to extending this website to marine observing sites. It might therefore have potential in the future to be used by some Ancillary observing ships. Data collected via WOW had already proven to be a useful additional source of information to Met Office forecasters, particularly during severe weather events. The Chair of the TT-VRPP undertook to keep SOT advised of any relevant developments.

7.3.1.14 Accordingly the meeting made the following recommendations:

43 http://wow.metoffice.gov.uk/

(i) That the Ancillary Pilot Project should be continued until the next SOT session, i.e. SOT-8, when a final decision will be taken on the future value of the Ancillary class;

(ii) That when it is not possible to recruit a potentially suitable manually reporting ship to participate in the VOS Scheme, or to maintain an existing manually reporting ship within the VOS Scheme that has a suitable observing record, then such ships and their parent shipowners/managers should be offered the opportunity to participate in the Ancillary Pilot Project;

(iii) That the new SOT TC should be tasked to liaise with Ancillary Ship Masters and parent companies (and with VOS Focal Points where appropriate), to gather and check the accuracy of Ancillary metadata prior to entering such information into the E-SURFMAR database (***action; SOT TC; ongoing***);

(iv) That the new SOT TC should be tasked with ensuring any masked call signs that may be assigned to Ancillary ships are referred to the Task Team on Callsign Masking for approval (***action; SOT TC; ongoing***);

(v) That the new SOT TC should be tasked with ensuring that monitoring information and qc tools are made available and are applied by shipping companies that have volunteered Ancillary class ships to participate in the Pilot Project (***action; SOT TC; ongoing***);

(vi) That the new SOT TC should provide input to the TT-VRPP on the operation of the Ancillary PP to assist decisions being made on the need to formally introduce the new VOS Ancillary class at SOT-8 (***action; SOT TC; ongoing***);

(vii) That the TT-VRPP should be additionally tasked with promoting the VOS Ancillary class and reporting on its implementation at SOT-8. Its Terms of Reference should be amended as appropriate;

(viii) That the next version of TurboWin software should be amended to include ‘Ancillary Pilot Project’ as an option under ‘Projects’, until such time as a decision is made on the need to formally introduce the new class. (Selecting this option will disable the standard VOS class options) (***action; Netherlands; asap***);

.

(ix) That the RSMC should produce and disseminate monthly monitoring statistics for Ancillary (and if necessary Ancillary AWS) Pilot Project ships, as a separate ‘Not Assigned’ list (***action; RSMC; ongoing***);and

(x) That the GCCs should advise if they wish to additionally receive delayed mode data from Ancillary (Ancillary AWS) ships (***action; GCCs; asap***).

8. TENTH SESSION OF THE SOOP IMPLEMENTATION PANEL (SOOPIP-10)

8.1 Programme review

8.1.1 Report by the SOOPIP Chairperson

8.1.1.1 The Panel Chairperson, Dr Gustavo Goni, opened the Tenth Session of the Ship Of Opportunity Program (SOOP) Implementation Panel (SOOPIP) and reported on his activities on behalf of the Panel during the last intersessional period.

8.1.1.2 He stressed that the SOOP continues being a critical player in the implementation and maintenance of the sustained ocean observing system for climate studies. Most of the observations carried by SOOP are by Expendable Bathy Thermographs (XBT) probes. XBT

temperature measurements are used to monitor changes of key surface and subsurface currents, to study meridional heat transport in all ocean basins, and to supplement other observational platforms to assess the variability of the upper ocean heat content. All XBT transects have been justified by their impact on our understanding of how the upper ocean dynamics and thermal structure is linked to long-term climate signals, extreme weather events, ecosystem assessments, etc. Scientists using XBT data currently produce more than 40 publications annually in peer review scientific publications, in addition to presentations in scientific meetings, and a large number of other applications in which several products for ocean condition monitoring are created.

8.1.1.3 The Team noted that XBT deployments continue to be done along fixed transects selected by the scientific and operational communities. SOOP produces approximately 20% of the upper ocean thermal observations (excluding moorings) with the deployment of approximately 20,000 XBTs per year in a global operation that involves the participation of 25 institutions from 12 countries. Ninety percent of these profiles are transmitted and distributed in real-time through the Global Telecommunication System (ThermoSalinoGraphs - TSG) (within 24 hours of its acquisition), thereby providing critical input to weather and climate forecast models and scientific applications.

8.1.1.4 In addition, ships of the SOOP serve as a platform for the deployment of other observational instruments, such as surface drifters and profiling floats, and the installation of equipment, such as ThermoSalinoGraphs (TSGs) and pCO_2 systems. In particular, TSG observations used in conjunction with pCO_2 observations provide critical information to determine frontal regions and mixed layer depths for ocean acidification assessments. Projects originally developed in support of SOOP also serve to help other programs, such as the NOAA SEAS (Ship Environmental Acquisition System), which is used by approximately 820 volunteer and scientific ships to acquire and transmit over 1 million marine meteorological observations per year. In addition, the AMVER[44] component of the Shipboard Environmental (data) Acquisition System (SEAS) is also widely used by the U.S. Coast Guard in support of search and rescue efforts.

8.1.1.5 Institutions participating in the SOOP are also involved in activities aimed at the continuous development of new technologies in support of the operations carried out as part of the XBT network. These activities involve the development of new equipment for the automatic deployment of several models of XBTs during cruises with high rate of deployments, as well as the transmission of data in real-time using different satellite networks.

8.1.1.6 Dr Goni particularly reported on the following SOOPIP activities:

(i) With the full implementation of Argo floats, the XBT network remains mostly concentrated in the implementation and maintenance of Frequently Repeated and High Density transects. A large part of the plan of XBT transects presented at OceanObs'09 are fully occupied, but financial and logistical constraints continue to prevent full implementation on all desired transects;

(ii) SOOPIP continues to encourage and facilitate the interaction between the scientific and operational communities operating different ship based in multidisciplinary observing platforms, such as pCO_2, Expendable Conductivity Temperature and Depth probes (XCTDs), TSGs, Continuous Plankton Recorders (CPRs), etc.;

(iii) A strong scientific and operational collaboration has been enhanced in the international community, by sharing the costs of implementing and maintaining XBT transects and participation in international efforts to assess XBT biases and other scientific studies using XBT data;

(iv) XBT observations are being used in scientific studies for variability of western boundary currents, undercurrents, heat transport, and heat content. A first draft of a

44 Automated Mutual-Assistance Vessel Rescue System - http://www.amver.com/

global XBT bibliography is being maintained on the NOAA Atlantic Oceanographic and Meteorological Laboratory (AOML) web page[45];

(v) SOOPIP continues to support additional XBT Fall Rate Equation (FRE) experiments, such as during the Prediction and Research Moored Array in the Atlantic (PIRATA) Northeast Extension cruises, and is currently supporting additional experiments in water tanks, swimming pools, and shallow ocean regions to investigate in more detail the descent of the probes in the upper 30 meters;

(vi) SOOPIP supports the development of climate quality XBT probes in collaboration with Lockheed Martin Sippican, Inc. During 2012 and 2013 two tests were performed during PIRATA Northeast Extension cruises of prototype of new XBT probes with upgraded temperature sensors and pressure switches;

(vii) SOOPIP continue the testing of BUFR[46] format for XBT data transmissions. Starting in 2012, AOML has started the operational transmission of XBT data into the Global Telecommunication System (GTS) in real-time in BUFR format, in parallel with data transmission on BATHY[47] format;

(viii) A science and technical presentation on the SOOP operations was made at the Global Temperature-Salinity Profile Program (GTSPP) meeting, held in Ostende (Belgium) in April, 2012;

(ix) Two U.S. Ship Of Opportunity workshops, hosted by NOAA at AOML were held in the spring of 2012 and 2013, to bring together several U.S. components of the U.S. scientific and operational components of the SOOP and VOS;

(x) With the support of the NOAA's Climate Program Office, the XBT pool for SOOP international partners was maintained to continue the strong international partnership in the XBT network. These partners currently receive approximately 2200 probes per year. Major international NOAA partners receiving XBT probes include South Africa (University of Cape Town), France (Institut de Recherche pour le Développement – IRD, and the University of Paris), Brazil (Federal University of Rio Grande), and Australia (Bureau of Meteorology – BOM). In addition, Italy received XBTs to carry out XBT transects in the Mediterranean Sea. A new partnership was started in 2012 to also support one XBT transect in the Pacific Ocean in collaboration with Japan (Tohoku University);

(xi) SOOPIP continues a strong interaction with the VOS panel, particularly with aspects of the logistics, recruitment, and operations of several XBT transects; and to maintain and upgrade the SEAS software;

(xii) SOOPIP continues a strong support of data acquisition and transmission systems, which are used by other programs (e.g. VOS) and projects such as the Global Ocean Surface Underway Data Project (GOSUD);

(xiii) SOOPIP continues supporting the monitoring of data collected from different platforms, such as surface drifters (BUOY[48]), TSGs (TRACKOB[49]), and sea stations for CTD, Argo floats and ADCP[50] (TESAC[51]); and

(xiv) The critical contribution of several shipping companies to the SOOP was acknowledged

45 http://www.aoml.noaa.gov/phod/goos/xbtscience
46 FM 94–XIV BUFR: Binary universal form for the representation of meteorological data
47 FM 63–XI Ext. BATHY: Report of bathythermal observation
48 FM 18–XII BUOY: Report of a buoy observation
49 FM 62–VIII Ext. TRACKOB: Report of marine surface observation along a ship's track
50 Acoustic Doppler Current Profiler
51 FM 64–XI Ext. TESAC: Temperature, salinity and current report from a sea station

with the award of plaques.

8.1.1.7. The meeting made the following recommendations:

(i) Continue the enhancement of capabilities for real-time transmissions and encourage all countries to transmit data in real-time, to enhance the value of assimilating data in models and to reduce risk of loss of data;

(ii) Continuing the strong working relationship with other scientific and operational communities and continue communicating the value of XBT observations, including the support of the newly formed XBT Science Team;

(iii) Continue active participation in international technical, operational and scientific meetings;

(iv) Maintain and promote a strong international collaboration for the implementation and maintenance of XBT transects as recommended by the scientific and operational communities;

(v) Supporting the continuation of experiments to evaluate XBT biases. Explore the possibility to implement a new fall rate equation (FRE) if/as recommended by the scientific community;

(vi) Strongly support the creation of an XBT prototype probe, with improved temperature sensor and pressure switches in order to obtain high precision temperature profile suitable for climate studies;

(vii) Increasing the international participation by supporting training of technicians and scientists in developing countries;

(viii) Supporting the maintenance of the Global Temperature Salinity Profile Program (GTSPP) and the World Ocean Atlas (WOA); and

(ix) Enforcing the creation of a global XBT metadata pool. This dataset will be used in conjunction with information from other available sources (Coriolis, GTS, GTSPP, Scripps Institution of Oceanography – SIO) to create global reports displaying the activities of the various programs obtaining XBT data.

8.1.1.8. The meeting decided on the following action items:

(i) SOOPIP members to strongly support the maintenance of the XBT network currently in place by dedicating financial resources, sharing logistics and equipment, for its implementation (***action; SOOPIP members; ongoing***);

(ii) SOOPIP members to continue the collaboration with Sippican in the development of an improved XBT prototype with upgraded temperature sensor and pressure switches (***action; SOOPIP members; SOT-8***);

(iii) Institutions participating in the SOOP with the deployment and transmission of XBT data to provide metadata containing information of the XBT operation in order to make possible the creation of reports for the monitoring of the global activity of the program (***action; SOOPIP members; ongoing***); and

(iv) AOML (a) to continue the tests for a full implementation of XBT data transmission to the GTS in BUFR format; and (b) to provide support as requested by other institutions for the implementation of BUFR transmissions operationally (***action; AOML; SOT-8***).

8.2 Programme status and implementation

8.2.1 Status of SOOP implementation, sampling scheme

8.2.1.1 Francis Bringas (USA), reported on the results of the SOOP Semestrial Surveys for 2011 and 2012 and on the timely submission of data by SOOP participants for the survey. The Panel identified the gaps with regard to programme implementation with the view to achieve optimal sampling using available resources.

8.2.1.2 The Panel discussed the status of implementation of OceanObs'09 [52] recommended transects for XBT deployments. From a total of 53 transects recommended by the international scientific community, a total of 38 (72%) were active during 2010, with deployments in frequently repeated (FR) mode in 42% of these and deployments in high density (HD) mode in 79%, including several transects with deployments in both modes. The number of active transects during 2011-2012, by basins, was as follows:

a) Atlantic Ocean: 13 (81%) active, with 15% in FR and 92% in HD;
b) Indian Ocean: 8 (61%) active, with 63% in FR and 38% in HD;
c) Pacific Ocean: 15 (65%) active, with 33% in FR and 67% in HD.

8.2.1.3 Additionally the Panel noted that 8 non-recommended transects were active in 2011-2012, some of them for specific scientific or operational interest.

8.2.1.4 The XBT network implementation continues to be mostly a multi-institutional and international collaboration. There were 12 countries participating in XBT deployments during 2011-2012: Argentina, Canada, Germany, Japan, Australia, Cyprus, India, South Africa, Brazil, France, Italy, and USA. These counties were involved in one or more aspects of the operation, providing probes, equipments, logistics, riders and/or data management, quality control and distribution. From the active transects during 2011-2012, 70% of the transects were implemented with the participation of more than one institution or country. The strengthening of these collaborations is critical for the maintenance of the SOOP operation.

8.2.1.5 SOOP transects also provided platforms for the deployment of Data Buoy Cooperation Panel (DBCP) surface drifters and Argo floats. Increasing this collaboration will help all. Collaboration with Port Meteorological Officers (PMOs) from the VOS program has also been fruitful.

8.2.1.6 The Panel reviewed the provisional table, updated every year, with information on the institutions participating in one or more aspects of the implementation of the XBT transects.

8.2.1.7 The Panel reviewed the status of the current sampling programme. Due to the complementary nature of the XBT SOOP, Argo, Tropical Moorings, and OceanSITEs, and considering the outcome of the OceanOBS'09 Conference, and the recommendations from the XBT Science Team, the Panel discussed possible adjustments to the global sampling scheme.

8.2.1.8 The Panel discussed requirements and implementation aspects for the XBT frequently repeated subset of the SOOP network.

8.2.1.9 The last SOOPIP Meeting reviewed the line responsibilities assigned to participating agencies or countries. It was recalled that line responsibility implies investigating ship opportunities for the line, and coordinating the logistics, training, and negotiations with shipping companies and ships.

8.2.1.10 On the basis of previous discussions during this Session, the Panel discussed international collaborations in the framework of the SOOP, and reviewed the line responsibilities.

52 http://www.oceanobs09.net/

The Panel agreed on the responsibilities and included the corresponding table in the SOT Implementation Strategy.

8.2.1.11 The Panel discussed how other programmes such as the Scientific Committee on Oceanic Research (SCOR) OceanScope, the Global Ocean Ship-Based Hydrographic Investigations Programme (GO-SHIP), the International Ocean Carbon Coordination Project (IOCCP, doing pCO_2 transects), and World Ocean Council (WOC), and Argo programme, could cooperate further with the SOOP and synergies developed in terms of: (i.) information exchange on common issues such as satellite data telecommunication, Global Telecommunication System (GTS), instrumentation and best practices; and (ii.) programme implementation such as logistics, ship recruitment and assistance with deployment opportunities

8.2.1.12 The Panel recommended that the SOOPIP Chair and the SOT TC work together to produce SOOP semestrial surveys (***action; SOT TC and SOOPIP Chair; end 2013***).

8.2.2 XBT Science *Team and SOOPIP*

8.2.2.1 Janet Sprintal (USA) briefly reported on the activities of the XBT Science Team, including outcome of the meeting that took place in Melbourne, Australia in July 2011, and the plans for organizing a second meeting of the Science Team in mid 2013. The Panel considered the recommendations by Dr Goni and made the following recommendations:

(i) The XBT Science Team will provide recommendations on the XBT Fall Rate Equation coefficients to SOOPIP;

(ii) Corrected data need to be made available by distribution data centres (note that long term datasets must be clearly identified if corrections have been applied (e.g. World Ocean Database – WOD – standard level data has XBT correction applies, but observed level data has no corrections);

(iii) To maintain a web site with literature and fall - rate comparison data[53];

(iv) To implement yearly, global fall - rate comparisons tests (to augment Naval Postgraduate School annual testing since 1999);

(v) To develop and document criteria for performance to be used to assess the XBT network status; and

(vi) To continue with the preparation of a summary white paper with recommendations for moving forward that also clearly describes each method so that users can easily choose the method most appropriate for them.

8.2.2.2 The Panel supported the XBT Science Team (XST), which was created to make recommendations on the implementation, maintenance, and enhancement of the XBT network and data management practices, relying therefore on a single overseeing body to make recommendations and to set up priorities. The Panel also supported the XST coordination with other operational groups, such as Ocean Observation Panel for Climate (OOPC), SOOPIP, etc.

8.2.2.3 The meeting decided on the following action items:

(i) To draft a plan for distributing corrected XBT data to the science and modeling community once the FRE coefficients have been finalized (***action; G. Goni; ASAP***);

(ii) To support and organize a Science Team meeting to be hosted approximately every two years, perhaps linked to SOOPIP or Argo science meetings (***action; G. Goni;***

53 http://www.aoml.noaa.gov/phod/goos/xbtscience/index.php

SOT-8);

(iii) To complete and maintain a dedicated web page hosted at AOML with information about the XBT Science Team, and with products on ocean currents and meridional heat transport, distribution of quality control data (e.g. with links to data distribution centres). The web page should also clearly describe recommendations for XBT data corrections, meetings and links to various XBT sites (***action; SOOPIP members, XBT Science Team members; ongoing***);

(iv) To assess the importance to carry out transects on marginal seas (Mediterranean, Gulf of Mexico) that could be critical because of lack of other type of sustained hydrographic observations (***action; XST; SOT-8***);

(v) To represent science goals to a broader community investigating boundary currents, eddies and fronts, including developing technologies, such as glider surveys. (***action; XST; SOT-8***).

8.3 Interaction with other programmes or projects

8.3.1 pCO_2 systems

8.3.1.1 Rik Wanninkhof (USA) recalled that the objectives of the CO_2 Measurement in the Ship of Opportunity (SOOP) effort are to: Produce seasonal maps of surface water CO_2 to determine anthropogenic CO_2 uptake by the oceans; and Determine trends and variability in surface water CO_2 levels and impact on ocean ecosystems. SOOP ships have contributed to CO_2 measurements which are largely captured in the Surface Ocean Carbon Atlas (SOCAT[54]), a community effort coordinated by IOCCP. ERDAP data server for sea-air flux products provides data product retrieval and visualization tools[55].

8.3.1.2 The Panel noted that TSG and XBT observations are very often carried in support of the pCO_2 operations to provide critical information to determine frontal regions and mixed layer depths for ocean acidification assessments and pCO_2 inventories.

8.3.2 Thermosalinograph Network

8.3.2.1 The Panel recalled that the SOOP coordinates the implementation of additional oceanographic observations with ship-of-opportunity, including thermosalinograph (TSG) operations. TSG data is distributed under Global Ocean Surface Underway Data (GOSUD) Project (GOSUD) and Shipboard Automated Meteorological and Oceanographic System (SAMOS) standards. The direct use of TSG data in models and in science applications is being evaluated. The greatest barrier for use of TSG data is the lack of calibration of some instruments against bottle data, which may reduce its accuracy. Many TSG instruments are associated with pCO_2 underway measurements.

8.3.2.2 TSG data are distributed mainly through GOSUD and the U.S. National Oceanographic Data Center (NODC). TSG data are also distributed as TRACKOB[56] messages to the Global Telecommunication System (GTS).

8.3.2.3 The Panel noted that the number of ships contributing data to GOSUD has increased during the last 12 years from less than 15 ships to about 86 ships in average during 2011 and 2012. NOAA contributes to these data transmissions with 7 ships of the SOOP and 10 ships of the

54 http://www.socat.info
55 http://cwcgom.aoml.noaa.gov/erddap/griddap/aomlcarbonfluxes.graph
56 FM 62–VIII Ext. TRACKOB: Report of marine surface observation along a ship's track

NOAA fleet. TSG from ships of the SOOP operated by NOAA collect and transmit the TSG data using AMVERSEAS[57].

8.3.2.4. The meeting made the following recommendations:

(i) To recognize the importance of regular complementary bottle data for absolute calibration of TSG salinity data;

(ii) To promote the use of TSG data for sea surface salinity applications, in support of satellite missions calibration and validation needs; and

(iii) To encourage the development, testing, and implementation of new technologies for measuring parameters underway or in the water-column, as well as new development for data transmission.

8.3.2.5. The meeting decided on the following action items:

(i) To increase the number of bottle samples for direct comparison and calibration (***action; SOOP members; SOT-8***);

(ii) If budget allows, to increase the number of ship collecting TSG data (***action; SOOP members; SOT-8***); and

(iii) To support scientific programs and projects that require TSG observations, such as satellite missions and observational projects (e.g. SPURS[58], pCO_2, …) (***action; SOOP members; SOT-8***).

8.4 Issues for the SOOP

8.4.1 XBT data flow and GTS transmissions

8.4.1.1 The Panel reviewed the report by Joaquin Trinanes (USA) on the real-time data transmission systems being used for the collection of SOOP data, including XBT data in particular. Most of the XBT data collected within the SOOP is transmitted from the observing platform in real-time. The data undergoes real-time QC tests and is then submitted into the Global Telecommunication System (GTS). During 2012 the NOAA Atlantic Oceanographic and Meteorological Laboratory (AOML) started the submission of XBT data into the GTS in BUFR[59] format. XBT data is also being submitted simultaneously in BATHY[60] code. BUFR transmissions are done in experimental mode and simultaneous transmissions in both formats will continue until a complete transition to BUFR is completed.

8.4.1.2 The Panel noted that with the transition of most of the XBT operation to Frequently Repeated (FRX) and High Density (HDX), the monitoring of the XBT network process is simplified. Using information available from different sources, including data centres, the GTS, and websites from different institutions participating in the SOOP, AOML prepares operational reports for the monitoring of the XBT Network. These reports are updated twice a year and contain information in the number of active transects, number and mode of deployment, as well as the different institutions involved in the logistics, deployments, data management and transmission.

8.4.1.3 The Panel reviewed the real-time data transmission systems being used for the collection of SOOP data, including XBT data in particular

57 AMVER: Automated Mutual-Assistance Vessel Rescue System - http://www.amver.com/; SEAS: Ship Environmental Acquisition System
58 Salinity Processes in the Upper **Ocean** Regional Study
59 FM 94–XIV BUFR: Binary universal form for the representation of meteorological data
60 FM 63–XI Ext. BATHY: Report of bathythermal observation

8.4.1.4 The Panel addressed limitations, cost-effectiveness, format issues, the reporting of instrument/platform metadata, and made recommendations as appropriate

8.4.1.5 The Panel discussed data tracking and quality control issues

8.4.2 Sippican Climate Quality XBT Probes

8.4.2.1 The Panel discussed Marlos Goes' (USA) report on development of Climate Quality XBT Probes under development by Sippican. NOAA has worked in collaboration with Sippican in the development of these new probes. During 2012 and 2013 two tests were performed during Prediction and Research Moored Array in the Atlantic (PIRATA) Northeast Extension cruises of prototype of new XBT probes with upgraded temperature sensors and pressure switches.

8.4.2.2 The Panel supported the development of the new Sippican Climate Quality XBT probe and recommended to coordinate release of specifications to scientific, operational, and technical community to allow the use of Climate Quality XBT probes by non-Sippican data acquisition systems.

8.4.3 XBT Fall Rate Equation (FRE) experiments

8.4.3.1 The Panel referred to the XBT science presentation made by Rebecca Cowley (Australia), Franco Reseghetti (Italy), and Tim Boyer (USA) under agenda item 8.5 (presentations number 2, 3, and 6 respectively).

8.4.3.2 The Panel discussed biases of XBT data, how they can be estimated through Fall Rate Equation (FRE) experiments and studies. Several studies with the aim to asses and develop methodologies to apply corrections to the current dataset were discussed. These studies are based in the comparison of temperature profiles obtained from different instruments including Conductivity Temperature and Depth (CTD) probes, Argo floats and XBT probes of different manufacturing date. Other studies were aimed to a better understanding of the dynamic behaviour of the XBT probes in the water and include experiments in water tanks to study the movement of XBT probes in the first 20m of its descent.

8.4.3.3 The Panel recommended that SOOPIP continue to support XBT FRE experiments and studies.

8.4.4 Plans for the future XBT network

8.4.4.1 The Panel discussed plans for the future XBT network. The current XBT operations address both operational and scientific goals of the international community and are aimed to building a sustained ocean observing system for climate.

8.4.4.2 Due to budget restrictions and scientific and climate research data requirements, a transition of XBT operations in Frequently Repeated (FRX) mode to High Density (HDX) mode during the last two years is visible. This transition allows the participating institutions to focus the resources and efforts on the XBT operation in HDX mode, where XBT deployments are done every 20-25 km and transects are repeated 2 to 10 times per year, depending on scientific requirements and logistics.

8.4.4.3 The strength of the XBT data set currently lies on its length and on its ability to estimate transports across entire ocean sections and key choke-points, such as Drake Passage, Indonesian Throughflow, the Antarctic Circumpolar Current (ACC) south of Africa, etc.

8.4.4.4 A strong international collaboration is critical for the maintenance and the future of the XBT network. During 2011-2012, 70% of all the XBT deployed and transmitted to the GTS were carried out with the participation of more than one institution or country.

8.4.4.5 The meeting made the following recommendations:

(i) To maintain and increase the collaboration between the different programs that share the same deployment platforms (these include the activities directed to the deployment of XBT, surface drifter and Argo floats among others); and

(ii) To maintain and increase the current international collaboration in the implementation and operation of the XBT Network.

8.4.4.6 The meeting agreed on the following:

(i) To support the full implementation of the XBT network;

(ii) To support the full implementation of data transmission in BUFR format;

(iii) To support experiments and studies related to the XBT Fall Rate Equation (FRE) and the development of a climate quality XBT probe;

(iv) To support the activities of the XBT Science Team; and

(v) To support the activities of related projects and programs, such as pCO_2, Thermosalinograph (TSG), Data Buoy Cooperation Panel (DBCP), and Argo.

8.5 SOOP Science Presentations

8.5.1 Dr Goni introduced series of SOOP science presentations, including:

(1) How the XBT Network Increases the Value of a Combined Observing System, Presentation by Janet Sprintall (USA);
(2) XBT fall rate and temperature biases and planning for the future, Presentation by Rebecca Cowley (Australia);
(3) The first meters of the XBT fall, Presentation by Francis Bringas (USA);
(4) Ocean studies in enclosed seas: The Mediterranean, Presentation by Franco Reseghetti (Italy);
(5) XBT studies in the Pacific Ocean, Presentation by Shoichi Kizu (Japan);
(6) XBT bias corrections effect on ocean heat content calculations, Presentation by Tim Boyer (USA);
(7) Science results from the XBT network in the North Indian Ocean, Presentation by V.V. Gopalakrishna (India);
(8) Estimating meridional transport including error in the five subtropical boundary currents of the ocean, Presentation by Nathalie Zilberman (USA);
(9) South Pacific Ocean variability studies by Bernadette Sloyan (Australia);
(10) The meridional heat transport in the North Atlantic Ocean, Presentation by Molly Baringer (USA);
(11) Meridional heat transport and heat budget in the South Atlantic, Presentation by Shenfu Dong (USA);
(12) The design of an optimal XBT transect in the South Atlantic for MOC studies, Presentation by Marlos Goes (USA);
(13) Variability of the Brazil Current, Presentation by Mauricio Mata (Brazil);
(14) Relationship of the eastward equatorial current system with the tropical Atlantic modes of variability, Presentation by Marlos Goes (USA);

(15) A multiplatform study of the meridional heat transport in the South Atlantic, Presentation by Gustavo Goni (USA).

8.5.2 The Team also recalled the presentation by Dr Ann Thresher (Australia) during the scientific and technical workshop (see agenda item 2) regarding the wireless XBT system developed by the CSIRO.

9. MONITORING, CODING AND DATA MANAGEMENT

9.1 Monitoring and data centre reports

9.1.1 VOS Monitoring Report from the Exeter (UK) Regional Specialized Meteorological Centre (RSMC)

9.1.1.1 Ms Sarah North (United Kingdom) 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 monthly and biannual quality reports as well as providing essential feedback to VOS operators regarding the quality of the data delivered by VOS ships.

9.1.1.2 The Met Office (RSMC Exeter) continues to compile lists of ships that have produced suspect observations each month (see Appendix A of Annex VIII), which are available via the Met Office web site[61] and are also sent to the WMO Secretariat.

9.1.1.3 Following action 102 from SOT-6, the Met Office agreed that the criteria for labelling ships as 'suspect' should be substantially tightened for ships that report with automatic observing systems, because these systems are seen to be more reliable and less prone to errors than manual observing systems. Due to steady improvements in the background forecasts, the criteria for ships with manual observing systems should also be tightened slightly. The Team agreed that the monitoring criteria should be set at the values shown in Appendix C of Annex VIII. To facilitate the separate monitoring of 'automatic ships' the station type ("i_X") should be included in all reports; the alternative of using "atm" from the ship metadata would require changes at the Met Office, which may delay implementation of the separate monitoring of manual and automatic ships.

9.1.1.4 The Met Office also produces monthly lists of monitoring statistics for all VOS, which are sent to the VOS focal points and are also available from the Met Office web site. To maintain up to date lists of ships, the Met Office advised that it was using the latest data downloaded from the online E-SURFMAR metadata database, rather than from the WMO Pub47 database. In addition, the Met Office uses the masked call sign data available from the JCOMMOPS FTP site.

9.1.1.5 It was noted that the SHIP masking scheme implemented by JMA in 2007 continues to prevent the Met Office from monitoring data from individual Japanese and possibly some US ships. Although the Met Office is able to collect data with real call-signs from JMA's FTP server, it is unable to route the data to its meteorological database due to problems with guaranteeing data security. In January 2013 there were 23457 reports of pressure from VOS with call-sign "SHIP", compared to just 3222 reports in March 2012, with the large increase being due to more automatic reports (now accounting for about 85% of the total).

9.1.1.6 Timeliness information for VOS reports received at the Met Office is also made available from the observation monitoring web site[62] (see Appendices D and E). This information shows that the majority of ship reports continue to be received promptly, with about 70% received within 15 minutes and 90% within 60 minutes of the observation time. Timeliness information for individual ships is also available from the website. The Team agreed that the timeliness information for national fleets should be split into two, for automatic and manual reports.

61 http://research.metoffice.gov.uk/research/nwp/observations/monitoring/index.html
62 http://research.metoffice.gov.uk/research/nwp/observations/monitoring/marine/TOR/index.html

9.1.1.7 The Team noted that the Met Office had made monthly VOS ranking scheme results available on their website for all VOS and for the national VOS fleets (action 101 from SOT-6). The monthly scheme is similar to the annual scheme that was described at SOT-6, ranking the VOS ships and whole fleets in terms of the timeliness, quantity and quality of their reports. Separate monthly lists of scores have been produced for automatic and manual ships. Details of the ranking scheme, an excerpt from the 2012 annual scores and national fleet rankings for February 2013 are shown in Appendix F of Annex VIII. VOS operators were invited to consider the value of the monthly and annual performance ranking system and to advise the Met Office if they considered that the parameters used were appropriate.

9.1.1.8 The meeting decided on the following action items:

(i) RSMC to contact other monitoring centres regarding new monitoring criteria (***action; RSMC; August 2013***);

(ii) Start using the new monitoring criteria (***action; RSMC & other monitoring centres; deadline to be agreed – possibly January 2014***);

(iii) PMOs to contact ships on monthly suspect lists to rectify any problems (***action; PMOs; ongoing***);

(iv) RSMC to separate timeliness information for manual and automatic ships (***action; RSMC; April 2014***).

9.1.2 Monitoring Report from the Real-Time Monitoring Centre (RTMC) for the VOS Climate (VOSClim) data

9.1.2.1 Ms Sarah North reported on the activities of the Real-Time Monitoring Centre (RTMC) for the VOS Climate (VOSClim) data, 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. An example of the suspect list for February 2013 can be seen in Appendix A of Annex IX and the monitoring criteria are given in Appendix B of Annex IX.

9.1.2.2 Following action 102 from SOT-6, regarding tightening the suspect criteria for VOSClim ships, the Met Office suggested new values shown in Appendix C of Annex IX, with tighter criteria for automatic ships. The Team agreed that these values were set at appropriate levels.

9.1.2.3 The Team noted that, as requested at SOT-6, the Met Office has been sending the VOSClim suspect lists and the lists of statistics to the JCOMMOPS mailing lists (PMO and VOS) since mid-2011.

9.1.2.4 The Team also noted that, as agreed at SOT-6, the Met Office had extended the BUFR data sent to the Data Assembly Center (DAC) in 2011, from just the VOSClim ship data, to encompass all ship and buoy reports and their co-located model field values. The Met Office continues to put a backup copy of the daily VOSClim BUFR data onto their FTP server, so that it is available for the DAC to access in case of problems with the GTS data.

The meeting decided on the following action items:

(i) RTMC to start using the new monitoring criteria (***action; RTMC; January 2014***);

(ii) PMOs to contact ships on monthly suspect lists to rectify any problems (***action; PMOs; ongoing***).

9.1.3 Global Collecting Centres (GCCs) report on the VOS

9.1.3.1 The meeting recalled that under the revised Marine Climatological Summaries Scheme (MCSS), adopted by the eleventh session of the Commission for Marine Meteorology (CMM) (Lisbon, Portugal, April 1993), through Recommendation 11 (CMM-XI), the two Global Collecting Centres (GCCs) were established, in Germany and the United Kingdom, to: (i) collect all marine climatological data observed worldwide; (ii) ensure that minimum quality control procedures are applied; (iii) generate complete and duplicate global data sets; and (iv) provide these data sets to the Responsible Members under the MCSS.

9.1.3.2 Gudrun Rosenhagen (Germany) provided a consolidated report from the two GCCs. The report included a status on the volume and frequency of delayed-mode data being forwarded to the VOSClim Data Assembly Centre. The GCCs also reported on how callsign masking schemes implemented per WMO Executive Council Resolution 27 (EC LIX) - both SHIP and MASK - had impacted on their operations and the user community and discussed potential solutions to this wide impacting issue.

9.1.3.3 The Team considered the role of the GCCs in processing the delayed-mode IMMT (International Maritime Meteorological Tape-format) data and the associated quality control standards.

9.1.3.4 The Team considered the new Marine Climate Data System (MCDS) and how the roles of MCSS members will migrate to the new data flow structure when it is introduced.

9.1.3.5. The meeting made the following recommendations:

(i) All Contributing Members (CMs) should submit data files in one IMMT format only – preferably now IMMT-5 quality checked to the seventh version of the Minimum Quality Control Standard (MQCS-7) making use of its increased coding capabilities;

(ii) CMs not able to submit their data because of issues e.g. with digitizing or converting into the IMMT format, should contact GCCs for advice;

(iii) All VOSClim class ships should use the indicator for registered VOSClim ships in element 41 (observation Platform) of the newly adopted formats IMMT-4 and -5 ;

(iv) All VOSClim class ship observations should include the additional VOSClim elements;

(v) If possible CMs should ensure all masked callsigns (i.e. ‘SHIP’) are converted back to the original ID prior to submission;

(vi) SOT should stay up to date with the Task Team on the MCDS (TT-MCDS) developments.

9.1.3.6. The meeting decided on the following action items:

(i) Electronic logbook programmers to upgrade logbook software to allow coding in IMMT-5 format (***action; e-logbook developers; asap***);

(ii) All CMs that did not submit data during 2012 should do so in 2013 or alternatively contact GCC for advice (***action; CMs; 2013***); and

(iii) The GCCs to provide maps about the availability of delayed mode VOS observations by variable (***action; GCCs; asap***).

9.1.4 VOSClim Data Assembly Centre (DAC) report

9.1.4.1 Mr Eric Freeman (USA) reported on the present status and activities of the Data Assembly Centre (DAC) for the VOSClim fleet in accordance with its Terms of Reference. The DAC is operated by the U.S. National Climatic Data Center (NCDC). He also reported on the status of the project website, including the collection and provision of real-time and delayed-mode observation data, metadata, ship listings and other project information. In the coming years, the MCDS will replace the MCSS and at that time it is expected that the VOSClim DAC will be upgraded to the VOSClim Global Data Assembly Centre (GDAC).

Data Assembly

9.1.4.2 The Team noted that the NCDC maintains several archives in support of the VOSClim Fleet and hosts a web presence[63] for access to fleet information and data. The archive consists of three data streams:

- GTS - near-real time collection of ship observations
- BUFR – ship observations plus model fields
- GCC – Global Collection Centres delayed mode ship observations

9.1.4.3 VOSClim observations from all streams are captured based on the most current ship list[64] 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.

9.1.4.4 The Team further noted that the DAC continues to report quarterly to the GCCs on the number of delayed mode VOSClim observations parsed from the delayed mode files distributed to Responsible Members (RM). This information is used in the GCC annual reports.

9.1.4.5 All observations are decoded into the International Maritime Meteorological Archive (IMMA) format[65] and placed on the project web site[63].

VOSClim Web Page and Data Access

9.1.4.6 NCDC reported that the VOSClim web page was significantly modified in 2011 to represent the upgrade of VOSClim from a project to its own class within the VOS Scheme. New VOSClim Fleet logos were added to the website, replacing the Project logo, and the site was downsized in order to focus primarily on VOSClim-related material and move all extraneous VOS Scheme materials/links to the official International VOS website[66].

9.1.4.7 The Team recalled that the data access website[67] allows viewing of the data directly by any browser. For an automated download, the data is available on an anonymous FTP site[68]. In either location, separate folders exist for each year beginning with 2001. Also available for download from the FTP site is the VOSClim Ship List in MS Excel format; award pictures; ship pictures; and the statistics and suspect ship reports. In light of the integration of the VOSClim fleet in the wider VOS, the Team nevertheless agreed that the VOSClim website was still a useful resource, and thanked NCDC for continuing to hosting it.

VOSClim Ship List and Participation

63 http://www.ncdc.noaa.gov/oa/climate/vosclim/vosclim.html
64 http://www1.ncdc.noaa.gov/pub/data/vosclim/vosclimshiplist.xls
65 http://icoads.noaa.gov/e-doc/imma/R2.5-imma.pdf
66 http://www.bom.gov.au/jcomm/vos/vos.html
67 http://www.ncdc.noaa.gov/oa/climate/vosclim/vosclimdata.html
68 ftp://ftp.ncdc.noaa.gov/pub/data/vosclim

9.1.4.8 The DAC noted with appreciation that the number of recruited ships was up to 432. Participation in VOSClim continues to increase. One hundred eleven (111) ships were recruited into the VOSClim fleet since SOT-VI (April 2011, inclusive) while 39 vessels were withdrawn during the same period, providing a net gain of 72 VOSClim vessels.

9.1.4.9 The DAC commends International Port Meteorological Officers (PMO) for timely updates and notifications of new VOSClim recruits/withdrawals.

9.1.4.10 Regarding the list of VOSClim ships, the Team recommended that for data processing purposes, to stop maintaining the list at NCDC, and instead begin using the ESURFMAR list [69], which is based on Pub 47 metadata (***action; VOSClim DAC; Apr. 2014***).

9.1.5 ASAP QC Monitoring report

ECMWF ASAP Monitoring

9.1.5.1 The Team reviewed a written report from the Mr Ersagun Kuscu of the European Centre for Medium-Range Weather Forecasts (ECMWF) on the ECMWF monitoring activities for ASAP. ECMWF is monitoring ASAP data on a daily and monthly basis. The Team noted that:

- The number of ASAP reports received at ECMWF were reduced in 2012 compared to the numbers received in 2011, despite a slight increase in the number of reporting platform identifiers;
- The percentage of ascents reaching the level of 100 hPa was reduced to values between 65 and 70% in the summer of 2012 at 06/18UTC observation window;
- Problems related to wrongly located reports are still there; and
- The quality of the data has continued to be good and highly valuable.

9.1.5.2 The Team noted that in some situations the ASAP profile positions are entered manually in the system, and position errors can unfortunately be introduced that way. To address this issue, the Team noted that an ASAP system software upgrade is expected to prevent manual positions to be entered, i.e. to allow the use of GPS positions only. On the other hand, the Team noted that this will prevent making ASAP soundings when the GPS is not functioning.

ASAP Monitoring Centre (Météo France)

9.1.5.3 Gérard Rey (France) reported via teleconference on the status of the ASAP monitoring centre, as well as future plans. The ASAP monitoring centre was established by Météo France, as agreed at the Seventh Session of the former ASAP Co-ordination Committee in 1995. Since that time, Météo France has been routinely providing annual monitoring report on behalf of the ASAP.

9.1.5.4 The Team reviewed the monitoring reports, noting in particular the operational performance and data quality of the ASAP.

9.1.5.5 The Team noted that:

- The reports were received from 23 different call signs;
- One of them ASGB01 moved in 2011 to ASEU06. The quality of the ASAP reports was generally of a high standard, with only a small percentage of erroneous data;
- Few corrupted call signs can be seen from time to time but less in 2012 than in 2011;
- Japanese ships follow a different procedure with an important shift between the sending of the message and the synoptic hour.

69 ftp://esurfmar.meteo.fr/pub/Pub47/VOSClim_list.csv

9.1.5.6 The Team made the following recommendations:

(i) ASAP ship operators should be very careful about setting the software to prevent incorrect positioning of the launching point (***action; ASAP members; ongoing***); and
(ii) ASAP operators should try to update their transmission systems in order to be able to transmit high resolution data messages (***action; ASAP members; asap***).

9.1.6 Global temperature and Salinity Profile Programme (GTSPP)

9.1.6.1 Ann Thresher (Australia) reported on behalf of the Chairperson of the Global Temperature and Salinity Profile Programme (GTSPP), Dr Charles Sun (USA) on the development and activities of the GTSPP, including the revision of the terms of reference and composition of the SG-GTSPP, publishing of the first edition of the "Global Temperature and Salinity Profile Programme – Data User's Manual" and GTSPP data formats. She recalled that the GTSPP was a joint program of the International Oceanographic Data and Information Exchange committee (IODE) and JCOMM.

9.1.6.2. GTSPP continues to deal in greater volumes of data over past two year period (e.g. 11% increase between the periods 2009 – 2010 and 2011 – 2012); while the number of delayed-mode data added to the archive decreased about 19% to 89,912 by the end of 2012. The GTSPP continues to improve its capabilities of serving the GTSPP data for operations and climate research.

9.1.6.3. The Japan Meteorological Agency (JMA) became the GTSPP Data Product Centre (GTSPP-DPC [70]) for the North Pacific Ocean in March 2011. With finical support from the IOC/IODE project office, the GTSPP was able to publish the first edition of the "Global Temperature and Salinity Profile Programme – Data User's Manual"[71] in November 2011. The First Session of the Joint IODE-JCOMM Steering Group for the GTSPP was held at the IODE project office for IODE in Oostende, Belgium, 16 – 20 April 2012, and adopted the GTSPP work plan for 2012–2013 (see report of the meeting on the web[72]). The Team noted that the GTSPP is expected to continue its operation during the next inter-sessional period, 2013 - 2014.

9.1.6.4. The U.S. National Oceanographic Data Center (NODC) currently supports two separate profile database systems: the World Ocean Database (WOD), which manages research-quality historic data using a custom data file system; and the Continuously Managed Database (CMD) of the GTSPP, which manages real-time data, and matches it to higher quality "delayed-mode" data to create a "Best Copy" product using the commercial Oracle RDBMS. The NODC is making plans for the future and preparing to operate with fewer resources, and is examining options for how they can continue to participate in the GTSPP. The US NODC has been developing a single Integrated Ocean Profile System (IOPS) using an open-source RDBMS (i.e., PostGreSQL). It is expected that the new Integrated Ocean Profile System will improve efficiency while also enhancing the quality of the profile data products of both programs.

9.1.6.5. An ad hoc GTSPP consultation meeting was held from 5 – 9 November 2012 in Tianjin, China. During the meeting, the National Marine Data and Information Service (NMDIS) of the State Oceanic Administration (SOA) agreed to allocate resources to implement a pilot project to demonstrate its capability of performing the role as a GTSPP Global Data Products Center to produce monthly/seasonal optimal estimates of 3-D, global ocean temperature and salinity fields and provide facilities and funds for implementing training courses on the use of GTSPP data at NMDIS.

9.1.7 Global Ocean Surface Underway data Pilot Project (GOSUD)

70 http://goos.kishou.go.jp/GTSPPDPC/index.html
71 IOC Manuals and Guides, 60, 50 pp, English - http://www.nodc.noaa.gov/GTSPP/document/datafmt/MG60.pdf
72 http://www.nodc.noaa.gov/GTSPP/document/reports/SG-GTSPP-I_3.pdf

9.1.7.1 The Chair of the Global Ocean Surface Underway Data Pilot Project (GOSUD), Mr Loïc Petit de la Villeon (France) presented a report on the developments and activities of GOSUD.

9.1.7.2. He recalled that the GOSUD Project is an International Oceanographic Data and Information Exchange (IODE) programme designed as an end to end system for data collected by ships at sea. The goal of the GOSUD Project is to develop and implement a data system for surface ocean data, to acquire and manage these data. For the moment, the parameters concerned are sea surface salinity and sea surface temperature.

9.1.7.3 The Team noted that since it began, the GOSUD partners have focused their efforts on assembling together data that have been collected by various agencies around the world. Some have been regular data contributors such as SO SSS – former ORE (France), NOAA (USA) and Coriolis (France). Some contributors that were used to provide data on non regular basis are now sending data on a regular basis (Belgium, Japan). Some others have been simply occasional (UK, Australia, and Germany). The contributions may be related to regular merchant ship lines (SO-SSS France) or to research vessel surveys (NOAA, IFREMER). ISDM (Canada) is decoding underway thermosalinograph data circulating on the GTS in ASCII code form FM-62 VIII (TRACKOB) and providing it to GOSUD on a daily basis.

9.1.7.4 During the reporting period, GOSUD has been essentially working on the following tasks:

1. Continue the effort to collect and gather data from observing vessels. The main contributor are IRD, NOAA, IFREMER;

2. Continuing the effort on enlarging the network of vessels providing Sea Surface Salinity and temperature data. 91 vessels have reported data in 2011 and 81 vessels in 2012;

3. Develop a software –TSG-QC- (IRD contribution) which is freely available on the web[73].

   This software allows to (i) Visualise TSG variables: Temperature, salinity and ship speed; (ii) compare TSG data with Levitus climatological values; (iii) data quality control using selected threshold criteria; (iv) validate and correct TSG data with external “bucket” measurements (water samples usually collected once a day and / or collocated Argo data); and (v) estimate the sensor drift;

4. Produce a delayed mode data set of science quality. Contribution IFREMER and IRD;

5. Define a new format GOSUD V3 which enables to hold in a single file near real time data, delayed mode data, metadata and ancillary data (buckets, Argo or CTD collocated data).

9.1.7.5 The meeting invited GOSUD to take into account the following recommendations:

(i) GOSUD to better identify the vessels that report data on a regular basis through the GTS and recommend them to report data directly to the GDAC in addition to the GTS (***action; GOSUD; ongoing***);

(ii) GOSUD to make the delayed mode data (science quality) more visible and advertise them (***action; GOSUD; asap***);

(iii) Considering the status of the Project and the need to adapt its governance, GOSUD must identify an advisory group and a steering committee; SOT members are invited to consider applying for becoming member of the advisory group (***action; GOSUD; SOT-8***); and

73 http://www.ird.fr/us191/spip.php?article63

(iv) GOSUD to enhance the relationship with science satellite community (SMOS and AQUARIUS) (***action; GOSUD; SOT-8***).

9.1.7.6 The meeting decided on the following action items:

(i) To assist the IODE in identifying a second co-Chair of the GOSUD Steering Group Chair (***action; SOT Chair; June 2013***);

(ii) To invite GOSUD to evaluate the quality of the whole GOSUD data set available (***action; GOSUD; September 2013***);

(iii) To organize a joint GTSPP/ GOSUD workshop in April 2014 in Ostende, Belgium (***action; SOT & GTSPP & GOSUD Chairs; April 2014***);

(iv) The Team requested the E-SURFMAR, GOSUD, and the SOT TC to liaise on the issue of putting the GOSUD metadata into the E-SURFMAR database (***action; P. Blouch, L. Petit de la Villeon, & SOT TC; asap***);

(v) The Team agreed that there was a need to improve the content of the BUFR template for underway data, and requested the Task Team on Table Driven Codes (TT-TDC) to address this issue (***action; TT-TDC; SOT-8***); and

(vi) While noting that it was sometimes difficult to access underway surface data that are split amongst different archives, the Team invited the DMCG to discuss the issue and make proposals to allow best-copy data-sets to be easily identified, and become accessible via ODP and WIS, while avoiding duplication (***action; DMCG; JCOMM-5***).

9.1.8 Global temperature data distribution by Coriolis

9.1.8.1 Mr Loïc Petit de la Villeon (France) reported on the development and activities of the Coriolis data centre (IFREMER, France) in particular regarding global temperature data distribution. He recalled that the Coriolis data centre was initially set up to fulfil the needs of operational oceanography at French level. Then Coriolis moved to a European coordinated effort to provide global ocean in situ datasets through the European Union (EU) projects MERSEA, MyOcean-1 and now MyOcean-2.

9.1.8.2 Mr Petit de la Villeon reported that Coriolis is focusing on few parameters: initially T & S, and now a few additional biogeochemical parameters. Within the European project MyOcean-2, the work load is shared at the regional level (Regional Ocean Observing Systems). He reported on how the Coriolis / MyOcean-2 data are distributed. Both a web site data selection tool and “on stop shopping” based on a ftp site are maintained. All relevant documentation is available on the web[74].

9.1.8.3 Due to its role as GDAC for the Argo, OceanSITES and GOSUD projects, Coriolis has been able to provide access to 1 500 000 new profile data in 2012. Data from about 3.000 different platforms are uploaded to the Coriolis data centre every month.

9.1.8.4 Mr Petit de la Villéon recalled that there is a strong relationship between MyOcean-2 and the EU Project SeadataNet-2. SeadataNet-2 aims to link the European National Data Centres. This collaboration make possible the access to historical datasets that were not widely distributed before.

9.1.8.5 Finally Mr Petit de la Villéon reported that the “Cora” Coriolis re-analysed global dataset is also distributed through the Coriolis web server. The data reprocessed were collected from 1990

74 http://www.coriolis.eu.org/Data-Services-Products/MyOcean-In-Situ-TAC/MyOcean-documentation

to 2011.

9.2 Operational Coding requirements

9.2.1 BUFR Template for VOS data

BUFR Templates

9.2.1.1 The Team recalled that WMO Commission for Basic Systems (CBS) migration to table driven codes for marine data shall be completed [75] between November 2012 and November 2014 per CBS-Ext. (2010) recommendation. The Team recognized that progress with regard to the development and updating of the required BUFR [76] templates for marine meteorological and oceanographic data has been limited since the sixth SOT Session (Hobart, Australia, April 2011).

9.2.1.2 The Team noted and concurred with a proposal from the UK MetOffice to add "Surface station type", and "Generic type of humidity instrument" in marine data BUFR templates (Appendix I of SOT-7 Document No. 9.2). The Team urged the Task Team on Table Driven Codes (TT-TDC) to speed the submission of SOT related BUFR template proposals to the CBS taking SOT requirements into account (***action: TT-TDC; asap***). However, the Team noted with concern that the TT-TDC had currently no Chair, and was not active. It requested the Secretariat to investigate for the nomination of a new chair in consultation with the Chair of DMCG (***action; Secretariat; asap***).

9.2.1.3. The Team noted that plans are underway for sharing tools for BUFR encoding/decoding software within the oceanographic community, and example of BUFR reports have been produced for training purposes (there have been recorded in the IODE OceanTeacher[77]). It was also noted that JCOMM-4 requested the DMPA to keep the "Cookbook for submitting ocean data in real-time and delayed mode[78]" under review, and continue to keep the BUFR templates for ocean data under review so that they continue to take end-user requirements into account. Highlighting the importance of BUFR, JCOMM-4 further requested the DMPA to finalize the BUFR Master Table 10 (Oceanographic Data).

9.2.1.4 The Team recalled that JCOMM has engaged a process for the rationalization of BUFR sequences for marine data in order to provide some standardization and consistency for the reporting of specific ocean variables and their metadata between the different types of ocean observation platforms reporting in BUFR format (e.g. same sequence for data and metadata for SST observations from VOS, moorings, drifters, tide gauges, etc.).

9.2.1.5 See also agenda item 6.6 (and corresponding SOT-7 preparatory document) relating to the provision of encrypted ship's call sign (ship masking) within the BUFR template for VOS data.

Preservability of marine data

9.2.1.6 Regarding the issue of preservability of the real-time data, the Team recalled that the ETMC had established a small *ad hoc* group at its third meeting (Melbourne Australia, February 2010) to address each of the following levels:

1. Observing practices and the recording of the observations on-board the ship;

75 Completion means that at this date the BUFR (CREX) exchange becomes the standard WMO practice. Parallel distribution of TAC and TDCF may continue and will be discontinued within a zone in accordance with step-by-step arrangements made between the NMHS concerned. Details in annex XI of the abridged final report with resolutions and recommendations of CBS-Ext (2010), Windhoek, Namibia, 17–24 November 2010 – http://www.wmo.int/pages/prog/www/CBS/Reports/2010_Ext10_Windhoek_1070/1070_en.pdf

76: FM-94 BUFR : Binary Universal Form for the Representation of Meteorological Data (used for distribution of time critical data onto the Global Telecommunication System – GTS.

77 http://library.oceanteacher.org/OTMediawiki/index.php/BUFR_and_GRIB_Formats

78 http://www.jcomm.info/index.php?option=com_content&task=view&id=37&Itemid=49

2. Transmission of the observations in real-time from ship to shore. While it was not proposed to standardize the format(s) used for the transmission of VOS data from ship to shore, the Team felt that it would be useful to provide guidance regarding the elements that should be transmitted, on a variable-by-variable basis; and
3. Transmission of the observations in real-time onto the GTS in BUFR format.

9.2.1.7 The Team recalled that the *ad hoc* group had produced a report that was then submitted to the sixth Session of the Ship Observations Team (SOT-6, Hobart, 11-15 April 2011). The Team recalled the recommendations from SOT-6 in this regard.

9.2.1.8 The Fourth Session of the ETMC (Ostend, Belgium, November 2012) recognized that there has not been sufficient validation of the existing BUFR templates for marine meteorological and oceanographic data, and agreed that the ICOADS should have been involved in the validation. ETMC-4 noting outstanding issues, agreed to re-activate the ad hoc group on preservability[79], and requested it to address the SOT-6 decisions, and to make further proposals to this SOT Session, especially regarding practices to be included in the section of the *Guide to Marine Meteorological Services* (WMO No. 471) describing the VOS Scheme and in the *Manual on Codes* (WMO No. 306). The ETMC-4 requested the *ad hoc* group to address the SOT-6 decisions, and to make further proposals to this SOT Session. The Team concurred with the following recommendations from the *ad hoc* group:

- **2a) Recommendation**: Endorse and encourage the creation of a permanent and open repository for the storage and provision of past observing instructions and regulations within the CMOC framework.

- **2b) Recommendation**: encourage the use of the above mentioned repositories for storing old e-logbook documentation and source code where software licensing allows.

- **2c) Recommendation**: Encourage the use of e-logbook and AWS manufacturers that support the archival of old versions and documentation.

- **3a) Recommendation**: support the creation of a new E-SURFMAR data format for non AWS VOS based on data format #100 with the conventional VOS section expanded to include either both the dew point temperature (replacing relative humidity) and wet bulb temperature to 0.1°C or the relative humidity together with a flag indicating the humidity variable reported.

- **4a) Recommendation**: Update B/C 10 to reflect that cloud is typically observed in Oktas and give guidance on the coding of this in % by the addition of the following note to B/C 10.4.4.1:

    2) When cloud cover is observed in Oktas the cloud cover shall be converted to percent, with fractional numbers rounded up (e.g. 1 Okta = 12.5%, rounded to 13 %).

- **4b) Recommendation**: Support the further development of the common marine sequences, with an aim to submitting a new BUFR template proposal, including table revisions, to the Autumn IPET-DRC meeting.

- **4c) Recommendation**: For an initial period(a minimum of 2 years) an additional descriptor is included in the BUFR / CREX template for VOS reports giving the report in its original

79 The group is comprised of Gudrun Rosenhagen (Germany), Shawn Smith (USA), David Berry (UK), Nicola Scott (UK), and Scott Woodruff (USA)

form before encoding into BUFR. This would require the addition of the following regulation to B/C 10 (and any update):

B/C 10.10 The element descriptor 2 05 YYY shall be included as the last element in all synoptic reports for sea stations, i.e. the data descriptors in Section 3 of the BUFR message for VOS shall be given by 3 08 009 2 05 YYY. The element 2 05 YYY shall include the synoptic report in its original form as reported and the YYY in the descriptor replaced by the number of characters in this element.

- **4d) Recommendation**: For an initial transition period of at least two years, the VOS reports shall also be distributed in parallel over the GTS in FM13 or the CREX format using the agreed BUFR / CREX template.

9.2.1.9 Regarding Recommendation 3a, the Team requested E-SURFMAR to finalize the proposed new data format for non AWS VOS, and liaise with the ETMC *ad hoc* group in this regard. The goal is to have the new format eventually approved by the VOSP Chair (***action; P. Blouch; end 2013***).

9.2.1.10 The Team noted that ETMC-4 has requested David Berry (UK) to coordinate with Joaquin Trinanes in the view to submit a CTD BUFR template to the DMPA Task Team on Table Driven Codes (TT-TDC) for their review, and further submission to the CBS.

9.2.1.11 The Team requested the Sub-Group on AWS of the TT-IS to look at the issue of preserving AWS data, and to make recommendations in this regard at the next SOT Session (***action; TT-IS/SG-AWS; SOT-8***).

9.2.2 BUFR Template for XBT/XCTD/TSG data

9.2.2.1 Mr Joaquin Trinanes (USA) reported on the development and evaluation of BUFR templates for XBT, XCTD, and TSG data.

9.2.2.2 The team noted that the template for XBT data has passed the validation stage and has been approved for operations through a fast-track procedure last Nov 7th, 2012. Bulletins in both FM 63-XI Ext. BATHY code form and the new BUFR format, are being routinely put on the GTS for global distribution. Up to date more than 3000 profiles were transmitted this way. The Team recommended its members to use the template for GTS distribution as required. To assist in this exercise, the Team received information on several software resources which are available to data providers to complete migration into BUFR. The Team agreed that the users of XBT data should be alerted about the migration to Table Driven Codes, and receive information on how to decode the data. Training materials should also be made available to data providers for supporting the migration. The Team invited the DMCG to address this issue (***action; DMCG; asap***).

9.2.2.3 The Team also discussed the development of a new TRACKOB template. For this work to succeed, it was noted that feedback from data users is essential to determine which metadata the new template should contain. the Team recommended that the SOT should work with the TSG community to define metadata to be included in a new TRACKOB template

9.3 SOOP and ASAP metadata requirements

JCOMM-4 guidance regarding metadata

9.3.1 The Team recalled that JCOMM-4, through Recommendation 1 (JCOMM-4) recommended in particular that (i) WMO Members and IOC Member States should record and

provide through the appropriate mechanisms, on a routine basis the required metadata about ocean instruments and observing platforms that they operate; and (ii) JCOMMOPS should routinely contact platform operators so that the metadata are being submitted to the relevant Centres for Marine Meteorological and Oceanographic Climate Data (CMOCs[80]), including for operational platforms and for historical ones.

SOOP Metadata

9.3.2 The Team recalled that a metadata collection mechanism has been established by SOOP through the SOOP annual XBT survey[81] coordinated by JCOMMOPS. A dedicated metadata format[82] has been developed for SOOP operators to submit the ship metadata for every XBT profile on a yearly basis.

9.3.3 The Team requested the SOOPIP Chair to make a proposal on the list of XBT specific ship metadata to be collected (e.g. height of the drop, speed of ship at the time of the drop, etc.) and to provide the information to the SOT TC (***action; G. Goni; asap***). The Team also recommended that all SOOP ships should also make VOS observations, and in that case record the ship metadata through WMO Publication No. 47 (***action; SOOPIP members; ongoing***).

GO-SHIP Metadata

9.3.4 The Team discussed requirements for GO-SHIP metadata, and agreed that results of already scheduled discussions between the GO-SHIP chair and JCOMMOPS will provide further necessary information for the design of a dedicated metadata format. The overall format will be similar to the SOOP format. The GO-SHIP website, in particular the reference sections[83] page, gives an overview of the most crucial information, such as ship, observed parameters, PI, data history, voyage dates and voyage report.

9.3.5 The SOT TC stressed that plans of upcoming cruises (both SOOP and GO-SHIP) should always be submitted as soon as possible to JCOMMOPS, in order to create synergies with other observation programs (e.g. deployment of Argo floats).

Automated Shipboard Aerological Programme (ASAP) Metadata

9.3.6 The Team recalled its discussion at SOT-6 regarding the collection of ASAP metadata. JCOMMOPS was particularly invited to discuss the details of a proposal with the ASAP Task Team, and the WMO Secretariat in the view to submit it at this SOT Session and later to the CBS.

9.3.7 The Team reviewed the proposal for better integration of ASAP metadata into WMO Publication No. 9 Volume A, Catalogue of Radio-sondes. Only metadata related to the ASAP station (not to the ship) are concerned by the proposal, where it is proposed that JCOMMOPS would play a role, by collecting the metadata from ASAP operators, and providing appropriate online tools to the complete metadata data-set. A simplified version of the ASAP metadata, consistent with WMO Publication No. 9, Vol. A, would be made available through the WMO website. At some later stage, the ASAP metadata would become consistent with the requirements for the WIGOS Operational Information Resource (WIR), and the Surface component (OSCAR/Surface) of the Observing System Capability Analysis and Review Tool (OSCAR[84]).

9.3.8 Per the proposal, ASAP operators would be required to (i) record, and compile their metadata; (ii) submit the metadata to JCOMMOPS using the proposed format; and (iii) submit the metadata on a quarterly basis, but preferably monthly. In addition, JCOMMOPS would be required

80 Per JCOMM-4 decision, National Marine Data and Information Service (NMDIS, Tianjin, China) of the China State Oceanic Administration (SOA) and the Deutscher Wetterdienst (DWD, Hamburg, Germany) undertake the functions of CMOCs on a trial basis.
81 http://www.jcommops.org/soop/soop_report.html
82 http://www.jcommops.org/doc/metadata/submission_format.html
83 http://go-ship.org/RefSecs/goship_ref_secs.html
84 http://www.wmo.int/oscar

to (i) routinely compile submissions from the ASAP operators and import them into the JCOMMOPS database as they become available; (ii) make the ASAP metadata accessible through the JCOMMOPS website and provide user friendly query tools; and (iii) extract the WMO No. 9 required fields from all the collected ASAP metadata, and submit updated files to the WMO Secretariat on a monthly basis in the appropriate format. It is also proposed to create an excel sheet with a reduced version of all ASAP metadata that is consistent with the WMO No. 9, Volume A, and includes additional information as provided for land-based systems through the *WMO Catalogue of Radio-sondes and Upper-air wind Systems*.

9.3.9 The Team agreed that metadata access policy needs to take into account the ship security and commercial sensitivity of maritime companies with regard to the availability of certain metadata fields to the general public. The Team therefore concurred with the ASAP metadata policy detailed in the proposal.

9.3.10 The Team concurred with the proposal (Appendix A of SOT-7 Document No. 9.3) and requested JCOMMOPS and the Secretariat to initiate its development in the view to have the ASAP metadata collection scheme fully operational by the end of 2014 (***action; JCOMMOPS & Secretariat; end 2014***).

9.4 Marine Climate Data System (MCDS) development and SOT contribution

(Sylvain de Margerie (ISDM, Canada) also participated in the discussion of this agenda item via teleconference)

9.4.1 The Chair of the JCOMM Expert Team on Marine Climatology (ETMC), Ms Nicola Scott (UK) reported on the status of the development of the new Marine Climate Data System (MCDS) per Recommendation 2 (JCOMM-4). The Team recalled that the MCDS is an outcome of the modernization of the Marine Climatological Summaries Scheme (MCSS) taking into account new sources of historical marine-meteorological and oceanographic climate data, as well as state of the art data management techniques. The goal is to develop a standardized international data management system across JCOMM, integrating collection, rescue, quality control, formatting, archiving, exchange, and access—for marine-meteorological and oceanographic real-time and delayed-mode data and associated metadata of known quality, and products that satisfy the needs of WMO and IOC applications. In particular, ocean data requirements for long term climate monitoring, and climate services are to be addressed.

9.4.2 The Team also noted the outcome of the twenty-second Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE-XXII), Ensenada, Mexico, 11-15 March 2013. The Session adopted Recommendations 7.1.1 on the IODE Global Data Assembly Centres (GDACs), and Recommendation 7.1.2 on the MCDS. The latter Recommendation approved the Marine Climate Data System (MCDS) Strategy taking into account decisions and the recommendations adopted by IODE-XXII on new structural elements of IODE, and agreed with the evaluation criteria for the WMO-IOC Centres for Marine Meteorological and Oceanographic Climate Data (CMOCs). IODE-22 also established a small *ad ho*c group to work on the implementation plan concerning MCDS.

10 SOT IMPLEMENTATION STRATEGY

10.1 The Team recalled that at its previous Session it agreed to review the SOT overarching implementation plan that was adopted at SOT-3, and to include in it an SOT strategy for addressing the full range of observational data requirements (drawn essentially from the RRR, and including those of WMO, OOPC, GCOS, operational oceanography and other applications) and gaps in terms of ship observations. It had requested the Chair, in liaison with the VOSP and SOOPIP Chairs, and the Secretariat to update the document for review at SOT-7.

10.2 SOT-6 had also agreed that the VOS strategies should be adjusted to address the requirements for sea surface meteorology, and promote the VOS programme in particular for the making of higher quality measurements to address new requirements such as GFCS.

10.3 The Team reviewed the first draft of the SOT Implementation Strategy produced by the SOT Chair in consultation with the VOSP and SOOPIP Chairs as well as the Secretariat. The Strategy provides an overall framework for the Team's work, and at the same time enables it and its members to react appropriately to future developments. The strategy elaborates on the rationale and plans for implementation of the ship fleets under SOT's responsibility in the foreseeable future. It particularly it includes the overarching implementation plan, and a detailed implementation plan with clear objectives, and some performance targets. The Team acknowledged that the document was drafted taking into the SOT overarching implementation plan adopted at SOT-3 as well as decisions and recommendations from past SOT Session, and latest developments within JCOMM and its Observations Programme Area (OPA). SOT Key Performance Indicators (KPIs) from the draft strategy are provided in Annex VII.

10.4 The Team proposed some adjustments to the implementation strategy. In particular, the following were proposed:

- Updating paragraphs 3.4.6 to 3.4.8;
- Include ship-based observation requirements for satellite data;
- Include information on SOOP metrics;
- All ongoing actions arising from this meeting will be inserted in the implementation strategy.

10.5 The Team invited its members to send comments on the implementation strategy to the SOT Chair and the Secretariat by 31 May (***action; SOT members; 31 May 2013***).

10.6 The Team then requested the SOT Chair to finalize the Strategy on behalf of the Team in consultation with the VOSP and SOOPIP chairs, the OPA Coordinator, the Task Team Chair, and the Secretariat. The goal is to post the first version of the strategy on the SOT and JCOMM websites by mid-2013 (***action; G. Ball; 31 July 2013***).

11. SUPPORT INFRASTRUCTURE

11.1 JCOMM in situ Observations Programme Support Centre (JCOMMOPS)

11.1.1 Ms Kelly Stroker (JCOMMOPS) reported on behalf of the JCOMMOPS Technical Coordinators (TCs) on the operations and development of JCOMMOPS in general and presented an update on the centre activities, priorities and challenges.

11.1.2 The Team took note that a first JCOMMOPS Strategy Meeting had taken place in December 2011 in Toulouse, France, after SOT-6. The meeting attendees, embryo of executive board for JCOMMOPS, agreed on a number of proposals and actions, including in particular: i) the firm establishment of a dedicated software engineer position, ii) the establishment of a JCOMMOPS Ship Coordinator position (for SOT and possibly GO-SHIP coordination), iii) the structural change within JCOMMOPS (Argo/SOT TC focusing on Argo and covering key JCOMMOPS managerial functions), and iv) investigate further the development of JCOMMOPS in Brest.

11.1.3 K. Stroker reported that the DBCP coordinator moved back to the US in January and now worked remotely from Colorado. JCOMMOPS stressed that the centre can work with high efficiency across all supported programs only if all coordinators are situated at the same location and invest a minimum of time on cross program issues and integrated services development.

11.1.4 K. Stroker was proud to announce that based on the approval of the supporting Panels and Steering Teams, host country, and the Secretariats, JCOMMOPS hired Mr Kramp as new

JCOMMOPS “Ship Coordinator”. The Team recalled that the announcement for this position was published from May to August 2012. Twenty-two applications were received, many of them outstanding. A committee with all stakeholders’ representatives, including a reduced executive committee (JCOMMOPS, CLS, JCOMM OPA Coordinator, and Secretariat) had been set up to review and select the incumbent. The executive committee made a short list and interviewed four candidates, and a final decision was taken in November. The position is currently regarded as a pilot activity based on an 18 months fixed term contract with CLS, which is also hosting JCOMMOPS. It is foreseen that if the pilot activity is proved successful, and provided long term funding can then be identified, this position could then become an international post through UNESCO or WMO, as it is currently the case for the two other coordinators at JCOMMOPS.

11.1.5 The Team thanked in particular Mathieu Belbéoch (JCOMMOPS) for his commitment and perseverance in leading the recruitment of the SOT TC, including detailed position description and justification, money engineering, negotiations with CLS, and transparent recruitment procedure.

11.1.6 The Team also noted with appreciation that during the recruitment process, the GO-SHIP Steering team agreed to support the JCOMMOPS Ship Coordinator’s position financially and provided inputs to the position workplan. Accordingly, a part of the working time is dedicated to GO-SHIP technical coordination, as formerly described by the SOT TC under item 3.4. The SOT TC will participate in developing further the linkage between SOT and GO-SHIP.

11.1.7 K. Stroker announced that former intern Damien Bourarach (JCOMMOPS), who trained within JCOMMOPS in 2011-2012, started at JCOMMOPS on September 17 as a CLS employee and full time software engineer. This was made possible thanks to increased contributions to JCOMMOPS via CLS, in particular from OceanSITES (Australia, USA WHOI and SIO, POGO). The JCOMMOPS Information Technology (IT) staff now comprises ¼ Full Time Equivalent (FTE) senior software engineer (Laurent Cros), and one FTE junior and occasional students. The team noted that D. Bourarach acts also as a “Junior Technical Coordinator” and will be a precious support to the Argo, DBCP, SOT/SOOP/GO-SHIP Technical Coordinator day to day work.

11.1.8 The Team noted that in February 2013, a teleconference with all JCOMMOPS stakeholders’ representatives took place. The arrival of Mr. Kramp, the anticipated departure of Ms. Stroker (initializing the recruitment of a new TC for DBCP and OceanSITES), and the positioning of JCOMMOPS headquarters were the core topics of the teleconference. Overall feedback was encouraging and positive with regard to JCOMMOPS development strategy, creativity, and future establishment in Brest.

11.1.9 K. Stroker recalled that such migration of the centre of gravity of JCOMMOPS in France, would build on the existing agreements with JCOMMOPS hosts (CLS and Coriolis), and add support from the local partners (Science Park, Brest city, Brittany region), including in-cash support. As part of the transition to Brest, a JCOMMOPS strategy including a full budget accounting with all TC activities is under development. The SOT TC will move to Brest by the end of 2013. An inauguration of the relocated JCOMMOPS headquarters in Brest is anticipated early 2015.

11.1.10 The Team encouraged such a migration of the office to a marine pole, closer to JCOMM ship based activities in France and the ESURFMAR coordination team.

11.1.11 K. Stroker presented a synthesis on the overall JCOMMOPS budget.

11.1.12 The SOT acknowledged the financial effort made by JCOMMOPS to initiate the SOT TC position, and will make a commitment to fund the position in 2013 from contributions of member states. The team thanked the members for their contribution and encouraged members/member states to continue and increase contributions to retain the SOT TC position.

11.1.13 The Team noted that JCOMMOPS will continue to proactively develop cooperation in an integrated manner. JCOMMOPS will continue to seek its own instruments (floats, drifters, etc) through partnerships development (e.g. manufacturers) or sponsoring (with e.g. industry), in order to promote further the JCOMM networks, develop training material.

11.1.14 The Team thanked all parties that contribute to the development of JCOMMOPS and noted the optimism of JCOMMOPS in serving the JCOMM/GOOS component, with a team close to be complete, successful experiments, and foundations of the infrastructure strengthened. A decade of enhanced integrated services is now in sight. In particular, the Team noted with satisfaction that the JCOMMOPS will be properly staffed to provide a sustained and quality support to the SOT.

11.1.15 The Team discussed and agreed on JCOMMOPS activities and, where possible, on areas of potential development during the next intersessional period, including in particular:

(i) The development of a new generation of monitoring products for SOT, SOOP and GO-SHIP;

(ii) The development of an integrated Cruise Information Centre; and

(iii) The development of a global Ship Time Service offer (floats/drifters deployment, SOT ancillary class expansion).

11.1.16 The meeting made the following recommendations:

(i) That JCOMMOPS, OPA coordinator and secretariats draft the Terms of Reference of the JCOMMOPS funds residing at CLS, including description of the rules for the management of the funds.

11.1.17 The meeting decided on the following action items:

(i) The SOT Chair to encourage SOT participating countries to augment their contribution to JCOMMOPS for eventually achieving appropriate support to the ship-based observations programme **(*action; SOT chair; on-going***);

(ii) The SOT TC to document the list of deliverables (tools, products, services) for SOT/SOOP/GOSHIP (***action; SOT TC; mid 2013***);

(iii) The TCs to develop new and integrated specification for a QC feedback mechanism, from data user to data producer (***action; JCOMMOPS TCs; end 2013***).

11.1.18 The Team reviewed and concurred with the JCOMMOPS strategy. In particular the SOT concurred with the moving of the headquarters to Brest, and in particular on the moving of the JCOMMOPS Ship Coordinator to Brest by the end of 2013.

11.1.19 The Team reviewed and concurred with the JCOMMOPS Ship Coordinator Terms of Reference as provided in Annex XX

11.1.20 The Team acknowledged the draft Terms of Reference for the JCOMMOPS Funds management at CLS (Annex XV) and agreed to review and finalize, with OCG, these Terms with an integrated perspective for all programs.

11.1.21 The Team noted that the production of SOT maps by JCOMMOPS is underway with the plan to produce them on a monthly basis. The Team invited the SOT TC to liaise with the Panel Chairs to make sure that these maps are properly addressing the SOT requirements (***action; SOT TC; asap***).

12. PROGRAMME PROMOTION, AND INFORMATION EXCHANGE

12.1 SOT Annual Report

12.1.1 The Team noted that the following SOT annual reports have been compiled by the WMO Secretariat and published on CD-Rom since the last SOT Session:

- SOT Annual Report for 2010 as JCOMM Technical Report No. 54. It is also available via the web[85].
- SOT Annual Report for 2011 as JCOMM Technical Report No. 60. It is also available via the web[86].

12.1.2 The annual reports 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 the end of the year, and URLs of web pages of interest (e.g. contact points listed on the JCOMM web site). The annual report for 2012 is about to be compiled on CD-ROM as JCOMM Technical Report No. 69, and published on the web[87], using the same structure as the previous issue.

12.1.3 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***).

12.1.4 The Team urged the SOOP operators to provide the SOT TC as soon as possible with the required SOOP metadata permitting the compilation of the SOOP survey (***action; SOOP operators; asap***).

12.1.5 The Team noted with appreciation that AOML offered to provide input on the annual status of the SOOP programme for the years 2010 to 2012 for producing revisions of the 2010 and 2011 annual reports, and for inclusion in the new 2012 annual report (***action; G. Goni; asap***).

12.2 Websites

12.2.1 Mr. Martin Kramp (JCOMMOPS) reported on the status of the websites maintained at JCOMMOPS including the JCOMMOPS[88], SOT[89], SOOPIP[90], and ASAP[91] web sites. He presented the web mapping applications supported by JCOMMOPS as well as planned and upcoming developments for the SOT, SOOPIP, and ASAP Websites.

12.2.2 Mr G. Ball, webmaster of the JCOMM VOS website[92], reported on the status of the website. 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-6 and possible future improvements or changes to the website.

12.2.3 The Team agreed to include an action item in the SOT Implementation Strategy to reflect that the VOS National Focal Points should provide the VOS website webmaster with links of national VOS or PMO web sites for their inclusion in the VOS website (***action; Secretariat; asap***).

85 ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-TR/J-TR-54-SOT-ANN-2010/index.html
86 ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-TR/J-TR-60-ANN-2011/index.html
87 ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-TR/J-TR-69-ANN-2012/index.html
88 http://www.jcommops.org/
89 http://sot.jcommops.org
90 http://www.jcommops.org/soopip/
91 http://www.jcommops.org/sot/asap/
92 http://www.bom.gov.au/jcomm/vos/

12.2.4 The Team requested the SOT TC to revamp the SOT website on the model of the DBCP website (***action; SOT TC; SOT-8***).

12.3 Focal Point mailing lists

12.3.1 The Team recalled that the SOT, VOS, VOSClim, PMO, and SOOPIP contact lists are being maintained by the Secretariat on the JCOMM web site[93]. JCOMMOPS also maintains the corresponding electronic mailing lists as detailed in Annex XIII, as well as mailing lists for the Task Teams.

12.3.2 The Team recalled that at its previous Session it had requested the Secretariat and JCOMMOPS to make the JCOMMOPS mailing list fully consistent with the lists of contact maintained on the JCOMM web site. The Team noted with appreciation that good progress was made in this regard.

12.4 Publications and brochures

12.4.1 The Team recalled the recommendations from the Task Team on VOS Recruitment and Programme Promotion, reviewed all current publications, and didn't make any further decision at this point.

13. ORGANIZATIONAL MATTERS

13.1 Review the Terms of Reference of the SOT, VOSP and SOOPIP

13.1.2 In light of the discussions and recommendations arising during the week, the Team reviewed its Terms of Reference (Appendix D of SOT-7 Doc. 3.1), and agreed to propose some small changes (see Annex VI) to be considered by the Observations Coordination Group and the Management Committee. The Team noted that the next SOT Session will be an opportunity to review again these Terms of Reference again prior to JCOMM-5.

13.1.3 Mr Ball reminded the Team that the Chairs of SOT, VOSP and the SOOPIP are appointed by JCOMM for the JCOMM intersessional period. These will be reviewed at JCOMM-5 (i.e. probably in 2017). The Team recalled that following the passing of the VOSP Chair appointed at JCOMM-4, Ms Julie Fletcher (New Zealand), that Ms Sarah North (United Kingdom) has been appointed as new VOSP Chair by the JCOMM Co-Presidents on behalf of the Commission. Noting that Ms North is planning to retire within a couple of years.

13.2 Review of the SOT Management Team (including the role of the SOT Technical Co-ordinator)

13.2.1 Mr Ball recalled that the Terms of Reference of JCOMMOPS have been expanded by JCOMM-III in 2009 to further enhance the synergies with other JCOMM Observations Programmes such as the International Ocean Carbon Coordination Project (IOCCP), the Global Sea Level Observing system (GLOSS), and the OceanSITES provided appropriate resources are identified to realize such support. New activities also include system performance monitoring, system design evaluation to improve system efficiency and effectiveness. Better links are being developed with the space agencies regarding the dissemination of information on satellite data requirements, and satellite information services through the JCOMMOPS web site.

13.2.2 The SOT Chair 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*

93 http://www.jcomm.info

SOT, such as liaison and international focus, problem resolution, information exchange, quality monitoring, network monitoring and network review. The SOT TC is currently employed by CLS and provides support to the SOT on a part-time basis. The Chair of the SOT provides technical guidance and is prioritising his tasks.

13.2.3 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. The SOT TC provides a valuable coordination and support service to the component programs of the SOT.

More specifically the SOT TC should provide the following services (by priority order):

(1) Produce SOT network monitoring reports, including: (i) SOOP Semestrial Survey (top priority), (ii) monthly network maps;(iii) graphs showing the performance of the networks and quality of the data, (iv) other metrics showing the evolution of the automated systems, and (v) propose changes to improve the effectiveness of the networks;
(2) Facilitate information exchange, in particular through the JCOMMOPS website, and update/modernize the SOT, ASAP and SOOP websites;
(3) Create tools to monitor the SOT Key Performance Indicators (KPIs) as defined in the SOT Implementation Strategy (see Annex VII);
(4) Maintain the secure database of REAL/MASK callsigns;
(5) Maintain quality control systems, in particular the VOS QCRelay;
(6) Create a metadata database for SOOP and ASAP;
(7) Provide support for the VOS Ancillary Pilot Project;
(8) Support and actively promote the VOS Donor Program to countries initiating VOS Programs;
(9) Rationalize the mailing lists (JCOMMOPS and WMO);
(10) Review and update the SOT program brochures;
(11) Provide problem resolution, in particular for problems related to GTS traffic;

Ongoing:

(12) Maintain liaison with current VOS, SOOP and ASAP national program managers, promote the SOT and its sampling programs at every opportunity, and assist with the ad-hoc recruitment of vessels in consultation with the Chairs of VOSP and SOOPIP;
(13) Provide a focus for contact from other international programmes and new programme operators;

13.2.4 The Team endorsed the additional requirements proposed by the Chair of SOT and the sub-panel Chairs. The Team also recalled the draft JCOMMOPS Ship Coordinator's workplan with deliverables and deadlines as outlined under agenda item 3.4. The Team endorsed the workplan provided in Annex XVIII.

13.2.5 The Team discussed the composition of the SOT lead Team, including the SOT Chair, the VOSP Chair, and the SOOPIP Chair. The Team agreed that for a number of reasons, including geographic distribution, succession planning, and for easing and sharing the work of the SOT leads, it would be useful if JCOMM could establish vice-chair positions for the SOT, the VOSP, and the SOOPIP. While recognizing that the decision will have to be made by JCOMM, the Team proposed the following individuals for the vice-chair positions:

- SOT: Chris Marshall (Canada)
- VOSP: Jan Rozema (Netherlands)
- SOOPIP: Rebecca Cowley (Australia)

13.2.6 Considering that it would be preferable to establish those positions before the next JCOMM Session which is likely to be organized no earlier than 2017, the Team requested the Secretariat to bring this proposal to the attention of the JCOMM Co-Presidents, and invite them to make a decision on behalf of the Commission, in which case the concurrence from the Permanent

Representatives of the Countries of the nominated persons for those positions can then be obtained (***action; Secretariat; asap***).

13.2.7 The Team invited the OCG to consider revising the JCOMMOPS ToR to better take into account recent evolutions and support being provided to GO-SHIP (***action; OCG; Aug. 2013***).

13.3 Funding issues (SOT Technical Co-ordinator, Ship Consumables Trust Fund, ASAP Trust Fund)

Funding of JCOMMOPS and the SOT Technical Coordinator's position

13.3.1 The Team recalled that during the last intersessional period the position of the SOT TC was occupied by Mr Mathieu Belbéoch (JCOMMOPS) on a part-time (30%) basis until the recruitment of the Ship Coordinator at JCOMMOPS in February 2013. From that date, the JCOMMOPS Ship Coordinator also became the SOT TC on a part-time basis. The Team noted that the JCOMMOPS Ship Coordinator's position, including salary and missions are now supported by (i) Argo, (ii) the DBCP, (iii) the SOT through voluntary contributions made to various trust funds (i.e. Argo trust fund at IOC, the DBCP and JCOMM trust funds at WMO, and the JCOMMOPS trust fund at CLS), (iv) GO-SHIP, and (v) JCOMMOPS (ship-time services income). The national contributions to the SOT are made through the DBCP and JCOMM Trust Funds at the WMO.

13.3.2 The Team also noted that the following budget lines were allocated to the SOT in DBCP 2013 budget with maximum expenditures on those lines exceeding the total of national contributions to the SOT:

- JCOMMOPS Logistical Support (SOT) (USD 6,914 allocated)
- SOT (USD 9,000 allocated)
- JCOMMOPS Ship Coordinator (USD 95,000 allocated)

13.3.3 The Team recommended that actual expenditures for the JCOMMOPS Ship Coordinator's position should be balanced with the contributions from other Panels contributing to JCOMMOPS, and that the total of SOT expenditures should not exceed the national contributions to the SOT in any case.

13.3.4 The Team agreed that contributions for the SOT TC would continue to be made to the DBCP Trust Fund at WMO, and that expenditures related to SOT budged lines should be authorized by the SOT Chair, noting that all DBCP TF expenditures have to be authorized by the DBCP Chair in any case per WMO financial regulation. The Team invited its members to contribute to the Trust Fund to support the Technical Co-ordinator post and thus ensure that current services are maintained while also allowing (i) to decrease the contributions of those countries contributing heavily to the SOT, and (ii) for future development in support of the VOS, ASAP and SOOP.

JCOMM Trust Fund for Ship Consumables

13.3.5 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, administered by WMO, provides 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.

13.3.6 The Team noted that no contribution nor expenditures had been made to the Ship Consumables Trust Fund at this point. The Team therefore decided the this Trust Fund was no longer needed.

ASAP Trust Fund

13.3.7 The meeting reviewed the final statements of account for the ASAP Trust Fund for the period 1 January 2011 to 31 December 2011, and for the period 1 January 2012 to 31 December 2012. These statements are given in Annex VI. The Team noted that some expenditures – approved by the SOT Chair – were made in support of (i) the participation of the Chair of the VOS Panel, Ms Julie Fletcher (New Zealand), at the sixth Session of the SOT, in Hobart, Australia, in April 2011, and (ii) the representation of the SOT through Ms Sarah North (United Kingdom) at the World Ocean Council (WOC) workshop in Paris, from 12 to 13 December 2011 . The Team accepted both statements of accounts.

13.3.8 The Team agreed that no additional contributions to the ASAP Trust Fund were needed at this point.

13.3.9 The Team agreed again with the conditions proposed by SOT-V regarding the use of the remaining funds within the ASAP Trust Fund (i.e. SOT-V final report, paragraphs I-7.2.3.4 and I-7.2.3.5).

14. NATIONAL REPORTS

14.1 Ms Gerie-Lynn Lavigne (Canada) chaired the National Reports session. Written reports were presented by the following countries: Australia; Brazil; Canada; Chile; China; Croatia; France; Gambia; Germany; Greece; Hong Kong, China; India; Indonesia; Ireland; Italy; Japan; Malaysia; Netherlands; New Zealand; Republic of Korea; Russian Federation; Singapore; South Africa; Spain; Sweden; and Thailand.

14.2 Additionally, a written report was submitted by E-SURFMAR[94].

14.3 These reports[95], included in the SOT Annual Report for 2012 (JCOMM Technical Report No. 69) 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.

14.4 In addition, the following national presentations were made during the meeting: Australia; Canada; France; Germany, Hong Kong, China; Indonesia; Italy; Japan; South Africa; United Kingdom; and USA.

14.5 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 2012 (***action; Secretariat; asap***).

15. NEXT SESSION OF THE SOT

15.1 The Team noted the kind offer from South Africa to tentatively, host the next SOT meeting in Cape Town, in April or May 2015. The Team agreed to tentatively, accept the offer of

94: E-SURFMAR (Surface Marine Operational Service) and E-ASAP are two operational services of the EUMETNET Observation Programme. Although participating in E-ASAP is mandatory, nineteen EUMETNET Members only are participating in E-SURFMAR which is optional. E-SURFMAR 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, the Netherlands, Norway, Poland, Portugal, Serbia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom of Great Britain and Northern Ireland, the Czech Republic, Montenegro, and the Former Yugoslav Republic of Macedonia.

95: ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-TR/J-TR-69-SOT-ANN-2012/national_reports.html

hosting the next SOT Session as proposed by South Africa, subject to formal approval by the Permanent Representative of South Africa with WMO.

16. REVIEW OF THE SOT-7 SESSION REPORT, ACTION ITEMS AND RECOMMENDATIONS

16.1 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 IV.

17. CLOSURE OF THE SESSION

17.1 The Chairperson congratulated the Team for the meeting's achievements. He thanked the Environment Canada for hosting the Session, the participants of the meeting for their contributions to the outcome of this meeting, his co-chairs, and the Secretariat for their support prior to and during the meeting. The Secretariat Representative thanked Environment Canada, 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 Seventh Session of the Ship Observations Team closed at 18:00 pm on Friday 26 April 2013.

ANNEX I

AGENDA

1. ORGANIZATION OF THE SESSION

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

2. SCIENTIFIC AND TECHNICAL WORKSHOP, NEW DEVELOPMENTS

3. REPORTS BY THE SECRETARIAT, OPA COORDINATOR, SOT CHAIRPERSON AND SOT TECHNICAL CO-ORDINATOR

- **3.1 Report from the Secretariat (incl. relationship with IMO)**
- **3.2 Report from the Observations Programme Area Coordinator**
- **3.3 Report from the SOT Chairperson**
- **3.4 Report from the SOT Technical Co-ordinator**

4. REVIEW OF ACTION ITEMS FROM SOT-6

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

- **5.1 Requirements for ship-based observations**
  - 5.1.1 GCOS / GOOS / WCRP Ocean Observing Panel for Climate (OOPC)
  - 5.1.2 Rolling Review of Requirements update
- **5.2 Reports by associated programmes**
  - 5.2.1 International Ocean Carbon Coordination Project (IOCCP)
  - 5.2.2 Shipboard Automated Meteorological and Oceanographic System (SAMOS) Project
  - 5.2.3 Global Ocean Ship-Based Hydrographic Investigations Programme (GO-SHIP)
  - 5.2.4 Group for High-Resolution SST (GHRSST)
  - 5.2.5 World Ocean Council
  - 5.2.6 OceanScope
  - 5.2.7 Ferrybox
  - 5.2.8 Other associated programmes

6. RECOMMENDATIONS BY THE TASK TEAMS

- **6.1 Task Team on Satellite Communication Systems**
- **6.2 Task Team on ASAP**
- **6.3 Task Team on VOS Recruitment and Programme Promotion**
- **6.4 Task Team on Metadata for WMO-No. 47**
- **6.5 Task Team on Instrument Standards**
- **6.6 Task Team on Call Sign Masking and Encoding**

7. EIGHTH SESSION OF THE VOS PANEL (VOSP-8)

- **7.1 Programme review**
  - 7.1.1 Report by the VOSP acting Chairperson
  - 7.1.2 Report on VOS issues from the E-SURFMAR Expert Team
- **7.2 Programme status and implementation**

7.2.1 VOS status, trends and developments
7.2.2 VOSClim status, and upgrading of ships to VOSClim standard
7.2.3 Electronic logbook software
7.2.4 Status of VOS automation
7.2.5 E-SURFMAR S-AWS developments
7.2.6 PMO activities and inspections - implications of automation
7.2.7 VOS Donation Programme

7.3. Issues for the VOS

7.3.1 VOS Ancillary Pilot Project

8. TENTH SESSION OF THE SOOP IMPLEMENTATION PANEL (SOOPIP-10)

8.1 Programme review
8.1.1 Report by the SOOPIP Chairperson

8.2 Programme status and implementation
8.2.1 Status of SOOP implementation, sampling scheme
8.2.2 XBT Science Team and SOOPIP

8.3 Interactions with other programmes or projects
8.3.1 pCO2 systems
8.3.2 Thermosalinograph Network

8.4 Issues for the SOOP
8.4.1 XBT data flow and GTS transmissions
8.4.2 Sippican Climate Quality XBT Probes
8.4.3 XBT Fall Rate Equation (FRE) experiments
8.4.4 Plans for the future XBT network

8.5 SOOP Science Presentations

9. MONITORING, CODING AND DATA MANAGEMENT

9.1 Monitoring and data centre reports
9.1.1 VOS Monitoring Report from the Exeter (UK) Regional Specialized Meteorological Centre (RSMC)
9.1.2 Monitoring Report from the Real-Time Monitoring Centre (RTMC) for the VOS Climate (VOSClim) data
9.1.3 Global Collecting Centres (GCCs) report on the VOS
9.1.4 VOSClim Data Assembly Centre (DAC) report
9.1.5 ASAP QC Monitoring report
9.1.6 Global temperature and Salinity Profile Programme (GTSPP)
9.1.7 Global Ocean Surface Underway data Pilot Project (GOSUD)
9.1.8 Global temperature data distribution by Coriolis

9.2 Operational Coding requirements
9.2.1 BUFR Template for VOS data
9.2.2 BUFR Template for XBT/XCTD/TSG data

9.3 SOOP, GO-SHIP, and ASAP metadata requirements
9.4 Marine Climate Data System (MCDS) development and SOT contribution

10 SOT IMPLEMENTATION STRATEGY

11. SUPPORT INFRASTRUCTURE

11.1 JCOMM *in situ* Observations Programme Support Centre (JCOMMOPS)

12. PROGRAMME PROMOTION, AND INFORMATION EXCHANGE

12.1 SOT Annual Report
12.2 Websites
12.3 Focal Point mailing lists
12.4 Publications and brochures

13. ORGANIZATIONAL MATTERS

13.1 Review the Terms of Reference of the SOT, VOSP and SOOPIP
13.2 Review of the SOT Management Team (including the role of the SOT Technical Co-ordinator)
13.3 Funding issues (SOT Technical Co-ordinator, Ship Consumables Trust Fund, ASAP Trust Fund)

14. NATIONAL REPORTS

15. NEXT SESSION OF THE SOT

16. REVIEW OF THE SOT-7 SESSION REPORT, ACTION ITEMS AND RECOMMENDATIONS

17. CLOSURE OF THE SESSION

ANNEX II

PARTICIPANTS LIST

PARTICIPANTS FROM MEMBERS/MEMBER STATES

AUSTRALIA

Mr Graeme BALL
Chair, SOT
Chair, SOT TT-Pub47
Chair, SOT TT-Masking
VOS Program Manager, PMO Supervisor
Australian Bureau of Meteorology
GPO Box 1289
Melbourne VIC 3001
Australia
Tel: +61 3 9669 4203
Fax: +61 3 9669 4168
Email: g.ball@bom.gov.au

Mrs Rebecca COWLEY
Data Analyst/Scientific Programmer
CSIRO Marine and Atmospheric Research, Tasmania
Marine Laboratories
Castray Esplanade
GPO Box 1538
Hobart Tasmania 7001
Australia
Tel: +61 3 6232 5446
Email: Rebecca.Cowley@csiro.au

Bernadette SLOYAN
CSIRO Marine and Atmospheric Research, Tasmania
Marine Laboratories
Castray Esplanade
GPO BOx 1538
Hobart Tasmania 7001
Australia
Email: Bernadette.Sloyan@csiro.au

Dr Ann GRONELL THRESHER
Scientist-in-Charge of Operations
Argo/SOOP
CSIRO Marine and Atmospheric Research, Tasmania
Marine Laboratories
Castray Esplanade
GPO BOx 1538
Hobart Tasmania 7001
Australia
Tel: +61 3 62 325 419
Fax: +61 3 62 325 123
Email: Ann.Thresher@csiro.au

BRAZIL

Dr. Mauricio MATA
A/Professor
Federal University of Rio Grande-FURG
Institute of Oceanography
Rio Grande
96203-900
RS
Brazil
Tel: +55 (53) 32336861
Fax: +55 (53) 32336860
Email: mauricio.mata@furg.br

CANADA

Ms Lily FUNG
Environment Canada, Meteorological Service of Canada, Ontario
4905 Dufferin Street
Toronto M3H 5T4
Ontario
Canada
Tel: +1 416 739 4441
Email: lily.fung@ec.gc.ca

Mr Ben LEMON
Port Met Officer and Data Buoy Program for Canadian Arctic Ports
Environment Canada, Meteorological Service of Canada, Ontario
M.J. Greenwood Centre
9345 – 49st NW
Edmonton T6B 2L8
Alberta
Canada
Tel: +1 780 495 6442
Fax: +1 780 495 7739
Email: ben.lemon@ec.gc.ca

Mr Bruce LOHNES
Monitoring Manager – Pacific & Yukon Region
Environment Canada, Meteorological Service of Canada, B.C.
Environment Canada
Meteorological Service of Canada
140-13160 Vanier Place
RICHMOND V6V 2J2
British Columbia
Canada
Tel: (604) 664-9188
Fax: (604) 664-4094
Email: Bruce.Lohnes@ec.gc.ca

Mr Martin MACLELLAN
Superintendent Port Meteorological & Data Buoy Program
Meteorological Service of Canada
16th Floor, 45 Alderney Drive
Dartmouth B2Y 2N6
Nova Scotia
Canada
Tel: (902) 426-6616
Fax: (902) 426-6404
Email: Martin.Maclellan@ec.gc.ca

Mr Chris MARSHALL
Manager of Marine Networks
Environment Canada, Meteorological Service of Canada, Ontario
Environment Canada
4905 Dufferin Street
Toronto M3H 5T4
Ontario
Canada
Tel: +1 416 739 4468
Fax: +1 416 739 4261
Email: Chris.Marshall@ec.gc.ca

Mr Mathieu OUELLET
Senior Policy and Technical Advisor, Oceanographic Data and Products Manager
Fisheries and Oceans Canada, Ottawa, Integrated Science Data Management (ISDM)
Department of Fisheries and Oceans
12W - 200 Kent St
Ottawa K1A 0E6
Ontario
Canada
Tel: +1 (613) 990-8570
Fax: +1 (613) 990-8570
Email: mathieu.ouellet@dfo-mpo.gc.ca

Mr Shawn RICKARD
Supervisor AMOS South, Marine Networks Specialist
Environment Canada, Meteorological Service of Canada, Ontario
100 Eastport Dr.
Hamilton L8H 7S4
Ontario
Canada
Tel: +1 905 312 0900 ext. 202
Email: shawn.rickard@ec.gc.ca

Ms Jenny SNAUFFER
Research Assistant
Ocean Networks Canada
University of Victoria
2300 McKenzie Ave
Victoria V8P 5C2
BC
Email: esnauffer@uvic.ca

Mr Al WALLACE
Chair, DBCP
Environment Canada, Meteorological Service of Canada, Pacific and Yukon Region
201-401 Burrard Street
VANCOUVER V6C 3S5
BC
Canada
Tel: +1 604 664 9090
Fax: +1 604 664 9004
Email: al.wallace@ec.gc.ca

CHINA

Prof Shao Hua LIN
Director Honorary
National Marine Data and Information Service
No. 93, Liuwei Road
Hedong District 300171 Tainjin
China
Tel: +86 22 2401 0803
Fax: +86 22 240 10926/ +86-22-24010820
Email: hslin@mail.nmdis.gov.cn

EGYPT

Dr Maged SHOUKRY KAMEL GUERGUESS
National Institute of Oceanography and Fisheries
Alexandria
Egypt
Tel: +203 555 4447
Fax: +203 480 1174
Email: theomaged@yahoo.com

FRANCE

Mr Pierre BLOUCH
Chair, SOT TT-Satcom
E-SURFMAR Operational Service Manager
Météo France
Centre de météorologie marine
13 rue du Chatellier
CS 12804
F-29228 Brest cedex 2
France
Tel: +33 (0) 2 98 22 18 52
Fax: +33 (0) 2 98 22 18 49
Email: pierre.blouch@e-surfmar.eu

Mr Jean-Baptiste COHUET
E-SURFMAR VOS Co-ordinator
Météo France
42, avenue Gaspard Coriolis
F-31057 Toulouse Cedex, France
France
Tel: +33 (0) 561 07 91 40
Fax: +33 (0) 561 07 91 69
Email: Jean-Baptiste.cohuet@meteo.fr

Mr Loic PETIT DE LA VILLEON
Head of Sismer -French NODC-
French Institute for the Exploitation of the Sea, IFREMER Centre de Brest
France
Tel: +33-2-98 22 49 13
Fax: +33-2-98 22 46 44
Email: loic.petit.de.la.villeon@ifremer.fr

GERMANY

Mr Henry KLETA
Chair, SOT TT-IS
Senior Field Service Engineer
Deutscher Wetterdienst
Frahmredder 95
22393 Hamburg
Germany
Tel: +49 69 8062 6635
Fax: +49 69 8062 6699
Email: Henry.Kleta@dwd.de

Mr Rudolf KROCKAUER
Chair, SOT TT-ASAP
E-ASAP Operational Service Manager
Deutscher Wetterdienst
Bernhard-Nocht-Strasse 76
20359 Hamburg
Germany
Tel: +49 69 8062 6317
Email: Rudolf.Krockauer@dwd.de

Ms Annina KROLL
Deutscher Wetterdienst
Bernhard-Nocht-Strasse 76
20359 Hamburg
Germany
Tel: +49 69 8062 63 10
Email: annina.kroll@dwd.de

Ms Gudrun ROSENHAGEN
Vice-Chair, ETMC
Deutscher Wetterdienst
Bernhard-Nocht-Strasse 76
20359 HAMBURG
Germany
Tel: +49 69 8062 6200
Fax: +49 69 8062 6209
Email: gudrun.rosenhagen@dwd.de

GREECE

Mr Michail MYRSILIDIS
Head, Marine Section
Hellenic National Meteorological Service
El. Venizelou 14
167 77 ATHENS
Greece
Tel: +30 210 9699013
Fax: +30 210 9628952
Email: mmirsi@hnms.gr

HONG KONG, CHINA

Mr Hing-Yim MOK
Senior Scientific Officer
Hong Kong Observatory
The Hong Kong Observatory
134A Nathan Road
Hong Kong, China
Hong Kong
Tel: +(852) 2926 8451
Fax: +(852) 2311 9448
Email: hymok@hko.gov.hk

INDIA

Dr Venkata V. GOPALAKRISHNA
Principal Investigator
National Institute of Oceanography
Dona Paula 403 004
Goa
India
Tel: +91 832 245 0302
Fax: +91 832 245 0602
Email: gopal@nio.org

INDONESIA

Mr. Furqon ALFAHMI, M.SI
Marine Forecaster
Indonesian Meteorological Climatological and Geophysical Agency
Perumahan Darmaga Regensi 2 Blok p9
Cihedeung Udik – Ciampea - Bogor
West Java
Indonesia
Tel: 021-6546315
Fax: 021-6546315
Email: furqonalfahmi@yahoo.com or furqon.alfahmi@bmkg.go.id

ITALY

Mr Franco RESEGHETTI
Researcher
ENEA Centro Ricerche Ambiente Marino S. Teresa
Forte S.Teresa - Pozzuolo di Lerici
19032 Lerici
Italy
Tel: +39 0187 978204
Fax: +39 0187 978273
Email: franco.reseghetti@enea.it

JAPAN

Dr. Shoichi KIZU
Associate Professor
6-3 Aza Aoba, Aramaki, Aoba-ku, Sendai
980-8578
Japan
Tel: +81-22-795-6528
Fax: +81-22-795-6530
Email: kizu@pol.gp.tohoku.ac.jp

Mr Satoshi OGAWA
Senior Scientific Officer, Office of Marine Prediction
Japan Meteorological Agency
1-3-4 Otemachi Chiyoda-ku
100-8122
Tokyo
Japan
Tel: +81 3 3211 6909
Fax: +81 3 3211 6908
Email: s.ogawa@met.kishou.go.jp

NETHERLANDS

Mr Jan ROZEMA
Head observations
Royal Netherlands Meteorological Institute
Postbus 201
NL-3730AE de Bilt
Netherlands
Tel: +31 30 220 64 84
Fax: +31 30 221 04 07
Email: jan.rozema@knmi.nl

SOUTH AFRICA

Ms Santjie DU TOIT
Senior Scientist: Marine
South African Weather Service
Tower Road
7525 Western Cape
South Africa
Tel: +27 21 934 0450
Fax: +27 21 934 3296
Email: Santjie.DuToit@weathersa.co.za

UNITED KINGDOM

Dr David BERRY
Senior Research Assistant
National Oceanography Centre
European Way
Southampton
SO14 3ZH
United Kingdom
Tel: +44-23 8059 7740
Fax: +44-23 8059 6400
Email: dyb@noc.ac.uk

Mr David MELDRUM
Vice-Chair, JCOMM OCG
Research Fellow, Technology Development
Scottish Association for Marine Science
Scottish Marine Institute
Oban, Scotland
PA37 1QA
United Kingdom
Tel: +44 1631 559 273
Fax: +44 1631 559 001
Email: dtm@sams.ac.uk

Ms Sarah NORTH
Acting Chair, VOS Panel
Chair, SOT TT-VRPP
Marine Networks Manager
Met Office
FitzRoy Road
Exeter
Devon
EX1 3PB
United Kingdom
Tel: +44 (0) 1392 885 617
Fax: +44 (0) 1392 885 681
Email: sarah.north@metoffice.gov.uk

Ms Nicola SCOTT
Chair, ETMC
GCC & Marine Data Manager
Met Office Edinburgh
S9 Saughton House
Broomhouse Drive
Edinburgh
EH11 3XQ
United Kingdom
Tel: +44 (0)131 528 7312
Fax: +44 (0)131 528 7345
Email: nicola.Scott@metoffice.gov.uk

USA

Dr Molly BARINGER
National Oceanic and Atmospheric Administration, Atlantic Oceanographic and Meteorological Laboratories
4301 Rickenbacker Causeway
Miami FL 33149
United States
Tel: +1 (305) 361-4345
Email: molly.baringer@noaa.gov

Tim BOYER
NOAA, National Oceanographic Data Centre, Silver Spring
National Oceanographic Data Center
NOAA/NESDIS E/OC1
SSMC3, 4th Floor
1315 East-West Highway
Silver Spring MD 20910-3282
United States
Email: boyer@nodc.noaa.gov

Dr Francis BRINGAS
Oceanographer / SEAS Operations
National Oceanic and Atmospheric Administration, Atlantic Oceanographic and Meteorological Laboratory
4301 Rickenbacker Causeway
Miami FL 33149
United States
Tel: +1 (305) 361-4316
Fax: +1 (305) 361-4412
Email: Francis.Bringas@noaa.gov

Ms Candyce CLARK
Chair, JCOMM OCG
WMO-IOC JCOMM Observations Coordinator
National Oceanic and Atmospheric Administration
NOAA/Climate Program Office
Climate Observation Division
1100 Wayne Avenue, suite 1202
Silver Spring MD 20910
United States
Tel: +1 301 427 2463
Fax: +1 301 427 0033
Email: candyce.clark@noaa.gov

Dr Shenfu DONG
Associate Scientist
National Oceanic and Atmospheric Administration, Atlantic Oceanographic and Meteorological Laboratory
4301 Rickenbacker Causeway
Miami FL 33149
United States
Email: shenfu.dong@noaa.gov

Mr. Eric FREEMAN
Meteorologist/Marine Observation Analyst
STG Inc. / National Climatic Data Center
151 Patton Avenue
ASHEVILLE North Carolina 28801-5001
United States
Tel: +1 828 271 4463
Fax: +1 828 271 4022
Email: Eric.Freeman@noaa.gov

Dr. Marlos GOES
National Oceanic and Atmospheric Administration, Atlantic Oceanographic and Meteorological Laboratories
4301 Rickenbacker Causeway
Miami Florida FL 33149
United States
Email: marlos.goes@noaa.gov

Dr Gustavo J. GONI
Chair, SOOPIP
Oceanographer
National Oceanic and Atmospheric Administration, Atlantic Oceanographic and Meteorological Laboratories; OAR
Physical Oceanography Division
USDC/NOAA/AOML/PHOD 4301
Rickenbacker Causeway
Miami FL 33149
United States
Tel: +1 305-361-4339
Fax: +1 305-361-4392
Email: gustavo.goni@noaa.gov

Ms Paula RYCHTAR
VOS Operations Manager
NOAA National Data Buoy Center
1100 Balch Blvd.
Stennis Space Center MS 39529
United States
Tel: +1 228-688-1457
Email: paula.rychtar@noaa.gov

Mr Shawn SMITH
Research Meteorologist
Florida State University, Center for Ocean-Atmospheric Prediction Studies
The Florida State University
Tallahassee FL 32306-2840
United States
Tel: +1 850 644 6918
Fax: +1 850 644 4841
Email: smith@coaps.fsu.edu

Dr Janet SPRINTALL
Scripps Institution of Oceanography
9500 Gilman Drive
Mail Code 0230
La Jolla CA 92093-0230
United States
Tel: +1 858 - 8220589
Fax: +1 858 - 5349820
Email: jsprintall@ucsd.edu

Dr Joaquin TRINANES
Assistant Professor
National Oceanic and Atmospheric Administration, Atlantic Oceanographic and Meteorological Laboratory
4301 Rickenbacker Causeway
Miami FL 33149
United States
Tel: (305) 600-0432
Email: Joaquin.Trinanes@noaa.gov

Dr Rik WANNINKHOF
Principal Investigator
National Oceanic and Atmospheric Administration, Atlantic Oceanographic and Meteorological Laboratories
4301 Rickenbacker Causeway
Miami Florida FL 33149
United States
Tel: (305)361-4379
Email: Rik.Wanninkhof@noaa.gov

Dr Nathalie ZILBERMAN
Postdoc
University of San Diego, Scripps Institution of Oceanography
9500 Gilman Drive
Mail Code 0214
La Jolla CA 92093
United States
Tel: 8083879532
Email: nzilberman@ucsd.edu

PRIVATE SECTOR

Mr Mark BLASECKIE
Technical Field Services
AXYS Technologies Inc.
2045 Mills Road West
Sidney V8L 5X2
BC
Canada
Tel: +1 250 655 5853
Fax: +1 250 655 5856
Email: mblaseckie@axys.com

Mr. Tony ETHIER
Manager Marine Systems
AXYS Technologies Inc.
2045 Mills Road West
Sidney V8L 5X2
BC
Canada
Tel: 2506555847
Email: tethier@axys.com

Mr. Paul HILL
JOUBEH Technologies
21 Thornhill Dr.
Dartmouth B3B 1R9
NS
Canada
Tel: +1(902) 405-4428
Fax: +1(902)405-4438
Email: paul@joubeh.com

Mr Michael KELLY
Vice President
CLS America
4300 Forbes Blvd, Suite 110
Lanham MD 20706
United States
Tel: 301-925-4411
Email: mkelly@clsamerica.com

Mr Alex PAPIJ
Director
Turo Technology Pty Ltd
13 Weld St
South Hobart Tasmania 7004
Australia
Tel: +61362369511
Fax: +61362369506
Email: papij@turo.com.au

Mr Paul SANGSTER
JouBeh Technologies Inc.
11 Thornhill Dr. Suite 201
Dartmouth B3B 1R9
NS
Canada
Tel: +1 (902) 405-4428
Fax: +1 (902) 405-4438
Email: paul.sangster@joubeh.com

PROGRAMMES AND SPECIAL PROJECTS

E-ASAP

Mr Rudolf KROCKAUER
Chair, SOT TT-ASAP
E-ASAP Operational Service Manager
Deutscher Wetterdienst
Bernhard-Nocht-Strasse 76
20359 Hamburg
Germany
Tel: +49 69 8062 6317
Email: Rudolf.Krockauer@dwd.de

EUMETSAT

Mr Nicholas COYNE
European Organization for the Exploitation of Meteorological Satellites
Eumetsat-Allee 1
D-64295 Darmstadt
Germany
Germany
Email: nicholas.coyne@eumetsat.int

E-SURFMAR

Mr Pierre BLOUCH
Chair, SOT TT-Satcom
E-SURFMAR Operational Service Manager
Météo France
Centre de météorologie marine
13 rue du Chatellier
CS 12804
F-29228 Brest cedex 2
France
Tel: +33 (0) 2 98 22 18 52
Fax: +33 (0) 2 98 22 18 49
Email: pierre.blouch@e-surfmar.eu

Mr Jean-Baptiste COHUET
E-SURFMAR VOS Co-ordinator
Météo France
42, avenue Gaspard Coriolis
F-31057 Toulouse Cedex, France
France
Tel: +33 (0) 561 07 91 40
Fax: +33 (0) 561 07 91 69
Email: Jean-Baptiste.cohuet@meteo.fr

GHRSST

Bernadette SLOYAN
CSIRO Marine and Atmospheric Research, Tasmania
Marine Laboratories
Castray Esplanade
GPO BOx 1538
Hobart Tasmania 7001
Australia
Email: Bernadette.Sloyan@csiro.au

SECRETARIAT

IOC

Dr Thomas GROSS
Programme Specialist GOOS, GSSC, Web Services
Intergovernmental Oceanographic Commission of UNESCO
1 rue Miollis
75732 Paris cedex 15
France
Tel: +33 1 45 68 39 92
Fax: +33 1 45 68 58 12
Email: t.gross@unesco.org

WMO

Mr Etienne CHARPENTIER
Scientific Officer
World Meteorological Organization
Observing and Information Systems Department
Observing Systems Division
World Meteorological Organization
7bis, av. de la Paix
Case Postale 2300
1211 Genève 2
Switzerland
Tel: +41 22 730 82 23
Fax: +41 22 730 81 28
Email: ECharpentier@wmo.int

OOPC

Dr Katherine (Katy) HILL
OOPC Technical Secretary
GOOS/GCOS Programme Specialist
World Meteorological Organization
7bis, avenue de la Paix
Case Postale 2300
1211 Geneva
Switzerland
Tel: +41 (0)22 730 80 83
Fax: +41 (0)22 730 8052
Email: khill@wmo.int

JCOMMOPS

Mr Martin KRAMP
Ship Coordinator
JCOMM *in situ* Observations Programme Support Centre, JCOMMOPS
8-10, rue Hermès
Parc Technologique du Canal
31526 Ramonville
France
Tel: +33 5 61 39 47 82
Fax: +33 5 61 39 39 33
Email: mkramp@jcommops.org

Ms Kelly STROKER
Technical Coordinator
DBCP, JCOMMOPS
8-10, rue Hermès
Parc Technologique du Canal
31520 Ramonville St-Agne
France
Tel: +33 5 61 39 47 82
Fax: +33 5 61 75 48 06
Email: kstroker@jcommops.org

OTHER

Mr Robert KEELEY
Retired
2243 Rembrandt Road
Ottawa K2B 7P8
Ontario
Canada
Tel: +1 613 829 7919
Email: robertkeeley@rogers.com

ANNEX III

ACTION ITEMS AND RECOMMENDATIONS FROM THE PREVIOUS SOT SESSION, WHICH STILL REQUIRE THE TEAM'S ATTENTION

Part 1 – Action items undertaken by individuals or the Task Teams

No	*Ref*	*Action item*	*By*	*Lead*	*Deadline*	*Status*	*% completed*
1	2.2(6-3) 10.1	The Team agreed that the roles of JCOMM and OceanScope with regard to the WOC had to be clarified relatively quickly	SOT Chair	G. Ball	June 2011	Done. Completed in preparation for WOC sponsored meeting attended by Sarah North for SOT.	100
2	3.1.4.3(c)	The TT-IS to complete the production of a JCOMM Technical Report to include guidelines on standards for instruments (including a list of related WMO, UNESCO/IOC, and national publications for each of the SOT programme components) and high quality best practices for the Voluntary Observing Fleet (VOF) and the Ship Of Opportunity Programme (SOOP)	TT-IS	H. Kleta	end 2011	Agreed to produce a webpage listing relevant existing documentation, and to keep it updated as needed.	90
3	3.1.4.3(e)	The TT-Satcom to consider the technical implications related to the compatibility between AIS equipments and observation stations	TT-SATCOM	P. Blouch	end 2014	See also action No. 77. Proposed realistic way is to assure communication between S-AWS and AIS. S. North suggested to change deadline to end 2014 (instead of end 2013)	30
4	3.1.4.4(b)	Continued review of relevant chapters of the WMO Publications No. 8, No. 471, and No. 488	TT-IS	H. Kleta	SOT-7	Review of WMO No. 8 underway per action item No. 118	70
5	3.1.4.4(e)	The Team also strongly supported the DBCP/SOT drifter donation programme in support of the VOS Scheme for developing countries (VOS-DP) and requested the Programme Evaluation Committee (PEC) of the VOS-DP to act proactively in this context	PEC	S. North	ongoing	Included in SOT Implementation Strategy. However, while the programme is well defined, documented, and the PEC ready to act, it has not lead to effective use of the offered resources yet.	75
6	3.4.13	the SOT TC to assist in making Research Vessel marine meteorological and	TC	M. Kramp	ongoing	Discussion scheduled in April 2013	50

No	Ref	Action item	By	Lead	Deadline	Status	% completed
		oceanographic data available on GTS					
7	5.1.1.7	to work with the JCOMM OPA Coordinator develop metrics of intensity of effort in maintenance of the observing networks - on the PMO network, on VOSClim class growth, or on SOOP line maintenance, recalling the need to keep the metrics simple to calculate	SOT, VOSP, SOOPIP chairs, and SOT TC	M. Kramp	ahead of JCOMM-4	Not done. To be addressed at SOT-7	0
8	5.2.2.3	Mr. Smith will coordinate this activity (SAMOS ship data on GTS) with the U.S. VOS program	Smith and US VOS program manager	S. Smith	August 2011	Initiated conversation with U.S. VOS coordinator (Wasserman). Compared data transmitted via GTS by vessels participating in SAMOS that are also recruited to VOS. Noted vessels that need to be contacted by U.S.VOS to determine why data are not being transmitted. Funding cuts have not allowed SAMOS data centre to pursue placing subset of SAMOS observations on GTS to date.	30
9	5.2.2.4	Investigating using the PMO to collect the R/V metadata, including identifying challenges and benefits of a potential joint activity	Smith & J. Wasserman	S. Smith	SOT-7	Initiated conversation with U.S. VOS coordinator, but no action has been taken. May be topic of conversation during SOT-7.	30
10	5.2.5.2	The Team noted the positive energy of the OceanScope Working Group, but stressed that it was important to build a future program also based on existing infrastructure and institutions, including the work of the Team. It was desirable to present a unified voice of all actors in ocean observations from commercial ships to the shipping industry. The Team decided to comment along these lines when the OceanScope report was made public for comment	SOOPIP, VOSP, and SOT chairs	G. Ball	by OceanScope comment deadline presumed mid-2011	No action. No recollection of the Oceanscope report being provided.	0
11	6.4.7	TT-Pub47, the ETMC, and the DBCP TT on Moored Buoys to coordinate between themselves in liaison with the DMCG and make sure that the requirements for Rigs and	TT-Pub47	G. Ball	SOT-7	No action. No request from DBCP for assistance.	0

No	Ref	Action item	By	Lead	Deadline	Status	% completed
		Platforms metadata, and for automated systems installed on offshore platforms in particular are well considered					
12	6.5.3	TT-IS to continue to collect information from AWS systems used by SOT members in the view to have sufficient materials to eventually perform the intercomparison and be able draw significant conclusions from the available information	TT-IS	H. Kleta	SOT-7	Closed; not realistic	0
13	7.2.1.7	JCOMMOPS to develop and make routinely available dedicated monitoring tools for the VOSClim status	TC	M. Kramp	SOT-7	These tools are developed within the new JCOMMOPS website and tools, prototype should be live by June 2013.	25
14	7.3.2.3	Sarah North to pursue and lead the ship design issue and relationship with ICS and IMO with the support of the WMO Secretariat and report on progress at the next SOT Session	Secretariat & S. North	S. North	SOT-7	Some limited progress See also actions 42 and 43. S. North made presentations to the ICS in 2010 and WOC in 2011 but these unfortunately haven't borne any fruit. SOT-7 invited to formally agree to make a WMO submission to IMO requesting that they pursue this issue in the interests of ensuring continued observations and safety of life at sea.	20
15	8.2.5.3(5)	creating and maintaining a bibliography of publications using TSG data	Chair to negotiate with IRD and/or Coriolis to host	G. Goni	SOT-7	In Progress See IRD website. Loïc to provide URL	50
16	9.1.1.15	the VOSClim Focal Point to consider whether the VOSClim website should be closed, related information included in the VOS web site, including monitoring information, and list of ships	VOSClim FP	J. Wasserman	SOT-7	Keep the website.	0
17	9.1.6.6 (2).	continue the production of metrics in support of the JCOMM Observations Programme Area	GTSPP Steering Group	C. Sun	ongoing	Ongoing	0

No	Ref	Action item	By	Lead	Deadline	Status	% completed
		(OPA) and the SOT					
18	9.2.5.7	The Team invited E-SURFMAR to make its database of VOS metadata available in real-time to all VOS operators for the benefit of the WMO and IOC Applications, and requested the WMO Secretariat to write to E-SURFMAR in this regard	WMO Secretariat	E. Charpentier	asap	Secretariat wrote to E-SURFMAR in February 2013 requesting to make DB available in real-time, and to report at SOT-7. ftp://esurfmar.meteo.fr/pub/Pub47/PUB_47_export_esurfmar_database_active_vos_v3a.csv	50
19	10.2.1(1)	to legacy recommendation 2, the Team agreed to contribute to the review of WMO and IOC Publications through its Task Team on Instrument Standards, and other Task Teams as appropriate	TT-IS	H. Kleta	SOT-7	David Meldrum working on the Publications and consulting with OPA Panels.	50
20	10.2.7	The SOT requested the TT-IS, in liaison with other Task Teams as appropriate, and in a way consistent with the strategy proposed by the JCOMM Pilot Project for WIGOS, to participate in the efforts to further update the above publications as well as IOC M&G No. 4 & 26, WMO No. 544 & 488	TT-IS	H. Kleta	SOT-7		0
21	11.1.5.2	Pending receipt of information, Candyce Clark (USA) to follow up the situation regarding whether artificial delays of 48h delay is introduced for making the GTS VOS data available via the Sailwx and others, and provide feedback if needed	C. Clark	C. Clark	asap	Keep action. NDBC to identify the source of GTS data for Sailwx	0
22	(to SOOP section)	TC to discuss with SOOPIP Chair the content of the SOOP semestrial yearly survey, and how the work for its production can be shared	SOT TC & G. Goni	M. Kramp	asap	Discussion took place in April 2013 between SOT TC and AOML. Tools in preparation in cooperation between JCOMMOPS and AOML.	0

Part 2 – Action items undertaken by SOT, VOS, SOOPIP members, PMOs, and manufacturers

No	*Ref*	*Action item*	*By*	*Lead*	*Deadline*	*Status*	*% completed*
1	2.2(1-2)	to review the Initial Science and Implementation Strategy and assist in the implementation and experimental design of SOOS	SOT members	SOT NFP	SOT-7		0
2	7.1.2.4	Members to consider providing financial resources through the VCP in support of PMO workshops	SOT members	SOT NFP	2014	No feedback as of January 2013	0
3	9.2.1.3(4)	End of 2012: Migration to BUFR completed, and stopping of GTS distribution of VOS data in FM13 SHIP format	members	SOT NFP	end 2012		0
4	9.3.4	The meeting invited its members to provide feedback to the WMO Secretariat, E-SURFMAR, and JCOMMOPS regarding any remaining timeliness or residual WMO resource issues to ensure continuing satisfactory metadata availability for marine climatology in the future	SOT members	SOT NFP	ongoing		75

ANNEX IV

ACTION LIST / WORKPLAN ARISING FROM THIS SESSION

No.	*Ref.*	*Action item*	*By*	*Deadline*
1	2.3(3)	To organize Webex training for PMOs on the use of the E-SURFMAR database	P. Blouch	end 2013
2	3.1.3.2(f)	To lead the SOT Pilot Project for the Indian Ocean, set up a Steering Team tasked to develop a workplan for the Pilot Project, and to report at the next SOT Session on the outcome	A. Mafimbo	SOT-8
3	3.1.3..4	To include SOT perspectives detailed in paragraph 3.1.3 regarding the JCOMM Observations (OPA) and Data Management (DMPA) Programme Area priority activities for this JCOMM intersessional period (2012-2016) into the SOT Implementation Strategy	SOR Chair	asap
4	3.1.4.1	To collaborate as needed to the identified WIGOS implementation activities	Team members	2016
5	3.2.3	To report an appropriate metric that demonstrates how well they are meeting the GCOS performance indicator	SOOPIP & VOSP Chairs	Aug. 2013
6	3.2.7	To reply to Bob Keeley's queries regarding assessment of the current data system	SOT members	SOT-8
7	5.1.2.4	To provide feedback to the Contact Point for Ocean Applications regarding the difficulty to make precipitation measurements from ships, and the need to update the SOG for ocean applications accordingly	Secretariat	asap
8	5.1.2.4	To discuss the need for precipitation measurements over the ocean, and to make recommendations on how to possibly address them	C. Clark	Aug. 2013
9	5.2.2.3	To contact NOAA and U.S. university research vessels not presently transmitting via GTS to recruit them as VOS (or VOSClim as appropriate)	US VOS	asap
10	5.2.2.7	To identify and define a set of standard quality control procedures for underway thermosalinograph (and additional flow through sensor) data	TT-IS & SOOPIP	SOT-8
11	5.2.4.8	To forward Dr. Reynolds contact details to the SOT chair	S. Smith	May 2013
12	5.2.4.8	To contact Dr. Reynolds as needed to obtain information relevant to GHRSST activities	SOT-GHRSST WG	TBD
13	5.2.5.7(i)	To consider nominating themselves to GOOS as prospective members of the WOC joint industry/science SO/SI Steering Committee in order to ensure that there is adequate participation from governments and international agencies in this committee	SOT members	asap
14	5.2.5.7(ii)	To work with the WOC to develop a list of key companies involved in voluntary observations	TT-VRPP	Jul. 2013
15	5.2.5.7(iv)	To assist the Task Team on Instrument Standards (TT-IS) in order to facilitate the design of ships, other vessels and other offshore facilities (e.g. aquaculture, wind farms) that would make the installation of marine meteorological and oceanographic instrumentation easier it invited the WOC to facilitate acceptance of generic ship design by shipping companies so that they can assist in this regard through classification societies and IMO	WOC	SOT-8
16	5.2.5.7(v)	To assist the Task Team on Satellite Telecommunications Systems (TT-Satcom) to explore how to best achieve cost effectiveness and cost efficiencies for voluntary observation and data telecommunication costs	WOC	SOT-8
17	5.2.5.8	To assist the WOC by providing input through the SOT TC for the preparation of inventories of	SOT TC	SOT-8

No.	Ref.	Action item	By	Deadline
		observation programmes and instrument types		
18	6.1.7(i)	To closely work with Inmarsat Safety Services team and IMSO to propose a new method for conventional VOS to report their observations ashore using the GMDSS FleetBroadband terminals	TT-SatCom	SOT-8
19	6.1.7(ii)	To closely work with DMPA/ETMC to define a binary ship-to-shore dataformat (#101) to be used by conventional VOS in the future	E-SURFMAR	end 2013
20	6.1.7(iii)	To continue to monitor the ways used by VOS and SOOP ships to report their observations ashore and to report the results during SOT sessions	TT-SatCom	SOT-8
21	6.3.3(i)	To liaise with the ETMSS Secretariat and keep the Task Team informed of relevant developments concerning the 2013 MMM Survey	TT-VRPP Chair and WMO/ETMSS Secretariat	SOT-8
22	6.3.3(ii)	To draft a new survey/questionnaire directed at the VOS observers and shipowners with a view to assessing the performance of VOS Scheme for	TT- VRPP Chair	SOT-8
23	6.3.3(iii)	To include a link to the E-SURFMAR articles on the VOS website	SOT Chair	asap
24	6.3.3(iv)	To consider the potential for widening the scope of the Mariners Weather Log to encompass international VOS activities	US Focal Point	SOT-8
25	6.3.3(vi)	To provide the SOT Chair with updated JCOMMOPS global network maps for inclusion in the SOT recruitment presentations	SOT TC	asap
26	6.3.3(vii)	To update the SOT recruitment presentation on the VOS website when a list of the required changes is available.	SOT Chair	asap
27	6.3.3(viii)	To propose amendments to the SOT recruitment presentation and to supply suitable new digital images for inclusion in the presentation.	TT –VRPP members	asap
28	6.3.3(ix)	To undertake the final editorial review of the VOS Brochure in liaison with the Task Team	SOT TC	end 2013
29	6.3.3(x)	To circulate the final revised brochure to the PMO, VOS and SOT mailing lists (in pdf format) and to KNMI with a view to inclusion in the TurboWin program.	TT –VRPP Chair	Jan 2014
30	6.3.3(xi)	To consider whether funding could be made available to publish hardcopies of the VOS Brochure	WMO Secretariat & SOT Chair	end 2013
31	6.3.3(xii)	To investigate the possibility of recording the issue of SOT Certificates in the E-SURFMAR database	E-SURFMAR	end 2013
32	6.3.3(xiii)	To review the content of the Quick Reference Guides and to send copies of the revised text to the Task Team for approval	VRPP Chair & SOT Chair	end 2013
33	6.3.3(xiv)	To prepare an initial draft of a VOS Poster for circulation to the Task Team	VRPP Chair	end 2013
34	6.3.3(xv)	To investigate the potential of using social media sites to promote the VOS with a view to making future recommendations to SOT	VRPP Task Team	SOT-8
35	6.3.3(xvi)	To investigate the potential for using video for promoting the VOS and for training observers	VRPP Task Team	SOT-8
36	6.3.3(xvii)	To assist on how to progress the Generic Design Recommendations in the light of recent developments e.g. discussions with ICS and WOC initiatives (see agenda item 5.2.5)	TT-VRPP & WMO Secretariat	SOT-7
37	6.3.3(xviii)	To keep the Task Team informed of any discussions they might have with ICS or the marine industries that impact on the design requirements	SCOR	SOT-8
38	6.3.3(xix)	To make the delayed mode VOSClim data and call sign fully available in ICOADS.	VOCClim DAC & ICOADS	asap

No.	Ref.	Action item	By	Deadline
39	6.3.3(xx)	To forward the approved VOSClim certificate to the SOT Chair for posting on the VOS website and subsequent advice to the SOT, PMO and VOS mailing lists	WMO Secretariat	asap
40	6.3.3(xxi)	To review the content of the DAC website in view of decisions taken by the Task Team	VOSClim DAC	end 2013
41	6.3.3(xxii)	To remove the VOSClim mailing list from the JCOMMOPS website	SOT TC	asap
42	6.3.3(xxiii)	To undertake minor revision to the VOS Framework Document so that it includes links to latest JCOMMOPS global maps and information on VOS numbers	SOT Chair	end 2013
43	6.3.3(xxiv)	To add links to the WMO Publications listed in this report to the VOS Website	SOT Chair	end 2013
44	6.3.3(xxv)	To remove the project Ship List from the DAC website	VOSClim DAC	April 2014
45	6.3.3(xxvi)	To send email to PMO and VOS mailing lists to advise that in future any changes to their VOSClim fleets should be made to their WMO Pub 47 lists (by submission to WMO or by updating E-SURFMAR Metadata database). VOSClim Ship operators to continue to separately notify the DAC of such changes until April 2014	VRPP Chair	Apr. 2014
46	6.3.3(xxvii)	To investigate feasibility and possibly to take steps for organizing the Fifth PMO workshop in Chile in 2014	WMO Secretariat & SOT Chair	SOT-8
47	6.3.3(xxvii)	To take steps to assure that financial assistance for the participation of their PMOs at the PMO-5 workshop will be provided from national sources	SOT members	2014
48	6.3.3(xxviii)	To investigate feasibility and possibly proceed in arranging a shipping industry forum to be held in conjunction with the next SOT-8 session	SOT Chair & Secretariat	SOT-8
49	6.3.3(xxix)	To present a poster at the next Oceanscience meeting in 2014	S. Smith	2014
50	6.4.3(i)	To submit a proposal to JCOMM-5 (later than SOT-8) of recommended changes affecting the structure of WMO No. 47	TT-Pub47	2016
51	6.4.3(ii)	To update the Pub47 XML Generator Tool to Pub47 version 04 specifications	TT-Pub47	1 June 2013
52	6.4.3(iii)	To provide VOS Program Managers with the list of ships that regularly report on the GTS but are not members of a national VOS Fleet or self-recruited as an Ancillary VOS vessel	E-SURFMAR	1 June 2013
53	6.4.3(iv)	To maintain the non-mandatory list of descriptors for logE, awsP and awsC, and to make the location of these list available to VOS Focal Points and VOS Program Managers	E-SURFMAR	1 June 2013
54	6.5.6(i)	To update the templates for national reports for the SOT annual report to allow the reporting of instrumentation	SOT Chair	end 2013
55	6.5.6(ii)	To complete the new JCOMM TR No. 63, Recommended Algorithms for the computation of marine meteorological variables	TT-IS	end 2013
56	6.5.6(iii)	To complete the review of relevant sections of the WMO No. 8 Guide, and to submit those changes to CIMO as needed	TT-IS & SOT Chair	asap
57	6.6.3	Members implementing SHIP masking schemes to review the proposed governance for the management of encryption keys, and provide feedback to the TT-Masking	Japan, USA, Canada	15 May 2013
58	6.6.3	To submit part of the ENCODE proposal to the CBS Inter-Programme Expert Team on Data Representation Maintenance and Monitoring (IPET-DRMM) through the Task Team on Table Driven Codes (TT-TDC)	TT-Masking	asap
59	6.6.4	To provide guidance regarding the masking of delayed mode data with the view to archive the data with the real callsign	ETMC	end 2013

No.	Ref.	Action item	By	Deadline
60	6.6.7	To take stock of the current situation with regard to the increasing amount of ship data now available publicly, and report this situation back to CBS, via the OCG, for a review of its decisions in this regard	SOT Chair	Sep. 2013
61	6.6.8(i)	To contact the International Chamber of Shipping and check whether the reporting of un-masked VOS observations via the GTS (with some of those positions ending-up on public websites) was still an issue	Secretariat	SOT-8
62	6.6.8(ii)	To investigate (i) whether the positions of their recruited VOS are also publicly available through AIS or LRIT reporting; and (ii) with the shipping companies whether the reporting of un-masked VOS observations via the GTS continues to be an issue	Japan	SOT-8
63	6.6.8(iii)	To investigate whether there are additional issues from their perspective	USA	SOT-8
64	7.1.1.6.	To make information on air pressure quality available to future SOT sessions in order to help determine the most appropriate instruments to be used and the best practices to follow	RSMC	SOT 8
65	7.1.1.7.	To revise the VOS annual report in readiness for the 2013 SOT annual Report	VOSP & SOT Chairs, SOT TC	Nov. 2013
66	7.1.1.8.	Noting that JCOMMOPS is already developing improved tools for the VOS community, to make them available on a permanent JCOMMOPS web page	SOT TC	asap
67	7.1.1.9.	To endeavour assigning time to complete the 2013 SOT national reports to the best of their ability, including information that could be of interest to their VOS colleagues in other countries	VOS Focal Points	Mar. 2014
68	7.1.1.13.	To consider how the JCOMMOPS Quality Information Relay (QIR) feedback mechanism, and its interface, could be improved as a feedback service to report systematic coding or transmission problems	SOT TC	end 2013
69	7.1.1.15(i)	To revise the template for VOS national annual reports to include PMO activity information and other metrics that will be helpful in monitoring VOS performance and formulating future SOT decisions	VOSP & SOT Chairs, SOT TC	Nov. 2013
70	7.1.1.15(ii)	To oversee the performance of the Ancillary VOS (e.g. checking that metadata is being collected and that the companies concerned are providing feedback on data quality) so that a decision can be made on the need for a new Ancillary Class at SOT-8	SOT TC	end 2013
71	7.1.1.16	To check that email systems are not rejecting observations un-necessarily	VOS operators	asap
72	7.1.2.4	To check the GHRSST requirements for SST measurements, investigate feasibility and costs, and inform the SOT-GHRSST working group accordingly	VOS operators	SOT-8
73	7.2.1.3	With a view to ensuring that the E-SURFMAR and WMO metadata records are maintained as accurate as possible, the Team agreed that such discrepancies should be raised with the VOS operating countries concerned	SOT TC	SOT-8
74	7.2.1.6	To make the JCOMMOPS products (maps & graphs showing VOS status, coverage and parameters reported) more readily available via the JCOMMOPS website rather than via ftp links at present, and to ensure that they are routinely updated.	SOT TC	SOT-8
75	7.2.1.7	To compile metrics in liaison with the Panel Chair and the TT on VRPP, and made available on the JCOMMOPS website	VOSP Chair & SOT TC	SOT-8
76	7.2.2.3	To continue to measure the existing KPI for 25% of the global active VOS to be upgraded to VOSClim class until SOT-8	VOSClim FP & RTMC	SOT-8
77	7.2.2.4	In view of the decisions taken at this session to tighten the VOSClim monitoring criteria the Panel agreed that the KPI for less than 3% of VOSClim class ships being flagged on the suspect list for air	RTMC	SOT-8

No.	Ref.	Action item	By	Deadline
		pressure should continue to be measured until SOT-8		
78	7.2.2.5	The KPI for 95% of VOSClim class observations to be received within 120 minutes should continue to be measured and reported to SOT-8	RTMC	SOT-8
79	7.2.2.9	To introduce new KPI for at least 25% of the active international VOS Fleet registered on the E-SURFMAR metadata database to be VOSClim Class by SOT-8	VOS Operators	SOT-8
80	7.2.2.11	To consider removing the option to select "VOSClim" in Turbowin as a means to increase the availability of VOSClim elements (so that all ship report VOSClim data)	KNMI	asap
81	7.2.2.12	To prepare a proposal on how remote vetting should be conducted and to circulate this to VOS focal points for consideration and with a view to possible approval at the next session	VOSP Chair	SOT-8
82	7.2.2.15	E-SURFMAR metadata database should be the main listing for ships recruited to VOSClim class and that the existing Excel VOSClim ship list on the VOSClim DAC should be deleted	DAC	asap
83	7.2.2.16	To harmonise the two VOSClim listings and to advise the SOT Chair when this work is completed so that the information can be disseminated to VOS focal points and PMOs via the JCOMMOPs mailing lists	SOT Chair	end 2013
84	7.2.2.18	The Panel noted that call signs were registered with the International Telecommunications Union (ITU) and suggested that an approach might be made to the ITU to obtain more accurate information on call sign changes.	VOS Panel Chair	SOT-8
85	7.2.2.20	To assess the value of the delayed mode VOS data, and propose related metrics	ETMC	SOT-7
86	7.2.3.8	To monitor initiatives for the development of "mobile-based" applications for Android hand-held and tablet platforms, and keep the VOS Focal Points informed of developments	VOSP Chair	SOT-8
87	7.2.4.5	To consult with Canada, the Netherlands, Japan, the Netherlands, and the USA and propose a classification of AWS systems according to the type of measurements they are making	SOT TC	end 2013
88	7.2.4.5	To take the proposed classification of AWS systems into account when preparing the templates for national reports	SOT Chair	end 2013
89	7.2.5.4	To make a proposal to be submitted to the next SOT Session for common guidelines on the criteria to be used regarding when to block data from Iridium transmission	ETMC Chair	SOT-8
90	7.2.6.6	To invite shipowners and AWS manufacturers to a possible international Shipborne AWS Workshop during the next intersessional period	SOT Chair, WMO Secretariat	SOT-8
91	7.2.6.7	To give consideration to developing new 'Shipborne AWS – VOS' inspection, and site inspection forms	TT-VRPP & SOT Chair	SOT-8
92	7.2.8(i)	To introduce a new KPI target should be introduced to aim for least 25% of the active international VOS Fleet registered on the E-SURFMAR metadata database being recorded as VOSClim Class by SOT-8	VOS Operators	SOT-8
93	7.3.1.14(viii)	To amend the next version of TurboWin software to include 'Ancillary Pilot Project' as an option under 'Projects', until such time as a decision is made on the need to formally introduce the new class. (Selecting this option will disable the standard VOS class options)	Netherlands	asap
94	7.3.1.14(x)	To advise if they wish to additionally receive delayed mode data from Ancillary (Ancillary AWS) ships	GCCs	asap
95	8.1.1.8(ii)	To continue the collaboration with Sippican in the development of an improved XBT prototype with upgraded temperature sensor and pressure switches	SOOPIP members	SOT-8
96	8.1.1.8(iv)	(a) to continue the tests for a full implementation of XBT data transmission to the GTS in BUFR format;	AOML	SOT-8

No.	Ref.	Action item	By	Deadline
		and (b) to provide support as requested by other institutions for the implementation of BUFR transmissions operationally		
97	8.2.1.12	The SOOPIP Chair and the SOT TC work together to produce SOOP semestrial surveys	SOT TC & SOOPIP Chair	end 2013
98	8.2.2.3(i)	To draft a plan for distributing corrected XBT data to the science and modeling community once the FRE coefficients have been finalized	G. Goni	ASAP
99	8.2.2.3(ii)	To support and organize a Science Team meeting to be hosted approximately every two years, perhaps linked to SOOPIP or Argo science meetings	G. Goni	SOT-8
100	8.2.2.3(iv)	To assess the importance to carry out transects on marginal seas (Mediterranean, Gulf of Mexico) that could be critical because of lack of other type of sustained hydrographic observations	XST	SOT-8
101	8.2.2.3(v)	To represent science goals to a broader community investigating boundary currents, eddies and fronts, including developing technologies, such as glider surveys.	XST	SOT-8
102	8.3.2.5(i)	To increase the number of bottle samples for direct comparison and calibration	SOOP members	SOT-8
103	8.3.2.5(ii)	If budget allows, to increase the number of ship collecting TSG data	SOOP members	SOT-8
104	8.3.2.5(iii)	To support scientific programs and projects that require TSG observations, such as satellite missions and observational projects (e.g. SPURS[1], pCO_2, …)	SOOP members	SOT-8
105	9.1.1.8 (i)	To contact other monitoring centres regarding new monitoring criteria	RSMC	August 2013
106	9.1.1.8 (ii)	To start using the new monitoring criteria	RSMC & other monitoring centres	deadline to be agreed – possibly January 2014
107	9.1.1.8 (iv)	To separate timeliness information for manual and automatic ships	RSMC	April 2014
108	9.1.2.5(i)	To start using the new monitoring criteria	RTMC	January 2014
109	9.1.3.6(i)	Electronic logbook programmers to upgrade logbook software to allow coding in IMMT-5 format	e-logbook developers	asap
110	9.1.3.6(ii)	All CMs that did not submit data during 2012 should do so in 2013 or alternatively contact GCC for advice	CMs	2013
111	9.1.3.6(iii)	To provide maps about the availability of delayed mode VOS observations by variable	GCCs	asap
112	9.1.4.10	For data processing purposes, to stop maintaining the list at NCDC, and instead begin using the ESURFMAR list [2], which is based on Pub 47 metadata	VOSClim DAC	Apr. 2014
113	9.1.5.6(ii)	ASAP operators should try to update their transmission systems in order to be able to transmit high resolution data messages	ASAP members	asap
114	9.1.7.5(ii)	To make the delayed mode data (science quality) more visible and advertise them	GOSUD	asap
115	9.1.7.5(iii)	Considering the status of the Project and the need to adapt its governance, GOSUD must identify an advisory group and a steering committee; SOT members are invited to consider applying for becoming member of the advisory group	GOSUD	SOT-8

1 S116alinity Processes in the Upper **Ocean** Regional Study
2 ftp://117esurfmar.meteo.fr/pub/Pub47/VOSClim_list.csv

No.	Ref.	Action item	By	Deadline
116	9.1.7.5(iv)	To enhance the relationship with science satellite community (SMOS and AQUARIUS)	GOSUD	SOT-8
117	9.1.7.6(i)	To assist the IODE in identifying a second co-Chair of the GOSUD Steering Group Chair	SOT Chair	June 2013
118	9.1.7.6(ii)	To invite GOSUD to evaluate the quality of the whole GOSUD data set available	GOSUD	September 2013
119	9.1.7.6(iii)	To organize a joint GTSPP/ GOSUD workshop in April 2014 in Ostende, Belgium	SOT, GTSPP & GOSUD Chairs	April 2014
120	9.1.7.6(iv)	To liaise on the issue of putting the GOSUD metadata into the E-SURFMAR database	P. Blouch, L. Petit de la Villeon, & SOT TC	asap
121	9.1.7.6(v)	To address the issue of improving the content the BUFR template for underway data	TT-TDC	SOT-8
122	9.1.7.6(vi)	To discuss the issue and make proposals to allow best-copy data-sets to be easily identified, and become accessible via ODP and WIS, while avoiding duplication	DMCG	JCOMM-5
123	9.2.1.2	To speed the submission of SOT related BUFR template proposals to the CBS taking SOT requirements into account	TT-TDC	asap
124	9.2.1.2	To investigate for the nomination of a new chair in consultation with the Chair of DMCG	Secretariat	asap
125	9.2.1.9	To finalize the proposed new data format for non AWS VOS, and liaise with the ETMC *ad hoc* group in this regard. The goal is to have the new format eventually approved by the VOSP Chair	P. Blouch	end 2013
126	9.2.1.11	To look at the issue of preserving AWS data, and to make recommendations in this regard at the next SOT Session	TT-IS/SG-AWS	SOT-8
127	9.2.2.2	To alert the users of XBT data about the migration to Table Driven Codes, and provide them with information on how to decode the data. Training materials should also be made available to data providers for supporting the migration	DMCG	asap
128	9.3.3	To make a proposal on the list of XBT specific ship metadata to be collected (e.g. height of the drop, speed of ship at the time of the drop, etc.) and to provide the information to the SOT TC	G. Goni	asap
129	9.3.10	To initiate development of the ASAP metadata collection scheme in the view to have it fully operational by the end of 2014	JCOMMOPS & Secretariat	end 2014
130	10.5	To send comments on the implementation strategy to the SOT Chair and the Secretariat by 31 May	SOT members	31 May 2013
131	10.6	To finalize the Strategy on behalf of the Team in consultation with the VOSP and SOOPIP chairs, the OPA Coordinator, the Task Team Chair, and the Secretariat. The goal is to post the first version of the strategy on the SOT and JCOMM websites by mid-2013	G. Ball	31 July 2013
132	11.1.17(ii)	To document the list of deliverables (tools, products, services) for SOT/SOOP/GOSHIP	SOT TC	mid 2013
133	11.1.17(iii)	To develop new and integrated specification for a QC feedback mechanism, from data user to data producer	JCOMMOPS TCs	end 2013
134	11.1.21	To liaise with the Panel Chairs to make sure that the JCOMMOPS maps for VOS, SOOP, and ASAP are properly addressing the SOT requirements	SOT TC	asap
135	12.1.3	To comment and provide feedback to the SOT Chairperson regarding the format of the National Report	VOSP, SOOPIP, ASAP TT chairs	asap
136	12.1.4	To provide the SOT TC as soon as possible with the required SOOP metadata permitting the compilation of the SOOP survey	SOOP operators	asap

No.	*Ref.*	*Action item*	*By*	*Deadline*
137	12.1.5	To provide input on the annual status of the SOOP programme for the years 2010 to 2012 for producing revisions of the 2010 and 2011 annual reports, and for inclusion in the new 2012 annual report	G. Goni	asap
138	12.2.3	To include an action item in the SOT Implementation Strategy to reflect that the VOS National Focal Points should provide the VOS website webmaster with links of national VOS or PMO web sites for their inclusion in the VOS website	Secretariat	asap
139	12.2.4	To revamp the SOT website on the model of the DBCP website	SOT TC	SOT-8
140	13.2.6	To bring the proposed SOT vice-chairs positions to the attention of the JCOMM Co-Presidents, and invite them to make a decision on behalf of the Commission	Secretariat	asap
141	13.2.7	To consider revising the JCOMMOPS ToR to better take into account recent evolutions and support being provided to GO-SHIP	OCG	Aug. 2013
142	14.3	To publish the national reports provided by the Members to the WMO Secretariat as well as the PowerPoint presentations made at this meeting on CD-Rom within the SOT annual report for 2012	Secretariat	asap

ANNEX V

TERMS OF REFERENCE OF THE SOT TASK TEAMS

TASK TEAM ON SATELLITE COMMUNICATION SYSTEMS

The Task Team shall:

ToR no.	***Terms of Reference***
1	Evaluate 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	Design a new communication system for conventional VOS based on their future FleetBoardband GMDSS terminals to replace Inmarsat Code-41;
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.

Task Team members:

- **Mr Pierre BLOUCH (Chairperson, E-SURFMAR, France)**
- Mr Graeme BALL (Australia)
- Mr Frits B. KOEK (Netherlands)
- Mr Michael MYRSILIDIS (Greece)
- Ms Sarah C. NORTH (United Kingdom)
- Mr Satoshi OGAWA (Japan)
- Ms Paula RYCHTAR (USA)
- Mr Derrick SNOWDEN (United States)
- Mr Johan STANDER (South Africa)
- Mr John WASSERMAN (USA)
- Ms Annina KROLL (Germany)
- Any representatives of countries where LES accepting Code 41 are located
- A representative of RA III.

TASK TEAM ON ASAP

The Task Team shall:

ToR no.	***Terms of Reference***
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.

Task Team members:

- **Mr Rudolf KROCKAUER (Chairperson, E-ASAP & Germany)**
- Mr Graeme BALL (Australia)
- Ms Sarah C. NORTH (United Kingdom)
- Mr Satoshi OGAWA (Japan)
- Mr Johan STANDER (South Africa)
- Mr Alexander KARPOV (Associated Member, HMEI)
- Plus any other country making ASAP soundings
- Possible participation by POGO

TASK TEAM ON VOS RECRUITMENT AND PROGRAMME PROMOTION

The Task Team shall:

ToR no.	***Terms of Reference***
1	Promote and monitor the upgrading of existing ships to VOSClim class standard (Action by DAC and VOSClim Focal Point)
2	Liaise with Scientific Advisors to monitor and report on compliance with VOSClim class requirements (Action by DAC and VOSClim Focal Point)
3	Progress the generic pre-installation design recommendations with a view to developing 'best practices' guidance that can be used by shipowners when ordering new ships, liaising with the ICS, WOC, IMO, WMO Secretariat, IACS etc., as appropriate
4	Review existing promotional aids (flyer, certificate) and recommend new promotional aids.
5	Promote the use of, and keep under review, the promotional 'SOT Recruitment Presentation'.
6	Establish a store of newsworthy articles for use in ~~a~~ SOT or VOS publications or in national newsletters.
7	Develop a new survey/questionnaire directed at the VOS observers and shipowners with a view to assessing the performance of VOS Scheme and identifying issues that need to be addressed by the SOT. Review proposed content of the 2013 Marine Meteorological Monitoring Survey, and propose amendments as necessary
8	Review all relevant JCOMM Publications to ensure they are up to date (in particular with respect to the new VOS classes) and comply with Quality Management terminology.
9	Promote the VOS Ancillary class and report on its implementation at SOT-8

Task Team members:

- **Ms Sarah C. NORTH (Chairperson, United Kingdom)**
- Mr Graeme BALL (Australia)
- Mr Pierre BLOUCH (E-SURFMAR & France)
- Ms Gerie Lynn LAVIGNE (Canada)
- Dr Thomas ROSSBY (United States)
- Mr Johan STANDER (South Africa)
- Ms Annina KROLL (Germany)
- Ms Paula RYCHTAR (USA)
- Mr John WASSERMAN (USA) - VOSClim Focal Point
- Ms Santjie DU TOIT (South Africa)
- VOSClim DAC
- VOSClim Scientific Advisors

TASK TEAM ON METADATA FOR WMO PUBLICATION NO. 47

The Task Team shall:

ToR no.	***Terms of Reference***
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.

Task Team members:

- **Mr Graeme BALL (Chairperson, Australia)**
- Mr Pierre BLOUCH (France)
- Ms Lily FUNG (Canada)
- Mr John WASSERMAN (USA)
- Dr Elizabeth C. KENT (United Kingdom)
- Ms Sarah C. NORTH (United Kingdom)
- Dr David BERRY (United Kingdom)

TASK TEAM ON INSTRUMENT STANDARDS

The Task Team shall:

ToR no.	*Terms of Reference*
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 dedicated WebPages containing this information, to be made widely available through the JCOMM web site and linked from other relevant websites (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.

Task Team members:

- **Mr Henry KLETA (Chairperson, Germany)**
- Mr Graeme BALL (Australia)
- Mr Jean-Baptiste COHUET (France)
- Dr Gustavo J. GONI (United States)
- Ms Gerie Lynn LAVIGNE (Canada)
- Dr Elizabeth C. KENT (United Kingdom)
- Mr Rudolf KROCKAUER (Germany)
- Ms Sarah C. NORTH (United Kingdom)
- Mr Shawn SMITH (United States)
- Mr Derrick SNOWDEN (United States)
- Mr Johan STANDER (South Africa)
- Mr Scott WOODRUFF (United States)
- HMEI representative (Associated Member, HMEI)

The Task Team also includes the following working groups:

- Working Group on Publications chaired by Henry Kleta (Germany);
- Working Group on Automatic Weather Stations chaired by Henry Kelta, and including Sarah North (UK), Shawn Smith (USA), Paula Rychtar (USA), and a representative of Canada (TBD) in its membership;
- Working on New Technology chaired by Shawn Smith (USA).

TASK TEAM ON CALL SIGN MASKING AND ENCODING (TT-MASKING)

The Task Team shall:

ToR no.	*Terms of Reference*
1	Oversee the implementation of **MASK**[1]**, SHIP**[2] and **ENCODE**[3] 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**[4] 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.

Task Team members:

- **Mr Graeme BALL (Chairperson, Australia)**
- Mr Etienne CHARPENTIER (WMO Secretariat)
- Ms Sarah C. NORTH (United Kingdom)
- Mr Colin PARRETT (United Kingdom)
- Mr Scott WOODRUFF (United States)
- Mr Chris MARSHALL (Canada)
- Dr David BERRY (United Kingdom)
- SOT Technical Coordinator (JCOMMOPS)
- Security Adviser (to be appointed)

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

TASK TEAM ON TRAINING (TT-TRAINING)

The Task Team shall:

ToR no.	***Terms of Reference***
1	Develop global standards, practices and functions for Port Meteorological Officers
2	Maintain Reference Guides for PMOs and national VOS, SOOP and ASAP Program Managers
3	Coordinate international PMO Training Workshops
4	Encourage the development of VOS programs in data-sparse areas
5	Encourage and promote the PMO Buddy Program to enhance the global PMO network
6	Assist the TT-VRPP in the development of PMO resources
7	Provide advice to Nautical Colleges about training syllabuses and assist with the training or the provision of training material
8	Maintain User Manuals, Best Practices, and Reference Guides for ship riders collecting XBT data or performing drifter and Argo float deployments.
9	Maintain a website with relevant training documents.

Task Team members:

- **Ms. Paula RYCHTAR (Chairperson, USA)**
- Mr. Graeme BALL (Australia)
- Ms. Sarah NORTH (UK)
- Mr. Francis BRINGAR (USA)
- Mr. Ben LEMON (Canada)

ANNEX VI

PROPOSED CHANGES TO THE SOT TERMS OF REFERENCE

TERMS OF REFERENCE OF THE SHIP OBSERVATIONS TEAM

(on the basis of excerpt of Annex to Resolution 3 (JCOMM-4), Terms of Reference and General Membership of the Coordination Group and Teams of the Observation Programme Area)

Note: The proposed insertions are highlighted in yellow. Proposed deletions are ~~stroked-through~~.

(2) Ship Observations Team

TERMS OF REFERENCE

The Ship Observations Team shall:

(a) Respond to 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;
(b) Provide continuing assessment of the extent to which those requirements are being met;
(c) Oversee and monitor the implementation of ~~Develop methodology~~ methodologies as determined by the scientific and operational communities for constantly controlling ~~and improving~~ the quality of data;
(d) 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;
(e) Coordinate Port Meteorological Officer (PMO)/ship greeting operations globally, propose actions to enhance PMO standards and operations, and contribute as required to PMO and observers training;
(f) Review, maintain and update as necessary technical guidance material relating to ship observations and Port Meteorological Officers;
(g) Liaise and coordinate as necessary with other JCOMM programme areas and expert teams, as well as with other interested parties;
(h) 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, Ships-Of-Opportunity and research ships;
(i) Seek new opportunities for deploying various kinds of measuring devices as recommended by the relevant panels and widely publicise those opportunities;
(j) Develop as necessary new pilot projects and/or operational activities and establish new specialized panels as required;
(k) Carry out other activities as agreed by participating Members/Member States to implement and operate the SOT programme and to promote and expand it internationally;
(l) Develop improved real-time feedback to volunteer ships regarding the quantity and quality of the observations that they submit and that are inserted on the GTS.

GENERAL MEMBERSHIP

- Chairperson and vice-Chairperson of the Ship Observations Team, selected by the Commission
- Chairpersons and vice-Chairpersons of the SOOPIP and Voluntary Observing Ship Panel, selected by the Commission

- Open membership, comprising operators of VOS and SOOP, representatives of monitoring centres, data management centres and bodies, representatives of the International Mobile Satellite Organization and other communications satellite systems, representatives of manufacturers, representatives of science advisory bodies and users as appropriate.

The JCOMM *in situ* Observing Platform Support Centre will participate in the work and the meetings of the Ship Observations Team.

TERMS OF REFERENCE OF COMPONENT PANELS

Ship-of-Opportunity Implementation Panel (SOOPIP)

The Ship-of-Opportunity 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 instrumentation that measure physical, chemical and biological parameters, such as XBTs, TSGs, and CPR. Its terms of reference are to:

(a) ~~Review, recommend on and, as necessary, coordinate the implementation of~~ Implement, maintain, and monitor 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 programme resources to ships to meet the recommended sampling network in the most efficient way;
(d) Ensure the transmission of SOOP data are carried out to the GTS and relevant data centres according to operational and scientific requirements ~~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 centres~~;
(e) Maintain, through the SOT chairperson, appropriate inventories, monitoring reports and analyses, performance indicators and information exchange facilities;
(f) Provide guidance to the coordinator in supporting the Ship-of-Opportunity Programme (SOOP);
(g) Prepare annually a report on the status of SOOP operations, data availability and data quality;
(h) Where relevant, serve as a platform for other observational programmes;
(i) Maintain close communications with the scientific community;
(j) ~~Support~~Facilitate the formation of ~~an XBT~~ SOOP related Science Teams dedicated to meet and discuss on a periodic basis results and ongoing research performed with ~~XBT~~ shipboard observations.

Voluntary Observing Ship Panel

The Voluntary Observing Ship (VOS) Panel shall:

(a) Review, recommend and coordinate the implementation of new and improved specialized shipboard meteorological instrumentation, siting and observing practices, as well as of associated software;
(b) Support the development and maintenance of new pilot projects;
(c) Oversee the upgrade of ships to VOSClim standard, and encourage other new ships to be recruited to the VOSClim class;
(d) Develop and implement activities to optimize ship inspections and ~~enhance ship~~ recruitment, including promotional brochures and training videos;

(e) Prepare annually a report on the status of VOS operations, data availability and data quality.

ANNEX VII

SOT KEY PERFORMANCE INDICATORS FROM THE SOT IMPLEMENTATION STRATEGY

TABLE 1: KPIs FOR THE VOS AND VOSCLIM

KPI	*Definition*	*Type*	*Target*
1	Percentage of VOSClim ships in the global active VOS[1]	Quantity	> 25%
2	Percentage of VOS ships to meet the reporting criteria of an 'Active ship' by providing an average of 20 Observations per month	Quantity	100%
3	Percentage of VOSClim class ships per month being flagged on the Suspect List for Air Pressure	Quality	< 3%
4	Percentage of VOSClim class observations to be received within 120 minutes	Timeliness	> 95%

TABLE 2: KPIs FOR THE SOOPIP

KPI	*Definition*	*Type*	*Target*
5	Number Frequently Repeated (FR) mode lines carried out	Quantity	25
6	Number of High Density (HD) mode lines carried out	Quantity	24
7	Number of Low Density (LD) mode lines carried out	Quantity	0
8	If all lines are carried out, number of XBTs that should be deployed each year	Quantity	33,000

1 The global active VOS is defined as the number of VOS registered in the Pub47 and reporting at least once per month – Today there are about 2000 such ships.

ANNEX VIII

RSMC EXETER MONITORING REPORT

Monitoring the quality and timeliness of VOS observations

(Report submitted by Colin Parrett, United Kingdom)

1 The Met Office (RSMC Exeter), as WMO-designated lead centre for monitoring the quality of surface marine meteorological data (observations from ships, buoys and other in situ marine platforms), compares observations from individual platforms with the Met Office's global model background 6-hour forecast fields for each variable. Platforms for which the observed values differ from the background by a significant amount are flagged as suspect.

2 Monthly lists of suspect marine platforms are sent to the WMO Secretariat and also exchanged among other monitoring centres (including JMA, NCEP, Météo France and ECMWF) for comparison. Generally there is considerable agreement between the different centres, both in terms of suspect platforms (using the same criteria) and mean and standard deviation of differences from the background fields. The Met Office monthly suspect lists are available via the Met Office web site[1]. A recent example of our on-line VOS suspect list for February 2013 is shown in Appendix A. Monthly QC plots are also available from the website for each ship that is listed as suspect.

3 Originally only mean sea level pressure was monitored, but wind speed, wind direction, sea surface temperature, air temperature and relative humidity have been added to the information being exchanged on a monthly basis. The current monthly monitoring criteria for the 6 variables are shown in Appendix B. In response to action 102 from SOT-6, we propose some tightening of these monitoring criteria. The selection criteria for labelling ships as 'suspect' have remained unchanged for up to 25 years (for pressure), during which time there have been large improvements in data assimilation, numerical modelling and data coverage (with many more satellite data types assimilated by the models). Consequently, the short-range background forecasts are more accurate now, resulting in smaller observation-background (o-b) differences overall. Thus we suggest a slight tightening of the criteria for manual observations (for which the criteria were originally agreed), as shown in Appendix C (i).

4 Also, over recent years there has been a large increase in the number of ships that send in reports from automatic weather stations, which are generally more accurate and less prone to errors than manual reports. Therefore we suggest that the monitoring of 'automatic ships' be separated from the monitoring of 'manual ships' and tighter limits imposed for automatic ships), as shown in Appendix C (ii). These values are based on o-b statistics, with the mean (or bias) limits set at approximately 1.5 times the rms o-b values for all observations in each category over the past year. The meeting is invited to confirm that the monitoring criteria shown in Appendix C are set at the correct levels, or to propose more appropriate values. (N.B. The splitting of the monitoring into manual and automatic ships requires that "i_X" be set correctly in all reports. The alternative of using "atm" from the ship metadata would require changes to the Met Office processing and may delay implementation of the separate monitoring of manual and automatic ships.)

5 The Met Office also produces monthly lists of monitoring statistics for the VOS fleets recruited by certain countries. To maintain up to date lists of the VOS fleets for each country concerned, the Met Office uses the meta-data available from the E-SURFMAR web-site.

6 Masked call sign data available from the JCOMMOPS Mask vs Real database is also taken into account when preparing the lists of VOS monitoring statistics.

7 National focal points are notified when the latest VOS monthly monitoring reports and suspect lists become available on the Met Office website by means of an email sent by the Met Office to the

1 http://research.metoffice.gov.uk/research/nwp/observations/monitoring/index.html

SOT, VOS and PMO mailing lists, which are maintained by JCOMMOPS. It is important therefore that focal points wishing to receive this monitoring information check that their mailing list information is kept up to date. However, national monthly monitoring statistics continue to be emailed directly to major VOS operating countries, and as mentioned in reports to previous SOT meetings, any other national focal points who may wish to receive directly emailed copies of the monthly monitoring lists or 'suspect' ship lists should advise the Met Office of their email address.

8 Every 6 months more detailed monitoring reports, for all platforms, are produced and made available to the WMO Secretariat via the Met Office web site. The statistics relating to suspect VOS operated by specific members are extracted from the report and distributed by the Secretariat to national focal points for the members concerned, under a covering letter requesting that remedial action be taken to correct the problems. The Team is invited to note that the Met Office intends to discontinue producing the individual time-series plots for each suspect platform, due to the time-consuming nature of this work and doubts as to the usefulness of these time-series for correcting problems, especially considering the monthly information available (mentioned above). If the general overview and statistics are still required these will continue to be produced and be available from the Met Office web site.

9 Timeliness statistics for VOS reports received at the Met Office are available from our web site[2] where monthly timeliness data for individual VOS is available as well as tables and graphs showing the relative timeliness of national VOS fleets. A graphical example for February 2013 data is shown in Appendix D, where it can be seen from the upper graph that the majority of ship reports were received promptly, with about 70% received within 15 minutes and more than 90% received within 60 minutes of the observation time. The cut-off time for operational NWP global data assimilation is typically 90-150 minutes after the analysis times of 00, 06, 12 and 18 UTC, so that about 95% of global VOS data are being received in time to be assimilated. An example of timeliness information for individual call-signs during February 2013 is shown in Appendix E. The timeliness has improved markedly over the last 4 years, mostly due to increased automation. The Met Office proposes separating the automatic ships from the manual ships to produce two sets of timeliness statistics for national VOS fleets.

10 For the last 2-3 years the Met Office has been producing annual lists of all VOS ships, ranked in order of importance to the numerical weather prediction (NWP) system, available from the Met Office web-site[3]. The ships are ranked in terms of their quantity, quality and timeliness of reports, largely to assist in presenting awards to the best performing ships (initially in the UK VOS fleet). The method and latest results for the UK fleet are shown in Appendix F. Recently this system has been extended to produce monthly scores and ranking lists, separately for automatic and manual ships and for national VOS fleets. These monthly lists are also available from the above link.

11 As mentioned at SOT-5 and SOT-6, the Met Office's role as CBS Lead Centre for monitoring marine data is incomplete, with Japanese ships not being monitored individually, due to JMA's adoption of the 'SHIP' masking scheme. The Met Office continues to collect the original data from JMA's FTP server, but this data is not routed into our meteorological database due to issues concerning its security. Consequently, to ensure that the VOS can continue to be monitored efficiently, the Met Office (RSMC Exeter) would prefer that all countries adopt a masking method with a unique masked identifier for each ship, until a new ENCODE masking scheme is rolled out.

---

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

APPENDIX 1 OF ANNEX VIII

MET OFFICE ON-LINE MONTHLY VOS SUSPECT LIST FOR FEBRUARY 2013

Pub47 VOS Suspects for Feb 2013

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.

Links
Observation Processing
Observation Types
Quality Control
Observation Monitoring
News
News releases
Contact
Contact us

PRESSURE (hPa)

CTRY CODE	SHIP NAME	CALL SIGN	TOTAL	GE (%)	BIAS	SD	Graph
CA	SAMUEL RISLEY	CG2960	166	45	0.0	0.7	QC plot
DE	MSC ALTAIR	A8YN2	25	0	-7.4	1.0	QC plot
IT	COSTA FASCINOSA	ICPO	44	0	-4.5	4.3	QC plot
NL	HAPPY RIVER	PCAW	46	0	-6.8	0.6	QC plot
RU	VIKTOR TKACHEV	UCJX	29	0	7.0	1.6	QC plot
RU	VILNUS	UFJN	33	12	-4.1	0.9	QC plot
US	ENSIGN	WBN3012	26	0	-4.9	2.6	QC plot
US	HONOR	WDC6923	29	0	-4.3	0.9	QC plot
US	NIEUW AMSTERDAM	PBWQ	47	0	-4.9	1.0	QC plot
US	VISION OF THE SEAS	C6SE8	27	0	-4.4	0.9	QC plot

TEMPERATURE (deg C)

CTRY CODE	SHIP NAME	CALL SIGN	TOTAL	GE (%)	BIAS	SD	Graph
CA	NEWFOUNDLAND LYNX	VAAZ	124	84	-12.4	3.7	QC plot
CA	OCEANEX SANDERLING	VOLG	602	36	-0.4	1.1	QC plot

WIND SPEED (m s-1)

CTRY CODE	SHIP NAME	CALL SIGN	TOTAL	GE (%)	BIAS	SD	Graph
IT	LA SUPERBA	ICGK	90	3	5.9	3.4	QC plot
US	EVER DELUXE	9V7953	60	10	8.2	3.5	QC plot
US	TROPIC OPAL	J8NW	23	0	5.4	2.1	QC plot

WIND DIRECTION (deg)

CTRY CODE	SHIP NAME	CALL SIGN	TOTAL	GE (%)	BIAS	SD	Graph
CA	ALGOSCOTIA	VAAP	332	17	74.2	111.1	QC plot
CA	NAMAO	CZ9742	51	0	-36.8	13.0	QC plot
FR	MAIDO	FNHC	167	0	41.2	16.3	QC plot
FR	MN COLIBRI (AWS)	FNHO	208	0	72.5	74.4	QC plot
GB	Berge Atlantic	LAIP5	31	6	-54.3	68.3	QC plot
GB	Grand Princess	ZCBU5	26	0	14.5	118.1	QC plot
GB	Maersk Patras	MYSU5	27	0	-21.8	89.4	QC plot
JP	NIKKEI PHOENIX	H9UY	21	0	-28.8	83.3	QC plot
TR	HILDE A	TCXV7	31	0	61.5	24.1	QC plot
US	BULWARK	WBN4113	25	0	-32.8	29.5	QC plot
US	EAGLE TRENTON	S6NK4	26	0	-0.1	92.2	QC plot
US	EVER DELUXE	9V7953	36	17	-39.0	30.3	QC plot
US	LAURENCE M. GOULD (AWS)	WCX7445	121	0	12.7	82.0	QC plot
US	MARCUS G. LANGSETH (AWS)	WDC6698	53	8	-19.2	87.5	QC plot

RELATIVE HUMIDITY (%)

CTRY CODE	SHIP NAME	CALL SIGN	TOTAL	GE (%)	BIAS	SD	Graph
CA	AIVIK	VOPP	426	7	31.2	15.5	QC plot
CA	NEWFOUNDLAND LYNX	VAAZ	71	0	29.8	7.3	QC plot
CA	OOCL MONTREAL	VRYO3	170	0	16.5	11.7	QC plot
CA	SKAUBRYN	3FZK3	230	0	27.2	8.5	QC plot

APPENDIX 2 OF ANNEX VIII

CRITERIA FOR MONTHLY MONITORING OF MARINE SURFACE OBSERVATIONS

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 observations from
background values, excluding those with gross errors.
BIAS :Mean difference of observations from
background values, excluding those with gross errors
(N.B. a positive bias indicates the wind
observation is veered to the background).
RMS :Root Mean Square difference of observations from
background values, excluding those with gross errors.

GROSS ERROR LIMIT :15 hPa (pressure)
:25 ms^{-1} (vector wind)
:15 ^oC (air temperature)
:50% (relative humidity)
:10 ^oC (sea surface temperature)

SELECTION CRITERIA :NOBS >= 20 , and one or more of the following:

1.Bias >= 4 hPa (pressure)
>= 5 ms^{-1} (wind speed)
>= 30 degrees (direction)
>= 4 ^oC (air temperature)
>= 15% (relative humidity)
>= 3 ^oC (SST)
2.SD >= 6 hPa (pressure)
>= 80 degrees (direction)
>= 6 ^oC (air temperature)
>= 25% (relative humidity)
>= 5 ^oC (SST)
3.PGE >= 25

N.B. Observations of wind direction are only included in the wind direction statistics if the observed or background wind speed is greater than 5 ms^{-1}

APPENDIX 3 OF ANNEX VIII

PROPOSED NEW CRITERIA FOR MONTHLY MONITORING OF (I) MANUAL VOS, (II) AUTOMATIC VOS

I. Manual ships
SELECTION CRITERIA :NOBS >= 15 , and one or more of the following:

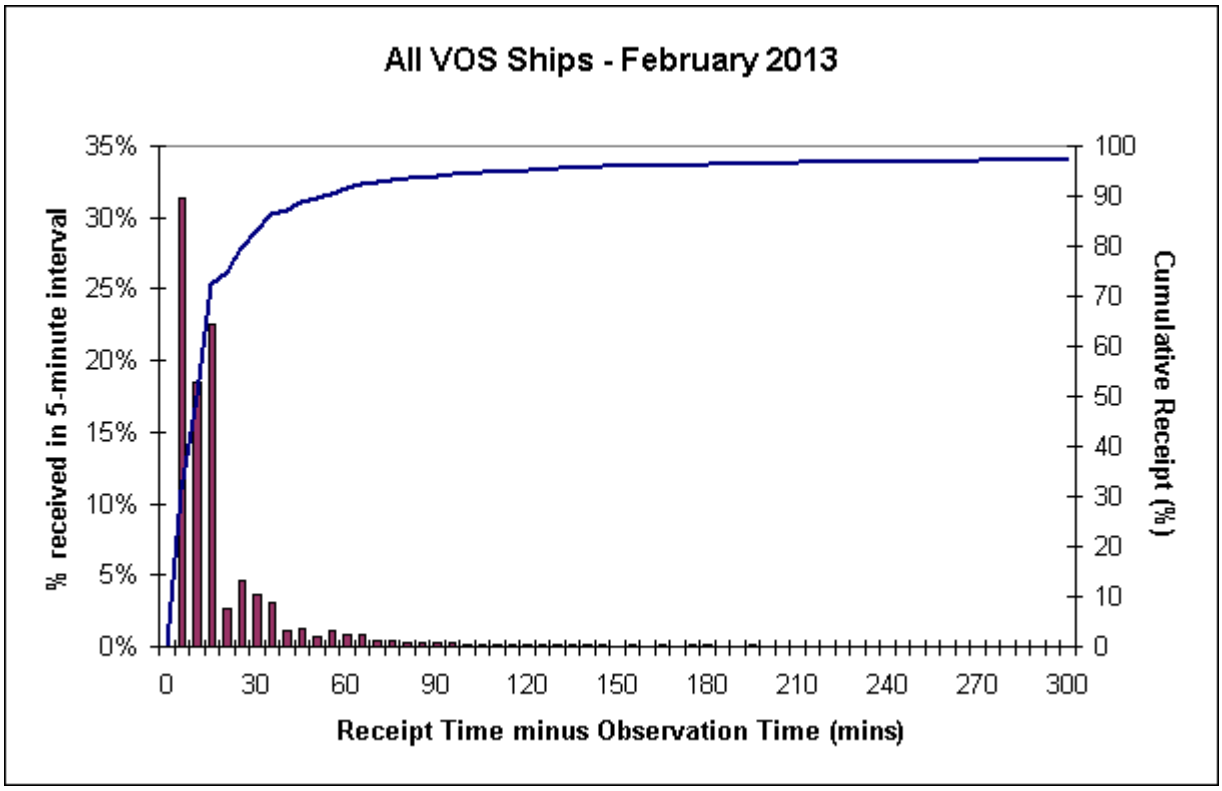
1.Bias >= 3 hPa (pressure)
>= 4 ms^{-1} (wind speed)
>= 30 degrees (direction)
>= 3 ^{o}C (air temperature)
>= 15% (relative humidity)
>= 2.5 ^{o}C (SST)
2.SD >= 5 hPa (pressure)
>= 70 degrees (direction)
>= 5 ^{o}C (air temperature)
>= 25% (relative humidity)
>= 4 ^{o}C (SST)
3.PGE >= 25

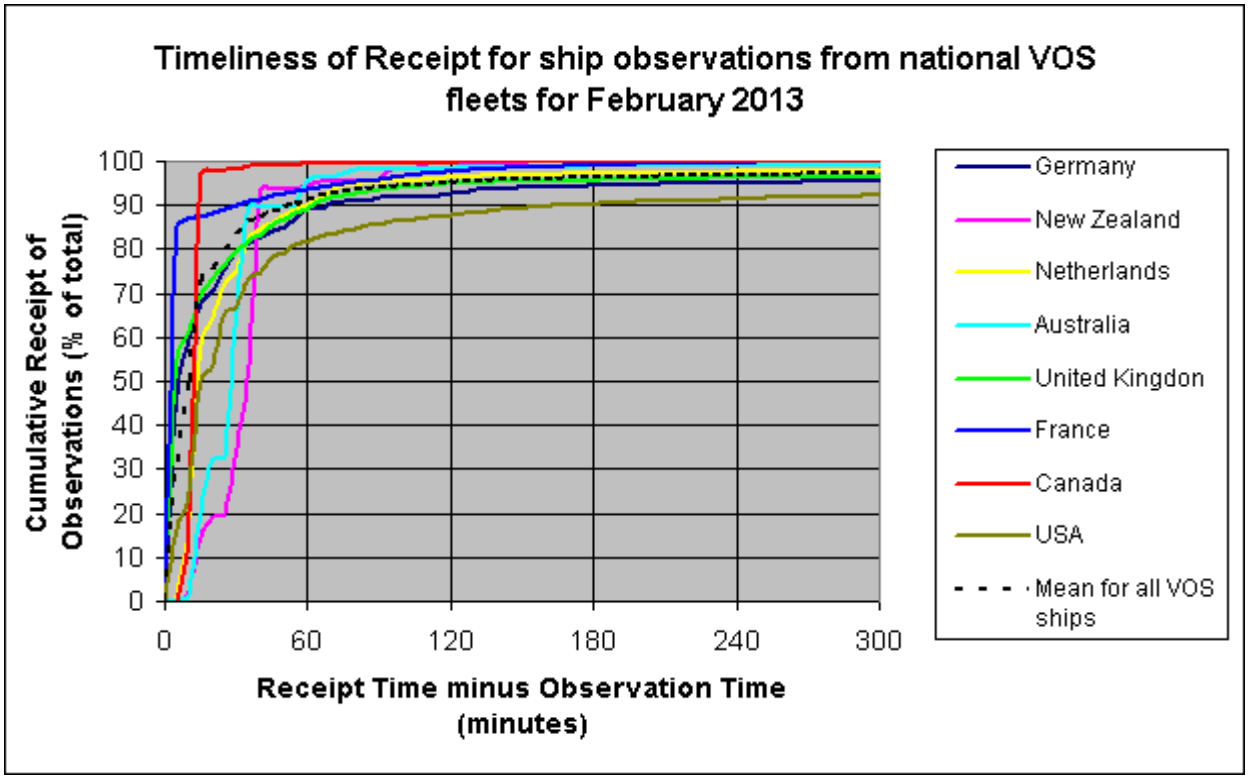
II. Automatic ships
SELECTION CRITERIA :NOBS >= 50 , and one or more of the following:

1.Bias >= 2 hPa (pressure)
>= 4 ms^{-1} (wind speed)
>= 25 degrees (direction)
>= 2.5 ^{o}C (air temperature)
>= 12% (relative humidity)
>= 2 ^{o}C (SST)
2.SD >= 4 hPa (pressure)
>= 50 degrees (direction)
>= 4 ^{o}C (air temperature)
>= 20% (relative humidity)
>= 3 ^{o}C (SST)
3.PGE >= 15

APPENDIX 4 OF ANNEX VIII

TIMELINESS OF VOS OBSERVATIONS RECEIVED AT THE MET OFFICE, FEB 2013





APPENDIX 5 OF ANNEX VIII

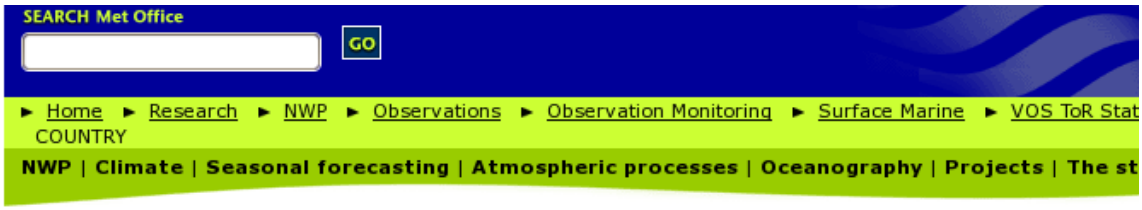
MET OFFICE ON-LINE TIME OF RECEIPT STATISTICS FOR INDIVIDUAL SHIPS, FEB 2013

Pub47 Time of Receipt Statistics by SHIP for February

CTRY	CALLSIGN	NAME	Observations	N<30	N<60	N<120	N>360	Average (R-O) (mins)
	TBWAA10		20	17	20	20	0	18.9
	N8Z001		11	10	11	11	0	19.4
NL	PCDE	ADMIRALENGRACHT	2	1	2	2	0	29.5
NL	PCKU	ALEXANDERGRACHT	17	15	15	17	0	21.5
NL	PCPR	AMSTELGRACHT	25	25	25	25	0	14.4
NL	PCGQ	ANJELIERSGRACHT	57	50	54	57	0	19.1
NL	PCSV	APOLLOGRACHT	37	36	37	37	0	14.8
NL	PHHD	ARNEBORG	34	31	34	34	0	16.1
NL	2EZE5	BERGE STAHL	31	19	26	27	3	94.7
NL	A8JH8	BUZZARD BAY	34	25	25	25	8	151.3
NL	PJRH	COLD STREAM	12	1	10	12	0	44.9
NL	PDKK	COOL EXPRESO	11	11	11	11	0	14.3
NL	PCFW	CORAL CARBONIC	8	4	4	4	4	598.8
NL	PHKM	CORAL FAVIA	15	11	14	15	0	23.4
NL	PDIB	CORAL MEANDRA	8	4	5	5	1	176.5
NL	ELXG9	CORAL PAVONA	18	17	18	18	0	12.8
NL	PBOF	DAMGRACHT	2	2	2	2	0	10.5
NL	PDNN	DANIELLA	14	5	7	14	0	46.2
NL	PDWZ	EDAMGRACHT	56	54	54	54	2	30.4
NL	OXOR2	EDITH MAERSK	83	67	74	77	2	41.5
NL	PDXQ	EEMSGRACHT	31	26	31	31	0	17.5
NL	PDVN	EENDRACHT	16	15	15	16	0	18.4
NL	PDWT	EGELANTIERSGRACHT	39	19	38	39	0	34.0
NL	PDYI	ELANDSGRACHT	10	10	10	10	0	14.3
NL	OXHY2	ELLY MAERSK	61	42	57	60	0	24.1
NL	A8IO2	ELSEBETH	50	34	44	48	0	28.2
NL	A8IP2	ELVIRA	61	51	58	60	0	20.8
NL	A8IP3	EMERALD	27	26	27	27	0	15.1
NL	PDYX	EMMAGRACHT	3	3	3	3	0	14.7
NL	A8IN8	ESMERALDA	85	70	83	85	0	4.6
NL	PDZS	EUROPA	55	21	50	54	0	33.9
NL	A8QJ7	EVA N	97	76	94	97	0	19.9
NL	OXHV2	EVELYN MAERSK	33	27	32	33	0	15.7
NL	PHEC	FAIRPARTNER	14	12	13	14	0	19.6
NL	A8JI2	FALCON BAY	23	3	19	20	0	81.3

APPENDIX 6 OF ANNEX VIII

MET OFFICE ON-LINE TIME OF RECEIPT STATISTICS FOR NATIONAL FLEETS, FEB 2013



Pub47 Time of Receipt Statistics by COUNTRY for February

COUNTRY	Ships	Observations	Average (Obs/Ships)	N<30 mins	N<60 mins	N<120 mins	N>360 mins	%<30 mins	%<60 mins	%<120 mins	%>360 mins	Average (R-O) (mins
AU	55	3964	72.1	2629	3787	3902	31	66%	96%	98%	1%	34.8
DK	2	736	368.0	736	736	736	0	100%	100%	100%	0%	3.6
EU	22	9314	423.4	8871	9312	9312	2	95%	100%	100%	0%	5.5
FR	56	16022	286.1	14397	15012	15658	5	90%	94%	98%	0%	13.0
GB	259	23889	92.2	19010	21320	22660	769	80%	89%	95%	3%	51.7
GR	2	5	2.5	4	4	5	0	80%	80%	100%	0%	23.8
NL	83	2868	34.6	2152	2589	2761	60	75%	90%	96%	2%	37.4
NZ	18	1043	57.9	360	989	1037	0	35%	95%	99%	0%	33.2
CA	41	21784	531.3	21432	21652	21712	12	98%	99%	100%	0%	12.3
DE	440	19637	44.6	15621	17475	18188	270	80%	89%	93%	1%	37.8
HK	28	449	16.0	15	414	428	12	3%	92%	95%	3%	78.7
IE	2	32	16.0	29	29	30	0	91%	91%	94%	0%	24.6
IL	4	49	12.2	41	45	45	4	84%	92%	92%	8%	65.7
IN	11	89	8.1	29	58	75	4	33%	65%	84%	4%	103.5
IS	3	112	37.3	105	107	111	0	94%	96%	99%	0%	4.3
IT	3	296	98.7	200	264	286	2	68%	89%	97%	1%	25.7
JP	13	1179	90.7	1068	1152	1166	7	91%	98%	99%	1%	38.1
KR	3	5	1.7	0	0	0	2	0%	0%	0%	40%	423.0
MY	3	97	32.3	0	93	97	0	0%	96%	100%	0%	56.6
NO	5	2758	551.6	2753	2757	2757	0	100%	100%	100%	0%	11.6
RU	57	1398	24.5	831	1230	1280	75	59%	88%	92%	5%	56.5
SE	16	817	51.1	418	483	742	58	51%	59%	91%	7%	95.9
US	429	24830	57.9	16639	20280	21796	1793	67%	82%	88%	7%	99.0
ZA	1	17	17.0	5	10	12	2	29%	59%	71%	12%	173.8
ZZ	2	36	18.0	20	35	35	1	56%	97%	97%	3%	59.7
Total	1558	131426	84.4	107365	119833	124831	3109	82%	91%	95%	2%	42.2

APPENDIX 7 OF ANNEX VIII

SCHEME FOR RANKING VOS SHIPS BY QUANTITY AND QUALITY OF REPORTS
Ranking Method

Statistics for each ship are accumulated for the year and these are used to rank the ships in terms of number of reports received, quality of the data and timeliness of the reports throughout the year.

The variables considered are:

- Pressure (P)
- Wind speed (Spd)
- Wind direction (Dir)
- Temperature (T)
- Relative humidity (RH)
- Visibility (Vis)
- Sea Surface Temperature (SST)

- these are the variables reported by SHIPs that are assimilated operationally at the Met Office.

Number of reports score

The set of numbers of reports received (Nobs) is 'capped' to limit the influence of any very high numbers from automatic stations, then a score is calculated for the number of observations (obs) received:
Firstly the values in Nobs are inversed to give low (good) scores to ships with high numbers of obs and vice-versa, **Nobs = MAX(Nobs) - Nobs**
Secondly, so that ships with below average numbers have scores greater than 1.0, and vice-versa, we set **NumObsScore = Nobs / MEAN(Nobs)**

Quality score

Quality scores for each variable are calculated, based on the following observation-minus-background (O-B) statistics:
MeanScore = (Absolute value of mean O-B) / VariableLimit
SDScore = (Standard Deviation of O-B) / VariableLimit
[where the following **VariableLimit** values are used, based on the Met Office reject list thresholds: **P = 2.0 hPa**, **Spd = 3.0 m/s**, **Dir = 40 degrees**, **T = 3.0 C**, **RH = 15.0 %**, **Log(Vis) = 1.0**, **SST = 3.0 C**] and
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.)
All scores are capped at 2.0, then a "quality-score" is created for each variable:
QualityScore = (MeanScore + SDScore + GEScore) / 3

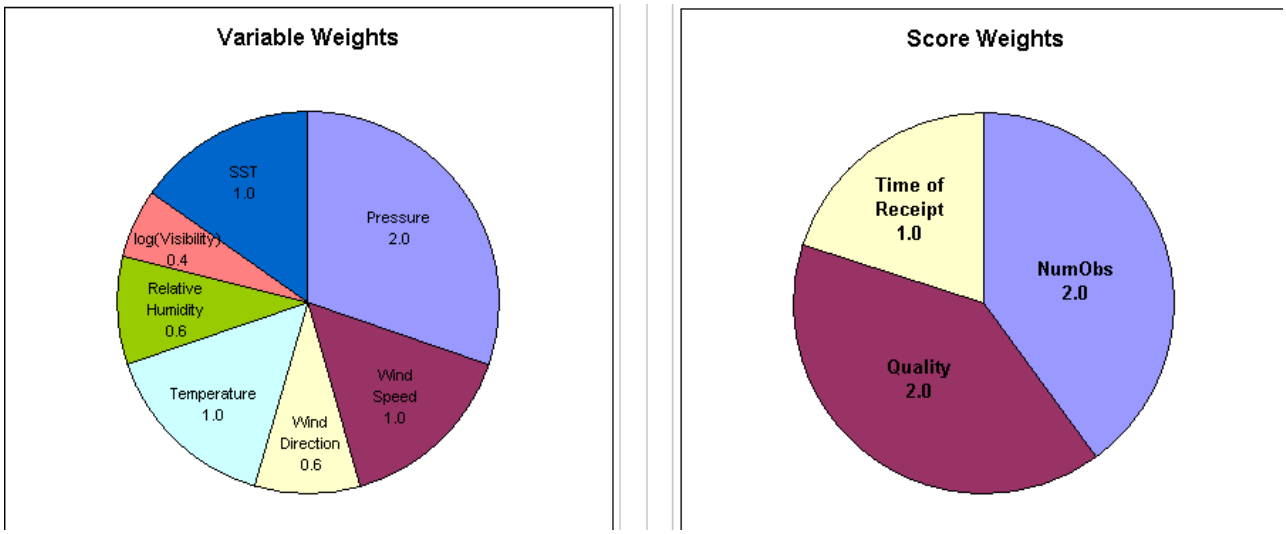
Time of receipt score

Time of receipt (ToR) scores are produced from yearly totals for the following ToR categories:
reports received within 30 minutes of the report time, 30-60 minutes, 60-120 minutes, 120-360 minutes and after 360 minutes.
Each ship is given a score that is the sum of the following numbers of points for each category multiplied by the number of observations in that 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; and 'points_after' has just been set to 360 minus 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 reports received later than that are less useful to NWP. The ToR scores are also capped at 2.0.

Combined score

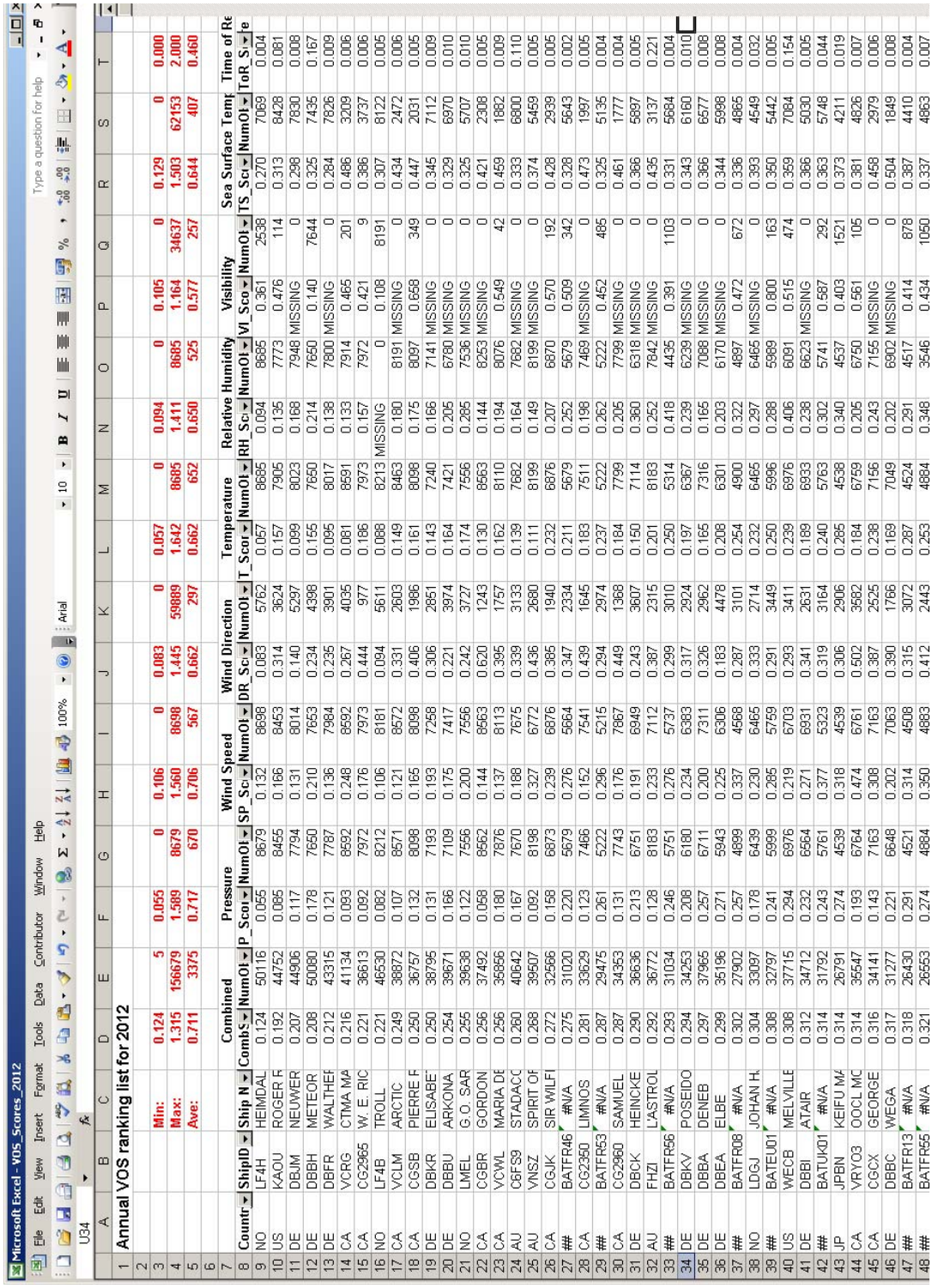
The **NumObs, Quality and ToR** scores are combined with weights of **0.4, 0.4 and 0.2**, respectively, for each variable.
For ships that do not report certain variables the scores are set to the worst score for that variable (usually 2.0).
Then the scores for each variable are combined using the following 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 (their values may need some further tuning).

Weights



N.B. The above ranking scheme is only intended to give an indication of the relative performance of individual observing ships and marine platforms. It is primarily aimed at usefulness for NWP and therefore only takes into account observations that have been received in near real time. It takes no account of delayed mode observations collected for climate studies (for which timeliness is largely irrelevant).

Annual VOS ranking scheme – some of the 'best' ships for 2012

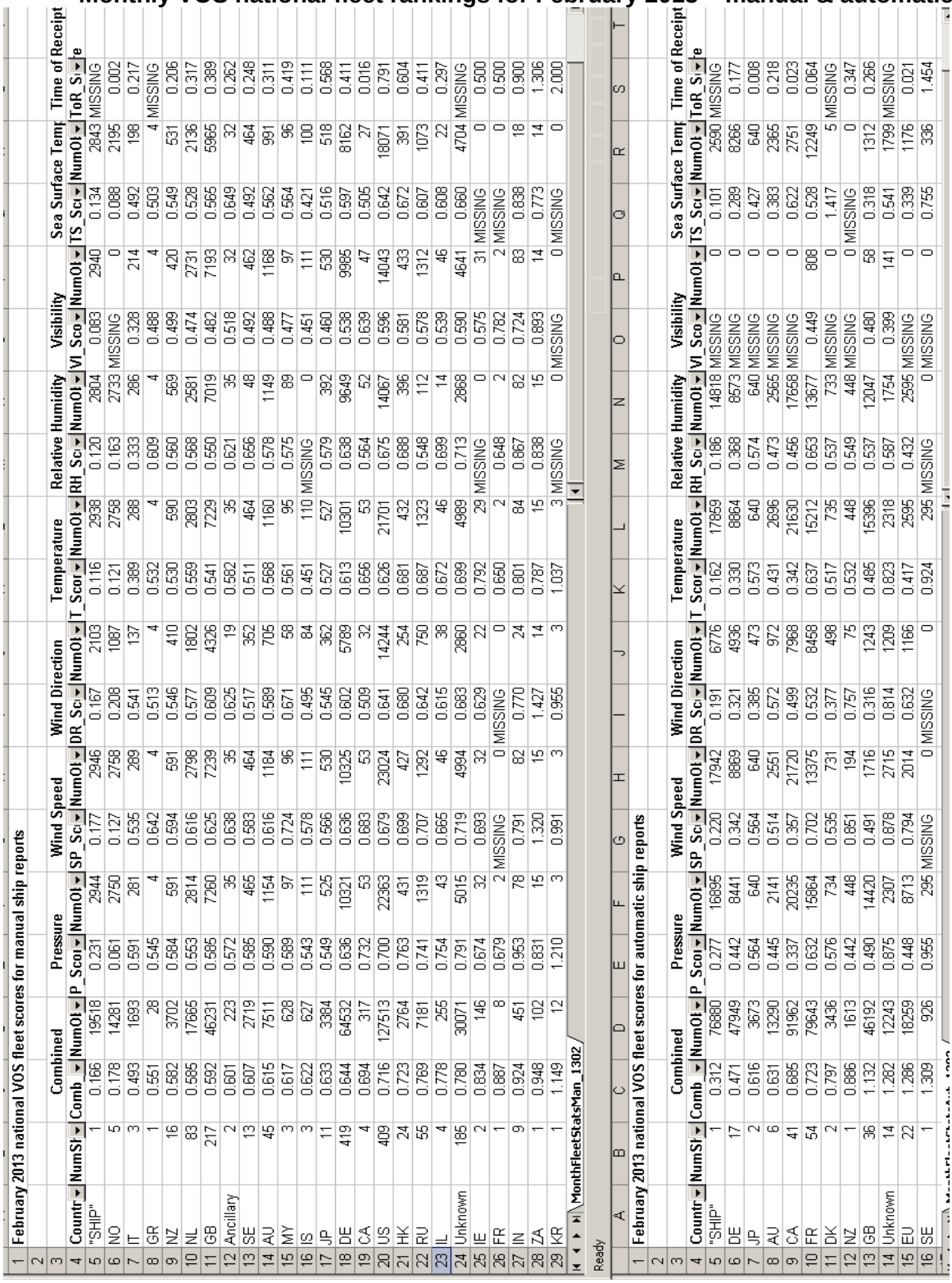


Microsoft Excel - VOS_Scores_2012

Annual VOS ranking list for 2012

	Country	ShipID	Ship N	Combs	NumOI	P_Scor	NumOI	SP_Sc	NumOI	DR_Sc	NumOI	T_Scor	NumOI	RH_Sc	NumOI	VI_Sco	NumOI	TS_Sc	NumOI	ToR_S
			Min:	0.124	5	0.055	0	0.106	0	0.083	0	0.057	0	0.094	0	0.105	0	0.129	0	0.000
			Max:	1.315	156679	1.589	8679	1.560	8698	1.445	59889	1.642	8685	1.411	8685	1.164	34637	1.503	62153	2.000
			Ave:	0.711	3375	0.717	670	0.706	567	0.662	297	0.662	652	0.650	525	0.577	257	0.644	407	0.460
9	NO	LF4H	HEIMDAL	0.124	50116	0.055	8679	0.132	8698	0.083	5762	0.057	8685	0.094	8685	0.361	2538	0.270	7069	0.004
10	US	KAOU	ROGER R	0.192	44752	0.085	8455	0.166	8453	0.314	3624	0.157	7905	0.135	7773	0.476	114	0.313	8428	0.081
11	DE	DBJM	NEUWER	0.207	44906	0.117	7794	0.131	8014	0.140	5297	0.099	8023	0.168	7948	MISSING	0	0.298	7830	0.008
12	DE	DBBH	METEOR	0.208	50080	0.178	7650	0.210	7653	0.234	4398	0.155	7650	0.214	7650	0.140	7644	0.325	7435	0.167
13	DE	DBFR	WALTHEF	0.212	43315	0.121	7787	0.136	7984	0.235	3901	0.095	8017	0.138	7800	MISSING	0	0.284	7826	0.009
14	CA	VCRG	CTMA MA	0.216	41134	0.093	8592	0.248	8592	0.267	4035	0.081	8591	0.133	7914	0.465	201	0.486	3209	0.006
15	CA	CG2965	W. E. RIC	0.221	36613	0.092	7972	0.176	7973	0.444	977	0.186	7973	0.157	7972	0.421	9	0.386	3737	0.006
16	NO	LF4B	TROLL	0.221	46530	0.082	8212	0.106	8181	0.094	5611	0.088	8213	MISSING	0	0.108	8191	0.307	8122	0.005
17	CA	VCLM	ARCTIC	0.249	38872	0.107	8571	0.121	8572	0.331	2603	0.149	8463	0.180	8191	MISSING	0	0.434	2472	0.006
18	CA	CGSB	PIERRE F	0.250	36757	0.132	8098	0.165	8098	0.406	1986	0.161	8098	0.175	8097	0.668	349	0.447	2031	0.005
19	DE	DBKR	ELISABE	0.250	38795	0.131	7193	0.193	7258	0.306	2851	0.143	7240	0.166	7141	MISSING	0	0.345	7112	0.009
20	DE	DBBU	ARKONA	0.254	39671	0.166	7109	0.175	7417	0.221	3974	0.164	7421	0.205	6780	MISSING	0	0.329	6970	0.010
21	NO	LMEL	G.O. SAR	0.255	39638	0.122	7556	0.200	7556	0.242	3727	0.174	7556	0.285	7536	MISSING	0	0.325	5707	0.010
22	CA	CGBR	GORDON	0.256	37492	0.058	8562	0.144	8563	0.620	1243	0.130	8563	0.144	8253	MISSING	0	0.421	2308	0.005
23	CA	VCWL	MARIA DE	0.256	35856	0.180	7876	0.137	8113	0.395	1757	0.162	8110	0.194	8076	0.549	42	0.459	1882	0.009
24	AU	C6FS9	STADACC	0.260	40642	0.167	7670	0.188	7675	0.339	3133	0.139	7682	0.164	7682	MISSING	0	0.333	6800	0.110
25	AU	VNSZ	SPIRIT OF	0.268	39507	0.092	8198	0.327	6772	0.436	2680	0.111	8199	0.149	8199	MISSING	0	0.374	5459	0.005
26	CA	CGJK	SIR WILFI	0.272	32566	0.158	6873	0.239	6876	0.385	1940	0.232	6876	0.207	6870	0.570	192	0.428	2939	0.005
27	##	BATFR46	#N/A	0.275	31020	0.220	5679	0.276	5664	0.347	2334	0.211	5679	0.252	5679	0.509	342	0.328	5643	0.002
28	CA	CG2350	LIMNOS	0.281	33629	0.123	7466	0.152	7541	0.439	1645	0.183	7511	0.198	7469	MISSING	0	0.473	1997	0.005
29	##	BATFR53	#N/A	0.287	29475	0.261	5222	0.296	5215	0.294	2974	0.237	5222	0.262	5222	0.452	485	0.325	5135	0.004
30	CA	CG2960	SAMUEL	0.287	34353	0.131	7743	0.176	7867	0.449	1368	0.184	7799	0.205	7799	MISSING	0	0.461	1777	0.004
31	DE	DBCK	HEINCKE	0.290	36636	0.213	6751	0.191	6949	0.243	3607	0.150	7114	0.360	6318	MISSING	0	0.366	5897	0.005
32	AU	FHZI	LASTROL	0.292	36772	0.128	8183	0.233	7112	0.387	2315	0.201	8183	0.252	7842	MISSING	0	0.435	3137	0.221
33	##	BATFR56	#N/A	0.293	31034	0.246	5751	0.276	5737	0.299	3010	0.250	5314	0.418	4435	0.391	1103	0.331	5684	0.004
34	DE	DBKV	POSEIDO	0.294	34253	0.208	6180	0.234	6383	0.317	2924	0.197	6367	0.239	6239	MISSING	0	0.343	6160	0.010
35	DE	DBBA	DENEB	0.297	37965	0.257	6711	0.200	7311	0.326	2962	0.165	7316	0.165	7088	MISSING	0	0.366	6577	0.008
36	DE	DBEA	ELBE	0.299	35196	0.271	5943	0.225	6306	0.183	4478	0.208	6301	0.203	6170	MISSING	0	0.344	5998	0.008
37	##	BATFR08	#N/A	0.302	27902	0.257	4899	0.337	4568	0.287	3101	0.254	4900	0.322	4897	0.472	672	0.336	4865	0.004
38	NO	LDGJ	JOHAN H.	0.304	33097	0.178	6439	0.230	6465	0.333	2714	0.232	6465	0.297	6465	MISSING	0	0.393	4549	0.032
39	##	BATEU01	#N/A	0.308	32797	0.241	5999	0.285	5759	0.291	3449	0.250	5996	0.288	5989	0.800	163	0.350	5442	0.005
40	US	WECB	MELVILLE	0.308	37715	0.294	6976	0.219	6703	0.293	3411	0.239	6976	0.406	6091	0.515	474	0.359	7084	0.154
41	DE	DBBI	ATAIR	0.312	34712	0.232	6564	0.271	6931	0.341	2631	0.189	6933	0.238	6623	MISSING	0	0.366	5030	0.005
42	##	BATUK01	#N/A	0.314	31792	0.243	5761	0.377	5323	0.319	3164	0.240	5763	0.302	5741	0.587	292	0.363	5748	0.044
43	JP	JPBN	KEIFU MA	0.314	26791	0.274	4539	0.318	4539	0.306	2906	0.285	4538	0.340	4537	0.403	1521	0.373	4211	0.019
44	CA	VRYO3	OOCL MC	0.314	35547	0.193	6764	0.474	6761	0.502	3582	0.184	6759	0.205	6750	0.561	105	0.381	4626	0.007
45	CA	CGCX	GEORGE	0.316	34141	0.143	7163	0.308	7163	0.387	2525	0.238	7156	0.243	7155	MISSING	0	0.458	2979	0.006
46	DE	DBBC	WEGA	0.317	31277	0.221	6648	0.202	7063	0.390	1766	0.169	7049	0.202	6902	MISSING	0	0.504	1849	0.008
47	##	BATFR13	#N/A	0.318	26430	0.291	4521	0.314	4508	0.315	3072	0.287	4524	0.291	4517	0.414	878	0.387	4410	0.004
48	##	BATFR55	#N/A	0.321	26553	0.274	4884	0.350	4883	0.412	2443	0.253	4884	0.348	3546	0.434	1050	0.337	4863	0.007

Monthly VOS national fleet rankings for February 2013 – manual & automatic reports



February 2013 national VOS fleet scores for manual ship reports																														
		Combined		Pressure		Wind Speed			Wind Direction			Temperature			Relative Humidity			Visibility			Sea Surface Temp			Time of Receipt		
Country	NumSI	Comb	NumOI	P_Scor	NumOI	SP_Scr	NumOI	DR_Scr	NumOI	T_Scor	NumOI	RH_Scr	NumOI	Vl_Sco	NumOI	TS_Scr	NumOI	ToR_Sc												
"SHIP"	1	0.166	19518	0.231	2944	0.177	2946	0.167	2103	0.116	2938	0.120	2804	0.083	2940	0.134	2843	MISSING												
NO	5	0.178	14281	0.061	2750	0.127	2758	0.208	1087	0.121	2758	0.163	2733	MISSING	0	0.088	2195	0.002												
IT	3	0.493	1693	0.591	281	0.535	289	0.541	137	0.389	288	0.333	286	0.328	214	0.492	198	0.217												
GR	1	0.551	28	0.545	4	0.642	4	0.513	4	0.532	4	0.609	4	0.488	4	0.503	4	MISSING												
NZ	16	0.582	3702	0.584	591	0.594	591	0.546	410	0.530	590	0.560	569	0.499	420	0.549	531	0.206												
NL	83	0.585	17665	0.553	2814	0.616	2798	0.577	1802	0.559	2803	0.568	2581	0.474	2731	0.528	2136	0.317												
GB	217	0.592	46231	0.585	7260	0.625	7239	0.609	4326	0.541	7229	0.560	7019	0.462	7193	0.565	5965	0.389												
Ancillary	2	0.601	223	0.572	35	0.638	35	0.625	19	0.582	35	0.621	35	0.518	32	0.649	32	0.262												
SE	13	0.607	2719	0.585	465	0.583	464	0.517	352	0.511	464	0.656	48	0.492	462	0.492	464	0.248												
AU	45	0.615	7511	0.590	1154	0.616	1184	0.589	705	0.568	1160	0.578	1149	0.488	1168	0.562	991	0.311												
MY	3	0.617	628	0.589	97	0.724	96	0.671	58	0.561	95	0.575	89	0.477	97	0.564	96	0.419												
IS	3	0.622	627	0.543	111	0.578	111	0.495	84	0.451	110	MISSING	0	0.451	111	0.421	100	0.111												
JP	11	0.633	3384	0.549	525	0.566	530	0.545	362	0.527	527	0.579	392	0.460	530	0.516	518	0.568												
DE	419	0.644	64532	0.636	10321	0.636	10325	0.602	5789	0.613	10301	0.638	9649	0.538	9985	0.597	8162	0.411												
CA	4	0.694	317	0.732	53	0.683	53	0.509	32	0.656	53	0.564	52	0.639	47	0.505	27	0.016												
US	409	0.716	127513	0.700	22363	0.679	23024	0.641	14244	0.626	21701	0.675	14067	0.596	14043	0.642	18071	0.791												
HK	24	0.723	2764	0.763	431	0.699	427	0.680	254	0.681	432	0.688	396	0.581	433	0.672	391	0.604												
RU	55	0.769	7181	0.741	1319	0.707	1292	0.642	750	0.687	1323	0.548	112	0.578	1312	0.607	1073	0.411												
IL	4	0.778	255	0.754	43	0.665	46	0.615	38	0.672	46	0.699	14	0.539	46	0.608	22	0.297												
Unknown	185	0.780	30071	0.791	5015	0.719	4994	0.683	2860	0.699	4989	0.713	2868	0.590	4641	0.660	4704	MISSING												
IE	2	0.834	146	0.674	32	0.693	32	0.629	22	0.792	29	MISSING	0	0.575	31	MISSING	0	0.500												
FR	1	0.887	8	0.679	2	MISSING	0	MISSING	0	0.650	2	0.648	2	0.782	2	MISSING	0	0.500												
IN	9	0.924	451	0.953	78	0.791	82	0.770	24	0.801	84	0.867	82	0.724	83	0.838	18	0.900												
ZA	1	0.948	102	0.831	15	1.320	15	1.427	14	0.787	15	0.838	15	0.893	14	0.773	14	1.306												
KR	1	1.149	12	1.210	3	0.991	3	0.955	3	1.037	3	MISSING	0	MISSING	0	MISSING	0	2.000												

February 2013 national VOS fleet scores for automatic ship reports																														
		Combined		Pressure		Wind Speed			Wind Direction			Temperature			Relative Humidity			Visibility			Sea Surface Temp			Time of Receipt		
Country	NumSI	Comb	NumOI	P_Scor	NumOI	SP_Scr	NumOI	DR_Scr	NumOI	T_Scor	NumOI	RH_Scr	NumOI	Vl_Sco	NumOI	TS_Scr	NumOI	ToR_Sc												
"SHIP"	1	0.312	76880	0.277	16895	0.220	17942	0.191	6776	0.162	17859	0.186	14618	MISSING	0	0.101	2590	MISSING												
DE	17	0.471	47949	0.442	8441	0.342	8869	0.321	4936	0.330	8864	0.368	8573	MISSING	0	0.289	8266	0.177												
JP	2	0.616	3673	0.564	640	0.564	640	0.385	473	0.573	640	0.574	640	MISSING	0	0.427	640	0.008												
AU	6	0.631	13290	0.445	2141	0.514	2551	0.572	972	0.431	2696	0.473	2565	MISSING	0	0.383	2365	0.218												
CA	41	0.685	91962	0.337	20235	0.357	21720	0.499	7968	0.342	21630	0.456	17658	MISSING	0	0.622	2751	0.023												
FR	54	0.723	79643	0.632	15864	0.702	13375	0.532	8458	0.637	15212	0.653	13677	0.449	808	0.528	12249	0.064												
DK	2	0.797	3436	0.576	734	0.535	731	0.377	498	0.517	735	0.537	733	MISSING	0	1.417	5	MISSING												
NZ	1	0.886	1613	0.442	448	0.851	194	0.757	75	0.532	448	0.549	448	MISSING	0	MISSING	0	0.347												
GB	36	1.132	46192	0.490	14420	0.491	1716	0.316	1243	0.485	15396	0.537	12047	0.480	58	0.318	1312	0.266												
Unknown	14	1.282	12243	0.875	2307	0.878	2715	0.814	1209	0.823	2318	0.587	1754	0.399	141	0.541	1799	MISSING												
EU	22	1.286	18259	0.448	8713	0.794	2014	0.632	1166	0.417	2595	0.432	2595	MISSING	0	0.339	1176	0.021												
SE	1	1.309	926	0.955	295	MISSING	0	MISSING	0	0.924	295	MISSING	0	MISSING	0	0.755	336	1.454												

ANNEX IX

REPORT BY THE REAL TIME MONITORING CENTRE (RTMC) OF THE VOSCLIM

(report submitted by Colin Parrett, United Kingdom)

This report includes the following appendices:

- Appendix 1: VOSClim suspect ships in February 2013
- Appendix 2: Monitoring criteria for VOSClim suspect Ships
- Appendix 3: Proposed new monitoring criteria for VOSClim suspect ships

APPENDIX 1 OF ANNEX IX

VOSCLIM SUSPECT SHIPS IN FEBRUARY 2013

Callsign	Element	NumObs	%GE	StdDvn	Bias	RMS
9HA2415	PMSL	37	0	1.2	2.5	2.7
A8JR6	PMSL	32	3	2.3	2.5	3.4
PCAW	PMSL	46	0	0.6	-6.8	6.9
VAAZ	T	124	84	3.7	-12.4	12.9
VOLG	T	353	39	1.1	-0.5	1.2
ZQDI9	T	60	0	2.0	2.3	3.1
CG3029	RH	114	0	9.8	16.6	19.3
CGBN	RH	61	0	10.2	19.0	21.6
D5BR6	RH	44	0	9.9	13.8	17.0
MZFC6	RH	60	0	11.0	15.5	19.0
OXHY2	RH	47	0	15.6	12.2	19.8
VAAZ	RH	71	0	7.3	29.8	30.7
VRYO3	RH	103	0	9.6	23.3	25.2
ZCDU9	RH	53	0	6.8	14.2	15.7
MSTM6	SPEED	57	11	4.2	0.9	4.3
OYYL2	SPEED	20	10	3.2	-0.2	3.2
VAAP	SPEED	256	16	5.4	5.2	7.5
9HA2415	DIRN.	25	0	66.9	-3.0	66.9
LAIP5	DIRN.	31	6	68.2	-54.3	87.2
LAMG7	DIRN.	23	0	34.2	-31.1	46.2
MYSU5	DIRN.	26	0	88.9	-25.6	92.5
MZIU7	DIRN.	23	0	63.5	-4.0	63.7
VAAP	DIRN.	180	22	96.2	41.7	104.9
WBP3210	DIRN.	124	1	62.7	-0.6	62.7
WCX7445	DIRN.	59	0	51.7	34.3	62.0
ZCBU5	DIRN.	25	0	120.4	14.3	121.3
A8IP3	SST	27	0	2.0	-2.6	3.2
C6IO9	SST	30	7	3.2	2.4	4.0
C6RM7	SST	26	0	1.4	-2.0	2.5
C6YT4	SST	30	3	1.2	2.6	2.9
CGBY	SST	169	0	0.6	2.2	2.3
CGCX	SST	331	0	1.0	2.1	2.4
D5BR6	SST	41	7	2.6	-2.3	3.5
MCLJ8	SST	22	0	1.1	-3.4	3.5
PCAW	SST	46	0	0.7	-2.7	2.7
VRJC9	SST	61	0	0.8	2.6	2.7
VRKJ7	SST	32	0	0.9	2.0	2.2
WBP3210	SST	209	0	1.2	2.3	2.6
WFLG	SST	46	0	1.1	-3.1	3.3
ZQAY4	SST	67	0	0.7	2.1	2.2

APPENDIX 2 OF ANNEX IX

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 to be a 'gross error'.

APPENDIX 3 OF ANNEX IX

PROPOSED NEW MONITORING CRITERIA FOR VOSCLIM SUSPECT SHIPS

1. For each ship and each variable there should be at least **15** reports for **manual** ships and **50** reports for **automatic** ships 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 following tables 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) **Manual Ships** Variable	(2) Mean o-b limit	(3) Std. Dev. o-b limit	(4) Gross error limit
Pressure (hPa)	**2.0**	**4.0**	**15.0**
Wind speed (m/s)	**4.0**	**10.0**	**25.0**
Wind direction (degrees)	**25.0**	**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**

(1) **Automatic Ships** Variable	(2) Mean o-b limit	(3) Std. Dev. o-b limit	(4) Gross error limit
Pressure (hPa)	**1.5**	**3.0**	**15.0**
Wind speed (m/s)	**4.0**	**10.0**	**25.0**
Wind direction (degrees)	**20.0**	**50.0**	**150.0**
Air Temperature (^{0} C)	**1.5**	**3.0**	**10.0**
Relative humidity (%)	**10.0**	**15.0**	**50.0**
Sea surface temp. (^{0} C)	**1.5**	**3.0**	**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 to be a 'gross error'.

ANNEX X

REPORT BY THE TASK TEAM ON ASAP

(Submitted by Mr Rudolf Krockauer, Chairperson of the JCOMM ASAP Task Team)

1. Introduction

The number of ships which routinely provide upper air soundings on the GTS throughout the year is around 20 worldwide. Occasionally there are some research vessels which perform soundings during certain research campaigns. But these activities are usually limited to some weeks.

After the reduction of the Japanese ASAP fleet from 5 to 2 research ships in 2010, there is only one significant ASAP programme left: The European (EUMETNET) E-ASAP fleet with 18 ships plus one 'laid up' station in NE Iceland (operated as land station since 2010).

E-ASAP is the only programme worldwide which is mainly based on a fleet of commercial vessels (plus two research ships and one hospital ship). 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:

- 83% (15 out of 18) stations 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 communications.
- ASAP stations on merchant ships 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 the stations are operated by skilled staff there are less technical and operational problems than in the E-ASAP fleet.

3. E-ASAP fleet

Table 1 lists 18 active E-ASAP ships (status Feb 2013). 10 out of 18 stations (ASEU- and ASDE-) are operationally managed by the E-ASAP management team of the Deutscher Wetterdienst DWD in Hamburg, Germany. The other stations are part of the E-ASAP fleet but are managed by the NMS's of France (ASFR-), Denmark (ASDK-), and Spain (ASES01). 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 is an efficient ship masking scheme which could also be applied to other ASAP stations outside the E-ASAP fleet.

Table 1: Ships in the E-ASAP fleet in Feb 2013

Station	Service	Sounding equipment
ASEU01	No regular service, Research ship	The 10’ container launcher is equipped with a Vaisala DigiCORA III (MW21). Launches are usually carried out by the electronic engineer (system administrator).
ASEU02	Northern Europe – Chile	The 10’ container launcher is equipped with a Vaisala DigiCORA III (MW21). Launches are usually carried out by the officers and cadets.
ASEU03	Western Mediterranean – Montreal	The ship has a 10’ container launcher portside and a manual deck launcher starboard. The Vaisala DigiCORA III (MW21) system is installed on the bridge. Launches are usually carried out by two cadets on board. (MW21).
ASEU04	Montreal – Northern Europe	The ship has a 10’ container launcher portside and a manual deck launcher starboard. The Vaisala DigiCORA III (MW21) system is installed on the bridge. Launches are usually carried out by two cadets on board.
ASEU05	Northern Europe – East coast US	The 10’ container launcher is equipped with a DigiCORA III (MW21). Most crew members are involved in launching operations.
ASEU06	Northern Europe – East coast US	The 10’ container launcher is equipped with a DigiCORA III (MW21). Most crew members are involved in launching operations.
ASDE01	Northern Europe – East coast US	The 20’ container launcher is equipped with a Vaisala DigiCORA III (MW21). Most crew members are involved in launching operations.
ASDE02	No regular service, Research ship	The 20’ container launcher is equipped with a Vaisala DigiCORA III (MW21). Launches are carried out by a professional observer of Deutscher Wetterdienst DWD.
ASDE03	Northern Europe – East coast US	The ship is equipped with 2 manual deck launchers starboard and portside and DigiCORA III (MW21) sounding system on the bridge. Most crew members are involved in launching operations.
ASDE04	Northern Europe – Chile	The ship is equipped with an E-ASAP manual launcher and DigiCORA III (MW21) on the bridge. Launches are usually carried out by the officers and cadets.
ASDK01	Denmark – West coast Greenland	The ship is equipped with a 10’ container launcher. The Vaisala DigiCORA III (MW21) sounding system is installed on the bridge.
ASDK02	Denmark – West coast Greenland	The launcher is integrated in the ship. The Vaisala DigiCORA III (MW21) sounding system is installed on the bridge.
ASDK3	Denmark – West coast Greenland	The ship is equipped with a 10’ container launcher. The GRAW MET 5 sounding system is installed on the bridge.

Station	Service	Sounding equipment
ASFR1	North West Europe – French West Indies	The ship is equipped with a open deck launcher and MODEM SR2K sounding system in the wheelhouse. Launches are usually carried out by the electricians.
ASFR2	North West Europe – French West Indies	The ship is equipped with a open deck launcher and MODEM SR2K sounding system in the wheelhouse. Launches are usually carried out by the electricians.
ASFR3	North West Europe – French West Indies	The ship is equipped with a open deck launcher and MODEM SR2K sounding system in the wheelhouse. Launches are usually carried out by the electricians.
ASFR4	North West Europe – French West Indies	The ship is equipped with a open deck launcher and MODEM SR2K sounding system in the wheelhouse. Launches are usually carried out by the electricians.
ASES01	No line service, Hospital ship	The 10' container launcher is equipped with a Vaisala DigiCORA III (MW21). Launches are usually carried out by the 1st officer.

The number of participating ships in the reporting period 2011-2012 was 18. However, some stations had to be transferred to other ships due to changes in the trade pattern of the ships. EUMETNET is mainly interested in soundings in the North Atlantic. If ships leave this sailing area for new services (e.g. in or to East Asia) the station is transferred to another ship.

Table 2 shows the development of the E-ASAP fleet since 2003.

Table 2: Development of the fleet from 2003 to 2012.

Year	Ships leaving the E-ASAP fleet[1)]	Ships joining the E-ASAP fleet	Active stations at the end of the year
2003	- 1	+ 1	13
2004	- 0	+ 1	14
2005	- 1	+ 4	17
2006	- 1	+ 0	16
2007	- 1	+ 0	15
2008	- 4	+ 1	12
2009	- 1	+ 4	15
2010	- 0	+ 4	18 + 1 temporary land station
2011	- 1	+ 1	18 + 1 temporary land station
2012	- 2	+ 2	18 + 1 temporary land station

[1)] Usually due to changes in the trade pattern of the ships (i.e. routes away from the EUCOS area).

Figures 1 and 2 demonstrate the different types of launchers on board the ships.


Figure 1: Examples of container launchers.

Figure 2: Examples of manual launchers.

4. Performance of the E-ASAP fleet

The performance of the ASAP stations is included in the annual EUMETNET SOT ASAP report. Figure 3 shows the spatial distribution of bulletins in 2012 on a 2x2° grid without interpolation.

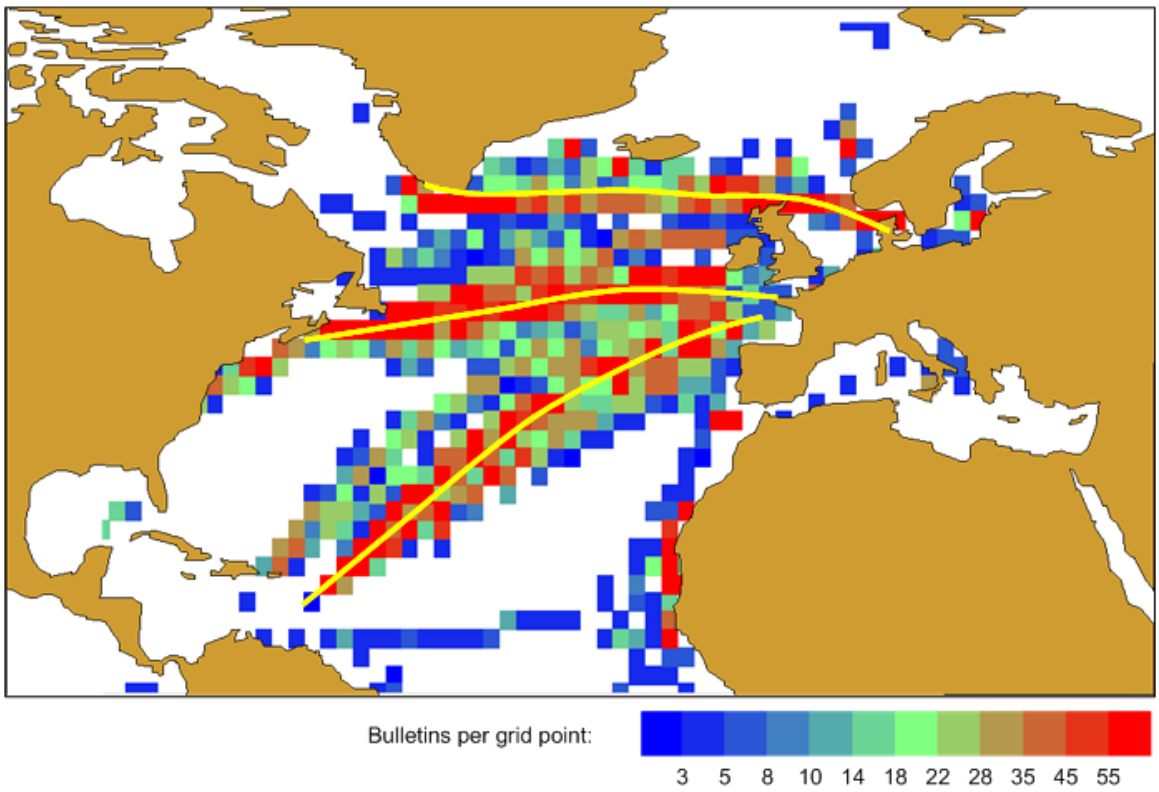


Figure 3: Distribution of TEMP bulletins in 2012 on a 2x2° grid without interpolation.

The distribution demonstrates the main trading routes between Europe and North America of the participating container vessels. Basically, there are three legs (yellow lines in figure 4):

- Northern leg: Denmark – Greenland,
- 'Fifties' leg: along 50°N,
- Southern leg: Channel – West Indies.

The individual performances differ widely from month to month and from ship to ship. Red spots away from the three main legs are soundings performed on board the Research Vessels MARIA S. MERIAN, METEOR and the Spanish hospital ship ESPERANZA DEL MAR (off West Africa).

The total number of soundings on the GTS was around 4763 in 2012. Taking into account the total number of launches on board versus the received soundings on the GTS, the average output (GTS/Launches ratio) was 90%. Main reasons for failed launches are

- technical problems of the equipment due to the permanent vibrations on board,
- unfavourable wind conditions at 15-20 knots sailing speed,
- unexperienced operators, and
- poor satellite communication.

5. Other ASAP ships

Table 3 lists four ships providing ASAP soundings on the GTS in 2012. The Japanese Met Service JMA operates an ASAP stations on the research vessel RYOFU MARU in the western north Pacific and seas adjacent to Japan. JAMSTEC (JAPAN AGENCY FOR MARINE-EARTH SCIENCE AND TECHNOLOGY) operates a station on the oceanographic research vessel MIRAI. In total, 272 soundings were received from the Japanese ASAP ships in 2012.

The German research vessel POLARSTERN operates in polar regions in the summer periods (Apr-Sep in the Arctic, Oct-Mar in the Antarctic) and provided 362 soundings. The US research vessel ROGER REVELLE provided 70 soundings in the Jan-Feb 2012. Both research vessels

transmit their upper air data to the GTS but do not cooperate with any WMO or regional ASAP programme.

Table 3: Japanese ASAP ships.

Ship name	Area	Sounding equipment	Received soundings in 2012
Mirai (JAMSTEC)	North West Pacific	Semi-automatic Container, Vaisala sounding system, Vaisala RS92 GPS radiosondes, Inmarsat-C SatCom.	54
Ryofu Maru (JMA)	North West Pacific	Semi-automatic Container, Vaisala sounding system, Vaisala RS92 GPS radiosondes, DCP SatCom	218
Polarstern	Arctic and Antarctic		362
Roger Revelle	Indian Ocean		70

6. Satellite communication and timeliness

All 18 ships in the E-ASAP fleet are equipped with Iridium SatCom systems to enable binary HiRes Bufr reporting from the ships. Most ships report HiRes Bufr and TEMP. The average timeliness of all stations in the E-ASAP fleet in 2012 was around HH+30 min.

The vertical resolution of the HiRes Bufr of the E-ASAP stations is 10 sec (ca. 50 m) plus mandatory and significant levels. Purpose is to limit the file size to 20 Kbyte to reduce transmission time. A vertical resolution of 50 m is fully compliant to the minimum WMO requirements (Goal = 100 m, Breakthrough = 200 m, Updated on 28 May 2010).

Soundings from the two Japanese stations are transmitted via Inmarsat-C or DCP (through Meteosat). The timeliness of the soundings on the GTS in 2012 was around HH+150 min for Ryofu Maru and HH+110 min for Mirai.

7. Summary and recommendations

In total, around 5120 soundings were received in 2012 from all ASAP stations worldwide. The distribution is as follows:

- 86% E-ASAP,
- 7% RV POLARSTERN,
- 7% RV MIRAI, RV RYOFU MARU, and RV ROGER REVELLE.

The spatial distribution is shown in figure 4. Occasional position errors (sign error in longitude) can be seen as soundings over East Europe. These errors were only observed at stations in the E-ASAP fleet and are due to operator errors.

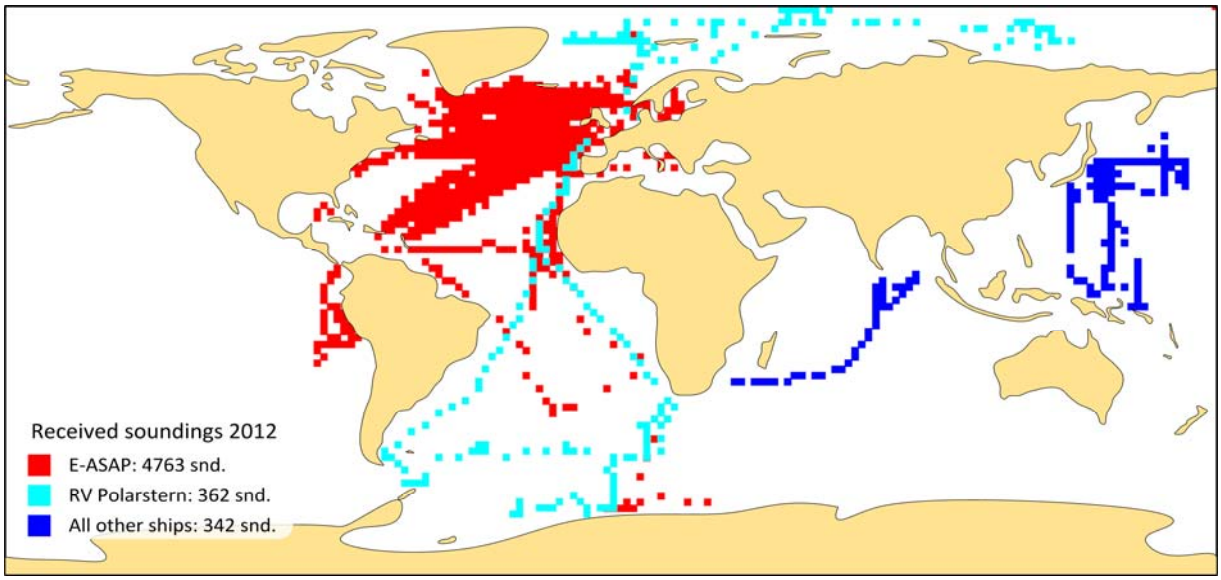


Figure 4: Distribution of global ASAP soundings from sailing ships in 2012.

The spatial distribution of global ASAP soundings show clearly the predominant and unique coverage of the North Atlantic by the European E-ASAP fleet.

ANNEX XI

ASAP TRUST FUND

ASAP TRUST FUND STATEMENTS OF ACCOUNT FOR 2011 AND 2012

1. ASAP TRUST FUND STATEMENT OF ACCOUNT FOR 2011

World Meteorological Organization
Organisation météorologique mondiale

Secrétariat
7 bis, avenue de la Paix – Casa 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

ASAP Trust Fund
Statement of income and expenditure
For the period 1 January to 31 December 2011
Amounts in Swiss Francs

1. Balance of fund at 1 January 2011		38,801
2. Income		
2.1 Unrealized gain on exchange difference	24	
2.2 Total income		24
3. Funds available for the period		38,825
4. Expenditure		
4.1 Direct costs		
4.1.1 Travel	4,541	
4.1.2 Total direct costs	4,541	
4.2 Indirect costs		
4.2.1 Support costs (7%)	318	
4.2.2 Bank charges	20	
4.2.3 Total indirect costs	338	
4.3 Total expenditure		4,879
5. Balance of fund at 31 December 2011		33,946

Certified correct:

Luckson Ngwira
Chief, Finance Division

1 May 2012

2. ASAP TRUST FUND STATEMENT OF ACCOUNT FOR 2012

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

Weather • Climate • Water
Temps • Climat • Eau

ASAP Trust Fund
Statement of income and expenditure
For the period 1 January to 31 December 2012
Amounts in Swiss Francs

1. Balance of fund at 1 January 2012	33,946
2. Income	-
3. Funds available for the period	33,946
4. Expenditure	-
5. Balance of fund at 31 December 2012	33,946

Certified correct:

Luckson Ngwira
Chief, Finance Division
18 February 2013

ANNEX XII

STATUS OF GLOBAL VOS AUTOMATION AS AT DECEMBER 2012

Table 1 – Status of VOS Automatic Weather Stations

Country	*Type of AWS*	*Method of Comms*	*Manual Entry Facility*	*Number of Ships with AWS*									
				31/12/ 2002	*31/12/ 2004*	*31/12/ 2005*	*31/12/ 2006*	*31/12/ 2007*	*31/12/ 2008*	*31/12/ 2009*	*31/12/ 2010*	*31/12/ 2011*	*31/12/ 2012*
Australia	Vaisala Milos 500 AWS	Inmarsat C (Data Mode)	Yes	9	11	10	8	9	9	8	8	8	6
	TECHSAS/ Other	Inmarsat Fleet Broadband	No								1	1	1
Brazil	VAISALA Maritime Observation System MAWS410	(not known)	No								4	6	6
Canada	AVOS – AXYS Technologies	Inmarsat C	Yes	13	14	14	39	41	45	35	18	4	2
		Iridium	Yes					1	1	17	35	48	49****
China	*DJQ-1*	BDS	No								33	(2)	2
	XZC2-2SA	Inmarsat C, CDMA, BDS	No								12	(12)	12
	XZC2-2SC	Inmarsat C, CDMA, BDS	No									(36)	36
	XZC6-1	Inmarsat C, CDMA, BDS	No								35	(17)	17
Croatia	BAROS	Iridium SBD	No									1*****	
Denmark	BATOS	Inmarsat C (Data Mode)	Yes	-	-	-	2	See EUMETNET					
EUMETNET	BATOS	Inmarsat C (Data Mode)	Yes					5	5	6	8	10	10
	BAROS	Iridium SBD	No					0	4	9	13	15	16
France	BATOS	Inmarsat C (Data Mode)	Yes	19	30	39	45	48	54	56	58	56	58
	Mini BATOS	Inmarsat C (Data Mode)	No		1	2	3	3	1	-	-		

Country	Type of AWS	Method of Comms	Manual Entry Facility	Number of Ships with AWS									
				31/12/ 2002	31/12/ 2004	31/12/ 2005	31/12/ 2006	31/12/ 2007	31/12/ 2008	31/12/ 2009	31/12/ 2010	31/12/ 2011	31/12/ 2012
	MINOS	Argos	No		6	7	8	8	7	8	7	6	5
	BAROS	Iridium	No					1	-	-	-		
Germany	Vaisala Milos 500 AWS	Meteosat DCP	No	23	21	21	17	18	17	16	17	17	17
	Ships' own data logger	Inmarsat/ Iridium	Yes							2	2	2	2
Indonesia	TECHSENSE MET	Inmarsat	No								(6)	6	
	PROJEX DX4 PRO	GPRS	No								(1)	1	[1]
Ireland	Vaisala Milos AWS	Meteosat	No	1	1	1	1	1	1	-	-		-
	BATOS	Iridium	No							1	2		-
Italy	BAROS ++	Iridium	No										3*****
	BAROS	Iridium	No										3*****
Japan	Integrated System for Marine Met Observation (Koshin Denki Kogyo Co)	Inmarsat (4), MTSAT(2)	Some	13	12	13	9	9	9	9	6	6	6
	Weather Observation System (Nippon)	Inmarsat C	Some				4	5	5	6	6	6	5
	SOAR - Shipboard Oceanographic & Atmospheric Radiation (Brookhaven National Laboratory)	Inmarsat C	Yes				1	1	1	1	1	1	1
	Ogasawara Keiki	Inmarsat	No				3	1	1	-	-		
	Seisakusho Co (Japan)	Inmarsat F	No				-	1	1	-	-		
	JRCS MFG. Co. Ltd (Japan)												

Country	*Type of AWS*	*Method of Comms*	*Manual Entry Facility*	*Number of Ships with AWS*									
				31/12/ 2002	*31/12/ 2004*	*31/12/ 2005*	*31/12/ 2006*	*31/12/ 2007*	*31/12/ 2008*	*31/12/ 2009*	*31/12/ 2010*	*31/12/ 2011*	*31/12/ 2012*
New Zealand	Sutron 9000RTU	MTSAT	Yes	1	1	1	1	1	1	1	1	1	1
	mSTAR-SHIP	GPRS Cell	No					1	1	1	1	1	1
Norway	AWS	VSAT	some	-	-	17	17	18	16	15	(15)	(15)	(5)
Russia	GM6	Inmarsat C	Yes	-	38	(38)	(38)	(38)	(38)	0	0	0	0
South Africa	Vaisala Milos 520	Inmarsat C	Yes	-		1	(1)	1	1	1	1	1	2
Spain	Vaisala MAWS 410	Inmarsat C	Yes	1	1	(1)	1	1	1	1	1	1	1
United Kingdom	Automet	Inmarsat	No	1	1	1	1	1	0	0	0	0	0
	MINOS –GP	Argos	No	-	-	1	2	6	5	5	5	3	2
	MINOS-GPW	Argos	No	-	-	1	2	1	1	1	1	1	1
	BATOS	Inmarsat C (Data Mode)	Yes	-	-	-	1	3	3	2	5**	4**	4**
	AVOS	Inmarsat	Yes					1	1***	0	0	0	0
	Metpod	Iridium	No						1	1	0	0	0
	Metocean Deck Buoy	Iridium	No						2	2	2	1	0
	AMOS - Automated Marine Observing System (met Office)	Iridium	No						-	-	-	21	33
United States	SEAS-AutoImet NOAA SCS (Science Computing System) Type 1	VSAT Email	Yes	-	3	(3)	0	3	16*	2	9	12	12
	NOAA SCS Type 2	VSAT Email	No	-	-	-	-	-	-	23	8	3	3
	Non NOAA (developed by Alaska Region)	Email	No									7	7

Country	Type of AWS	Method of Comms	Manual Entry Facility	Number of Ships with AWS									
				31/12/ 2002	31/12/ 2004	31/12/ 2005	31/12/ 2006	31/12/ 2007	31/12/ 2008	31/12/ 2009	31/12/ 2010	31/12/ 2011	31/12/ 2012
	Other ship owned AWS systems	Email	Yes								12	5	6
TOTAL				**81**	**140**	**171**	**204**	**227**	**250**	**229**	**334**	**337**	**336**

Notes -

Numbers in brackets not confirmed

Sweden advised 1 AWS system in 2012 but details not yet confirmed

*2008 number corrected in 2009 - different from 2008 report

** (includes 3 systems installed by Met Office on behalf of E-SURFMAR)

*** System Transferred to Environment Canada

**** 2 systems on training establishments

***** (E-SURFMAR systems)

Table 2 – Status of VOS using Electronic Logbook Software (excludes AWS software for manual data entry)

Country	*Electronic Logbook type*	*Number of Ships at 31/12/2002*	*Number of Ships at 31/12/2004*	*Number of Ships at 31/12/2005*	*Number of Ships at 31/12/2006*	*Number of Ships at 31/12/2007*	*Number of Ships at 31/12/2008*	*Number of Ships at 31/12/2009*	*Number of Ships at 31/12/2010*	*Number of Ships at 31/12/2011*	*Number of Ships at 31/12/2012*
Australia	**TurboWin**	33	41	50	51	64	61	58	57	72	64
Canada	**TurboWin**								2	2	1
Chile	**TurboWin**										10
Croatia	**TurboWin**	3	4	3	7	(7)	(7)	(7)	(7)	-	-
Denmark	**TurboWin**	-	-	-	32	0	Finished	-	-	-	-
France	**TurboWin**	-	7	6	7	10	4	4	2	3	2
Germany	**TurboWin**	315	412	556	600	709	730	780	800	825	695
Greece	**TurboWin**	2	0	0	0	1	3	1	4	3	2
Hong Kong	**TurboWin**	-	-	1	2	2	2	2	3	22	34
India	**TurboWin**	-	21	28	33	(33)	(33)	(33)	(33)	-	40
Ireland	**TurboWin**	-	-	-	-	-	-	-	2	2	2
Japan	**OBSJMA**	-	49	61	70	74	95	102	100	141	129
Netherlands	**TurboWin**	200	259	198	195	193	195	185	172	112	57
	TurboWeb										6
New Zealand	**TurboWin**	0	12	15	22	20	19	22	24	25	26
Poland	**TurboWin**								61	-	-
Singapore	**TurboWin**	-	-	2	3	1	1	1	(1)	-	7
South Africa	**TurboWin**	5	5	8	-8	8	14	14	19	15	17
Sweden	**TurboWin**	-	-	-	-	-	1	1	3	20	-
United Kingdom	**TurboWin**	82	104	147	241	261	286	272	276	268	263
	TurboWeb	0	0	0	0	0	0	0	0	0	1
United States	**SEAS**	353	439	447	622	129	344	524	507	722	849
	TurboWin							3	-	5	30

Country	*Electronic Logbook type*	*Number of Ships at 31/12/2002*	*Number of Ships at 31/12/2004*	*Number of Ships at 31/12/2005*	*Number of Ships at 31/12/2006*	*Number of Ships at 31/12/2007*	*Number of Ships at 31/12/2008*	*Number of Ships at 31/12/2009*	*Number of Ships at 31/12/2010*	*Number of Ships at 31/12/2011*	*Number of Ships at 31/12/2012*
TOTAL		**993**	**1353**	**1522**	**1893**	**1512**	**1795**	**2009**	**2073**	**2237**	**2235**

Figure 1: Number of Electronic Logbooks from 2002 to 2012

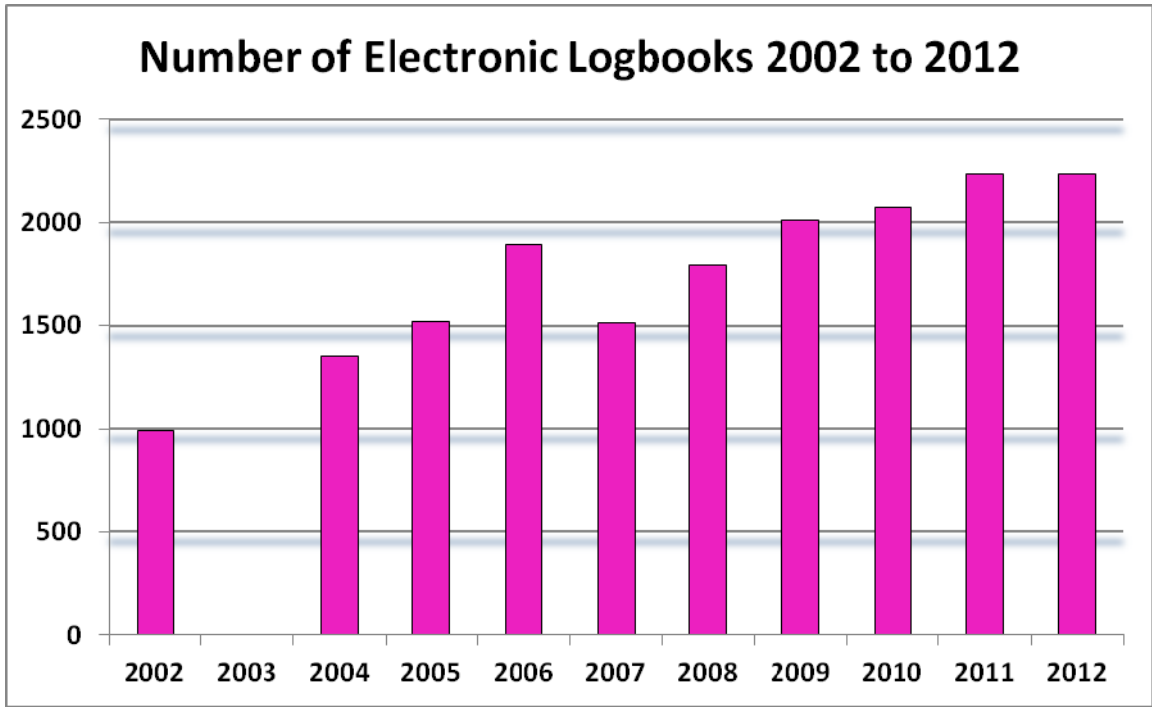
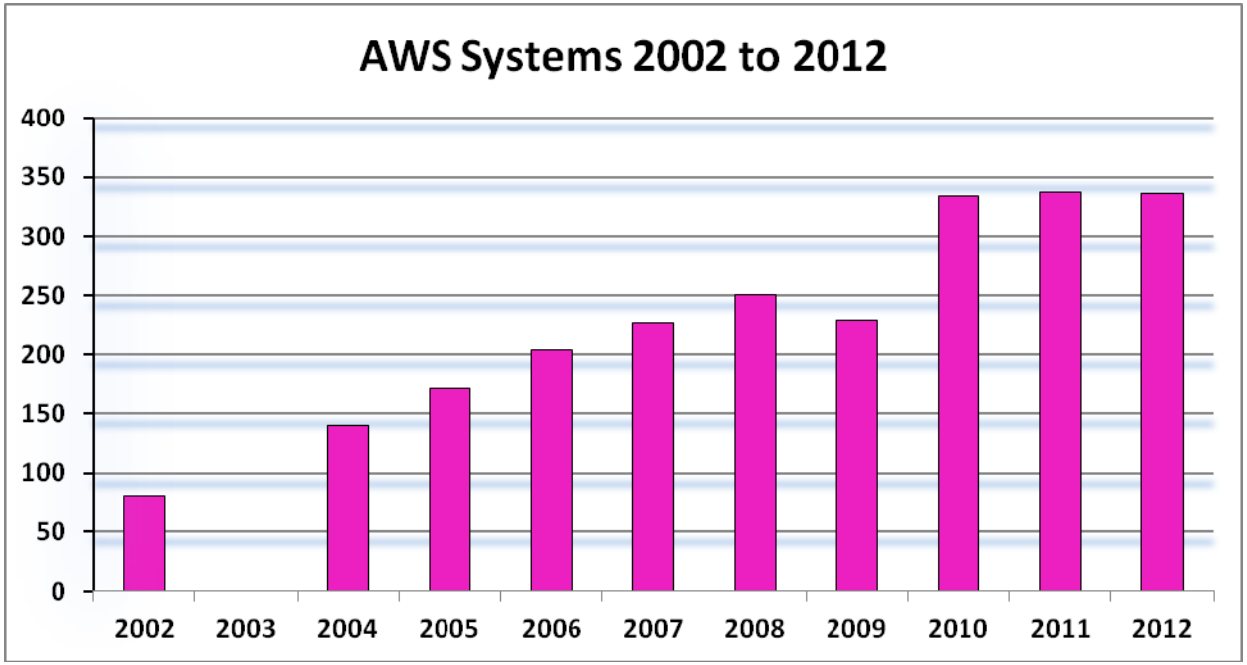


Figure 2: Number of AWS systems from 2002 to 2012



ANNEX XIII

RELEVANT ELECTRONIC MAILING LISTS MAINTAINED BY JCOMMOPS

JCOMMOPS is maintaining the following electronic mailing lists for the SOT:

List	*Email address*	*Comment*
General SOT contact points	sot@jcommops.org	
VOS focal points	vos@jcommops.org	
SOOPIP focal points	soopip@jcommops.org	
Useful PMO contact points	pmo@jcommops.org	
Task Team on Instrument Standards	sot-tt-is@jcommops.org	Created after SOT-V
Task Team on Metadata for WMO-No. 47	sot-tt-pub47@jcommops.org	Created after SOT-V
Task Team on Satellite Communications Systems	sot-tt-satcom@jcommops.org	Created after SOT-V
Task Team on VOS recruitment and programme promotion	sot-tt-vos-recruit@jcommops.org	Created after SOT-V
Task Team on Call Sign masking and encoding	sot-tt-masking@jcommops.org	
Task Team on ASAP	sot-tt-asap@jcommops.org	Created after SOT-V

ANNEX XIV

CONTRIBUTIONS TO THE DBCP/SOT TRUST FUND FOR 2013
TABLE OF NATIONAL CONTRIBUTIONS TO THE DBCP TRUST FUND FOR 2013

Budget / Country	JCOMMOPS	DBCP	OceanSITES	SOT	JTA	COMMENT
Australia	EUR 11,700		USD 5,000			JCOMMOPS: including DBCP and SOT
Canada	CAD 27,500					JCOMMOPS, including DBCP and SOT
CLS					USD 65,000	USD 15,000 for JTA Chairperson USD 30,000 for the JTA-Executive Committee USD 10,000 for the IOC Secretariat (paid directly to IOC) USD 10,000 for the WMO Secretariat
E-SURFMAR		EUR 40,000				Belgium, Croatia, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, and the United Kingdom
Germany				EUR 3,600		Support to SOT
India		USD 5,000				
New Zealand	Eur 1,800					JCOMMOPS, including DBCP and SOT
South Africa		EUR 4,000				
USA		USD 115,000	(USD 30,000)	USD 80,000		Contribution to DBCP TC and SOT made to WMO as of 2012

ANNEX XV

DRAFT TERMS OF REFERENCE FOR THE JCOMMOPS FUNDS MANAGEMENT AT CLS

1. The purpose of the JCOMMOPS/CLS Fund (hereafter referred as the Fund) is to support the activities of the JCOMMOPS infrastructure and the programmes it serves (Argo, DBCP, SOT, GO-SHIP, OceanSITES) under the guidance of the JCOMM Observations Coordination Group, IOC/UNESCO and WMO secretariats, and appropriate Panels and Steering Team.

2. The Fund will follow the regulations of the host country (France) and the host company (CLS).

3. The Fund shall be managed by JCOMMOPS, under JCOMM OPA and secretariats oversee, according to an annual budget adopted by the JCOMM OCG at its regular Sessions and any other directions provided by the Panels and Steering Team.

4. The budget will be constructed according to a stable format, in phase with calendar years. All elements (incomes, expenses) will have a corresponding written justification (invoice).

5. All expenditures will not exceed the Fund limits and will have to be provisioned a year in advance.

6. The unit of account shall be the Euro. When commitments are made, the appropriate funds will be converted, as necessary, to the currency of commitment in at least the amount of the commitment;

7. The income of the Fund will include:

(i) Annual contributions from participating Members / Member States;

(ii) Funds deposited for specific purposes, hereafter referred to as deposits;

(iii) Other contributions from third parties;

(iv) Contributions from services developed by JCOMMOPS;

(v) Miscellaneous income

8. The Fund will be used, as agreed by the concerned parties, and when required, to:

(i) Finance technical and operational support services for the observing programmes supported by JCOMMOPS, including in particular for supporting staff salary, benefits, logistical support, and missions; infrastructure costs (rent, hardware/software needs); capacity-building activities; instruments technical evaluation and Pilot Projects; consultancy and missions of experts; practical arrangements for the deployment or servicing of instruments; promotion and exchange of information about the Panels and Steering Teams activities; promotion and exchange of information about JCOMMOPS activities;

(ii) Meet appropriate administrative costs incurred by CLS in providing support to JCOMMOPS activities;

(iii) Meet other administrative costs including such items as meetings and consultants;

(iv) Purchase specified goods or services; and

(v) Support other activities required to meet the basic goal of the observing systems supported by JCOMMOPS;

9. Authority for the disbursement of funds, in respect of contracts and agreements properly concluded, is delegated in practice to the JCOMMOPS lead[1].

10. The Fund shall be maintained on a continuous basis and amounts standing to the credit of the Fund at the end of a calendar year shall remain in the Fund for use in the subsequent period;

11. Upon liquidation of the Fund for any reason, the DBCP shall make provision for the payment of unliquidated obligations and estimated expenses of winding-up business. It shall then arrange for repayment - to the extent that funds are available and according to the depositors instructions - of deposits for which no equipment or services have been received;

12. At the closure of the Fund, any remaining surplus after (11) above, shall be distributed among the Fund contributors in proportion to their total contributions and deposits paid by them to the Fund;

13.The Fund will be terminated not later than one year after the formal termination of JCOMMOPS;

14. All funds credited to the JCOMMOPS Fund shall be subject to these terms of reference and to the Terms of Reference of JCOMMOPS; and

15. Any revision or amendment to the present Terms of Reference is subject to a decision of the JCOMM OCG, IOC/UNESCO and WMO secretariats, and appropriate Panels and Steering Team.

1 Concept yet to be defined and agreed.

ANNEX XVI

DRAFT WHITE PAPER AND PROPOSED WORKPLAN FOR THE WESTERN INDIAN OCEAN VOLUNTARY OBSERVING SHIP AND SHIP OF OPPORTUNITY PROGRAMME PILOT PROJECT (WIO-VOS/SOOP)[1]

PILOT PROJECT PROPASAL DOCUMENT

1.0 INTRODUCTION.

The Western Indian Ocean region is constituted by the Island states of Comoros, Madagascar, Mauritius, Seychelles and La Reunion (France) as well as mainland states of Kenya, United Republic of Tanzania, Mozambique, Somalia and the Republic of South Africa.

This region forms one of the least monitored areas in terms of sourcing real-time meteorological and oceanographic data and information. While satellite observations provide good coverage over the region, such data need to be complemented by *in situ* observations, in particular to provide ground truthing and to improve the integrated satellite and *in situ* products. From that perspective, there isn't enough activity in terms of Voluntary Observing Ship, programme as well as data buoy deployments in the region to properly monitor marine meteorological and oceanographic variables over the oceans in order to address the WMO and IOC observational data requirements, in particular for climate monitoring, climate services, numerical weather prediction, and marine forecasting.

The Pilot Project proposal is in line with the terms of reference of the JCOMM Observations Programme Area (OPA) Ship Observing Team (SOT) and its voluntary Observing Ship Panel (VOSP) and Ship of Opportunity Implementation Panel (SOOPIP).

By addressing the climate monitoring requirements while at the same time recognizing the need of operational applications for real-time data, it is believed that most of the requirements of the targeted WMO and IOC applications will be met. Yet some specific additional requirements derived from the WMO Rolling Review of Requirements (RRR) are being considered by the SOT. The following Application Area being particularly relevant to marine meteorological and ocean observations:

- Climate Monitoring (GCOS)
- Seasonal to Inter-annual Forecasts (SIAF);
- Ocean Applications;
- Global Numerical Weather Prediction (GNWP);
- High Resolution Numerical Weather Prediction (HRNWP);
- Nowcasting and Very Short Range Forecasting (NVSRF).

Looking at the Statements of Guidance[2] (i.e. gap analysis) for the above applications, the requirements where gaps have been identified could be addressed by increasing the number of VOS and thereby providing more surface meteorological data required by GNWP, HRNWP, and NVSRF, and heat surface flux data as required by SIAF. Equatorial areas, where the atmospheric pressure signal is typically weak, would benefit from a greatly increased density of wind observations but requirements for accurate in situ pressure measurements from these regions have also been expressed by NWP at a resolution of 500km x 500 km. Spatial surface air pressure coverage is marginal for marine services applications. Mean sea level pressure is vital to detect and monitor atmospheric phenomena over the oceans (e.g., tropical cyclones) that significantly

1 Per Resolution No. 6 from the Third DBCP Capacity Building workshop for countries of the Western Indian Ocean region, Mombasa, Kenya, 16-20 April 2012, see Appendix F.

2 See http://www.wmo.int/pages/prog/www/OSY/GOS-RRR.html#SOG

constrain shipping. Even very isolated stations may play an important role in synoptic forecasting, especially when they point out differences with NWP model outputs.

RATIONALE FOR VOS/SOOP ENHANCEMENT IN WESTERN INDIAN OCEAN OF RA 1.

The Pilot Project to enhance the VOS activities in the region is necessary because:

- It will be addressing the data gaps for many WMO Application Areas (see above);
- It will act as co-operative venture to enhance the provision of marine meteorological and oceanographic data in support of a diversity of national, regional and global programmes.
- During the 1982-84 la Niña episode the Indian Ocean gave a strong signal as compared to the Pacific Ocean, which is informative that a thorough study of the ocean's physical processes in the region can help a better understanding of the global climate change.
- Currents within the WIO region do not give any indication of how they are distributed with depth due to limited data sets. This information is crucial to understanding how heat and other properties are transported in the ocean. The Indonesian through flow, which originate from west Pacific and flows westwards into the Indian Ocean, affects the ocean's heat budget and is thought to be significant in predicting El Nino and Lanina episodes.
- Fresh water inputs in an ocean region can modify the surface heat budget whose interannual variations are of primary interest to the ocean observing system for climate. However no attempt has yet been made to understand the pattern of fresh water transports in the region due to limited data sets.

3.0 CURRENT PROBLEMS TO BE ADDRESSED BY THE PILOT PROJECT.

The problems expected to be addressed by the implementation of the WIO-VOS/SOOP Pilot Project in the region are.

- Lack of equipment for the recruitment of ships into the VOS and SOOP and programs
- Lack of well developed capacity for making data quality control monitoring of the VOSand SOOP data sets
- Lack of coordination of VOSand SOOP activities within the region.
- Lack of technical know-how of the Port Meteorological Officers (PMOs) in the region.

Latest records show the status of VOS recruited by the countries of the region as shown on the table below: (requires updating) -

COUNTRY	**VOS STATUS**	
	SHIPS (NUMBER)	**PMO'S**
COMOROS	NIL	NIL
FRANCE (LA REUNION)	-	1
KENYA	NIL	1

MADAGASCAR	NIL	-
MAURITIUS	2(AUXILLARY)	1
MOZAMBIQUE	NIL	-
SYCHELLES	NIL	NIL
SOUTH AFRICA	27(SELECTED) 20(AUXILLARY)	2
TANZANIA	NIL	1

However, most of the recruited ships accounted in the table above do not ply within the ocean of the region. At least they have not yet been monitored at the Port of Mombasa.

4.0 POTENTIAL FOR VOS AND SOOP IN THE REGION.

The potential for VOS/SOOP Programme in the region exists. There is a strong shipping circuit, which has developed within the Indian Ocean linking the various Indian Ocean Rim countries in Africa, the Middle East, the Indian sub-continent and the Indian Ocean islands. There are a number of un-recruited ships monitored at the Port Meteorological Office Mombasa, Kenya and operating within the Rim and beyond which are willing to be recruited in the programme.

5.0 STRATEGY.

It is proposed to develop the WIO-VOS/SOOP as a Pilot Project monitoring 10 ships plying within the region. These ships will be selected in consultation with the PMOs in the region.

5.1 SELECTION OF SHIPS

The proposed criteria for the selection of Ships to be Recruited in this Pilot Project are:

- Their willingness to be recruited;
- Their regularity at the regional Ports where we have PMOs;
- Their appreciation for the expected Meteorological services to be offered to them in the region;
- Their duration of operation within the region.

5.2 EQUIPMENTS AND STATIONERY FOR TEN SHIPS

It is proposed that electronic logbooks (e-logbook) made available to this Pilot Project would be committed to the participating countries as a whole, and thereby receive the regional WIO logo of the Pilot Project. From that perspective, the e-logbooks could be shifted between participating vessels as needed, irrespective of the recruiting country.

All equipments and stationery necessary for VOS and SOOP operations in a ship.
The equipments to loan to ships will include:

- Precision aneroid barometers;
- Barographs;
- Sheathed thermometers (air and wet bulb);
- Screens;

- Sea thermometers;
- Rubber buckets;
- XBT'S. etc

6.0 PILOT PROJECT MANAGEMENT.

A Steering Team for the Pilot Project will be set up (see proposed Terms of Reference in Appendix 1). It shall be responsible for all aspect of the Pilot Project implementation during its duration, and provide coordination as needed.

The Pilot Project will require the involvement of all the national meteorological and oceanographic Services of the countries of this region. In particular the active participation of at least of one country the West coast mainland and one country in the Island states of the region will be required. It will however be necessary that the Steering Team comprise representatives from all participating countries.

The Pilot Project Steering Team will require the support of the WMO/IOC secretariats in implementing its objectives.

7.0 ACTIVITIES (embryo workplan).

The Steering Team will draw up the activities of the Pilot Project, but may consider the following

1. Identification of the Management Team

   Implementer - Countries' Directors and PR with WMO by request from WMO

   Time frame - immediately

2. Meeting of the Steering Team with JCOMM experts on an opportunistic basis, or via teleconference for coordination and guidance purposes

   Implementer - JCOMM/Team Leader
   Host - Identified member country
   Time frame - immediately

3. Identification of the ten ships

   Implementer - Focal points

   Time frame - Immediately

4. Provision of Meteorological and Oceanographic Equipment to loan to the ships and printing of logbooks with regional outlook.

   Implementer - Member states in collaboration with Friendly countries through WMO's VCP Programme e.g. (UK, USA, NETHERLANDS etc).

Time frame - After identification of Ships

5. Networking of all PMO's within the region through an interactive website

   Implementer – WMO/participating States.

   Time frame - on going within the Pilot Project duration.

6. Data Monitoring and Training

- All PMO's in the region on data quality control monitoring.
- Trainers for ships crews on board ships or at maritime colleges in respective countries in basic knowledge on interpretation of met products to ships.
- On public relations management.
- Data and information transmission techniques through INMARSAT or other Satcom systems as appropriate.
- Latest software on electronics logbooks etc.

SUMMARY

	ACTIVITY	***RESPONSIBILITY***	***TIMING***	***OUTPUT***
1	Identification of Steering Team	Country Directors and PR with WMO by request from WMO	Immediately	• Steering Team in Place
2	Meeting of Steering Team and JCOMM	Chair of the SOT (or his delegate) and host country	Immediately	• Getting Team Leader • Confirming country focal points • Drawing a timetable and a budget
3	**Identification of the ten (10) ships**	PMOs of Participating Countries	**Immediately**	Ships ready for recruitment
4	Provision of Meteorological and Oceanographic Equipment to loan to the ships and printing of logbooks with regional outlook.	Member states in collaboration with Friendly countries through WMO's VCP Programme e.g. (UK, USA, NETHERLANDS etc).	**After identification of Ships**	Availability of equipments
5	Networking of all PMO's within the region through an interactive website	Individual participating States.	On going within the Pilot Project duration	Good monitoring of the ships and Pilot Project progress
6	Data monitoring and training.	WMO/IOC, Friendly countries, member countries.	Ongoing	Enhanced capacity to manage data

APPENDIX 1 OF ANNEX XV

TERMS OF REFERENCE AND MEMBERSHIP OF THE WIO-VOS/SOOP PILOT PROJECT STEERING TEAM

1. Terms of Reference

In support of the WWW, GOOS, GCOS, and Natural Disaster Prevention and Mitigation applications, the Pilot Project will evaluate and demonstrate the operational use of marine meteorological and oceanographic observations made from Voluntary Observing Ships (VOS) and Ships of Opportunity (SOO) in the Western Indian Region (WIO) with active support form WMO Members and IOC Member States contributing to the Pilot Project.

The Pilot Project will run for an initial two-year period as of June 2013 and will report to the Ship Observations Team at its eighth Session on progress and achievements.

The WIO-VOS/SOOP Pilot Project Steering Team shall be responsible for all aspect of the Pilot Project implementation during its duration, and provide coordination as needed. In particular, the Team shall:

1. Set up a detailed workplan for the pilot project with clear targets and deliverables;
2. Seek active participation from WMO Members and IOC Member States in the region, and identify a focal point in each participating country;
3. Seek resources in the region and beyond for the purpose of implementing the pilot project (PMOs, ships to be recruited, equipment & instruments, calibration service, satellite data telecommunication, data and quality management, data distribution);
4. Provide guidance to the focal points regarding to the recruitment of vessels, and seek feedback from them on the pilot project implementation aspects;
5. Monitor progress, and publish status reports on a quarterly basis (number of recruited vessels, ship routes, number of observations reported on GTS, data quality, timeliness);
6. Keep the SOT Task Team on VOS Programme Promotion and Recruitment informed of its developments;
7. Report progress and achievements to the eighth Session of the SOT;

2. Membership

The Pilot Project Steering Team shall be comprised of:

- Representative from the WIO region (Chair) – Ali Mafimbo (Kenya)
- Representatives of participating countries – TBD
- Chair of the SOT Task Team on VOS Recruitment and Programme Promotion
- Chair of the SOT Task Team on Training
- SOT Technical Coordinator
- Representative of the WMO Secretariat (*ex-officio*)
- Representative of the IOC Secretariat (*ex-officio*)

ANNEX XVII

RECOMMENDATIONS FROM THE GROUP FOR HIGH RESOLUTION SST (GHRSST) TO THE JCOMM OBSERVATIONS COORDINATION GROUP (OCG) FOURTH SESSION

The following specific recommendations from GHRSST in relation to in situ observations were included in the GHRSST Recommendations to the fourth Session of the JCOMM Observations Coordination Group (OCG), Hobart, Australia, 18-20 April 2011, some of which are of interest to the SOT:

1. Adding the provision of radiometric skin SST data to the JCOMM OCG portfolio of VOS measurements. Ships that participate in such a measurement programme should also, ideally, maintain a radiosonde capability.
2. Ensure that ships and other platforms currently providing high quality in situ data where possible expand their provision of high quality meteorological metadata. Wind speed, history of wind speed, air temperature and local humidity are the most important. Measurements of near-surface temperature profiles should also be encouraged.
3. Enhance the capability of Argo floats, drifting buoys and moorings to measure temperature profiles in the top 2 m of the ocean.
4. Where possible a regular accurate calibration of in situ data instrumentation is carried out, preferably against a standard that is traceable to an SI reference.
5. Establishing a JCOMM SOT working group to collaborate with GHRSST to better define requirements for measurements of SST and ancillary variables from ships, and to identify new opportunities that may assist with a more uniform coverage of the global oceans.
6. Planning to obtain ship of opportunity participation in future SST measurement inter-comparison experiments.
7. Encourage JCOMM data providers to use the GHRSST data set to assess the accuracy and performance of their SST measurement instruments.

ANNEX XVIII

JCOMMOPS SHIP COORDINATOR'S WORKPLAN

(for the period February to December 2013; version 1.2 dated 21 April 2013)

1. OVERVIEW

This work plan drafts the mission of the new Ship Coordinator at JCOMMOPS. It is based on the job specification, and input given during the JCOMMOPS roundtable (audio conference) which took place on 13 February. The draft version 1.0 was presented to the responsible program and panel chairmen for evaluation and validation. The final version will be created during SOT-7.

Deliverable #1: Final Work plan. Deadline 26 April

2. TECHNICAL COORDINATION

Structure of programs

In a first step it is necessary to familiarize with the programs SOT and GO-SHIP, and to understand structures and objectives of the different components and teams. The JCOMMOPS data base and the JCOMM and program websites will be primary information sources. Simultaneously, contact and mailing lists will be updated, rationalized or created if necessary, which requires input from SOT-7.

Deliverable #2: Up-to-date contact and mailing lists. After SOT-7

Metadata

Information about metadata sources (SOT and GO-SHIP) will be gathered / reviewed in details and synchronization mechanisms will be set up with the IT team. Metadata content will be reviewed from a cross-program point of view and reasonable additions could be proposed (e.g. Pub47, SeaDataNet). Standard metadata exchange systems must be established between all operators for a set of crucial variables, in particular for GO-SHIP and SOOP ex post & ex ante.

Deliverable #3: GO-SHIP metadata format. Deadline 15 June

Deliverable #4: Metadata sources information document (SOT, GO-SHIP). Deadline 31 May

SOT-7 - biannual meeting

Some remaining action items from SOT-6 require further input from SOT-7, but most tasks were meanwhile fulfilled. Status maps of the SOT observing systems for 2012 must be created (GTS data) for the TC general report, which requires GIS software training by the former TC. For the SOOP panel, a strategy must be created on how the production of the SOOP surveys could be shared with the SOOPIP-chair. In particular, it must be discussed how the data from different sources should be merged and treated, to generate a unique and complete data basis. For GO-SHIP, meetings with both co-chairs will help to create an up-to-date contact list of focal points in different participating countries, aiming to see how metadata could be exchanged and to analyze the status of the system.

Deliverable #5: Finish SOT-6 action items. After SOT-7
Deliverable #6: SOT-7 TC general report. Deadline 29 March
Deliverable #7: SOOP survey production strategy. Deadline SOT-7

Technical information and assistance

The existing instrumentation information must be reviewed (JCOMMOPS data base) and updated. The Ship Coordinator acts as a focal point for all ship-based technical issues.

Deliverable #8: Up-to-date data base for technical information and assistance. Ongoing

3. MONITORING

The status of the observing system(s) must be monitored continuously. For GO-SHIP, key products (e.g. maps) must be identified or designed (the mission to AOML, PMEL and SOT-7 in April will be helpful here). If necessary the Ship Coordinator intervenes as soon as an issue occurs (e.g. platforms unexpectedly disappear). Tools to monitor the KPIs proposed at SOT-6must be created.

Deliverable #9: Define key products for GO-SHIP. Deadline 15 May
Deliverable #10: Reports to the community with network maps. Monthly. Yearly Summary
Deliverable #11: Performance measurement system with given KPIs and KPTs. 30 September

4. MANAGEMENT OF WEBSITES

SOT and GO-SHIP websites must regularly be reviewed and refreshed (including national initiatives). This includes in particular news, contact points, bibliographies and mailing lists.

Deliverable #12: Quick improvement of main program sites. Ongoing

5. CRUISE INFORMATION CENTRE

With the formerly gathered information, the available metadata will be analyzed and expanded by including and synchronizing cruise plans from key players such as BSH, IFREMER, NOAA, etc. Interoperability aspects (POGO, SeaDataNet) and operation requirements of other programs (deployments etc.) will be taken into account in order to achieve cross sector information and synergies. These will be made available to the community through new JCOMMOPS web-services and –tools (under construction within JCOMMOPS) with ex-post, ex-ante and present views.

Deliverable #13: Creation of a coherent and wide-spread cruise plan. Ongoing
Deliverable #14: Provide the community with the information (web-based). Start 30 November

6. SHIP TIME SERVICE & PARTNERSHIPS: RECRUITING ACTIVITIES

The Ship Coordinator will as of now take care of already existing ship-based partnerships and initiatives (set up by JCOMMOPS, e.g. Lady Amber, Voile sans Frontières, SailingOne, or VOS-DP …) and strengthen or rationalize these activities. New partnerships must be established through aggressive and pro-active recruiting activities (e.g. with organizers of ocean races transiting regularly sea areas below 40° S) to fill up growing gaps due to substantial budget cuts. New commercial and communication strategies will be developed (cross sector within JCOMMOPS, e.g. with labels, agendas, educational and sponsoring programs, “adoptions”), requiring also the review of information material such as the VOS brochure and the creation of contracts and agreements.

Deliverable #15: Yearly report on recruiting activities. 15 December
Deliverable #16: Review or create recruitment brochures and presentations. TBD

7. MEETINGS, MISSIONS AND CONTACT

The Ship Coordinator will report at the meetings of the SOT. He will represent and promote the SOT and GO-SHIP programs at every opportunity inside and outside of JCOMM, as appropriate and provide a focus for contact from programs and operators, in- and outside of SOT.

Deliverable #17: Represent the communities and act as a contact point. Ongoing

8. JCOMMOPS WEB SERVICES AND TOOLS

As a member of JCOMMOPS, the Ship Coordinator will assist in the development of the new website, especially on items for SOT, SOOP, GO-SHIP and further ship-based activities. A number of tools must be defined (for monitoring, cruise information, etc.) and new content regularly generated and published, such as the secure database of REAL/MASK callsigns.

Deliverable #18: Spec sheet and prototype of the new JCOMMOPS website and tools. Deadline 31 May

9. SUMMARY DELIVERABLES

	#	Deliverable	Deadline	Priority
General overview	1	Work plan	26 April	High
Technical coordination	2	Up-to-date contact and mailing lists	After SOT-7	High
	3	GO-SHIP metadata format	15 June	High
	4	Metadata sources information	31 May	Medium
	5	Status action items	After SOT-7	High
	6	TC general report (SOT-7)	29March	High
	7	SOOP survey production strategy	SOT-7	High
	8	Technical information& assistance	Ongoing	Low
Monitoring	9	Define key products for GO-SHIP	15 May	Medium
	10	Regular maps / report	Monthly, yearly	Medium
	11	PMS with KPIs and KPTs	30 September	Low
Websites	12	Refresh main program sites	Ongoing	Medium
Cruise information centre	13	Widespread cruise plan	Ongoing	Low
	14	Implementation as web service	30 November	Low
Ship-time service and partnerships	15	Report on recruiting activities	15 December	High
	16	Review or create brochures/PPTs	TBD	Low
Missions	17	Represent the communities	Ongoing	Medium
JCOMMOPS I.S.	18	Spec sheet and prototype of new website and tools	31 May	Medium

10. Working time

Duties and responsibilities will be balanced between the regularly overlapping items, with 2/3 of the working time allocated to technical coordination / monitoring items and 1/3 to all the other items (within ship-related issues across all programs JCOMMOPS supports). As many of the items will be treated with JCOMMOPS team assistance, SOT and GO-SHIP will benefit from synergies and common resources.

<table>
<tr><td rowspan="2">Technical Coordination</td><td rowspan="2">2/3</td><td>SOT (SOOP, VOS, ASAP)</td><td>1/3</td></tr>
<tr><td>GO-SHIP</td><td>1/3</td></tr>
<tr><td>JCOMMOPS</td><td>1/3</td><td colspan="2"></td></tr>
</table>

ANNEX XIX

JCOMM DRAFT PROPOSAL FOR THE ENCRYPTION OF SHIP'S CALLSIGNS WITHIN BUFR REPORTS

(v 2.00 of 26/4/2012)

Introduction and rationale

Resolution 27 (EC-59) is recommending that Members who, in consultation with ship owners, wish to protect the identity of VOS may implement a callsign masking scheme, as a process which would facilitate open distribution of masked data on the Global Telecommunication System.

Such schemes have therefore been implemented by the JCOMM Ship Observations Team (SOT) to address the ship owners and master's concerns with regard to VOS data exchange for ship security and commercial competitiveness reasons.

The following masking schemes have been proposed:

Scheme	***Definition***	***Comment***
REAL	Official ITU callsign of the ship.	**IMPLEMENTED** The call sign is not masked so this scheme is not addressing the ship owners and masters concerns
SHIP	Letters "SHIP" used in place of the real ship identifier.	**IMPLEMENTED** This scheme is addressing the ship owners and master concerns but the ship's identification completely disappears from GTS reports forcing NMHS to make parallel distribution of unmasked reports to legitimate users in order to allow quality monitoring activities
MASK	Unique, repeating identifier. The masking identifier is assigned by the NMS that recruited the ship.	**IMPLEMENTED** This scheme is addressing the ship owners and master concerns while still allowing quality monitoring activities. However, access to a cross reference list of MASK vs. Callsign identifiers is required to allow access to ship metadata (WMO No. 47) which is based on the normal ITU callsigns
ENCODE	Unique, non-repeating identifier. The identifier is derived from encrypting elements in the message, e.g. callsign + latitude + longitude.	**PENDING** This is regarded as the potential universally accepted solution, which is addressing (i) ship owners and master concerns, (ii) the requirements for quality monitoring, and (iii) allow legitimate users to readily access the ITU Callsign identifier thus the ship metadata.

Per Resolution 27 (EC-59), all Members implementing masking schemes, are recommended to seek long-term solutions, and to continue the trial masking schemes in successive years, unless decided otherwise by the Executive Council, while pending the universal acceptance and

implementation of a more suitable solution and the Commission for Basic System migration to table-driven codes[1].

The proposal

The proposal described herewith is the result of an extensive consultation within JCOMM, in particular through the Ship Observations Team (SOT), and the Expert Team on Marine Climatology (ETMC). Details about the proposal can be found in the following reports:

- JCOMM MR No. 97, Final Report, Seventh Session of the JCOMM Ship Observations Team (SOT), Victoria, Canada, 22-26 April 2013, Section 6.6 (available on the web[2]).
- SOT-7 preparatory document No. 6, Report by the Task Teams, Appendix F and its Annexes (available on the web[3]);
- JCOMM MR No. 94, Final Report, Fourth session of the Expert Team on Marine Climatology (ETMC), Ostend, Belgium, 26 - 28 November 2012, Section 5.4 (available on the web[4]);
- JCOMM MR. No. 84, Final Report, Sixth Session of the JCOMM Ship Observations Team (SOT), Hobart, Australia, 11-15 April 2011, Section 6.6 (available on the web[5]).

Description of the proposal for the encoding of ship observations in BUFR reports

If required by shipping companies where VOS ships are recruited, for ship reports the Ship call sign can be encrypted in BUFR reports according to the following method:

- The normal callsign (i.e. descriptor 0 01 011) shall be encoded with missing value;
- The encryption method shall be indicated using a new descriptor. Initially, it is recommended to use AES Encryption with 256-bit secret key;
- The version of the encryption key that is used shall be indicated using a new descriptor; proposed governance for the management of the key is detailed in the Annex;
- The callsign itself shall be encrypted according to the indicated method, and key version, and coded in BUFR report using a new descriptor.

To do that, it is recommended to create the required new descriptors and update the common sequence 3 01 003 (Ship's call sign and motion) as described in Table 1 below (new fields highlighted in blue):

Table 1: Required new sequence

Sequence	***Descriptors***	***Name***
3 01 003	Ship's call sign and motion	
	0 01 011	Ship or mobile land station identifier Ship's call sign
	0 01 YYY	Encrypted Ship or mobile land station identifier Ship's call sign
	F XX YYY	Encryption method used
	F XX YYY	Encryption key version
	0 01 012	Direction of motion of moving observing platform
	0 01 013	Speed of motion of moving observing platform

Table 2 below described the requirements for the new proposed descriptors.

1 EC-59 had in mind that the completion of the migration to Table Driven Codes would have included a universally accepted solution on the basis of encrypting ship call signs within BUR reports.
2 Pending at the time of writing this report
3 http://www.jcomm.info/index.php?option=com_oe&task=viewDocumentRecord&docID=10511
4 ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-MR/JCOMM-MR-94-ETMC-4.pdf
5 ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-MR/JCOMM-MR-84-SOT-VI.pdf

Table 2: Required new descriptors					
Name	***Unit***	***Scale***	***Ref. value***	***Data Width (bits)***	***Note***
Encrypted station identifier (ENCODE result - 32 bytes)	Binary	0	0	256	(1)
Encryption method code	Code Table	0	0	8	(2)
Encryption key version	Code Table	0	0	16	(3)

Notes:

1. This assumes use of symmetric (AES-256) encryption with binary output.
2. This proposed new field is an indicator for the encryption method employed, so that as encryption technology changes (and existing methods possibly become insecure), a new ENCODE solution can be adopted, and this indicator will document which method has been used in the given BUFR report, e.g.:
   0 = preliminary encryption method (for testing prior to international adoption)
   1 = first internationally adopted encryption method
3. As the encryption method, and the key version are provided together with the encrypted ship's call sign, this will provide the means of locating a specific archived key (i.e. via a code table to include a version number, and the date and time the key was released, and terminated) at which it was issued by WMO. See also the Annex.

Annex of Annex XIX

Proposed governance for the management of encryption methods and keys

This annex describes the proposed governance for the management of ship's callsigns encryption methods and keys.

The encryption method used shall be public and properly documented by the WMO Secretariat. The encryption method shall be indicated (un-encrypted) in the BUFR reports together with the ship's callsign encrypted value.

While the decryption private key version will be public and documented by the WMO Secretariat together with the documentation of the encryption methods, the access to the key itself will be restricted to legitimate users. Legitimate users include data users of WMO and IOC Applications, including in particular those participating in WMO co-sponsored programmes such as the Global Ocean Observing System (GOOS), the Global Climate Observing System (GCOS), and the World Climate Research Programme (WCRP).

Encryption methods, and keys shall be proposed by the WMO Secretariat in compliance with the encryption scheme, and in consultation with relevant CBS experts (e.g. the Chair of the CBS Inter-Programme Expert Team on Data Representation Maintenance and Monitoring (IPET-DRMM)). Encryption keys shall normally be updated on a yearly basis.

WMO shall keep a record of the encryption methods used and their metadata as well as the different versions of the secret keys. It shall also record the periods during which these have been in operational use and effective. Additionally, WMO should provide public access to available encrypting and decrypting software.

All those centres with legitimate requirements to decrypt the ship's Callsigns shall be granted access to the private key after formally requesting it through the Permanent Representative of their country with WMO, and signing an agreement not to release it to third parties.

The Permanent Representatives shall routinely provide the Secretary General of WMO with the list of legitimate users in his/her country.

The Secretary General in turn will provide access to the private key the legitimate users through some "manual" procedure, such as temporarily placing the key on some secured (password protected) ftp site for download by them, and providing those access codes to the authorized persons strictly via telephone.

To allow for the historical use of the data by all users, portions of the WMO record of encryption keys shall be made public after a period of two years.

A critical issue for the scheme will be detection (if possible) and recovery in the event the method or key(s) are compromised. In general terms, WMO shall have the authority to withdraw key privileges if rules of use are broken. Withdrawal implies the issuance of a new key(s) to legitimate users and withholding the new key(s) from any violators.

ANNEX XX

DRAFT TERMS OF REFERENCE OF THE JCOMMOPS COORDINATOR

(as of SOT-7, 26/04/2013)

Post Title	Ship Coordinator
Organizational Unit	JCOMMOPS
Administration	CLS
Duty Station	Toulouse / (Brest end 2013) - France
Contract Type	Full Time
Position starts	**04/02/2013**

Main duties & responsibilities
Under the general supervision of JCOMMOPS head, acting in close collaboration with the chairman of the Ship Observation Team, the chairman of the GO-SHIP Committee, and IOC of UNESCO and WMO secretariats, under the guidance from the Data Buoy Cooperation Panel and the Argo and OceanSITES Steering Teams, the incumbent is responsible for:

- The **Ship Observation Team** Technical Coordination (monitoring, reporting, acting as a clearing house and assisting as appropriate in the implementation of ship based observing systems within the SOT).

- The **GO-SHIP** program Technical Coordination (maintain regular communication with national points of contacts to keep abreast of developing plans for hydrographic sections, provide up-to-date information on GO-SHIP voyages activities to CCHDO for update of tables, reference map and GO-SHIP website, liaise with CCHDO and other data repositories to ensure data delivery to data centres).

- **Operations and logistics** within JCOMMOPS (develop the ship time service; recruit new ships for deployment, retrieval or pilot projects, and organize their planning; assist observing programmes where needed and create new logistics to fill gaps or address piracy/vandalism issues; assist in recovering instruments at sea or found by third parties).

- **Metadata and information** (gather, integrate and maintain all ship metadata useful for those operations within JCOMMOPS Information System, develop appropriate tools and services with the JCOMMOPS I.T. Team, seeking and identifying opportunities for the deployment of instruments from ships).

- **Technical support and expertise** (on observing platforms, self training with regular time at sea, guides on deployment methods, technology transfer, etc).

- **Communication** (serve this information to the community regularly, document and communicate on activities, develop relational network).

- **International cooperation** (partnerships, clearing house, training workshops, donor programmes, assist as appropriate with national, regional, international initiatives, ...).

Duties and responsibilities will be balanced between the regularly overlapping items, with 2/3 of the working time allocated to technical coordination (SOT and GO-SHIP) and 1/3 to JCOMMOPS cross programmes ship-related issues.

ACRONYM LIST

ABE-LOS	IOC Advisory Body on the Law of the Sea
ACCESS	African Centre for Climate and Earth System Science
ADB	AOML Data Buoy
ADOS	Autonomous Drifting Ocean Station
AG	DBCP Action Groups
AIC	Argo Information Center
ALD	UNESCO Appointment of Limited Duration
AOML	NOAA Atlantic Oceanographic and Meteorological Laboratory (USA)
AP	Air Pressure
Argo	Argo Profiling Float Pilot Project
ASCLME	Agulhas and Somali Current Large Marine Ecosystems
AST	Argo Steering Team
ATLAS	Autonomous Temperature Line Acquisition System
BAS	British Antarctic Survey
BOM	Bureau of Meteorology (Australia)
BUFR	FM 94 BUFR GTS format: Binary Universal Form for Representation of meteorological data
BUOY	FM 18 BUOY GTS format: Report of a buoy observation
CB	Capacity-Building
CBS	Commission for Basic Systems (WMO)
CCHDO	CLIVAR and Carbon Hydrographic Data Office
CCl	Commission for Climatology (CCl)
CDIP	Coastal Data Information Program
CDMP	Climate Database Modernization Programme (USA)
Cg	Congress (WMO)
CIMO	Commission on Instruments and Methods of Observation (WMO)
CLIVAR	Climate Variability and Predictability (WCRP)
CLS	Collecte Localisation Satellites (France)
CMR	Christian Michelsen Research (Norway)
CONOPS	WIGOS Concept of Operations
CRREL	Cold Regions Research and Engineering Laboratory (USA)
CSV	Comma Separated Values format
DAR	Data Discovery, Access and Retrieval service (WMO WIS)
DART	Deep-ocean Assessment and Reporting of Tsunami (buoy)
DB	Data Buoy
DBCP	Data Buoy Co-operation Panel (WMO-IOC)
DB-TAG	E-SURFMAR Data Buoy Technical Advisory Group
DCP	Data Collection Platform
DCPC	Data Collection and Production Centres (WMO WIS)
DCS	Data Collection System
DMCG	Data Management Coordination Group (JCOMM)
DMPA	Data Management Programme Area (DMPA)
EB	DBCP Executive Board
EBD	Equivalent Buoy Density
EC	Executive Council
ECMWF	European Centre for Medium-Range Weather Forecasts
EEZ	Exclusive Economic Zone
EIG	Economic Interest Group
EUMETNET	Grouping of European Meteorological Services
EOV	Essential Ocean Variable
ER	Expected Result
E-SURFMAR	Surface Marine programme of the Network of European Meteorological Services, EUMETNET
ET/AWS	CBS / IOS Expert Team on Requirements for Data from Automatic Weather

	Stations (WMO)
ETCCDI	joint CLIVAR / CCl / JCOMM Expert Team on Climate Detection and Indices
ET/DRC	CBS Expert Team on Data Representation and Codes (WMO)
ET/EGOS	CBS / IOS Expert Team on the Evolution of the Global Observing System (WMO)
ETDMP	Expert Team on Data Management Practices (JCOMM)
ETMC	Expert Team on Marine Climatology (JCOMM)
ETSI	Expert Team on Sea Ice (JCOMM)
ETWS	Expert Team on Wind Waves and Storm Surge (JCOMM)
EUMETNET	Network of European Meteorological Services
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
EuroSITES	European integrated network of open ocean multidisciplinary observatories
FAD	Fish Aggregation Device
FAO	Food and Agriculture Organization
FG	First Guess Field
FOAM	Forecasting Ocean Assimilation Model (United Kingdom)
GCC	Global Collecting Centre (of MCSS)
GCOS	Global Climate Observing System
GDAC	Global Data Assembly / Acquisition Centre
GDP	Global Drifter Programme
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GFCS	Global Framework for Climate Services
GHRSST	GODAE High-Resolution SST Pilot Project
GIS	Geographical Information System
GISC	Global Information System Centres (WMO WIS)
GLOSS	Global Sea-level Observing System (JCOMM)
GODAE	Global Ocean Data Assimilation Experiment (GOOS)
GOOS	Global Ocean Observing System (IOC, WMO, UNEP, ICSU)
GOS	Global Observing System (WMO)
GPS	Global Positioning System
GPSRO	GPS Radio Occultation
GSOP	CLIVAR Global Synthesis and Observations Panel
GSM	Global System for Mobile Communications
GSSC	GOOS Scientific Steering Committee
GTS	Global Telecommunication System (WWW)
HMEI	Association of Hydro-Meteorological Equipment Industry
HRPT	High Resolution Picture Transmissions
HRSST	DBCP/GHRSST High Resolution SST Pilot Project
IABP	International Arctic Buoy Programme
IBPIO	International Buoy Programme for the Indian Ocean
ICG	Intergovernmental Coordination Group
ICG/IOTWS	ICG for the Indian Ocean Tsunami Warning and Mitigation System (IOC)
ICOADS	International Comprehensive Ocean-Atmosphere Data Set (USA)
ICSU	International Council for Science
ICT-IOS	CBS Implementation / Coordination Team on the Integrated Observing System
ICTT-QMF	Inter Commission Task Team on Quality Management Framework
ID	Identification Number
IGDDS	Integrated Global Data Dissemination Service (satellite)
I-GOOS	Intergovernmental IOC-WMO-UNEP Committee for GOOS
IHO	International Hydrographic Organization
IMB	Ice Mass Balance
IMEI	International Mobile Equipment Identity
IMO	International Maritime Organization
InaGOOS	Indonesian Global Ocean Observing System
IndOOS	Indian Ocean Observing System
IOC	Intergovernmental Oceanographic Commission (of UNESCO)

IOCCP	International Ocean Carbon Coordination Project
IODE	International Oceanographic Data and Information Exchange (IOC)
IPAB	WCRP-SCAR International Programme for Antarctic Buoys
IPP	Iridium Pilot Project
IPY	International Polar Year (2007-2008)
ISABP	International South Atlantic Buoy Programme
ISDM	Integrated Science Data Management (formerly MEDS, Canada)
ISO	International Organization for Standardization
IT	Information Technology
ITP	International Tsunameter Partnership
ITT	Invitation To Tender
JAMSTEC	Japan Agency for Marine-Earth Science and Technology
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
JCOMM-III	Third Session of JCOMM (Marrakech, Morocco, 4-11 November 2009)
JCOMMOPS	JCOMM *in situ* Observations Programme Support Centre
JTA	Joint Tariff Agreement (Argos)
KML	Keyhole Markup Language
LOI	Letters of Intent
LUT	Local User Terminal (Argos)
MAN	JCOMM Management Committee
MCSS	Marine Climatological Summaries Scheme
MDT	Modelling Development Team
MEDS	Marine Environmental Data Service (Canada, now ISDM)
META-T	Water Temperature instrument/platform Metadata Pilot Project (JCOMM)
METOP	Meteorological Operational satellites of the EUMETSAT Polar System (EPS)
MOFS	Met-Ocean Forecasts and Services
MOI	Mauritius Oceanography Institute
MOU	Memorandum of Understanding
MSC	Meteorological Services of Canada
NAVOCEANO	Naval Oceanographic Office (USA)
NC	National Centres (WMO WIS)
NCDC	NOAA National Climatic Data Center (USA)
NCEP	NOAA National Center for Environmental Prediction (USA)
NCOSM	National Centre of Ocean Standards and Metrology (China)
NDBC	NOAA National Data Buoy Center (USA)
NESDIS	NOAA National Environmental Satellite Data and Information Service (USA)
NFP	National Focal Point
NIOT	National Institute of Ocean Technology (India)
NMDIS	National Marine Data and Information Service (China)
NMHS	National Meteorological and Hydrological Service
NOAA	National Oceanic and Atmospheric Administration (USA)
NODC	National Oceanographic Data Centre
NPDBAP	DBCP-PICES North Pacific Data Buoy Advisory Panel
NPOESS	National Polar-orbiting Operational Environmental Satellite System (USA)
NSF	National Science Foundation (USA)
NWP	Numerical Weather Prediction
NWS	NOAA National Weather Service (USA)
OceanSITES	OCEAN Sustained Interdisciplinary Timeseries Environment observation System
OCG	Observations Coordination Group (JCOMM)
OCO	NOAA Office of Climate Observation (USA)
ODAS	Ocean Data Acquisition Systems
ODASMS	ODAS Metadata Service (operated by China on behalf of JCOMM)
ODINAFRICA	Ocean Data and Information Network for Africa (IODE)
ODP	Ocean Data Portal (IODE)
ODT	Observation Development Team

OGP	Oil and Gas Producers
OOPC	Ocean Observations Panel for Climate (GCOS-GOOS-WCRP)
OPA	Observations Programme Area (JCOMM)
OPAG	Open Programme Area Group
OPAG-IOS	CBS OPAG on the Integrated Global Observing System
OPSC	Observing Programme Support Centre
OPSCOM	Argos Operations Committee
OSE	Observing System Experiment
OSMC	NOAA Observing System Monitoring Center (USA)
PA	Programme Area (JCOMM)
PANGEA	Partnerships for New GEOSS Applications
PGC	Principal GTS Co-ordinator (DBCP)
PICES	North Pacific Marine Science Organization
PICO	Panel for Integrated Coastal Observations
PIRATA	Pilot Research Moored Array in the Tropical Atlantic
PMEL	NOAA Pacific Marine Environmental Laboratory (USA)
PMO	Port Meteorological Officer
PMOC	Principal Meteorological or Oceanographic Centres responsible for quality control of buoy data (DBCP)
PMT	Platform Messaging Transceivers
POGO	Partnership for Observation of the Global Oceans
PP-WMD	Pilot Project on Wave Measurement from Drifters
PP-WET	JCOMM Pilot Project on Wave measurement Evaluation and Test from moored buoys
PTT	Platform Transmitter Terminal (Argos)
QA	Quality Assurance
QC	Quality Control
QMF	WMO Quality Management Framework
QMS	Quality Management Systems
RAMA	Indian Ocean Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction
RMIC	WMO-IOC Regional Marine Instrument Centre
RMS	Root Mean Square
RNODC	Responsible Oceanographic Data Centre (IODE)
RNODC/DB	RNODC for Drifting Buoys
RRR	Rolling Review of Requirements
RTMC	VOSClim Real-Time Monitoring Centre
RUDICS	Iridium Router-Based Unrestricted Digital Interworking Connectivity Solution
RV	Research Vessel
SADC	South African Development Community
SAMS	Scottish Association for Marine Science
SAT	Site Acceptance Test
SAWS	South African Weather Service
SBD	Short Burst Data (Iridium)
SC	Steering Committee
SCAR	Scientific Committee on Antarctic Research
SCG	Services Coordination Group (JCOMM)
SeaDataNET	Pan-European infrastructure for Ocean & Marine Data Management
SFSPA	JCOMM Services and Forecasting Systems Programme Area
SIA	Seasonal to Inter-annual Forecast
SIO	Scripps Institution of Oceanography (University of California, USA)
SLP	Sea Level Pressure
SMOS	Soil Moisture and Ocean Salinity mission
SOBP	Southern Ocean Buoy Programme
SOC	Specialized Oceanographic Centre (JCOMM)
SoG	Statements of Guidance
SOOP	Ship-Of-Opportunity Programme

SOOPIP	SOOP Implementation Panel (JCOMM)
SOT	Ship Observations Team (JCOMM)
SPA	JCOMM Services Programme Area (now SFSPA)
SSA	WMO Special Service Agreement
SSG	Scientific Steering Group
SST	Sea-Surface Temperature
STIP	Stored Tiros Information Processing
SVP	Surface Velocity Programme (of TOGA and WOCE, replaced by GDP) drifter
SVP-B	SVP barometer drifter
SVP-BS	SVP drifter with salinity
SVP-BTC	SVP drifter with temperatures in depth
SVP-BW	SVP barometer and wind at a drifter
TAO	Tropical Atmosphere Ocean Array
TC	Technical Co-ordinator
TD	Technical Document
TIP	Tiros Information Processing
TIP	Tropical Moored Buoys Implementation Panel
TOGA	Tropical Atmosphere and Global Ocean programme
TOWS-WG	Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems
TRITON	Triangle Trans-Ocean buoy network
TT	Task Team
TT-CB	DBCP Task Team on Capacity-Building
TT-DM	DBCP Task Team on Data Management
TT-MB	DBCP Task Team on Moored Buoys
TT-IBP	DBCP Task Team on Instrument Best Practices & Drifter Technology Developments (merged the TT-QM & TT-TD)
TT-QM	DBCP Task Team on Quality Management (now merged into TT-IBPD)
TT-TD	DBCP Task Team on Technological Development (now merged into TT-IBPD)
TT-TDC	DMPA Task Team on Table Driven Codes
UN	United Nations
UNESCO	UN Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
URL	Uniform Resource Locator
USA	United States of America
USD	United States Dollar
VAR	Value Added Reseller
VOS	Voluntary Observing Ship (JCOMM)
VOSClim	VOS Climate Project
WCRP	World Climate Research Programme
WCC-3	World Climate Conference 3
WDIP	WIGOS Test of Concept Development and Implementation Plan
WDIS	WIGOS Development and Implementation Strategy
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization (UN)
WOCE	World Ocean Circulation Experiment
WWW	World Weather Watch (WMO)
XBT	Expendable BathyThermograph
WML	Extensible Markup Language

[page left intentionally blank]