SHIP OBSERVATIONS TEAM (SOT)
SECOND SESSION

London, United Kingdom, 28 July to 1 August 2003

FINAL REPORT

JCOMM Meeting Report No. 24

WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

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N O T E

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C O N T E N T S

GENERAL SUMMARY OF THE WORK OF THE SESSION

I. COMMON SESSION

I/1. Organization of the session

I/1.1 Opening of the session

I/1.1.1 The second session of the JCOMM Ship Observations Team (SOT) was opened by the chairman of the team, Mr Graeme Ball (Australia), at 0930 hours on Monday, 28 July 2003, in Meeting Room 1 of the International Maritime Organization (IMO), London, United Kingdom.

I/1.1.2 On behalf of all participants, Mr Ball expressed his appreciation to IMO for hosting the session and for providing such excellent facilities and support. He also thanked the local organizer of the session, Captain Gordon Mackie, for his work in liaising with IMO, on behalf of the SOT, in the preparations for the session. He then stressed the importance of the present meeting, both in following up the progress achieved at the first session of the SOT (SOT-I) (Goa, India, 25 February – 2 March 2002) in integrating and streamlining environmental monitoring from volunteer ships, and also in continuing efforts to enhance the quantity and quality of ship-based meteorological and oceanographic observational data. He then introduced Mr Keith Groves, Head, Observations Supply, The Met Office, United Kingdom.

I/1.1.3 On behalf of the Chief Executive of The Met Office, Dr Peter Ewins, Mr Groves welcomed participants to London and to the meeting, and also expressed his thanks to IMO for hosting it. He noted the ongoing importance of ship-based observations to operational forecasting and maritime safety services, as well as their increasing significance for global climate studies. Despite the increasing quantity and quality of satellite observations over the oceans, in situ ship-based observations remained, and would continue to be a vital complement to these data. At the same time, he stressed that much work remained to be done to enhance the quality of such ship-based observations. Mr Groves concluded by wishing participants a successful meeting and enjoyable stay in London.

I/1.1.4 On behalf of the Secretary-General of WMO, Professor G.O.P. Obasi, and the Executive Secretary IOC, Dr P. Bernal, the Secretariat representative also welcomed participants to the second session of the SOT. In doing so, he expressed the very sincere appreciation of both Organizations to IMO, for the excellent facilities provided as well as for the ongoing high level of cooperation extended by IMO to the JCOMM cosponsors in areas of common interest and concern, such as the work of the SOT. The Secretariat representative then supported the remarks of the chairman concerning the objectives and importance of the meeting. He assured participants of the full support of the Secretariat, both during the meeting and throughout the implementation of the SOT work programme, and he concluded by wishing all participants a very successful meeting and an enjoyable stay in London.

I/1.1.5 The list of participants in the meeting is in *Annex I.*

I/1.2 Adoption of the agenda

I/1.2.1 The SOT adopted its agenda for the session on the basis of the provisional agenda. This agenda is given in *Annex II*.

I/1.3 Working arrangements

I/1.3.1 The meeting agreed its hours of work and other practical arrangements for the session. The documentation was introduced by the Secretariat. To facilitate interactions, all participants also made a brief introduction of themselves to the meeting.

I/2. Reports of the chairman and the Secretariat

I/2.1 Report of the Secretariat

I/2.1.1 A number of the key activities under the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) were highlighted in a presentation on the work of the Commission by the JCOMM co-president, Dr Savi Narayanan (Canada). This presentation covered in particular relevant JCOMM meetings and projects in the Observations, Data Management, Services and Capacity Building Programme Areas, as well as a brief review of the structure and operations of the Commission as a whole. The meeting expressed its appreciation to Dr Narayanan for this interesting and informative presentation, as well as for the very successful work of JCOMM to date.

I/2.1.2 The meeting noted with interest and appreciation a brief report by the Secretariat on its activities during the past intersessional period relevant to the SOT. This included preparations for the Brussels 150 celebration seminar; web site development, including implementation of the new JCOMM domain name (www.jcommweb.net); development of a JCOMM logo and booklet, and various other activities of a routine nature.

I/2.2 Report of the Observations Programme Area Coordinator

I/2.2.1 The meeting noted with interest and appreciation a presentation by the new JCOMM Observations Programme Area Coordinator and chair of the Observations Coordination Group (OCG), Mr Mike Johnson (USA). He emphasized the importance of volunteer ships, not only for provision of observations in their own right, but also for deployment of drifting arrays. Volunteer ships and the drifting arrays are components of the global ocean observing system which is a composite of complementary, in situ, satellite, data, and modeling subsystems. Each subsystem brings its unique strengths and limitations. Together they build the whole.

I/2.2.2 The OCG recognized the importance of advancing the SOOP network from the present status of about 24,000 XBTs per year to a high resolution/frequently repeated network of 35,000 XBTs per year, the importance of implementing the VOS Climate (VOSClim) project of at least 200 ships, and the importance of additional Southern Hemisphere ASAP units. The OCG has also requested the implementation panels to develop standard base maps showing required global coverage against what is presently in place, and noted that the JCOMM *in situ* Observing Platform Support Centre (JCOMMOPS) has made good progress on standardized mapping over the past year. SOT coordination with the International Ocean Carbon Coordination Project (IOCCP) was also encouraged.

I/2.2.3 Requirements for global coverage by the SOT climate subsets have now been well documented by the consensus reached at the first International Conference for the Ocean Observing System for Climate (OceanObs99) (St Raphael, France, October 1999) and by the recent Global Climate Observing System (GCOS) Second Adequacy Report to the UN Framework Convention on Climate Change (UNFCCC). Although the global system design is based on climate requirements, improved marine services will also be achieved as a result. A major challenge for the observations programme area is to develop observing system monitoring and performance reporting in order to produce easy to understand reports that can help in evaluating the effectiveness of the observing system and help in efforts to convince governments to provide the funding needed to meet implementation targets. It was noted that the Earth Observation Summit being held in Washington, DC, 31 July 2003, has potential to promote ministerial level awareness and support for implementing a sustained global observing system for oceanography and marine meteorology.

I/2.3 Report of the SOT chair

I/2.3.1 The chairman of the SOT, Graeme Ball, reported on actions undertaken by himself in support of the team since his appointment to succeed Rick Bailey (Australia) as SOT chair in 2002.

In doing so, he recognized that the challenge for the SOT was to maintain, coordinate and, wherever possible, integrate ship-based observing programmes, to support a developing range of well defined operational and research applications.

I/2.3.2 He noted that SOT-I was an important first step in this process, by bringing together the three main panels involved in ship-based observations (Voluntary Observing Ship Panel, VOSP; Ship-of-Opportunity Implementation Panel, SOOPIP; and the Automated Shipboard Aerological Programme Panel, ASAPP) to identify common problems and issues, and to develop mechanisms to facilitate the coordination and integration of the programmes. The work of the intersessional Task Teams to address specific problems was another positive step towards a coordinated global ship-based observing programme.

I/2.3.3 He indicated that SOT-II now provided the opportunity to build on the foundation established in Goa at SOT-I. He therefore strongly encouraged the team to actively participate in: the common sessions of SOT-II; the separate VOS, SOOP and ASAP panel sessions; and the SOT-II workshop, to realize the following outcomes:

a. Provide a status, and build on the understanding among the participants of the programmes and projects using merchant vessels and ships of opportunity.
b. Continue to evolve the mechanisms for coordinating and integrating the ship-based observing programmes.
c. Discuss common implementation issues, including the “volatility” in ship routing operations and recruitment, coordination of ship greetings and inspections, etc.
d. Exchange information on existing and developing instrumentation and data applications.
e. Review the implications of contributing to operational ship-based observing programmes, including the need to standardize observing systems and methods, data processing and data management.
f. Identify general issues requiring consideration and support from JCOMM.
g. Review the recommendations of the Task Teams on:
    i. VOS Recruitment and Programme Promotion,
    ii. Satellite Communications System Costs,
    iii. JCOMMOPS (SOT coordination),
    iv. Instrument Testing and Intercalibration,
h. Review and document issues, and, where necessary, form Task Teams to consider specific issues during the intersessional period.
i. Continue the liaison and coordination with the ocean carbon community.

I/2.3.4 The meeting expressed its considerable appreciation to the chair for his report and work to date, and endorsed his views of the key issues to be addressed. Actions on these are recorded under subsequent agenda items.

I/3. Reports on associated programmes and requirements for ship-based observational data

Climate Requirements

I/3.1 The meeting noted with interest and appreciation a report by the chairman of the Ocean Observations Panel for Climate (OOPC), Dr D.E. Harrison. He informed the meeting that recent developments of possible interest to SOT-II include the endorsement of the recommended ‘next steps’ toward the initial global ocean climate observing system by the steering groups of the World Climate Research Programme (WCRP), Global Ocean Observing System (GOOS) and GCOS. These ‘next steps’ represent an ocean community consensus on specific actions that will significantly improve the effectiveness of the global observing system. Also of note were the preparation of the Second “Report on the adequacy of the global climate observing system” by the GCOS and its acceptance by the Subsidiary Body for Science and Technological Affairs (SBSTA) of the UN FCCC, and the reformulation of the Climate Variability and Predictability (CLIVAR)

Ocean Observations Panel including sending representatives of the CLIVAR Basin Panels to OOPC meetings.

I/3.2 The OOPC chair indicated that ocean climate information needs arise from the desire to assess the state of the global ocean (and its changes from previous states), to make climate forecasts (and evaluate forecasts) and to support climate research (to determine the patterns of climate variation and change and to understand the processes responsible for them). The UNFCCC also seeks to know the oceanic role in the global carbon cycle (because this affects the atmospheric concentration of this important greenhouse gas), to have information for the detection and attribution of climate change and to know how climate change may affect extreme oceanic events. Among the important summary statements in the Second Adequacy Report that concern the oceanic domain are that "the ocean networks lack global coverage and commitment to sustained operation" and that unless 'urgent action' is taken to address these issues, the Parties to the Convention "will lack the information necessary to effectively plan for and manage their response to climate change."

I/3.3 The OOPC chair stated that ocean climate quality information requires care in its collection, because the large scale, seasonal and longer period climate signals are small over most of the globe. An example of the present effect of VOS information on global SST analysis was presented. If a typical VOS SST observation were of the same uncertainty as a buoy observation, the impact of VOS on SST analyses would be an important contributor in the regions of significant marine activity. However, recent estimates from the AOPC/OOPC Climate SST working group suggest that about six VOS observations must be averaged together to have the same impact as one buoy observation. With this adjustment, the existing VOS SST data set has a much more limited effect on climate SST analysis. Improvement of the quality of VOS SST observations would be very desirable.

I/3.4 The historical distribution of upper ocean subsurface temperature data, based on the World Ocean Data Set, was briefly reviewed. The OOPC chair indicated that the importance of well occupied ship tracks is clear at depths above 750 meters, where XBT data have been the primary data source. Most of the global ocean has a very limited subsurface data set; concentration of XBTs on the well occupied lines would improve the utility of the data set for, e.g., climate change detection. An example temperature time series at 500m from one of the best-sampled locations in the open North Atlantic was shown. The scatter of values about the linear trend line is considerable; how the data are edited can affect the linear trend (needed for detection of global change) non-trivially. Efforts to collect the highest quality subsurface temperature data will greatly assist in future trend determination.

I/3.5 In addition to suggesting that VOS and SOOP make every effort to improve the quality of their observations, the OOPC chair also suggested that consideration be given to: (i) development of a plan for what they can contribute to the efforts that will be needed to maintain global deployment of both the recommended surface drifting buoy (5x5 coverage) and Argo profiling float (3x3) arrays; (ii) development of a plan for reporting all VOS and SOOP observations in real time (with minimal human intervention); (iii) implementation of the 'next steps' plan to concentrate XBT deployments along a set of 41 high resolution (HRX) and frequently repeated (FRX) lines; (iv) assisting in every way the WMO in the maintenance of the VOS ship metadata needed by the 'next-steps' recommended VOSClim project.

I/3.6 The meeting thanked Dr Harrison for his very comprehensive report. It agreed with his analyses and recommendations, and requested the SOT chair and Secretariat to liaise with relevant SOT members, with a view to developing the plans proposed in paragraph I/3.5 above, in liaison with the Observations Programme Area Coordinator. (**Action**: Chair, Secretariat and OPA Coordinator)

Argo

I/3.7 The meeting noted with interest and appreciation a report on the status of Argo, prepared by the Argo Information Centre (AIC) Technical Coordinator, Mr Mathieu Belbeoch. Argo is a pilot project of GOOS and GCOS and is a contributor to the WCRP's CLIVAR and an essential element of the Global Ocean Data Assimilation Experiment (GODAE). Argo collects and distributes data from the upper 2000m of the water column using profiling floats. The aim of Argo is to maintain a global array of 3000 floats (3°x3°). The data it collects are freely and openly available to everyone, without any restriction. A major use of Argo data will be the better understanding and prediction of climate variability and change caused by interaction between the atmosphere and ocean. Argo data may also help with the prediction of changes in shelf seas that impact coastal ecosystems and fishery resources.

I/3.8 Argo implementation is internationally coordinated by the Argo Science Team (AST, http://www.argo.ucsd.edu), now assisted by a Director (John Gould). It is made up of contributing country representatives, national programme managers , principal investigators, and other experts. The Argo Data Management Team (ADMT) deals with the data issues. The Argo Technical Coordinator deals with international technical coordination, integrated within JCOMMOPS (http://www.jcommops.org) at the AIC. The AST meets on a yearly basis: the 5th meeting was held in China (after United Kingdom, France, Canada and Australia). Additionally three regional implementation meetings have been held in Japan, France and India. The ADMT meets on a yearly basis too: after France and Canada, the third meeting will be held in USA, November 2003. The first Argo Science Workshop, will be held in Tokyo, November 2003, to demonstrate the early achievements of Argo.

I/3.9 Argo is a truly global and truly international programme that will revolutionize the way *in-situ* data are collected from the oceans. At the present time, 15 countries participate in Argo by funding some floats (Australia, Canada, China, Denmark, European Union, France, Germany, India, Japan, New Zealand, Norway, Republic of Korea, Russian Federation, United Kingdom and United States). Countries that are not willing or able to buy and operate floats can help the project by providing deployment opportunities and/or opening their Exclusive Economic Zones. In that regard, Mozambique, Mauritius and most of Pacific Islands nations have made this major contribution to the implementation of Argo. In mid-2003, 25% of the global array was operational and the 1000 floats target was expected to be reached by the end of the 2003.

I/3.10 Established in February 2001, the international Argo Information Centre (AIC), staffed by the Argo Technical Coordinator and located in Toulouse, France, is participating in the JCOMMOPS activities. The AIC is funded, on a yearly basis, through voluntary contributions of Canada, France, United Kingdom and United States. The Centre basically provides support, in an integrated way, for implementation, and operations of the Data Buoy Coodination Panel (DBCP), SOOP, and Argo programmes. The Argo Technical Coordinator acts as a focal point, and assists, through direct contacts (email, phone, visits), in solving any technical issues arising between float operators, manufacturers, data telecommunication providers, data assimilation centers, quality control and archiving agencies, etc. The Coordinator acts as a clearing house for information on all aspects of float use, and promotes an improved international dialogue between oceanographers and meteorologists, and between research and operational communities.

I/3.11 A web-based information system has been designed to respond to the requirements of the international coordination of Argo and, also to other international programmes integrated within JCOMMOPS:

(i) Implementation of IOC Resolution XX-6
(ii) Monitoring System
(iii) General Web Site
(iv) Facilitate regional/national/international programmes implementation
(v) Facilitate decision making process
(vi) Facilitate Operations

(vii) Facilitate (and automate when possible) basic TC tasks

Some tools (dynamic web based applications) are available on-line for a large public, others are available for a restricted user groups and others are only available for the Argo Technical Coordinator (e.g. application to manage the JCOMMOPS database).

International Ocean Carbon Coordination Project

I/3.12 The meeting noted with interest a report on the International Ocean Carbon Coordination Project (IOCCP), by Dr Maria Hood of the IOC Secretariat. In January 2003, the SCOR-IOC Advisory Panel on Ocean CO_2 and the IGBP-IHDP-WCRP Global Carbon Project developed a joint pilot project, the IOCCP. This project encompasses the CO_2 Panel's former project areas dealing with coordination of ongoing and planned ocean carbon observations. The IOCCP principle objectives are to (i) develop a compilation and synthesis of ocean carbon activities and plans; (ii) work with international research programmes to fully integrate carbon studies into planning activities; (iii) standardize methods, quality control /quality assurance (QC/QA) procedures, data formats, and use of certified reference materials; and (iv) support regional synthesis groups and create regional databases.

I/3.13 With regard to issues for the SOT to consider, the ocean carbon working group had recommended to ensure close collaboration with JCOMM and its SOT as the carbon network develops towards a more reliable and sustained network. The group remarked that an appropriate link should be made between the Web sites of the IOCCP and SOOP. The group also requested JCOMM's assistance in resolving the issue of long delays in obtaining proper permission to make measurements in territorial waters. The carbon network, through its regional groups, will be developing compiled data sets of measurements made from ships of opportunity. The working group noted that these data sets will include temperature and salinity data that may be of interest to the wider SOOP community, and once developed, the carbon network proposed to contribute these data holdings to the SOOP database. The meeting requested the JCOMMOPS coordinator and the Secretariat to ensure follow-up on these issues (**Action**: Secretariat and JCOMMOPS coordinator)

Other projects

I/3.14 The representative of the SeaKeepers Society, Rod Zika, reported that a recent workshop, "The Next Generation of in situ Biological and Chemical Sensors in the Ocean," was held at Woods Hole Oceanographic Institution to define needs and identify new technologies for developing new or better marine sensors. Recommendations from the workshop will appear in the coming months; however, they can briefly be summarized by terms such as low cost small size, low power, automated, integrated packages with multiple sensors and a common bus and computer hardware, and greatly enhanced capabilities relative to current sensor technologies. The meeting agenda and programme information can be found at:
http://www.whoi.edu/institutes/oli/activities/symposia_sensors_programs.htm

Operational requirements

I/3.15 Finally under this agenda item, the meeting recognized that requirements for ship-based observational data to support operational meteorology and oceanography, including maritime safety services, had not changed during the past intersessional period. Work was continuing to develop a statement of guidance related to marine services, as reported at SOT-I. (**Action**: Management Committee and Secretariat)

I/4. Support infrastructure

I/4.1 Ship recruitment and servicing

I/4.1.1 The meeting noted with interest a brief report by the chair of the Task Team on VOS Recruitment and Programme Promotion, Steve Cook (USA), which covered both existing practices and recommendations within National Oceanic and Atmospheric Administration (NOAA) (USA) regarding ship recruitment and servicing, as well as recommendations of the task team, which had been established by SOT-I. These recommendations are:

(i) Develop a single page, preferably single paragraph, international "flyer" to simulate interest in observing ships. (**Action**: To be coordinated by SOT Chair)
(ii) Develop a Marine Observing Newsletter that will reside and be supported by the SOT Web Page as a mechanism that can be visited, downloaded and printed or copied and emailed to any appropriate prospective participant (i.e. shipping companies, ships officers, agents, educational institutions and scientists). (**Action**: To be coordinated by the SOT Chair)
(iii) Use the submitted Power Point presentation "The Partnership between the Maritime Industry, Marine Forecasting and Science", whenever possible to promote recruitment. (**Action**: Operators)
(iv) During the intersessional period, present the above mentioned presentation to major maritime shipping companies and ship owners associations and report results to the SOT Chair. (**Action**: To be coordinated by the SOT Chair.)
(v) Use the developed "Basic Ship Visit and Rider Rules" as a training tool for all interaction with participating vessels. (**Action**: PMO's, scientific support staff etc).
(vi) Appoint a Task Team to develop "generic" pre-installation design standards that will eventually be available to ship builders and classification societies. The idea is to provide a future "pool" of potential VOS with a view of reducing the expenditure of resources for installations. (**Action:** Steve Cook to initiate.)
(vii) Design an appropriate JCOMM/SOT Certificate of Appreciation for participating ships and others as appropriate. (**Action**: Existing Task Team to develop criteria for issuing.)

I/4.1.2 The meeting agreed with the recommendations, and decided that the Task Team should be re-established, to continue work on some of the recommendations as noted above. (see *Annex III*)

I/4.2 Telecommunication facilities and procedures

I/4.2.1 Telecommunication facilities

Inmarsat

I/4.2.1.1 The representative of Inmarsat Ltd., Mr Vladimir Maksimov, made a presentation on aspects of the present and future Inmarsat system of interest to the work of the SOT. Inmarsat operates eight communication systems Inmarsat: A, B, C (including Mini-C), M, mini-M, Fleet F77, Fleet F55, Fleet F33 which provide a wide choice for safety at sea and commercial communications. Inmarsat E/E+ is distress alerting system to alert Maritime Rescue Coordination Centres (RCCs).

I/4.2.1.2 **Inmarsat C** is a cornerstone of the Global Maritime Distress and Safety System (GMDSS), supporting 6 out of 9 communication functions defined in the IMO SOLAS Convention, Chapter IV. It is a packet data communication system providing store and forward messaging including e-mailing, distress alerting and distress priority messaging to associated RCCs, reception of maritime safety information via the International SafetyNET service and a data reporting and polling service. Inmarsat C is also used to send messages to a short code or two-digit address, e.g. sending meteorological reports, navigational hazards and warnings, request for medical advice and medical assistance, requests for search and rescue assistance and sending ship position reports to shore authorities. Inmarsat C also supports a data reporting and polling service that is used for data (position) reporting, vessel tracking and identification. Enhanced Group Code (EGC) SafetyNET service is one of the GMDSS communication functions and provides an efficient and low-cost means of transmitting maritime safety information to vessels at sea. It is used by meteorological, hydrographic, search and rescue and coastguard authorities. Messages to ships at

sea are addressed using IMO defined NAVAREAs/METAREAs, coastal areas or sea areas defined by a circular, e.g. area around vessel in distress, or rectangular area.

I/4.2.1.3 **Inmarsat Fleet F77** is the first in a new family of Inmarsat services for the maritime industry in eight years and brings a new dimension to maritime safety. Fleet F77 is the only service that meets the International Maritime Organisation's latest requirements – IMO Resolution A.888(21) "Criteria for the provision of mobile satellite communication systems in the Global Maritime Distress and Safety System (GMDSS)" - by providing voice prioritization and pre-emption.

I/4.2.1.4 **Inmarsat mini-C** with integrated GPS receiver, is a low-power and compact communications solution, suitable for all vessels but ideally suited to small vessel markets such as fishing vessels, yachting and inland waterways. Mini-C is an evolution of the existing Inmarsat C technology and supports all Inmarsat C maritime services (excluding distress calling at the moment), combined with a significantly reduced level of power consumption. Lower power consumption also offers the possibility of using a solar-fed battery power source where required. Inmarsat mini-C offers two-way messaging to an e-mail address, short access code addressing for maritime safety services (e.g. sending meteorological reports to Meteo center by using short code 41), EGC SafetyNET and FleetNET services, ship-to-ship communications and data position reporting and polling for ship's tracking and identification. This makes mini-C an ideal portable and inexpensive solution to fulfill basic messaging, tracking and security communications requirements for everyone, but especially small maritime users.

I/4.2.1.5 The meeting expressed its appreciation to Inmarsat for this update. It noted with interest that if an Inmarsat-C terminal was equipped with a second communications port, then this port could be connected directly to a non-GMDSS PC. Such a connection would greatly facilitate observations report compilation and transmission via Inmarsat.

I/4.2.1.6 The meeting reviewed the list of Inmarsat LES accepting code 41 messages, as well as any restrictions placed on this acceptance. The meeting requested the Secretariat to include in the list an extra column to show, where possible, forthcoming changes to LES status. The updated list is given in *Annex IV*, which is also accessible through the JCOMM web site. (**Action**: Secretariat).

Argos

I/4.2.1.7 The meeting noted with interest a report from CLS/Service Argos on the status of the Argos system, relevant to the work of the SOT. It was noted that there were currently six NOAA satellites, three of them equipped with Argos-2 generation, plus ADEOS-II fitted with an Argos 2 two-way system. Argos 2 generation permits lifetime increase because of the lowering of the required transmission power, i.e. 3dB increase of the Data Collection System (DCS) antenna sensitivity from Argos 1 to Argos 2. Another 6 dB increase will be provided with Argos 3 generation, which was planned for 2005 with the launch of MetOp.

I/4.2.1.8 The Argos downlink became operational in April 2003 after the launch of ADEOS-II. The Argos Downlink enables to (i) send commands to the platforms (e.g. mission tuning, adapting transmission parameters etc.), (ii) optimize platform performance (e.g. save battery power by transmitting only when a satellite is known to be above the platform thanks to downloaded orbital parameters), (iii) double the data throughput by using the new interactive data collection mode (e.g. acknowledgement of reception of messages by the satellite). Argos 3 generation will provide a 4.8 kbits/sec high data rate channel.

I/4.2.1.9 The Argos system was being used by Australia and France to collect XBT data from about 20 ships of opportunity. The small automatic Minos Meteorological station for ships uses Argos for data collection and includes atmospheric pressure, air temperature under shelter, a Global Positioning System (GPS) receiver, and a display terminal on the bridge. It is planned to add wind speed and directions.

EUMETSAT

I/4.2.1.10 The meeting noted that a full report on the status of the EUMETSAT data collection system is given under item V/1.2.

New telecommunications facilities

I/4.2.1.11 Under this item, the panel reviewed an updated report on developments in satellite communication systems prepared by the DBCP vice-chairman, Mr David Meldrum (United Kingdom). During the intersessional period there had been consolidation amongst the range of systems being planned or launched, largely in response to financial pressures. As a result, development work on roughly half of the systems described in the report had been suspended or cancelled. However, the systems that remained offered a range of facilities that could well encompass all envisaged applications in terms of data throughput capability, geographical coverage and the like.

I/4.2.1.12 In particular, the meeting noted developments with the Iridium system that underlined the potential of this system for real time interactive communications at high data rates, and a new approach to data acquisition, management and distribution. In this context, the meeting also noted an ongoing US Navy Office of Naval Research (ONR) programme that had funded the distribution and support of 100 Iridium modems for evaluation by the ocean observations community. Two of these modems are about to undergo testing on ships by SeaKeepers, including one on a ship in polar waters.

I/4.2.1.13 The meeting remained concerned, however, that the financial status of some of the operational systems remained precarious and that no system currently offered the range of data dissemination and quality control services that were available to users of Argos. Nonetheless, the meeting recognized the potential benefits of the new systems. The meeting thanked Mr Meldrum for his excellent review. It considered that a regular review of communications options was central to its objectives, and requested Mr Meldrum to again present an updated report to its next session. (**Action**: David Meldrum and the Secretariat)

I/4.2.2 Satellite communications system costs

I/4.2.2.1 The meeting recalled that the first session of JCOMM (JCOMM-I) (Akureyri, June 2001) had recognized that there was a marked lack of uniformity among Inmarsat Land Earth Station (LES) and their associated National Meteorological Services regarding the policy for accepting ship reports using Code 41, with restrictions being applied in some cases, which resulted in loss of valuable data. It therefore requested the SOT, in concert with the Data Management Coordination Group (DMCG) and its expert on communications, to review this question, with a view to developing, if possible, a common policy and approach to the application of Code 41, in particular which minimized such restrictions. JCOMM-I further recognized that the Global Telecommunication System (GTS) continued to be the primary mechanism for the real time global exchange of marine data and products.

I/4.2.2.2 SOT-I discussed this issue and recognized that this situation needed to be addressed, with the idea of some form of global cost sharing scheme being suggested, among other possible solutions. In order to fully assess the extent of the problem, and to also have an idea of all potential solutions, the meeting established a small intersessional Task Team on Satellite Communications System Costs, to prepare a report on the issue for consideration by SOT-II.

I/4.2.2.3 The meeting noted with interest and appreciation a report on the work of this task team by its chair, Dr Volker Wagner (Germany), which included a detailed assessment of the problem, as well as a number of recommendations for possible actions. Essentially, the task team reviewed three possible scenarios, with attendant advantages and disadvantages:

1. Continuation of the existing situation, with data transmission costs borne by a small number of NMS whose countries host participating LES;
2. Data transmission costs to be shared out among VOS ship operators, in proportion to their numbers of such ships;
3. Some form of global cost-sharing scheme, financed through a single common fund, administered by WMO or a single national service on behalf of all. Two variations on this scenario are possible:
   (a) A scheme independent of the communications provider or technology;
   (b) A scheme with a single, third-party, provider.

The full report of the task team is in *Annex V*. The recommendation of the task team was for one or other of the scenario 3 variants.

I/4.2.2.4 The meeting agreed that that it was now becoming critical to address the problem of unequal sharing of the costs of collecting ship-based observational data if potentially disastrous reductions in the real time availability of such data were to be avoided. To this end, some form of global cost-sharing was essential, and in this regard the team also supported the future introduction of one or other of the scenario 3 variants. At the same time, the team recognized that obtaining agreement by all National Meteorological Services (WMO Members) to contribute to such a global scheme would be difficult, and would eventually require a decision of Congress, based on advice from the Executive Council. The meeting therefore decided to re-establish the task team, to be chaired by Ms Sarah North (United Kingdom), and with terms of reference and membership as given in *Annex III*. The primary task of the team would be to work with the Secretariat to prepare a formal submission on the issue for consideration by the WMO Executive Council. This submission would first be reviewed by the third session of the JCOMM Management Committee (tentatively Geneva, March 2004), and eventually presented to the EC session in June 2004 by co-president Johannes Guddal on behalf of the Commission. (**Action**: Task Team, Secretariat and Management Committee)

I/4.3 JCOMM in situ Observing Platform Support Centre

I/4.3.1 The JCOMMOPS Coordinator presented the development and activities of JCOMMOPS since SOT-I. He recalled that JCOMMOPS was established by JCOMM-I in 2001 and that it is operated by the DBCP/SOOP, and Argo Coordinators. DBCP, SOOP, and Argo provide the resources needed to run JCOMMOPS. The Centre basically provides support in an integrated way for implementation, and operations of the DBCP, SOOP, and Argo programmes. A complete description of JCOMMOPS, including terms of references, can be found at http://www.jcommops.org/doc/jcommops/jcommops.htm.

I/4.3.2 JCOMMOPS development started in practice when the Argo Technical Coordinator was recruited in early 2001, and became a two person centre, i.e. the latter and the Technical Coordinator of the DBCP and SOOP. Focus was initially placed on the development of the Argo Information Centre (AIC). Then development of a common database and web products between the AIC, the DBCP, and SOOP started. Work which was shared between the Argo and the DBCP/SOOP Technical Coordinators plus some assistance from CLS, Service Argos can be divided into the following tasks: (i) normal TC DBCP/SOOP and TC Argo tasks (i.e. day to day coordination to support programme implementation and operations, including technical assistance and relay of quality information back to data producers), (ii) specific developments of web based tools and on-line database, and (iii) database initialization and data loading. JCOMMOPS is acting as a focal point and gateway for information on the programmes. Relevant information from Member states is therefore also made available via JCOMMOPS.

I/4.3.3 JCOMMOPS is already providing a number of tools via the web. These include (i) information on programme status (maps, list of stations), (ii) information on deployment opportunities, (iii) and practical information on how to initiate an observational programme. Integrated products now available include a monthly platform status by country, a monthly GTS

report, status maps (dynamic and static), searching WMO numbers and call signs, access to contact point information, meeting information, etc.

I/4.3.4 As far as the SOT is concerned, JCOMMOPS is hosting the SOT Home page (www.jcommops.org/sot) and maintains the SOT mailing list. Individuals willing to be registered on the mailing list are invited to contact the JCOMMOPS Coordinator. Tools more specific to SOOPIP are also made available via JCOMMOPS. These include the SOOP semestrial resources survey, line sampling indicators, status maps (dynamic and static, semestrial and monthly), information on the definition of SOOP lines, and filtering of Global Temperature Salinity Profile Project (GTSPP) quality information so that only the ships from a selected SOOP operator are shown.

I/4.3.5 The meeting thanked the JCOMMOPS Coordinator for his report, and expressed its appreciation for the excellent services already offered by the facility, which it regarded as being an important component of the operational work of JCOMM and the SOT.

I/4.3.6 The meeting then reviewed with interest the report of the Task Team on JCOMMOPS, relating to the possible extension of the work of JCOMMOPS to support overall SOT coordination. SOT-I had recognized the need for a detailed development plan for SOT coordination before consideration could be given to estimating and identifying the resources needed for further JCOMMOPS development in support of the SOT. This plan would include a specification of requirements (in particular for VOS and ASAP under JCOMMOPS, together with the integration aspects), plus an implementation plan to achieve full operational status. SOT-I had therefore established a small Task Team on JCOMMOPS, comprising the chairs of the SOOP, VOS and ASAP Panels and the JCOMMOPS Coordinator, chaired by the SOT chair, to develop this plan.

I/4.3.7 At the first meeting of the JCOMM Observations Coordination Group (OCG-I) (La Jolla, 24-27 April 2002) the plan proposed at SOT-I for SOT Coordination was endorsed. OCG-I also suggested a number of services that might be offered for SOT coordination in the near future, using existing resources either at JCOMMOPS or at specific agencies in Member States (e.g. QC feedback for VOS, SOT web page, information on telecommunication systems, SOT logo). A range of other services was identified which needed additional resources (e.g. SOT brochure, VOS web site). OCG-I recommended the task team include all these services when drafting the SOT Coordination Plan.

I/4.3.8 The SOT coordination plan was subsequently formulated by the task team, and is given in *Annex VI*. The meeting expressed its appreciation to the chairman and task team for this report. It agreed that all of the activities proposed in the report for JCOMMOPS to support SOT coordination were potentially of value to the work of the team, including in particular a web-based system, such as a web forum, for quickly implementing remedial action on identified problems in ship-based observations. Such a system could be similar to the existing QC guidelines implemented by the DBCP for buoy data. At the same time, the meeting recognized that a number of the activities, both one-off and ongoing, contained in the plan might most effectively be done in national agencies, rather than on the basis of additional funding resources provided to JCOMMOPS. It therefore decided to establish a sessional group, to identify specific new activities and functions for JCOMMOPS which should be developed and implemented within the facility itself. On the basis of the report of this sessional group, the chair would then prepare an updated plan for consideration by the Observations Coordination Group at its second session, tentatively April 2004. (**Action**: SOT chair, JCOMMOPS coordinator) The report of the sessional group is given in *Annex VII* (see also agenda item I/7).

I/4.3.9 As part of its review of the plan, the meeting modified slightly the proposed new draft terms of reference for JCOMMOPS. These are also included in *Annex VI*.

I/5. Operational Standards

I/5.1 The meeting recalled that, the issue of instrument evaluation, calibration and possible accreditation, as raised at JCOMM-I, was discussed at SOT-I. The session had been provided with

background material provided by the WMO Commission for Instruments and Methods of Observations (CIMO) on the Regional Instrument Centres (RICs), and was also informed about WMO procedures and guidelines relating to formal instrument inter-comparisons developed by CIMO.

I/5.2 SOT-I had recognized the importance of this issue and that it affected VOSP, SOOPIP and ASAPP. It further recognized there were at least different pathways to undertake such evaluations:

(i) Through the different panels and other platform-specific groups, as happened now on an ad-hoc basis;
(ii) Through the establishment of a formal JCOMM instrument evaluation, inter-comparison and testing programme;
(iii) Through existing CIMO mechanisms, with JCOMM providing the required technical expertise.

I/5.3 The meeting was informed that, during a visit to the Bureau of Meteorology, Melbourne, in March 2003, Peter Dexter, WMO Marine Programme, met with Graeme Ball, SOT chair, and Dr Ray Canterford, vice president of CIMO, for further discussion on this important subject. It was noted during the discussion that CIMO has extensive expertise in testing terrestrial meteorological observing systems. Some parameters however, such as atmospheric pressure and sea surface temperature, are also observed in the marine environment, either onboard ships or drifting buoys, and had been largely ignored in past testing. It was agreed that future testing should include terrestrial and marine systems where the element is common to both environments. It was recommended that the testing and intercalibration of other systems, designed to measure specific marine meteorological or oceanographic elements, should remain the responsibility of the relevant panel (in a similar manner to the testing of atmospheric profilers) under the guidance of an expert group established within SOT. The test or inter-comparison results would be published and made available for other members, possibly via the SOT web site. These results should also be consolidated and fed into a more comprehensive compilation of existing standards and procedures, including for biological chemical oceanography, being prepared by IOC. (**Action**: Expert Group (see below) and Secretariat) The meeting also stressed that instrument intercomparisons in particular should involve long-term field testing based on long-lifetime sensors. (**Action**: Panels)

I/5.4 The meeting decided to establish an SOT Expert Group on Instrument Testing, to liaise with CIMO in addressing these issues. The meeting agreed that the convenor of the expert group should ideally have a knowledge of, or an affiliation with, CIMO. It therefore accepted with appreciation the offer of David Evans, JCOMM liaison representative to CIMO, to chair the group. The remaining three members of the expert group would be drawn from the VOSP, SOOPIP and ASAPP. Additional members of the expert group would include representatives of other interested groups or invited instrument experts (GOOS, IODE) on an ad-hoc basis. Terms of reference and membership of the group are given in *Annex III*. (**Action**: Secretariat and group)

I/6. Discussion of issues for the SOT panels to consider

I/6.1 Based on a review by the SOT chair, the meeting agreed that the following general, potentially crosscutting issues, should be addressed by the team and individual panels, with a view to eventually formulating specific actions to be undertaken at the level of the SOT itself:

[SOT] Review, and address as necessary, the need to promote SOT to relevant groups and institutions outside of the SOT community, and invite them to work with SOT to realize their goals.

[SOT] Review, and address as necessary, the best utilization of the VOS to ensure the 'better' reporters are not 'over-tasked'.

[SOT] Review, and address as necessary, reliability concerns relating to the Eumetsat satellite communication system.
[SOT] Review, and address as necessary, the 'volatility' in ship routing, in particular the increasing occurrence of the lack of warning to remove equipment, cabling, plumbing and supplies.

[SOT] Consider possible input and instructions to the Data Management Programme Area on the management of ship data.

[VOSP] Review, and address as necessary, the impact of changes in the network of LES accepting SAC 41 on the VOS.

[VOSP] Review the MAROB experimental programme, including the distribution of data on the GTS.

[VOSP] Review metadata requirements for the VOS.

[VOSP] Review, and address as necessary, the need for an up-to-date and maintained 'online' version of WMO Pub No. 47.

I/6.2 The meeting noted that actions on most of these issues would be recorded under the relevant agenda items.

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II. Scientific and Technical Workshop

II/1. Thirteen papers were presented to the scientific and technical workshop, which constituted an integral part of the session. These covered issues such as instrumentation and observational practices, observational equipment and communication facilities development, data and system evaluation, and data applications. The meeting recognized the value of the workshop, both to meeting participants and all ship operators and data users, and expressed its appreciation to Julie Fletcher for chairing it. It requested the Secretariat to publish the full texts of the presentations as a JCOMM Technical Report, on CD-ROM only. It also requested that a similar workshop should be organized in conjunction with SOT-III. (**Action**: Secretariat and SOT chair)

II/2. In addition, the meeting noted the request of Elizabeth Kent (Southampton Oceanography Centre) for information on both current and historical VOS practices and instrumentation. Details of guidance provided to observers, and descriptions and pictures of instruments used form an important part of the VOS climate record, and should be collated and disseminated. (**Action**: VOS focal points)

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Panel Sessions

III. VOSP-III

III/1. Programme Review

III/1.1 Report of the chairman of the VOS panel including the review of action items

III/1.1.1 The meeting noted with considerable appreciation that Ms Julie Fletcher (New Zealand) had taken up responsibilities as the VOS panel chair in June 2003.

III/1.1.2 Ms Fletcher reported on work by the past chair, Michael Myrsilidis, in the past intersessional period as follows:

(i) Join the Task Team on JCOMMOPS (SOT Coordination)
(ii) Join the Task Team on Satellite Communications System Costs
(iii) Finalize the template for SOT national report together with other SOT chairs
(iv) Collect information on automation (see agenda item III/3)

III/1.1.3 The meeting expressed its sincere appreciation to Michael Myrsilidis (Greece) and George Kassimidis (Greece), who had had to resign as chairs of the VOS panel, for their efforts and valuable work in support of the VOS Scheme. The meeting wished every success to Mr Myrsilidis who had taken new national responsibilities towards the Athens Olympics, 2004.

III/1.1.4 The meeting reviewed the action items from the second session of the VOS panel (Goa, February-March 2002). The meeting noted that actions allocated to the Secretariat had been done and that most operational actions were underway. The meeting further noted that actions taken by Members would be reported in their national report.

III/1.2 Monitoring report

III/1.2.1 Ms Sarah North (United Kingdom), on behalf of Mr Gareth Dow (United Kingdom), presented a report on real-time data quality monitoring conducted by the RSMC Bracknell.

III/1.2.2 The meeting noted with appreciation that RSMC Bracknell had, at the request of WMO/CBS, assumed responsibility in 1987 as lead centre for real-time monitoring of the quality of surface marine data. Specific variables monitored were surface air pressure, surface wind speed and direction and sea surface temperature, and the monitoring encompassed observations from ships, moored and drifting buoys and other in situ marine platforms. The monthly monitoring reports for ship observations, once compared and rationalized with similar monitoring results from the European Centre for Medium-Range Weather Forecasts (ECMWF), Japan Meteorological Agency (JMA) and Natioanl Weather Service (NWS/NOAA), were distributed directly by RSMC Bracknell to a number of National Meteorological Services (NMSs). The full six-monthly report, for all platforms, has also been provided to the WMO Secretariat since April 2001. The statistics relating to suspect VOS operated by specific Members are extracted, and distributed by the Secretariat to PMO focal points for the Members concerned, under a covering letter requesting that remedial action be taken to correct the problems. The meeting agreed that this monitoring and its follow-up by PMOs, has significantly enhanced the quality of data available in real-time on the GTS.

III/1.2.3 At the SOT-I meeting, in February 2002, the VOS Panel considered that the Met Office's monthly report would be of enhanced value to VOS operators and data users if it was written in a more user-friendly language (see para. 1.1.2 of the SOT-I final report). The meeting noted with appreciation that, as a consequence, the header of the monthly report submitted to the WMO Secretariat had been rewritten as shown in *Annex VIII.*

III/1.2.4 The meeting further noted with appreciation and satisfaction that the Met Office was now planning to extend its monitoring to include air temperature and relative humidity — thereby increasing the monitoring list to six observed variables. The meeting agreed with values for the selection criteria for the monthly monitoring of temperature and humidity as in the following table:

Variable	Bias limit	Standard deviation limit	Gross Error limit
Air Temperature (deg C)	3.0	5.0	15.0
Relative Humidity (%)	20	30	50

III/1.2.5 The meeting recalled that the original purpose of this monitoring was to provide a coarse indication of bad reporting ships. While noting the importance of the quality of VOS data, the meeting agreed that strict criteria could make a huge list of suspect ships, which could not be followed up by the current manpower of PMOs. The meeting noted that monitoring these

additional variables would start after the Met Office HQ relocates from Bracknell to Exeter, possibly in the last quarter of 2003. (**Action**: RSMC Bracknell)

III/1.2.6 The meeting noted that the Met Office was producing monthly lists of monitoring statistics for the complete VOS fleets recruited by certain countries, which were then e-mailed to those countries' contact points. Pending the availability of updated WMO ship catalogue (WMO-No. 47) metadata, the meeting encouraged VOS focal points to regularly (ideally monthly) provide the Met Office with lists of their VOS so that the Met Office can maintain up-to-date lists of the VOS fleets for each country concerned. (**Action**: VOS focal points)

III/1.2.7 The meeting noted with appreciation that the Met Office was pleased to provide any country and/or any national VOS focal point with monthly monitoring statistics for their VOS. The meeting encouraged those wishing to receive copies in the future to advise the Met Office of their e-mail addresses, so that they can be added to the distribution list. (**Action**: VOS focal points and ship operators)

III/1.2.8 The meeting noted with interest that other monitoring tools such as those developed by Météo-France for the EUMETNET Composite Observing System (EUCOS) Surface Marine Programme (see agenda item III/2.2) were also available. Information on data quality, automatically updated every day, can be obtained for any VOS reporting on the GTS, not only those of EUCOS Members, through a web interface: http://www.meteo.shom.fr/vos-monitoring/

III/2. Project review

III/2.1 Review of the VOSClim project

III/2.1.1 Ms Sarah North (United Kingdom), Project Leader of the VOSClim project, presented the meeting with the development and present status of the project. She was pleased to note that steady progress had been made in the past intersessional period. A modest target of 200 participating ships was set at the start of the project and, by June 2003, a total of 89 ships had been notified to the Data Assembly Centre (DAC). Seven of the eleven countries that made provisional commitments to participate in the project at VOSClim-I had so far recruited ships. She stressed that the success of the project was dependent upon the efficient operation of three distinct data streams — real time data, delayed mode data and ships metadata. She also emphasized the importance of ensuring PMO involvement for the success of the project.

III/2.1.2 Ms North also reported on the VOS Climate Project Fourth Project Planning Meeting (VOSClim-IV) (London, United Kingdom, 21-22 July 2003) which was held prior to SOT-II. Considering the importance of increasing the number of observations, VOSClim-IV agreed that, provided a PMO can eventually collect the necessary metadata and follow up their performance, any ships which are willing to provide the additional observation elements could be considered for VOSClim recruitment, regardless of their observation systems.

III/2.1.3 Ms North conveyed the following recommendations raised by VOSClim-IV:

(i) a web-based metadata input and archive system;
(ii) need for further revisions to certain fields in Pub 47;
(iii) to issue a VOS newsletter, incorporating a VOSClim newsletter;
(iv) to establish mechanisms to exchange information on PMO activities especially their remedial actions by PMOs.

III/2.1.4 The meeting noted with interest and appreciation that the project had entered into an implementation phase, and that observed data, associated metadata and project information were now available on the project web site (http://lwf.ncdc.noaa.gov/oa/climate/vosclim/vosclim.html). Specific issues raised were discussed in detail under the relevant agenda items.

III/2.2 VOS coordination activities under EUCOS

III/2.2.1 The meeting noted with interest a report on the EUCOS Surface Marine Programme presented by Mr Pierre Blouch (France), Manager of the programme. The programme started on 1 April 2003. It presently focused on the VOS activities of the joint European Meteorological Services Network (EUMETNET). It will also include the data buoy activities presently managed by the European Group on Ocean Stations (EGOS), within a couple of years.

III/2.2.2 As with other EUCOS programmes, it contributes to establishing and operating a European observing network to deliver increased efficiency, leading to better-quality numerical and general forecasts. Regional Numerical Weather Prediction models are a primary focus. The EUCOS area of interest is from 10°N to the Pole, and from 70°W to 40°E, i.e. including a great part of the North Atlantic, a part of the Arctic and the Mediterranean Sea.

III/2.2.3 For the Surface Marine Programme, increased efficiency implies coordination of the activities but also partial funding of the observing systems by country members, in proportion of their GNIs. System operators will receive compensation according to their contribution to the network. This mechanism should ensure a certain long-term security for surface marine observation networks, presently supported by a few countries.

III/2.2.4 The programme is divided into two stages of two years each: network design first, then implementation. During the first 4 months of the programme, work consisted in making an inventory of the existing systems regarding the availability and quality of Sea Level Pressure observations in the EUCOS area. Monitoring tools of VOS data have been developed to perform this. The next step is the design study.

III/2.2.5 A VOS technical advisory group will be established in Paris on 24-25 September. European meteorological institutes participating in the EUMETNET programme and which manage a national programme of VOS ships or which are willing to re-activate or to develop such a programme, are invited to be represented at this meeting.

III/2.2.6 With regard to the funding system, Mr Blouch indicated that the EUCOS funding would not cover the whole surface marine activities of EUMETNET members and that some activities would remain funded at a national level, including transmission of VOS observations made outside the EUCOS area of interest.

III/2.2.7 The meeting recalled that VOS data were important not only to operational weather forecast, but to climate studies. It noted that automatic systems such as MINOS which were used for the programme did not make SST observations and did not provide a way to report visual observations. It expressed a concern that this programme was focusing on short-term weather forecasting only.

III/2.2.8 The meeting, noting that about 50 % of global observations were made by EUCOS participating countries, expressed its concern that focusing on the EUCOS area could endanger observations in other areas.

III/2.2.9 The meeting expressed its appreciation to Mr Blouch for his comprehensive report. It suggested that the EUCOS Surface Marine Programme should consider such concerns expressed by this meeting so that the programme could further contribute to a globally coordinated observation system. (**Action**: Pierre Blouch)

III/3. Automation and software

III/3.1 The meeting expressed its appreciation to Ms Fletcher and Mr Myrsilidis, current and former chairs of the panel, for their efforts to collect and assemble information on automation and electronic logbooks used by VOSs, based on the request by VOSP-II. Ms Fletcher pointed out: there was a steady move towards using compilation software such as TurboWin, and that numbers

of fully automated shipboard systems were increasing. However, these automated systems still represent only a small percentage of the total VOS.

III/3.2 While noting that only a very limited number of countries had responded to the survey by the chairs, the meeting recalled that national reports to SOT-II include such information. The meeting accepted with appreciation that Ms Fletcher and Ms Sarah North would assemble such information from the national reports, to provide more complete information on such automated systems. The list prepared by Ms Fletcher and Ms North is in *Annex IX*.

III/3.3 The meeting noted that, while the number of ships equipped with automated systems had been greatly increased, the category of VOS (Selected, Supplementary, Auxiliary ships) in the WMO Technical Regulations did not presently allow for a category of VOS equipped with automated systems. It thus agreed that it would be necessary to revise the WMO Technical Regulations and the WMO metadata list (WMO-No. 47). The meeting agreed that a sessional group on metadata for WMO-No. 47 should be established to address this issue. The group was composed of Graeme Ball, Ron Fordyce (Canada), Pierre Blouch, Julie Fletcher, Elizabeth Kent, Sarah North and David McShane (USA). (see para III/4.2.5 and para I/7(i))

III/4. Data Management

III/4.1 Review of MCSS including codes and formats (report by the chairman of ET on Marine Climatology)

III/4.1.1 Dr Volker Wagner presented a summary of the Marine Climatological Summaries Scheme, the data collection/archival scheme for VOS observations.

III/4.1.2 The MCSS started originally with the intention of preparing climatological monitoring products for the world oceans, Marine Climatological Summaries. These products were prepared under the shared effort of eight “Responsible Members” (RM) for eight allocated ocean regions. For achieving this task a special data distribution scheme was set up to provide each RM with the necessary database. Subsequently, the profile of the MCSS has changed: the mandatory preparation of the Summaries developed from a yearly basis at the beginning, to decadal products to be prepared on a voluntary basis at the present (the latest edition for the South Atlantic 1991-2000 is going to be issued by the RM Germany in September 2003). Instead, the scheme has recently been focusing on data management with respect to quality improvement and speeding-up of the data flow within the system, including the establishment of the Global Collecting Centres (GCCs) in 1994.

III/4.1.3 The meeting recommended that the requirement and availability of the Summaries should be carefully considered by the Expert Team on Marine Climatology (ETMC) at its next session to be held in mid-2004. (**Action**: ETMC)

III/4.1.4 Based on their TORs, the GCCs have been making efforts to ensure that MQC has been applied to the data and following up any problematic data contributions bilaterally with the contributing member concerned. The meeting noted with appreciation and satisfaction that the GCCs had issued MQC software for use before sending in the data and that approximately 20 countries had received this software. The GCCs request attention for the position information, which often is still erroneously reported. The overall quality has been improving steadily during the last years.

III/4.1.5 The meeting recalled that the current Minimum Quality Control Standards (MQCS-IV) did not extend to the additional elements introduced for the VOSClim project. The meeting was informed that VOSClim-IV had agreed with the MQCS proposed by the GCCs for these new elements as described in *Annex X*. The meeting endorsed the agreement by the VOSClim-IV. The meeting agreed that the GCC Germany should submit this proposal to the next session of the ETMC for its consideration (**Action**: GCC Germany). It noted that once the ETMC agreed with the

revision, a proposal to revise the Manual on Marine Meteorological Services (WMO-No. 558) should be submitted to JCOMM-II for its consideration.

III/4.1.6 The meeting recommended that other concepts of data management, such as distributed servers, should be considered by the ETMC at its next session. (**Action**: ETMC)

III/4.2 Metadata

III/4.2.1 The meeting recognized that WMO-No. 47, the ship catalogue, was an absolutely essential source of vital metadata, not just to support VOSClim and global climate studies, but also for a range of operational applications, including the real time monitoring and many of the activities of JCOMMOPS. It therefore expressed disappointment that the database structure had not yet been updated by the WMO Secretariat to include the new metadata fields as required by VOSClim and other applications and approved by JCOMM-I, and that consequently the database had not been updated since the end of 2001. It very much hoped that this work would be completed within the next two months, so that the available metadata updates could be included before the end of 2003, and the fully updated database made available to users through the WMO web site. In the meantime, it requested the Secretariat to investigate the possibility to make individual national updates available on the web site as simple ASCII flat files, as an interim measure. (**Action**: Secretariat). The meeting further noted with appreciation the offer of the National Data Buoy Center (NDBC/NOAA), USA, to consider the possibility to assist future updates of the database by providing a compatible, web-based data entry interface. It requested the Secretariat to liaise with NDBC on the matter, with a view to implementing such an interface as soon as possible. (**Action**: Secretariat and NDBC)

III/4.2.2 The meeting noted that, in addition to the timely delivery of up-to-date VOS metadata, there is a growing requirement for the archival of historical No. 47 metadata for climate studies. (**Action**: Secretariat)

III/4.2.3 Further on this issue, the meeting recognized the potential value of associating marine climate data and metadata within a single database system such as Distributed Oceanographic Data System (DODS)/OPeNDAT. It therefore requested the Expert Team on Marine Climatology to address this issue. (**Action**: ETMC and Secretariat)

III/4.2.4 The meeting noted that the new format of WMO-No. 47 is not suitable for a number of observation practices, especially for automated systems. It therefore agreed that revision of the Pub 47 should be considered. The meeting agreed that the sessional group on metadata for WMO-No. 47(see para. III/3.3) should consider this issue.

III/4.2.5 The meeting agreed with the suggestions proposed by the sessional group (see para I/7 and *Annex XI*). The meeting further agreed that the group would continue its discussions along these lines, and that a final proposal should be submitted to the ETMC at its next session for its consideration (*see Annex III*). (**Action**: Task Team on Metadata for WMO-No. 47)

III/5. Information exchange

III/5.1 Web site

III/5.1.1 The meeting noted that at OCG-I, the need for a dedicated VOS web site was recognized. Following OCG-I, it was proposed, and subsequently agreed by the Commonwealth Bureau of Meteorology, that Australia would host the web site, and Graeme Ball would develop and maintain the web site. The JCOMM VOS web site, which was implemented in late 2002, draws on the VOS Framework Document and the Final Report from SOT-I, as well as training material from the Second WMO Regional PMO Training Workshop (RAs II and V, Melbourne, Australia, November 1999) and the Third WMO Regional PMO Training Workshop (RA I, Cape Town, South Africa, November 2000). The web site includes an overview of the VOS and PMO programmes

and the VOSClim project, and provides links to other international and national web sites and resources.

III/5.1.2 The meeting expressed its considerable appreciation to Graeme Ball for his excellent work in developing and maintaining the site, which it agreed provided a valuable window for the VOS programme in general, for operators and users alike.

III/5.1.3 The meeting noted with appreciation that the VOS brochure was now available for download from the VOS web site in pdf format, as requested at SOT-I. It further recommended that the ASAP brochure should also be posted on the VOS web site (**Action**: Graeme Ball)

III/5.2 Publications

III/5.2.1 The meeting recalled that JCOMM-I agreed with a recommendation from the former CMM Subgroup on Marine Climatology (now a JCOMM Expert Team), that JCOMM should contribute, as required, to the major revision being undertaken by the WMO Commission for Climatology of the WMO *Guide to Climatological Practices* (WMO-No. 100) see para 7.1.12 of the final report of JCOMM-I). Subsequently, the CCl expert responsible for coordinating the revision to this guide, Mr Pierre Bessemoulin, had proposed that JCOMM should be responsible for the preparation of Chapter 2.1.4 of Part II of the guide, dealing with “Marine measurements”.

III/5.2.2 Within the context of this part of the guide, and following a review of its draft contents, the meeting agreed that this chapter on marine measurements should cover observing practices for marine observational data, as well as data management issues. Thus responsibility for its preparation would have to be a shared effort between the SOT and the ETMC, with expertise in both fields being required. The meeting therefore accepted with appreciation the kind offer of Canada to investigate the possibility of nominating an expert to undertake this work on behalf of the panel. (**Action**: Canada, VOS chair and Secretariat)

III/5.2.3 The meeting noted with considerable regret that *the Marine Observer,* which had been published by the Met Office UK for almost 80 years, would likely be discontinued. The meeting recalled that the Marine Observer was used as an international newsletter regarding VOS. The meeting also recalled that SOT-I had noted: that an international newsletter for VOS would be useful; and that the VOSClim Newsletter might also be expanded for use with all VOS. The meeting recognized the necessity of an international VOS newsletter. The meeting agreed that this issue should also be taken up by the Task Team on VOS Recruitment and Programme Promotion. (**Action**: Task Team on VOS Recruitment and Programme Promotion) (see *Annex III)*

III/5.2.4 The meeting agreed that communication mechanisms among VOS focal points and/or PMOs should be established. A possible way would be to develop a VOS/PMO forum similar to the DBCP forum. The meeting noted that it would not be difficult to set up a forum, but that developing a specific format to exchange information on remedial action might not be realized very easily. The meeting agreed that the Task Team on VOS Recruitment and Programme Promotion should consider this item as well. (**Action**: Task Team on VOS Recruitment and Programme Promotion) (see *Annex III*)

III/6. Organizational Matters

III/6.1 The terms of reference of the VOSP are reviewed, along with those of the other component panels, when addressing the overall terms of reference of the SOT under agenda item I/9.

III/7. Future Work Programme and Implementation Issues

III/7.1 SOT coordination and integration issues

III/7.1.1 The panel discussed several issues raised under agenda item I/6 in the common session and VOSClim-IV.

Over-tasking of VOS

III/7.1.2 The meeting recognized that the success of the VOS had seen its popularity increase, and, as such, many of the best reporters were being recruited by different agencies or organizations to support their individual projects. It was important to agencies that operate truly "operational" programmes and require real-time observations, that the VOS were not over-tasked for the sake of short-term research projects. In addition, the volatile nature of the maritime industry was creating a "competition" between agencies seeking to recruit new vessels to replace old and reliable reporters when they go off line. The meeting urged operators to bear this in mind, when dealing both with their own VOS and also with other agencies in their countries which might wish to make use of the VOS as observing platforms. (**Action**: Operators)

Volatility

III/7.1.3 The meeting noted that the volatility in ship trading patterns was of concern to programme operators who, through lack of warning about route changes, are often unable to remove equipment, plumbing, cabling and consumables from merchant ships before they leave the area. As a result, agencies risk losing expensive and often sophisticated equipment and costly consumables if they are unsuccessful in recovering the items through other means, such as the ship's agent or the international PMO network. In addition, there is a disruption in the collection of data for operational use and for long-term time-series records.

III/7.1.4 The meeting agreed that it would be necessary to establish mechanisms to encourage ship operators to provide timely warnings about routing changes, and also consider a coordinated approach to the dissemination of such advice. The meeting noted the necessity of good liaisons among PMOs as well as those between PMOs and ship companies. In this regard, the meeting suggested that an electronic message board among PMOs should be established. It further suggested that the possibility of the JCOMMOPS hosting such an electronic message board should be considered. The issue should be carefully discussed by the sessional group on JCOMMOPS.

MAROB

III/7.1.5 The meeting noted with interest that the National Weather Service/NOAA had introduced MAROB, an experimental voluntary marine observations programme, whose goal is to collect as many marine observations as practicable to improve the accuracy of coastal, offshore and high seas forecasts. MAROB seeks the participation of recreational and commercial non-VOS vessels. The purchase of equipment and all transmission costs are borne by the ship. Participating ships send an abbreviated report, based on the standard WMO FM-13 (BBXX) Code Form but replace BBXX with MAROB as the message identifier. Ships may download a freeware programme from the Internet to facilitate the coding and transmission of the observation. The messages are, as of early June 2003, available on the GTS. Whilst the goal and simplicity of MAROB should ensure its use by other meteorological services, there is, however, concern among some VOS operators about the quality of data collected under MAROB. Data quality issues were raised with NWS during the formative stages of MAROB, and relate to: (1) the lack of adequate training, (2) the quality of the meteorological equipment, (3) conformity to standard exposure criteria, and (4) the lack of a regular inspection programme. The question also arises as to whether domestic codes should be transmitted on the GTS.

III/7.1.6 The meeting expressed its concern that the data whose quality was not assured were put onto the GTS. It suggested that the NWS should take an appropriate action. Mr David McShane agreed to bring this concern to the NWS. (**Action**: David McShane)

10-m wind

III/7.1.7 The meeting recalled that SOT-I had suggested that, instead of the reduced (10m) wind, the original wind data should be reported. The meeting was informed that this suggestion had been endorsed by the Management Committee at its second session (MAN-II) (Paris, February 2003). The meeting noted that the recommendation would be sent to JCOMM-II for its consideration.

III/7.1.8 The meeting recalled that only the VOS using Turbowin (version 2.1.2 onwards) had been reporting the reduced (10m) wind. It was informed that VOSClim-IV had agreed that the type and version of the electronic logbook should be reported in footnotes as an interim procedure. The meeting recommended other VOS operators should also take the same action. (**Action**: VOS operators)

III/7.1.9 The meeting noted that Turbowin would be revised to report non-reduced wind in six months. It was recommended that a revised version should be used so that non-reduced wind would be widely reported as soon as possible pending that the recommendation would be adopted by JCOMM-II. (**Action**: KNMI, VOS operators)

III/7.2 Action items

III/7.2.1 Action items raised in the Panel are summarized in *Annex XVII*.

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IV. SOOPIP-IV

IV/1. Programme Review

IV/1.1 Report of the SOOPIP chair

IV/1.1.1 The chairman of the SOOP Implementation Panel, Steve Cook, introduced the history of ship opportunity programmes. He recalled that the SOOP was formally established in 1985 as a subset of VOS network under guidance of the Integrated Global Ocean Services System (IGOSS). Twenty-three different nations and their representatives have contributed to the programme, in the collection of oceanographic, biological, chemical and climate quality data as well as the subsurface temperature data.

IV/1.1.2 Beginning with the Tropical Ocean Global Atmosphere (TOGA) Research Programme (1990) of which the Expendable Bathythermograph (XBT) network formed a large component, and building upon the World Ocean Circulation Experiment (WOCE) and the scientific guidance of the World Climate Research Programme the XBT network was expanded and more effectively utilized. The scientific objectives and the implementation of the XBT network were overseen by the TOGA/WOCE XBT XCTD Planning Committee based on the recommendations from the proceedings of the Ocean Observations for Climate Conference (St. Raphael, France) and The Role of XBT Sampling in the Ocean Thermal Network in Observing the Oceans in the 21st Century (2001), the SOOP continues to provide complementary data to Argo and the TAO/TRITON/PIRATA moored arrays. As Argo comes online plans are that SOOP should gradually reduce the broadcast mode while at the same time shifting SOOP resources into Frequently Sampled and High-Density line modes.

IV/1.1.3 The SOOPIP chair then outlined the present status of the programme. The SOOPIP Technical Coordinator working within JCOMMOPS has developed reporting and graphical tools that provide more comprehensive monitoring. Utilization of these tools has made the SOOP Semestrial Survey a more useful document, especially for evaluating the effective coverage along each 2D line, and all SOOP operators are encouraged to contribute to and make use of it as a resource for determining future deployment plans (**Action**: SOOPIP members).

IV/1.1.4 The Chair reviewed the current status of data management and programme monitoring. Most of the upper ocean thermal data and the surface salinity data, are transmitted in real-time via satellite to the GTS. The real-time (low-resolution) and delayed mode (high-resolution) data are managed through the Global Temperature Salinity Profile Project (GTSPP) and the WOCE/CLIVAR Data Assembly Centres. All the upper ocean thermal data is available via the World Data Centres (e.g. National Oceanographic Data Center (NODC) in the US). Quality control is undertaken by the Marine Environmental Data Service (MEDS) in Canada for the real-time data, and Data Assembly Centres for the delayed mode data. The objective of these centres is to involve scientists and users with intimate knowledge of the data in particular regions in the QC process. CSIRO/BMRC Joint Australian Facility for Ocean Observing Systems (JAFOOS) operates the Indian Ocean Science Centre, Scripps Institution of Oceanography the Pacific Centre, and the NOAA Atlantic Oceanographic & Meteorological Laboratory the Atlantic Science Centre.

IV/1.1.5 The SOOPIP Task Team on Quality Control and Automated Systems (TT/QCAS) has undertaken extensive field evaluations on the data acquisition and sensor systems used by SOOP. Corrections to field standards and in some case manufacturing processes have resulted from these evaluations, as problems and errors have been identified. The work is ongoing, but inadequately funded due to the limited resources of the participating agencies.

IV/1.1.6 The SOOPIP chair then noted the outcomes of the High Resolution Marine Meteorology Workshop held at the Florida State University (Tallahassee, USA, 3-5 March 2003), which was focused on the impact of high-resolution sampling on SOOP and VOS. A number of recommendations were made by this workshop. The chair pointed out that actions to implement most of the recommended activities are just started or were very incomplete. The meeting nevertheless agreed on the importance of the recommendations, bearing in mind that requests to ships to undertake additional work should be minimized.

IV/1.1.7 The Chair reported on the development of a power point presentation for use in recruiting VOS (“The Partnership between the Maritime Industry, Marine Forecasting and Science”), which is designed for the upper management of the world's maritime companies as a concise briefing of the past, present and future of collecting Oceanographic and Meteorological observations from the VOS Programme and how this cooperative partnership can be enhanced in the future. It points out the complexity of oceanographic and climate sampling and the potential payoff to the maritime industry. This presentation has been given to Maersk/Sealand of North America and will be given to Maersk Headquarters and Safmarine, Inc. in August.

IV/1.1.8 The meeting expressed its appreciation to the SOOPIP chairman for his comprehensive and valuable report.

IV/1.2 Report by SOOP Coordinator

IV/1.2.1 The SOOPIP Coordinator reported on his activities for the Panel since SOT-I. He recalled that he was spending about 30% of his time on SOOP, the rest being spent on DBCP and JCOMMOPS. He stressed that nearly 50% of his SOOPIP time was spent on the following monitoring related issues: (i) coordinating design, developing, and producing SOOP line sampling indicators, (ii) SOOP semestrial resources survey, and (iii) SOOP monthly BATHY report.

IV/1.2.2 The Coordinator attended the OCG-I, where he presented a status of SOOP, JCOMMOPS, and a proposal for the integration of DBCP quality control guidelines within JCOMM. In this regard the meeting suggested inclusion of VOS type data within the proposed scheme while Argo and XBT data would not be included. He visited the Institut Français de Recherche Scientific pour le Development en Cooperation (IRD) and Institut Français de Recherche pour l’Exploitation de la Mer (IFREMER) in January 2003 and the Commonwealth Bureau of Meteorology (BoM) (Australia) in March 2003. At BoM, the SOT coordination issue was discussed with Graeme Ball. He attended the 6th meeting of I-GOOS in March 2003 and made a presentation on Argo and JCOMMOPS.

IV/1.2.3 The SOOP semestrial resources survey is a routine exercise of SOOPIP but was substantially reformatted to take into account results from the discussions online sampling indicators. The report is based on data and metadata submitted by the SOOP participants on a semestrial basis. Submitted data need to be carefully checked, and sometimes completed with additional information (e.g. line numbers). SOOP line sampling indicators and 2D sampling tables are now computed. Precise analysis, line by line, permits to identify where sampling is adequate, where lines are oversampled, and where they are undersampled. He stressed that this was an efficient and objective way of doing programme monitoring, which should be continued.

IV/1.2.4 Work for JCOMM basically included work for JCOMMOPS. In this regard, the JCOMMOPS database is now completed and includes information on buoys (DBCP), profiling floats (Argo), and ships of opportunity (SOOP). More tools and web based services were developed (e.g. SOOP status maps, SOOP line sampling indicators, GTS monthly report, etc.). (See agenda item I/4.3 JCOMMOPS for details of tools and services of interest to the SOT.)

IV/1.2.5 The SOOP database is now operational at JCOMMOPS. It is routinely updated with appropriate data from various sources, including WMO ship catalogue (WMO-No. 47). The database includes information on ships (call signs, ship names, allocation dates), SOOP lines and types of lines, national ship of opportunity programmes, agencies, contact points, statistics, information on data quality (from GTSPP), GTS statistics from monitoring centres (Australia, Canada, France, Japan, USA), GTS BATHY reports received by Météo France, lists of individual observations (including some metadata) made by SOOP participants and also submitted to the SOOP Coordinator on a semestrial basis. Miscellaneous tools and a generic search engine permit access to the database online via the JCOMMOPS web site (see above). In order to keep the database up-to-date, SOOP operators are invited to routinely provide the SOOP coordinator with the list of ships they operate as well as semestrial data and metadata.

IV/1.2.6 No major changes were made to the SOOPIP web site (http://www.brest.ird.fr/soopip/). A new SOT home page was established (http://www.jcommops.org/sot/). Web pages and products of interest to SOOPIP (e.g. maps) were added and made available via the JCOMMOPS web site. These included line sampling indicators, semestrial resource surveys, GTS monthly reports, dynamic maps, high resolution status maps). The SOOP coordinator also coordinated the addition of new entries for new types on probes and recorders (e.g. Devil-1 and Devil-2 of CSIRO/BOM) in BATHY and BUFR code tables.

IV/1.2.7 The meeting expressed its considerable appreciation to the SOOP coordinator for his comprehensive report and for his ongoing support for SOOP in general. In the discussion following this report, the following issues and action items were identified:

(i) While a capability existed already for the GTS distribution of XBT data in BUFR code, there is also now a developing requirement for the GTS distribution in BUFR of other data types, such as XCTD and ADCP data. It was agreed that work should begin now on this issue, with a view to providing input to the next meeting of the CBS Expert Team on Data Representation and Codes, scheduled for November 2003. (**Action**: SOOP coordinator and Bob Keeley) The meeting recognized that some assistance might be required by operators and users in how to encode, transmit and decode in BUFR. (**Action**: SOOP coordinator)

(ii) With regard to ADCP data, the meeting noted that there were already some current data being distributed on the GTS in TESAC code, and that two data centres for ADCP data had been established under WOCE, at JODC/Japan and NODC/Hawaii/USA. The SOOPIP chair was requested to contact these centres, to investigate if they were willing to continue this function on an ongoing basis, in support of JCOMM. (**Action**: SOOPIP chair)

(iii) The meeting noted that JCOMMOPS presently held an old version of WMO-No. 47, which was used for various applications. It agreed that it was not appropriate to maintain a completely separate copy of this metadata base within JCOMMOPS, and that, once the database had been fully updated, the JCOMMOPS site should act simply as a portal to the

definitive updated version maintained by WMO and available on the WMO web site. (**Action**: SOOP coordinator and Secretariat)

IV/1.3 Monitoring report

IV/1.3.1 SOOP monitoring reports

IV/1.3.1.1 The SOOP Coordinator reported on monitoring reports that SOOP produces on a regular basis. These are produced by monitoring centres and/or the SOOP Coordinator based upon GTS data and input from the participants in the Programme. The reports are paramount for the Programme to analyze its performance in comparison to the global requirements and goals (see conclusions from the Upper Ocean Thermal Review (UOT-1999)) and to eventually adjust its sampling strategy in a way complementary with other observing systems such as Argo and moorings under the Tropical Moored Buoy Implementation Panel (TIP). SOOP operated with limited resources in the last three years and could not practically achieve the goal of dropping about 35000 probes every year as recommended by the Review in 1999. Bearing in mind that resources (i) need to reach the users in real-time, (ii) must not to be wasted on oversampled lines, and (iii) must be deployed onlines where the need is clearly identified, this makes the SOOP monitoring exercises even more important. They permit to identify and eventually fix (i) line sampling deficiencies, (ii) data format and distribution problems, (iii) data quality problems.

IV/1.3.1.2 The main monitoring activities include:

a) SOOP semestrial survey.
   - This is the major monitoring exercise of SOOP. See paragraph IV/1.3.1.4 below for details.

b) SOOP line sampling Indicators.
   - This exercise is also part of the semestrial survey. Indicators permit to objectively estimate how sampling is being done for each line compared to the requirements (Upper Ocean Thermal Review (UOT-1999)). See agenda item IV/1.3.2 for details.

c) SOOP monthly GTS report.
   - Report is based upon input from Australia, Canada, France, Japan, and USA. It is used to check whether these selected GTS centres do actually receive all BATHY and TESAC reports distributed by the SOOP participants on the GTS. Duplicates are counted. The report helps in identifying possible loss of data, mainly at the GTS source. It provides a global view over the programme and permits among other things to identify the origin of the data and ship operators, and to eventually fix identified problems relatively quickly. It is therefore complementary to the MEDS monthly QC report.

d) GTSPP quality monitoring report.
   - This report is produced by MEDS and permits to monitor the quality of BATHY and TESAC reports distributed on the GTS, e.g. spikes, profile cut off at the bottom, temperature inversions, etc., and to eventually contact ship operators in order to fix problems. It is sent monthly by email to the SOOP Coordinator and the SOOP Participants. It is imported into the JCOMMOPS database so it is also available via a dedicated web form. Hence, SOOP operators can make specific selections for the ships they operate.

e) GTSPP JJVV/KKYY monitoring reports.
   - These reports are produced by MEDS and are based upon SOOP data received in BATHY and TESAC formats. They are sent by email to SOOP operators. They are imported into the JCOMMOPS database so a query form can also be used via the JCOMMOPS web site to identify quickly problems for individual SOOP operators. They are useful for identifying ships still reporting on the GTS using older code forms of BATHY or TESAC and for convincing ship operators to use the latest code version. However, for practical reasons (e.g. changing software onboard ships), the process to have all ships reporting

on the GTS comply with current WMO regulations is slow. The reports can be used in conjunction with the SOOP monthly BATHY report to identify GTS bulletin headers and the operators of those ships still reporting data in an older code form.

f) MEDS line reports.
   - o Line information is only available in deferred time through the SOOP semestrial survey. Also, there is no provision in BATHY format to distribute line number information in real-time. Besides, the information is not necessarily available from the deck of the ship at the time the report is distributed in real-time. In order to assist real-time users to get this information in a shorter delay (i.e. less than two months), MEDS is producing monthly line reports using algorithms it developed.

IV/1.3.1.3 Other monitoring products include:

a) The JCOMMOPS dynamic monthly map is zoomable and provides information on who operates the lines and GTS originating centres.
b) The monthly GTSPP status map is a global static map produced by MEDS which shows one dot for every BATHY and TESAC profile received for the considered month.
c) MEDS monthly density map. This is a static map showing the 2°lat.x5°lon. boxes where at least one BATHY profile was made during the month.
d) MEDS yearly static density map. This is a static map showing the number of months in every 2°lat.x5°lon. box where at least one BATHY profile was made during the year.
e) GTSPP cruise catalogue. For each observing platform, the catalogue provides information on number of temperature, salinity, and oxygen profiles as well as on maximum depth of profile.
f) MEDS regional T/S profile map. This is showing all drops and profiling depths for BATHY and TESAC reports from the Atlantic, Pacific & Arctic.
g) The WOCE performance report analyzes the results of quality control conducted by MEDS. It includes for example the total number of BATHY and TESAC report, the number of profiles where something was found to have failed a test of data quality, including sensor data (e.g. suspect, wrong, changed, comparisons with Levitus), position, and date/time.
h) SOOP monthly GTS map (Static, high resolution. colours by GTS originating centre).
i) JCOMM GTS statistics. This report is produced by some of the Member States (Australia, Canada, France, Germany, Japan, USA, and occasionally from Argentina and Russia) for monitoring the flow of BATHY, TESAC, BUOY, and TRACKOB reports between specific sources and GTS routing centres.

IV/1.3.1.4 The Coordinator reported on the results from the January-December 2002 SOOP survey. In 2002 only 21306 drops were made by SOOP (see figure 1, drops for which information was provided to the Coordinator), while more than 32000 probes are needed per year according the conclusions from the UOT-1999 once Argo is fully implemented. It appears that in a global SOOP perspective (i.e. ignoring National requirements for this exercise) a number of lines received more drops than required and that substantial resources (i.e. about 3200 probes) could potentially be split to undersampled lines although in practice this could be difficult to realize. In any case available resources do not permit the achievement of required sampling. Even with a more efficient sampling we are short of at least 7000 probes.

IV/1.3.1.5 As far as the broadcast mode is concerned, he noted that we also have to take the TAO Array and Argo data into account. There were 840 Argo floats operational in June 2003 (i.e. about 28% of the planned array), and 82 TAO moorings in equatorial Pacific and Atlantic Oceans. From JAFOOS and MEDS density maps, it appears that (i) SOOPIP helped in achieving good coverage in the Northern Hemisphere and equatorial regions, and (ii) SOOPIP can potentially enhance the

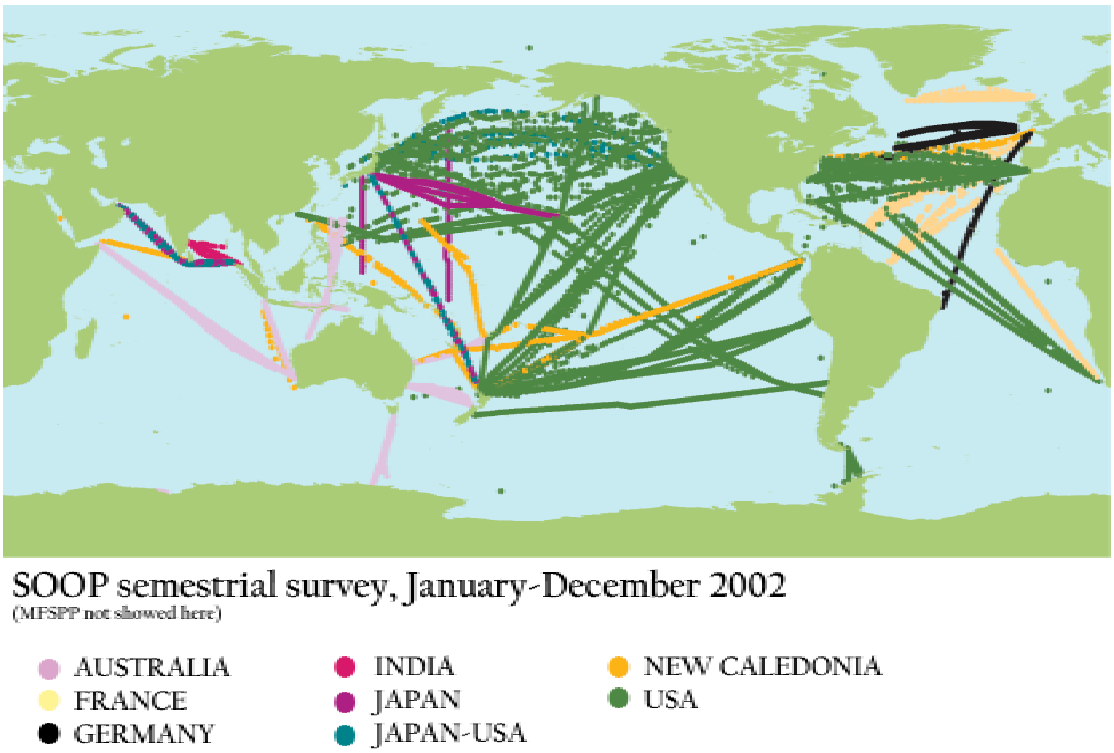
situation in the Southern Ocean where there is still a lack of data. The Panel noted that it was expected to have 50% of the Argo array covered in mid-2004 and that the requirements from the UOT-1999 were increasingly relevant. Noting that OOPC would meet about two months ahead of SOT-II, the meeting recommended that OOPC should discuss the issue at its meeting and make further recommendations to the SOT regarding how practically to ensure the transition from the current mode of SOOP operations to the full FRX/HDX UOT-1999 mode (**Action**: OOPC).

IV/1.3.1.6 The meeting agreed that XBT probes were particularly required in the following data sparse area: the SouthWest Indian Ocean (IX06, IX07, IX08, IX15, IX21), the Eastern Pacific Ocean (PX21), and the Southern Ocean (PX36, AX25). The meeting also identified the following lines where efforts should be made to obtain a more adequate sampling:

Table 1: Lines where sampling was not adequate in 2002.

Line	UOT type	Drops	Comment
AX07	HDX	271	Undersampled.
AX08	FHD	663	Not well sampled in FRX mode. Relatively well sampled in HDX mode.
AX10	FHD	350	Oversampled in HDX mode during first semester. Undersampled in HDX mode during second semester. Not well sampled in FRX mode.
AX15	FRX	401	Partly sampled. Sampled South of 10N.
AX20	FRX	142	Partly sampled. Too many probes dropped in Feb. and Oct. 2002
AX22	HDX	542	Oversampled
AX25	HDX	0	Not sampled
AX29	FRX	1	Practically not sampled
AX34	FRX	0	Not sampled
IX06	FRX	0	Not sampled
IX07	FRX	0	Not sampled
IX08	FRX	0	Not sampled
IX09	FRX	218	FRX line here partly sampled in LDX mode in 1st semester, sampled in FRX mode in 2nd semester. Area 31S-6N not sampled
IX10	HDX	220	Undersampled 47E-72E. Sampled HDX mode between 78E and 95E.
IX12	FRX	535	Oversampled in LDX mode. Undersampled in January, May, August, November, and December. Not well sampled in FRX mode.
IX15	HDX	0	Not sampled
IX21	HDX	0	Not sampled
IX28	HDX	475	Oversampled in February and November. Undersampled in between
PX02	FRX	190	Oversampled in LDX and FRX modes.
PX04	FRX	114	Undersampled
PX05	FHD	289	Undersampled. FRX line sampled in LDX mode (undersampled in that mode also). Not sampled around April 2002
PX08	FRX	1068	Badly sampled in FRX mode.
PX09	FHD	832	Undersampled in FRX mode. Well sampled in HDX mode
PX21	FRX	0	Not sampled
PX31	FHD	174	Not well sampled during 1st semester (LDX, FRX, and HDX modes). Not sampled 2nd semester
PX32	HDX	103	Undersampled East of 160E. Well sampled in HDX mode West of 160E. Remark: BOM samples the line only West of 160E.
PX36	HDX	0	Not sampled

Figure 1: Drops made by SOOPIP participants in 2002



IV/1.3.1.7 The meeting recalled that in order to produce the semestrial review it was essential that the SOOPIP participants provide the Coordinator with required information at least on a semestrial basis (and more often if they can or if this is more convenient to them). The meeting agreed that efforts should be made to include transect information in the submitted data as this was not always the case in previous submissions and as such information was required to compute some of the SOOPIP line sampling indicators **(Action:** SOOP operators**)**.

IV/1.3.1.8 The meeting thanked the SOOP coordinator for his comprehensive report, and for the excellent monitoring tools he maintained. It agreed that all the monitoring reports were valuable to operators and users alike, and should therefore be maintained. It also agreed that the results presented through this monitoring now provided an excellent basis for approaching governments for the additional funding support required to fully implement the identified system requirements. (**Action**: SOOP operators)

IV/1.3.1.9 With regard to the transition of SOOP to HDX/FRX mode, as recommended by the upper ocean thermal review in 1999, the meeting noted that this was now becoming a major issue in the light of the rapid implementation of Argo, to cover the broadcast mode. It therefore requested the chair and the Observations PA Coordinator, together with the OOPC chair, to bring this to the attention of the OOPC, with a view to obtaining their advice regarding an appropriate transition mechanism. (**Action**: SOOPIP chair, OOPC chair, OPA Coordinator)

IV/1.3.2 Line sampling indicators

IV/1.3.2.1 The SOOP Coordinator reported on the development of SOOP line sampling indicators. At the first SOT meeting, it was agreed that it was essential to monitor how well the sampling was realized for each type of line. The present semestrial monitoring exercise was based primarily on transect counts and was not ideal. The meeting agreed that dedicated performance indicators applied to each individual shipping line (e.g. regularity of sampling, completeness of line sampling along the whole transect, adequate spacing between drops according to the type of line, adequate number of transects) should be defined and computed by the Coordinator for each line based upon the data/metadata provided by the SOOP participants on a semestrial. The basic idea would be to

be able to determine, for each line, if the sampling had been made according to the specifications in terms of (i) timing/periodicity and (ii) spacing. Specific techniques might be developed to that end and eventually provide for a series of indicators which, combined with each other, should show if the sampling strategy had been met. SOT-I requested the SOOP Coordinator to make proposals regarding such possible performance indicators.

IV/1.3.2.2 The scheme which is now in place resulted from discussions between the Coordinator, Jean-Paul Rebert (France), Alexander Sy (Germany), Satoshi Sugimoto (Japan), and Bob Keeley (Canada) (March-April 2002), and further discussion with Rick Bailey (Australia), Steve Cook, and Gary Soneira (USA) (May 2002). Based on those discussions, in May 2002, the SOOPIP Chairman, Steve Cook, made final recommendations which were taken into account for the final synthesis by the SOOP Coordinator.

IV/1.3.2.3 The idea is to produce, on a semestrial basis, a series of indicators indicating how well SOOP lines are being sampled. They are computed from the data and metadata submitted by the SOOP operators to the Coordinator on a semestrial basis. Results are submitted back to the SOOP operators and feedback expected from them. Indicators basically produce Boolean results: for each indicator, either the line is correctly sampled according to defined criteria (result 1) or it is not (result 0). Under-sampled, correctly sampled, and over-sampled indicators, and specific graphics are also added. Indicators are computed according to the requirements expressed by the upper ocean thermal review. The review proposed sets of FRX and/or HDX lines.

IV/1.3.2.4 For those lines where at least one indicator says that the line is not correctly being sampled, SOOP operators are invited to:

(i) Check the series of indicators for that line,
(ii) Estimate whether the line was effectively not sampled correctly (e.g. perhaps transect information or drop numbers submitted to the Coordinator in the metadata were wrong),
(iii) In case the line was indeed not correctly sampled, understand the cause for it and suggest action for the future (e.g. move resources to another line and give up measurements along that line, change sampling mode, try to sample that line correctly by increasing resources on that line), and
(iv) Provide the SOOP Coordinator with feedback information and conclusions regarding the line sampling and proposed future actions.(**Action**: SOOP operators)

IV/1.3.2.5 The following indicators are being proposed. Indicators are computed for each line for all drops made from different ships and operators along that line.

a) Indicator I1: Transect frequency (LDX lines must be sampled 12 times a year, FRX lines must be sampled 18 times a year, FRX/HDX lines must be sampled 14 times a year in FRX mode and 4 times a year in HDX mode, HDX lines must be sampled 4 times a year)
b) Indicator I2: Adequate transect cycle and variability
c) Indicator I6: Adequate transect trajectory compared to expected line path (i.e. RMS of distances between each drop position and the theoretical line).
d) Indicator I7: Sufficient percentage of adequately sampled transects (each transect evaluated individually first)
e) Indicator I8: Undersampling/oversampling
f) Indicator I9: Summary Indicator (summary result of all other indicators)
g) 2D time/space diagrams. We draw 2D tables comprised of boxes. X axis is for time, Y axis is for space and we count the number of drops that were made in each box. Box spacing uses requirements for LDX, FRX, and HDX lines, i. e. for LDX lines: 2 transects per year, 150 km horizontal resolution along the meridian for North-South lines and 5 degrees along the parallel for East-West lines; for FRX lines: 18 transects per year, 150 km horizontal resolution along the meridian for North-South lines and 5 degrees along the parallel for East-West lines; and for HDX lines: 4

transects per year, 50km resolution horizontal along the ship track. Theoretically, if sampling was perfect all boxes should be filled in with one drop. Such tables show precisely at a glance (i) whether sampling was made according to the requirements, and (ii) in case in was not correct, where and when this was the case.

IV/1.3.2.6 Important requirements in order to compute accurate line sampling indicators are:

a) **Theoretical line track**: As we do these calculations to estimate whether the sampling is meeting the upper ocean thermal review requirements we will use, among other things, average theoretical line tracks. It will be crucial to make sure that the line definitions are correct. Up to now this was not so important. Now it is. the SOOP Coordinator who is keeping line track definition in the JCOMMOPS database. SOOP operators are therefore invited to check with the Coordinator that the information in the database is accurate **(Action**: SOOP operators**)**.

b) **Transect number and line number**: Transect number information as well as line number information from the data submitted to the Coordinator are to be used to compute the indicators. If these numbers are wrong, then the calculated indicator values will be wrong so it is extremely important that this initial information be as correct as possible. Experience has demonstrated that automatic procedures are not ideal for computing this information. It might be preferable that SOOP operators put in place a routine of manual procedures to do this or that they double check the values produced by the automatic procedures.

IV/1.3.2.7 The SOOP coordinator stressed that, because transect information was not available for many drops made during 2002, it was not possible to compute the indicators for most of the indicators I1 to I9 for that period. Only the 2D space/time tables could be computed because they are “transect independent”. On the other hand, the SOOP Panel might actually consider to only compute such tables as they are very informative and indicate clearly whether sampling was made correctly or not.

IV/1.3.2.8 The meeting noted this information with considerable interest, and thanked the SOOP coordinator for the work he had undertaken on this important issue. It fully supported the results of this work, and the specific line indicators he recommended, which it regarded as now critical to the work of SOOPIP, as well as to data users and JCOMM in general.

IV/1.4 SOOPIP-IV Action items review

IV/1.4.1 The meeting established a sessional group to review the action items from the last SOOPIP session. The meeting reviewed the report by the sessional group. (see agenda item I/7(ii)) Details are given in *Annex XII*.

IV/2. Implementation

IV/2.1 The chair of the SOOPIP reported on the overall status of implementation of the programme, as well as a number of issues related to this implementation. At the present time, only about 23,000 XBT observations (JCOMMOPS 21,306 ; GOOS Centre 24,453) were collected and successfully distributed on the Global Telecommunications System in 2002. This is still below the fully successful number of 30,000 per year now and 32,000 after Argo is fully implemented and the Frequently Sampled and High Density lines replace most of the present Low Density sampling. The traditional and difficult to sample areas of the world’s oceans are still being under sampled (southern oceans, southwestern Indian Ocean, Gulf of Guinea, and the South American Bight (10 to 30 South and 70 to 90 West). SOOP should concentrate on these data sparse regions. Plots of past years sampling are available on the SOOPIP web site (http://www.brest.ird.fr/soopip/).

IV/2.2 As of April 2003 there were 770 active Argo floats deployed or about 26% of the total planned array. As of April 2003 there were 79 active TAO/TRITON/PIRATA moored buoys. SOOP

combined with Argo and TAO/TRITON/PIRATA provide good coverage in the Northern Hemisphere and equatorial regions.

IV/2.3 The volatile commercial shipping industry continues to make long-term recruitment of participating vessels a problem. The price of XBT probes is straining existing resources identified to support the global monitoring networks of participating countries. That coupled with reduced programme funding has caused a reduction in some of the line sampling.

Multidisciplinary Sampling

IV/2.4 Some contributing nations are integrating their sampling programmes. Examples are the installation of more Automated Weather Systems that collect climate quality data and at the same time reduces the impact on ship personnel, pCO2 systems being integrated with Thermosalinograph Systems, Atmospheric Air Sampling for CO2, Acoustic Doppler Current Profiling Systems and Continuous Plankton Recorder Systems. The chair stressed that, as operators continue to ask more and more of our VOS for the benefit of science they must keep in mind how they impact on the resources of those participating VOS and make every effort to minimize our requirements of the ship.

Implementation of Shipboard Quality Control of XBT Data

IV/2.5 The US GOOS centre checks for a valid position relative to ship speed by checking against previous observations. It then interpolates between raw samples to calculate one-metre intervals. It then transmits at two-metre intervals starting with two metres up to the tail depth. For inflection points, it smoothes the raw data by applying a 3,5,7,11 point median filter. From this smoothed profile the inflection points are computed.

IV/2.6 Ship riders are instructed by SIO to transmit profiles only after final editing. The editing software makes it very easy to remove tails at 700m or deeper. Ship riders go through fairly extensive training to get proficient at editing, reviewing many examples from previous data sets and the CSIRO cookbook. They are instructed to cut profiles at a first spike, wire stretch, or bottom hit. In rare cases they will interpolate across small spikes (1 or 2 data points). They refer to previous profiles and earlier transect data to determine whether to redrop, cut or keep questionable features such as nubs, inversions, and fine structure. SIO hopes to make the new software (Seas2000) smarter by incorporating climatology into the chkprof routine.

Implementation of Automated Quality Control before GTS Insertion

IV/2.7 GOOS Centre – SEAS is in the process of implementing an automated quality control procedure that will analyze every SEAS real-time XBT observation and flag those observations that don't pass QC criteria developed by the Atlantic Data Assembly Centre. Those that pass QC will be inserted onto the GTS. Those that do not will be routed to a secondary quality control bin and will be visibly checked and, if necessary, edited before insertion onto the GTS.

Implementation of a CRC for Unique Identification of GTS Records

IV/2.8 The Cyclical Redundancy Check (CRC) will be incorporated into the SEAS System. The algorithm used was supplied by MEDS. It will be a 32 bit value based on the ASCII generated BATHY message of those values following the 888 group and terminating at the equal (=) sign of the message. Development is concurrent with the development of the AOML auto-QC software presently underway. It is expected to be implemented in time for the August 2003 high-density cruise of the Sea-Land Florida (KRHX). A meeting with NODC is needed to determine the desired format and content of the real-time *archive message* along with details regarding the destination server and schedule. Paul Chinn is responsible for development, test, and implementation and can be contacted at: Paul.Chinn@noaa.gov or +1-301-713-2790 x 289. Below is a crude description of the SEAS data flow regarding unique record identification. When an XBT is collected the SEAS shipboard software creates a binary record of the entire data stream, metadata, and computed

unique SEAS ID for archive aboard ship. This is referred to as the *complete message*. The *complete message* is the delayed mode record sent to AOML and forwarded to NODC. SEAS shipboard software also creates a *best message* for transmission to Silver Spring, which also has the SEAS ID.

IV/2.9 The SEAS processing servers in Silver Spring essentially build two real time messages from the *best message*. One is the familiar BATHY (JJVV) formatted record distributed on the GTS to MEDS among other places. (The GTS record reaches MEDS and is incorporated into their GTSPP operation. MEDS computes a CRC and attaches it to the record.) The other real time message is a real time *archive message*. The *archive message* is the same GTS record but has the SEAS ID *and* computed CRC of the GTS record attached. This archive record is sent to NODC and becomes part of their GTSPP data management operation.

IV/2.10 Ideally NODC receives two SEAS records from NOAA. The real-time *archive message* (SEAS ID + GTS CRC ID) and the delayed mode *complete message* (SEAS ID). Comparison of the SEAS ID completes the data flow from NOAA. Ideally NODC also receives a GTSPP record from MEDS which has the same GTS CRC ID computed. Comparing GTS CRC ID=s of *archive message* to MEDS GTSPP record completes the GTSPP data flow. NODC data management determines which record becomes part of the permanent archive.

IV/2.11 The meeting noted this report with interest, and thanked the chair for the information provided.

IV/3. Instrumentation and procedure evaluations

IV/3.1 The meeting recalled that a compilation of existing instrumentation and procedure evaluations was being undertaken by an expert group established by SOT for this purpose (See common session para. 5.4), prior to interacting with CIMO and IOC on the further development of such evaluations within JCOMM in a coordinated way. It therefore decided to take no further action within SOOPIP on this issue pending the finalization of the work of the expert group, as well as its coordination with CIMO in particular.

IV/4. Data Management

GTSPP

IV/4.1 The meeting recalled that the Global Temperature Salinity Profile Programme (GTSPP) is a joint project of WMO and IOC. Functionally, GTSPP reports to JCOMM and to the IOC Intergovernmental Oceanographic Data and Information Exchange (IODE) Committee. GTSPP handles real-time profile data circulating on the GTS and the original high resolution, delayed mode data. The main functions of real-time data flow are handled by MEDS in Canada, and for delayed mode data by the US NODC. Both operations are assisted by a number of countries including France, Japan, Australia and Germany.

IV/4.2 The GTSPP provides details on a number of aspects of the data system including data volume, timeliness, delayed mode replacing real-time, and data quality. Highlights include:

(i) A significant increase in T and S profiles due to Argo but a reduction in XBT data in the last few years.
(ii) High resolution, delayed mode data still take a significant time to arrive at archives.
(iii) Fewer losses of BATHY and TESAC profiles on the GTS in recent years
(iv) Slower conversion of BATHY code forms to the last (JJVV) than compared to TESAC converting to KKYY.
(v) Even after many years the number of real-time data in archives (not replaced by delayed mode original data) is uncomfortably high.
(vi) There has been a noticeable impact of automated systems in improved timeliness of data so that now some 40% of data from ships arrive within 1 day of the observations time.

(vii) Argo data are presently arriving at about 50% within 1 day, although this is expected to improve.
(viii) Although delayed mode data still take a significant amount of time (years) to reach the archives, the trend appears to be decreasing.
(ix) General statistics on data quality suggest that there is a decrease in errors in both position and time as well as in the profiles. We still see something like 4% of real-time profiles with questionable values.

IV/4.3 GTSPP issues a number of monitoring reports particularly related to the real-time data. These include:

(i) A monthly review of data received from various GTS nodes looking at the level of duplication from different centres.
(ii) A monthly review and platform notification of systematic errors seen in real-time data.
(iii) A monthly map of sampling on SOOP lines.
(iv) A monthly presentation of the frequency global SOOP observations.

IV/4.4 Work that is currently being pursued includes:

(i) A more critical assessment of how well real-time data meet observational requirements.
(ii) Implementation of a unique tagging of original data to allow easier matching of real-time to the original profiles.
(iii) Investigations towards a distributed archive rather than a centralized one.

IV/4.5 The meeting expressed its appreciation to MEDS/Canada for its ongoing coordination of the GTSPP, and to Bob Keeley in particular, both for his comprehensive report, and also for his excellent work in support of SOOP.

GOSUD

IV/4.6 The meeting noted with interest and appreciation a report from Bob Keeley on the Global Ocean Surface Underway Data (GOSUD) Project. This is also an IODE/JCOMM project, designed as an end-to-end system for data collected by ships as they traverse the ocean. The goal of the GOSUD Project is to develop and implement a data system for ocean surface data, to acquire and manage these data and to provide a mechanism to integrate these data with other types of data collected in the world oceans. For the purposes of this Project, the data concerned are those collected as a platform is underway from the ocean surface down to about 15m depth.

IV/4.7 Development of the GOSUD Project began in 2000. Two meetings followed (2001 in Brest, France, and 2002 in Ottawa, Canada) to develop a project plan for approval by IODE. The plan was approved by IODE in March, 2003. A copy of the draft plan is available from the GOSUD web site at http://www.ifremer.fr/sismer/program/gosud/. Work will continue this year to finalize membership of a Steering Group, and to encourage participants to volunteer for the work required by the Project Plan. A meeting to continue this work is planned for early November 2003 in Monterey.

IV/5. Organizational Matters

IV/5.1 TOR of SOOPIP and Membership

IV/5.1.1 The terms of reference of the SOOPIP are reviewed, along with those of the other component panels, when addressing the overall terms of reference of the SOT under agenda item 9.

IV/5.2 SOOP Coordinator

IV/5.2.1 The panel recognized the importance of the coordinator position to the ongoing success of the programme, and expressed its considerable appreciation to Etienne Charpentier for his work in support of the panel, its members and activities. It therefore agreed to continue to maintain and support the position, under the general conditions established and maintained by the DBCP. (**Action**: Secretariat)

IV/5.3 Trust Fund

IV/5.3.1 The Secretariat representative presented the financial statements and budget for the employment of the coordinator, funded through voluntary contributions by DBCP and SOOPIP member institutions. The trust fund is maintained by WMO and the coordinator is employed by IOC and located at CLS, Service Argos in Toulouse. SOOPIP contributions so far total $US 20 000 per year, which are used to fund a portion of the coordinator salary and travel expenses, as agreed previously by both the DBCP and SOOPIP. New contributions beyond those already made would be welcome, and would permit a greater range of activities to be undertaken in support of SOOPIP. The panel accepted the WMO and IOC statements of account for the trust fund for 2002/2003, agreed the SOOPIP components of the expenditure and income estimates for 2003/4, and endorsed the SOOPIP contributions for 2003/4 (see *Annex XIII*). (**Action**: Secretariat)

IV/5.3.2 The meeting recalled its general approval of the plan presented for the further development of JCOMMOPS in support of SOT coordination (see paragraph 4.3.8). In this context, it considered that the existing SOOP Trust Fund, if augmented appropriately with the resources required to develop and maintain the expanded functions of JCOMMOPS, should now be considered an overall SOT Trust Fund. It therefore requested the chair of the SOT, with the chairs of all three component panels, the Secretariat and the technical coordinator, to investigate the possibilities for identifying and obtaining these resources, and to prepare a proposal to this end, for consideration by the Observations Coordination Group. (**Action**: Chairs of SOT, VOSP, SOOP, ASAPP, Secretariat and technical coordinator)

IV/6. Information exchange

IV/6.1 No additional issues or actions were identified under this agenda item. The meeting expressed full satisfaction with the existing SOOP web site and documentation.

IV/7. Future Work Programme

IV/7.1 SOT coordination and integration issues

IV/7.1.1 These are dealt with under agenda item I/7.

IV/7.2 Action items

IV/7.2.1 The full list of SOOPIP action items is contained in the overall SOT action item list in *Annex XVII.*

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V. ASAPP-XIV

V/1. Programme review

V/1.1 Report of the chairman of the ASAP Panel including review of action items

V/1.1.1 The meeting noted with appreciation the report of the ASAPP chair, Mr Jean-Louis Gaumet (France). This report covered in particular changes in ASAP operational status since

SOT-I, as well as the evolution in communications facilities and radio-sounding techniques over the same period. The chair concluded by stressing that the fundamental objectives of the panel remained unchanged: to enhance the numbers of soundings over the oceans, both by improving the cost-effectiveness of the system and by obtaining new resources where possible; and to maintain and enhance data quality, thus improving the value of the data to users.

V/1.2 Report of EUMETSAT

V/1.2.1 The EUMETSAT representative, Mr Sean Burns, reported on the status of its monitoring activity and of the geostationary meteorological satellites in general, including in particular a report on the status of Meteosat Second Generation (MSG). He indicated, in particular, that MSG-1 would most probably be operational for DCPs in early 2004. He also noted that EUMETSAT was planning to set up a list server for DCP operators, which would essentially act as a DCP user forum. This report has been reproduced as usual in the 2002 ASAP Annual Report. The panel expressed its appreciation to EUMETSAT for this report and for its continuing support for ASAP, and for marine data collection in general.

V/1.3 Monitoring reports

V/1.3.1 Report of ECMWF

V/1.3.1.1 The ECMWF representative, Mr Antonio Garcia, reported on their monitoring activities for ASAP. The panel was pleased to note that ASAP data quality continued to be comparable with or superior to that of land stations and aircraft reports with respect to model fields, and that the total number of reports monitored remained stable. It was particularly pleased to note that there was a positive trend in the number of soundings received which reached above the 50 hPa level. It regarded this result as particularly important, and urged operators to ensure that these good results were made widely known in their national services. The meeting further considered that the monitoring results presented demonstrated clearly the overall value of ASAP, which should also be made known to the user community. (**Action**: ASAP operators)

V/1.3.1.2 The panel expressed its appreciation to ECMWF for this report, which has been reproduced in full in the 2002 Annual Report.

V/1.3.2 Report of ASAP monitoring centre

V/1.3.2.1 The chairman of the panel reported on the status and operation of and some results from the ASAP monitoring centre, which had been established by Météo France as agreed at ACC-VII. This report indicated little change globally from 2001 in the reception of ASAP reports by Météo France. The panel expressed its appreciation to Météo France for this comprehensive and very valuable report. The report of the ASAP Monitoring Centre has been reproduced in the 2002 Annual Report.

V/2. Project review

V/2.1 Report on the EUMETNET ASAP project

V/2.1.1 Dr Klaus Hedegaard (E-ASAP Programme Manager) presented the status and plans for E-ASAP 2003-2006. E-ASAP has procured two units, and will procure additionally three units before 2005, giving a total of five units procured 2000-2005. Thirteen national European units will be integrated into E-ASAP before the end of 2006, giving a total of 18 E-ASAP units by 2006, taking a total of 6,300 ASAP soundings annually. The costs are shared among the EUMETNET Members on a Gross National Income (GNI)-scale.

V/2.1.2 The two E-ASAPP units made a total of 598 launches in 2002 out of which 65 failed. Out of the 533 successful soundings 492 TEMP, were received on the GTS, giving a 92.3% communication efficiency. The systems use 350g balloons and use Inmarat-C as means of

communication. The E-ASAPs are deployed to sea areas being within data sensitive areas for short range forecasting for Europe. This defines areas of interest and E-ASAP Management carries out the procurement and operations of E-ASAP within these limits.

V/2.1.3 he meeting expressed its appreciation to Dr Hedegaard for this presentation, as well as for the success of E-ASAP to date.

V/2.2 Worldwide Recurring ASAP Project (WRAP)

V/2.2.1 The meeting noted with interest and appreciation a report by the WRAP Project leader, Gordon Mackie, and Australian WRAP coordinator, David Evans. The report covered operations up to the decommissioning of the original WRAP ship, the Palliser Bay, in mid-2002, as well as an assessment of the future of the project. The meeting expressed regret that operations on the Palliser Bay had been terminated, and that there now appeared to be no ships operating on the preferred round-world line, via South Africa, Australia and South America to Europe. Of the alternative lines and shipping companies, the meeting agreed with the assessment of Gordon Mackie, that the Mediterranean Shipping Company (MSC) offered the best prospects. MSC operates ships trading from Europe to Australia and New Zealand via the Mediterranean and Suez, and was willing to host and operate ASAP free of charge.

V/2.2.2 In addition to the cost factor, the meeting recognized that the ships offered by MSC sailed on routes that were of potential value for a number of countries with regard to upper air soundings. These included India, Kenya, New Zealand, Saudi Arabia, South Africa, USA and EUCOS, and if some or all of these countries were willing to participate in the project, this would greatly increase its value to the global user community as a whole. In this regard, Ali Mafimbo (Kenya) indicated that he would discuss with the head of his national service about the possibilities for Kenyan participation in WRAP. (**Action**: Ali Mafimbo)The meeting further noted with appreciation that the MSC ships were also willing to participate in SOOP, if so requested. It therefore authorized Captain Mackie to proceed with the recruitment and implementation of a MSC vessel as the next WRAP. (**Action**: Gordon Mackie) It also requested the SOOPIP chair, Steve Cook, to liaise with Gordon Mackie regarding the possible recruitment of the WRAP ship to SOOP. (**Action**: Steve Cook and Gordon Mackie)

V/3. Coordination of implementation

V/3.1 The panel chair, Jean-Louis Gaumet, reviewed the different elements involved in ASAP radio-sounding implementation aboard ships and coordination on a regional level (e.g. EUCOS) as well as on a global WMO level. Topics included in the review were: ship recruitment, maritime route recommendations, technical aspects, data transmission, performance and overall quality, and operating costs. He noted that ASAP is managed in the European area by EUMETNET, through the EUCOS committee, under the E-ASAP project. The aim of this approach is to increase the economic efficiency of the programme, by increasing the number of shipping lines without increasing the financial burden. On the worldwide level, JCOMM fosters the recruitment of new shipping lines in the Southern Hemisphere. JCOMM, through the SOT and the ASAPP, has the ability to provide technical and financial support to national authorities at this step of the project. He invited interested national agencies to request the Panel for further information about opportunities for ASAP implementation. (**Action**: ASAPP chair and Secretariat)

V/3.2 The panel thanked the chair for this valuable analysis. It stressed in particular the value to all operators of upper air sounding stations in Europe, including ASAP operators, of the continuance of the LORAN-C system, and urged that this concern should be made widely known. (**Action**: Operators and Secretariat)

New launcher developments

V/3.3 The meeting noted with interest and appreciation a report by Warren Keenan (USA) on work underway to develop a new deck launcher system for ASAP. He indicated that the likely end

cost of the launcher system could be around USD 10,000, decreasing with expanded sales, and that he hoped to be able to report on results from operational trials at ASAPP-XV. A full report on these developments is given in the proceedings of the technical workshop.

V/4. Organizational Matters

V/4.1 TOR of ASAPP and Membership

V/4.1.1 The terms of reference of the ASAPP are reviewed, along with those of the other component panels, when addressing the overall terms of reference of the SOT under agenda item 9.

V/4.2 ASAP Trust Fund

V/4.2.1 The meeting reviewed and accepted an interim statement of account for the ASAP Trust Fund for the biennium 2002/2003. This statement is given in *Annex XIV*. It recognized that substantial expenditures would continue to be required during 2004, in particular to support the further development of WRAP, including the continued engagement of Captain Gordon Mackie as consultant to support the project. It therefore agreed a draft budget for 2004, including a table of contributions, which is also given in *Annex XIV*. The panel noted and approved the fact that the Secretariat had invoiced contributors for 2003, including for WRAP, and that these contributions had all been received, except that from Denmark, which had stated that it could no longer contribute to the trust fund. (**Action**: Secretariat)

V/5. Information exchange

V/5.1 Web site

V/5.1.1 The meeting agreed that a simple static web page, accessible through JCOMMOPS and the SOT page, would prove a useful window for the programme, and also a gateway for accessing operational information, such as the status of E-ASAP and the ECMWF monitoring results. It therefore requested the JCOMMOPS coordinator to prepare such a page, in coordination with the ASAPP chair. The page should include pdf versions of the ASAP brochure and the most recent annual report, as well as links to related operational information and pages as noted above. (**Action**: JCOMMOPS coordinator and chair)

V/5.2 Publications required including ASAP annual report

V/5.2.1 The meeting agreed that, irrespective of whether there was eventually a full SOT annual report, it had an ongoing requirement for a separate ASAP Annual Report. At the same time, it recognized that the full SOT national report now contained all information necessary for compiling the summary tables in the annual report, and that in this case a separate ASAP annual national report was not necessary. The meeting reviewed and endorsed existing procedures for the preparation of the annual report, as well as the overall structure for the 2003 report. These are given in *Annex XV*. (**Action**: Secretariat, chairman and operators)

V/5.2.2 The meeting noted with appreciation that the revised ASAP brochure agreed at SOT-I had subsequently been finalized, printed and distributed to operators. It was agreed that there were no requirements for further revisions at the present time, but to keep the brochure under review at future sessions. (**Action**: ASAPP chair and Secretariat) The panel requested that the brochure should also be made available, in pdf format, on the VOS and SOT/ASAP web sites. (**Action**: SOT chair and JCOMMOPS coordinator)

V/5.3 Future data management

V/5.3.1 The meeting noted that, although the low resolution ASAP sounding profiles on the GTS were all archived in relevant national data archives, this was not presently the case for the high

resolution profiles available in delayed mode. The meeting nevertheless considered that these were potentially valuable data, which might be used for example in studies of the fine scale structure of the marine planetary boundary layer. As an immediate action on this issue, the ASAPP chair was requested to prepare a short paper on ASAP data flow and data management, for consideration by the JCOMM Data Management Coordination Group at its session in 2004. (**Action**: ASAPP chair)

V/6. Future work programme

V/6.1 SOT coordination and integration issues

V/6.1.1 No additional coordination issues were identified at the present time.

V/6.2 Action items

V/6.2.1 The meeting reiterated that the top priority in programme implementation for the panel over the next year and more would be the continuation and enhancement of WRAP. Other implementation **action items**, in addition to those noted in preceding paragraphs, are included in the SOT action list in *Annex XVII*.

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I/7. Panel summaries and issues

I/7.1 The meeting recognized that, as the panel sessions had taken place in plenary, and all participants had thus had the opportunity to take part in all of these, there was no need at this particular session for formal panel summaries. At the same time, a number of ad hoc sessional groups had been established, to consider specific issues. These were:

(i) Sessional group on metadata for WMO-No. 47. The report of this group is in *Annex XI.* (see para III/4.2.5) The group was requested to continue its work and prepare a formal proposal on revisions to ship metadata fields in various publications, for consideration by the ETMC in mid-2004. (**Action**: Group members)

(ii) Sessional group on SOOPIP action items. The list of action items and results is in *Annex XII* (see para IV/1.4.1)

(iii) Sessional group on JCOMMOPS. The report of the group is in *Annex VII*. The SOT chair and the JCOMMOPS coordinator were requested to use the report of this group as the basis for preparing a submission on JCOMMOPS development for consideration by the Observations Coordination Group at its second session in 2004. (**Action**: SOT chair and JCOMMOPS coordinator) (see paragraphs I/4.3.8 and III/7.1.4)

(iv) Task Team on VOS Recruitment and Programme Promotion. This team, established at SOT-I, met several times during the session. The recommendations of the team are recorded under agenda item I/4.1.

I/7.2 Under this agenda item, the meeting also addressed a number of other issues:

(i) Gordon Mackie, chair of the PMO workshop which had taken place in IMO the previous week (23-25 July 2003), presented a brief report on the outcomes of the workshop, which is in *Annex XVI*. The meeting expressed its appreciation for the success of the workshop, and supported its request that a similar, third ,international PMO workshop should be organized within a 3-4 year time frame. (**Action**: Secretariat) The meeting strongly reiterated its view that the national PMOs were absolutely essential to the present and future maintenance of ship-based observing systems, and expressed serious concern at the gradual degradation of PMO networks in a number of countries. It requested that this concern should be brought to the attention of the WMO Executive Council. (**Action**: Secretariat and JCOMM co-president);

(ii) The chair introduced the SOT national report template, which had been used as the basis for the national reports to the present session, covering the calendar year 2002. It agreed in general on the usefulness of the report, and made a number of suggestions for modifications, including a short, half-page summary in each national report. The chair agreed to undertake the necessary redesign, before the template was reissued in late 2003, with requests for the 2003 national reports, to be completed and returned by April 2004. (**Action**: Chair and Secretariat);

(iii) The meeting agreed that the SOT should eventually have a full SOT Annual Report, using information in the national reports as basic input data. The SOT and panel chairs were requested to prepare a design for such an annual report, for consideration by SOT-III. (**Action**: SOT and panel chairs);

(iv) The meeting agreed that it should prepare input relating to overall SOT data management procedures and facilities, for consideration by the JCOMM Data Management Coordination Group. The SOT chair was requested to coordinate this, in consultation with the panel chairs and the VOSClim Project Leader. (**Action**: SOT and panel chairs, VOSClim Project Leader)

I/8. Overarching implementation plan

I/8.1 SOT-I agreed that the SOT chair would prepare an overarching strategy and implementation plan for the SOT. Work on the preparation of such a document has been suspended pending the finalization of an overall JCOMM strategy, as well as one for the whole observations programme area. At the same time, the meeting agreed that there was an immediate requirement for a short descriptive document on the SOT, giving its objectives, structure, status and working procedures. The SOT chair and secretariat were requested to prepare such a document, in consultation with the Panel chairs, which might also eventually serve as the basis for an SOT brochure. (**Action**: SOT chair, Secretariat and panel chairs)

I/9. Review of the terms of reference of the SOT

I/9.1 The meeting recalled that it had reviewed and modified its terms of reference, as well as those of its component teams, at SOT-I. These revised TORs had subsequently been endorsed by OCG-I and approved by the MAN-II, on behalf of JCOMM. The meeting agreed that there were no requirements for further revisions to its TORs at the present time, but that it should keep them under review at future sessions. (**Action**: Chair and Secretariat)

I/10. National reports

I/10.1 The meeting was presented with national reports from Argentina, Australia, Canada, China, France, Germany, Iceland, India, Japan, Kenya, New Zealand, United Kingdom and USA. Those reports, together with other written national reports received by the Secretariat, will be published separately in electronic form as a JCOMM Technical Report. (**Action**: Secretariat and participants)

I/11. Next session of the SOT

I/11.1 The meeting agreed that the SOT, including its component panels, required at least biennial meetings, to ensure ongoing programme coordination and implementation, as well as to address new requirements and technical developments in a timely manner. At the same time, it recalled and reiterated its agreement at SOT-I, that the team and its panels should be largely self-funding.

I/11.2 The meeting agreed that SOT-III should be convened, if possible, during the first half of 2005 (March-April time frame), prior to JCOMM-II. It requested the chair and Secretariat to finalize the exact dates and venue as soon as possible. (**Action**: Chair and Secretariat)

I/12. Review of SOT-II session report, action items, and recommendations

I/12.1 The meeting reviewed, revised and adopted the final report of the session, including action items and recommendations.

I/13. Closure

I/13.1 In closing the meeting, the chairman, Graeme Ball, offered his sincere thanks once more, on behalf of all participants, to IMO, and to Gordon Mackie, for organizing and hosting the meeting and for providing such excellent support. He also thanked all participants for their input to what had been a complex, but ultimately very productive and rewarding meeting. He recognized that the concept of an integrated Ship Observations Team had been successfully established, and he looked forward to the third session of the team in 2005, by which time many of the actions reviewed or initiated at the present meeting would be coming to fruition. He concluded by also thanking the Secretariat for its ongoing support for the work of the team.

I/13.2 The second meeting of the JCOMM Ship Observations Team, including sessions of the component VOS, SOOP and ASAP Panels, was closed at 1630 hours on Friday, 1 August 2003.

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Annex I

List of Participants

ARGENTINA

Mr Mario Jorge García
Jefe del Dto. Redes
Servicio Meteorologico Nacional
25 de Mayo 658 (C1002ABN)
BUENOS AIRES
Argentina
Telephone: +54-11 4514 1525
Telefax: +54-11 5167 6709
E-mail: garcia@meteofa.mil.ar

AUSTRALIA

Mr Graeme Ball
Chairman, JCOMM Ship Observations Team
Manager, Marine Operations Group
Commonwealth Bureau of Meteorology
GPO Box 1289K
MELBOURNE, Vic. 3001
Australia
Telephone: +61-3 9669 4203
Telefax: +61-3 9669 4168
E-mail: g.ball@bom.gov.au

Mr David K. Evans
Manager, Observations Operations
Commonwealth Bureau of Meteorology
GPO Box 1289K
MELBOURNE, Vic. 3001
Australia
Telephone: +61-3 9669 4205
Telefax: +61-3 9669 4168
E-mail: d.evans@bom.gov.au

Mr Alex Papij
Manager
Marine Instrumentation Group
CSIRO Marine Research
GPO Box 1538
HOBART, TAS 7001
Australia
Telephone: +61-3 6232 5230
Telefax: +61-3 6232 5229
E-mail: Alex.Papij@csiro.au

BRAZIL

Cmdr Antonio Claudio Magalhães Vieira
Brazilian Navy
OIC Environmental Predictions Division
Brazilian Marine Meteorological Service
R. Barao de Jaceguai, S/N
Ponta da Armacao - Niteroi
Brazil 24.048-900
Telephone: +55-21 2613 8027, 8857 7535
Telefax: +55-21 2620 8861
E-mail: claudio@smm.mil.br

CANADA

Mr Yves Durocher
National Manager
Surface Weather, Climate and Marine Networks
Meteorological Service of Canada
4905 Dufferin Street
TORONTO, Ontario
Canada M3H 5T4
Telephone: +1-416 739 5957
Telefax: +1-416 739 4261
E-mail: yves.durocher@ec.gc.ca

Mr Ronald Fordyce
Port Meteorological Office
Meteorological Service of Canada
Ontario Region
100 East Port Blvd
HAMILTON, ON L8H 7S4
Canada
Telephone: +1-905 312 0900
Telefax: +1-905 312 0730
E-mail: ron.fordyce@ec.gc.ca

Mr J.R. Keeley
Co-chairman, Argo Data Management Team
MEDS, Department of Fisheries and Oceans
W082, 12th floor, 200 Kent Street
OTTAWA, ON K1A 0E6
Canada
Telephone: +1-613 990 0246
Telefax: +1-613 993 4658
E-mail: keeley@meds-sdmm.dfo-mpo.gc.ca

Dr Savithri (Savi) Narayanan
Co-president, JCOMM
Marine Environmental Data Service
Dept. of Fisheries and Oceans
W082, 12th floor
200 Kent Street
OTTAWA, ON K1A 0E6
Canada
Telephone: +1-613 990 0265
Telefax: +1-613 993 4658
E-mail: narayanans@dfo-mpo.gc.ca

CHINA

Dr Gong Jiandong
NMC/CMA
Zhongguancun South Road #46
BEIJING 100081
China
Telephone: +86-10 6840 7470
Telefax: +86-10 6217 4797
E-mail: gongjd@cma.gov.cn

Mr Xu Liuzhi
State Oceanic Administration
1 Fuxingmenwai Street
BEIJING 100860
China
Telephone: +86-10 6804 7673
Telefax: +86-10 6804 7644
E-mail: yuzw@nmefc.gov.cn

Professor Yu Zhouwen
National Marine Environment Forecasting Center, SOA
8 Dahuisi Road, Haidian District
BEIJING 100081
China
Telephone: +86-10 6217 3564
Telefax: +86-10 6217 3620
E-mail: yuzw@nmefc.gov.cn
yuzw@sun.ihep.ac.cn

ECUADOR

Mr Carlos Viteri Manzo
Instituto Oceanografico
Av. 25 de Julio-Base Naval Sur
GUAYAQUIL
Ecuador
Telephone: +593-4 2481 300, 2481 105
Telefax: +593-4 2485 166
E-mail: cdmbac@inocar.mil.ec
meteorologia@inocar.mil.ec
cviteri1969@hotmail.com

FRANCE

Mr Pierre Blouch
EUCOS Surface Marine Programme Manager
Météo-France
Centre de météorologie marine/Brest
13, rue du Chatellier
BP 90411
29604 BREST Cédex
France
Telephone: +33-2 98 22 18 52
Telefax: +33-2 98 22 18 49
E-mail: pierre.blouch@meteo.fr

Mr Denis Diverres
Institut de recherche pour le développement (IRD)
BP 70
29280 PLOUZANE
France
Telephone: +33-2 98 22 46 55
Telefax: +33-2 98 22 45 14
E-mail: Denis.Diverres@ird.fr

Mr Jean-Louis Gaumet
Chairman, ASAP Panel
Météo France
DSO/DOA/D
7, rue Teisserenc de Bort
B.P. 202
78195 TRAPPES
France
Telephone: +33-1 30 13 64 70
Telefax: +33-1 30 13 60 68
E-mail: jean-louis.gaumet@meteo.fr

GERMANY

Mr Peter Koenig
Bundesamt für Seeschiffahrt und Hydrographie
(BSH)
Federal Maritime and Hydrographic Agency
Bernhard-Nocht-Strasse 78
D-20359 HAMBURG
Germany
Telephone: +49-40 3190 3212
Telefax: +49-40 3190 5000
E-mail: peter.koenig@bsh.de

Dr Volker Wagner
Deutscher Wetterdienst
Klima and Umwelt, FE26
Bernhard-Nocht-Strasse 76
D-20359 HAMBURG
Germany
Telephone: +49-40 6690 1430
Telefax: +49-40 6690 1499
E-mail: volker.wagner@dwd.de

ICELAND

Mr Hreinn Hjartarson
Icelandic Meteorological Office
Bustadavegur 9
150 REYKJAVIK
Iceland
Telephone: +354 522 6000

Telefax: +354 522 6001
E-mail: hreinn@vedur.is

INDIA

Dr V.V. Gopalakrishna
Indian XBT Program
Physical Oceanography Division
National Institute of Oceanography
Dona-Paula
GOA-403 004
India
Telephone: +91-832 2456700
Telefax: +91-832 2456702 / 2456703
E-mail: gopal@csnio.ren.nic.in
gopal@darya.nio.org

Mr S.K. Prasad
Director
India Meteorological Department
Shivaji Nagar
PUNE - 411005
India
Telephone: +91-20 5535 211/ 5532 875
Telefax: +91-20 5533 201
E-mail: s_k_prasad50@rediff.com
imdpune@pn3.vsnl.net.in

JAPAN

Mr Jun'ichi Hirosawa
Senior Scientific Officer
Marine Division
Climate and Marine Department, JMA
1-3-4 Otemachi, Chiyoda-ku
TOKYO 100-8122
Japan
Telephone: +81-3 3211 6909
Telefax: +81-3 3211 6908
E-mail: VOS@climar.kishou.go.jp

KENYA

Mr Ali Juma Mafimbo
Port Meteorological Office
Meteorological Department
P.O. Box 98512
MOMBASA
Kenya
Telephone: +254-41 225687 / 433689
Telefax: +254-41 433689
E-mail: mafimbo@lion.meteo.go.ke

NEW ZEALAND

Ms Julie Fletcher
Manager, Marine Observations
Meteorological Service of New Zealand Ltd
P.O. Box 722
WELLINGTON
New Zealand
Telephone: +64-4 4700 789
Telefax: +64-4 4700 772
E-mail: fletcher@metservice.com

RUSSIAN FEDERATION

Mr Ravil S. Fakhrutdinov
National Coordinator
VOS Scheme of the Russian Federation
Roshydromet
12, Novovagan'kovsky Street
MOSCOW 123995
Russian Federation
Telephone: +7-095 255 23 88
Telefax: +7-095 255 20 90
E-mail: marine@mcc.mecom.ru
fakhrutdinov@rhmc.mecom.ru

SAUDI ARABIA

Mr Ashraf A. Abulhamail
Kingdom of Saudi Arabia
P.O. Box 1358
JEDDAH 21431
Saudi Arabia
Telephone: +9662 6512312

SOUTH AFRICA

Mr C. Sydney Marais
Port Meteorological Officer
Cape Town Regional Weather Office
P.O. Box 21
Cape Town International Airport
CAPE TOWN 7525
South Africa
Telephone: +27-21 934 0836
Telefax: +27-21 934 3296
E-mail: maritime@weathersa.co.za

UNITED KINGDOM

Mr James Crease
9 West Street
Chipping Norton
OXON 0X7 5LH
United Kingdom
Telephone: +44-1608 642 335
E-mail: jim@udel.edu

Mr Garry Dawson
Data Manager
Maritime Environment Information Centre (MEIC)
UK Hydrographic Office
TAUNTON, Somerset TA1 2DN
United Kingdom
Telephone: +44-1823 337900 ext. 3225
Telefax: +44-1823 284077
E-mail: garry.dawson@ukho.gov.uk

Mr Gareth Dow
Observation Monitoring
Met Office
London Road
BRACKNELL, Berkshire RG12 2SZ
United Kingdom
Telephone: +44-1344 856 243
E-mail: gareth.dow@metoffice.com

Captain Harry Gale
Port Meteorological Office
The Meteorological Office
Trident House
21 Berth, Tilbury Dock
TILBURY, Essex RM18 7HL
United Kingdom
Telephone: +44-1375 859 970
Telefax: +44-13725 859 972
E-mail: harry.gale@metoffice.com

Dr Elizabeth C. Kent
James Rennell Division (254/31)
Southampton Oceanography Centre
European Way
SOUTHAMPTON SO14 3ZH
United Kingdom
Telephone: +44-23 8059 6409
Telefax: +44-23 8059 6400
E-mail: eck@soc.soton.ac.uk

Ms Sarah C. North
Project Leader, VOSClim
Nautical Officer
Met Office
Observations Supply - Marine Networks
Beaufort Park
Easthampstead
WOKINGHAM, Berkshire RG40 3DN
United Kingdom
Telephone: +44-1344 855 617
Telefax: +44-1344 855 873
E-mail: sarah.north@metoffice.com

Captain Edward J. O'Sullivan
Manager UK VOS/ASAP Programme
MET OS4 (Marine Obs)
Beaufort Park, Easthampstead
WOKIN£GHAM RG40 3DN
United Kingdom
Telephone: +44-1344 855 723
Telefax: +44-1344 855 873
E-mail: edward.osullivan@metoffice.com

Dr Ute Schuster
CAVASSOO Project Manager
School of Environmental Sciences
University of East Anglia
NORWICH NR2 3EZ
United Kingdom
Telephone: +44-1603 593 763
E-mail: U.Schuster@uea.ac.uk

Dr Claire Smith
Deputy WMO Manager
Met Office
London Road
BRACKNELL, Berkshire RG12 2SZ
United Kingdom
Telephone: +44-1344 854 476
E-mail: claire.smith@metoffice.com

Mr Jon Turton
Ocean Applications
Met Office
London Road
BRACKNELL
Berkshire RG12 2SZ
United Kingdom
Telephone: +44-1344 856 478
Telefax: +44-1344 854 499
E-mail: jon.turton@metoffice.com

Mr Paul Whiteley
Data Buoy Coordinator
UK Met Office
Marine Networks
Beaufort Park
Easthampstead
WOKINGHAM RG40 3DN
United Kingdom
Telephone: +44-1344 855 872
E-mail: paul.whiteley@metoffice.com

USA

Mr Steven K. Cook
Chairman, JCOMM SOOP Implementation Panel
NOAA/OAR/AOML
GOOS Center

8604 La Jolla Shores Drive
LA JOLLA, CA 92037
USA
Telephone: +1-858 546 7103
Telefax: +1-858 546 7185
E-mail: Steven.Cook@noaa.gov

Ms Elizabeth Horton
Naval Oceanographic Office
Aircraft Operations, NS3
1002 Balch Boulevard
STENNIS SPACE CENTER, MS 39522-5001
USA
Telephone: +1-228 688 5725
Telefax: +1-228 688 5514
E-mail: hortone@navo.navy.mil

Mr Michael Johnson
Coordinator, JCOMM Observations PA
Chairman, JCOMM Observations Coord. Group
NOAA Office of Global Programs
1100 Wayne Avenue, Suite 1210
SILVER SPRING, MD 20910
USA
Telephone: +1-301 427 2089 ext. 169
Telefax: +1-301 427 2073
E-mail: mike.johnson@noaa.gov

Mr Warren H. Keenan
NOAA Office of Global Programmes
1100 Wayne Avenue, Suite 1210
SILVER SPRING, MD 20910
USA
Telephone: +1-301 427 2089 ext. 155
Telefax: +1-301 427 2073
E-mail: warren.keenan@noaa.gov

Mr David McShane
VOS Technical Leader
National Weather Service/NOAA
National Data Buoy Center
Building 1100, RM 353A
STENNIS SPACE CENTER, MS 39529-6000
USA
Telephone: +1-228 688 1768
Telefax: +1-228 688 3153
E-mail: david.mcshane@noaa.gov

ORGANIZATIONS

ECMWF

Mr Antonio Garcia-Mendez
European Centre for Medium-Range Weather Forecasts
Shinfield Park
READING, Berkshire RG2 9AX
United Kingdom
Telephone: +44-118 949 9000
Telefax: +44-118 986 9450
E-mail: a.garcia@ecmwf.int

EUMETSAT

Mr Sean Burns
System Operations Manager
EUMETSAT
Postfach 10 05 55
D-64295 DARMSTADT
Germany
Telephone: +49-6151 807 571
Telefax: +49-6151 807 304
E-mail: burns@eumetsat.de

IMSO

Mr Andrew C. Fuller
International Mobile Satellite Organization (IMSO)
99 City Road
LONDON EC1Y 1AX
United Kingdom
Telephone: +44-20 7728 1378
Telefax: +44-20 7728 1172
E-mail: andy_fuller@imso.org

PROGRAMMES/PROJECTS

E-ASAP

Dr Klaus Hedegaard
E-ASAP Programme Manager
Deutscher Wetterdienst
Bernard-Nocht-Str. 76
D-20359 HAMBURG
Germany
Telephone: +49-40 3190 8550
Telefax: +49-40 6690 1496
E-mail: Klaus.Hedegaard@dwd.de

OOPC

Dr D.E. Harrison
Chairman, GCOS/GOOS/WCRP Ocean Observations Panel for Climate
Pacific Marine Environmental Laboratory
NOAA/PMEL/OCRD
7600 Sand Point Way, NE
SEATTLE, WA 98115
USA
Telephone: +1-206 526 6225
Telefax: +1-206 526 6744
E-mail: D.E.Harrison@noaa.gov

SEAKEEPERS SOCIETY

Dr Edward Kearns
SeaKeepers
University of Miami, RSMAS
4600 Rickenbacker Cswy.
MIAMI, FL 33149
USA
Telephone: +1-305 361 4837
Telefax: +1-305 361 4622
E-mail: ekearns@rsmas.miami.edu

Dr Rod G. Zika
International SeaKeepers Society
University of Miami, RSMAS
4600 Rickenbacker Cswy.
MIAMI, FL 33149
USA
Telephone: +1-305 361 4715
Telefax: +1-305 361 4894
E-mail: rzika@rsmas.miami.edu

WRAP PROJECT

Captain Gordon Mackie
WRAP Project Leader
30 Keephatch Road
WOKINGHAM
Berkshire RG40 1QJ
United Kingdom
Telephone: +41-1189 783 687
Mobile: +41-7770 933 046
Telefax: +41-1189 890 379
E-mail: gvmackie@aol.com

COMPANIES

INMARSAT

Mr Vladimir Maksimov
INMARSAT
Maritime Safety Services
99 City Road
LONDON EC14 1AX
United Kingdom
Telephone: +44-2077 281 095
Telefax: +44-2077 281 752
E-mail: vladimir_maksimov@inmarsat.com

TSKA, INC.

Mr Greg Ferguson
TSKA, Inc.
46208 SE 139th Place
NORTH BEND, WA 98045
USA
Telephone: +1-425 888 3404
Telefax: +1-425 888 3895
E-mail: ghf@centurytel.net

TSURUMI SEIKI CO., LTD.

Mr Hiroshi Iwamiya
President
Tsurumi-Seiki Co. Ltd.
2-20, 2-Chome, Tsurumi-Chuo
Tsurumi-Ku
YOKOHAMA 230-0051
Japan
Telephone: +81-45 521 5252
Telefax: +81-45 521 1717
E-mail: trade@tsk-jp.com

VAISALA OYI

Mr Ari Meskanen
Vaisala Soundings
Vaisala Oyi
P.O. Box 26
FIN-00421 HELSINKI
Finland
Telephone: +358-9 8949 2473
E-mail: ari.meskanen@vaisala.com

SECRETARIAT

Mr Etienne Charpentier
Technical Coordinator, DBCP and SOOP
JCOMMOPS
c/o CLS/Service Argos
8-10 rue Hermes
Parc Technologique du Canal
31526 RAMONVILLE SAINT-AGNE
France
Telephone: +33-5 61 39 47 82
Telefax: +33-5 61 75 10 14
E-mail: charpentier@jcommops.org

Dr Peter E. Dexter
Ocean Affairs Division
World Weather Watch-Applications Department
World Meteorological Organization
7 bis, Avenue de la Paix
Case postale No 2300
CH-1211 GENEVE 2
Switzerland
Telephone: +41-22 730 82 37
Telefax: +41-22 730 80 21
E-mail: pdexter@wmo.int

Ms Boram Lee
GOOS Project Office
Intergovernmental Oceanographic
Commission
UNESCO
1, rue Miollis
75732 PARIS Cédex 15
France
Telephone: +33-1 45 68 39 88
Telefax: +33-1 45 68 58 12
E-mail: b.lee@unesco.org

Ms Teruko Manabe
Ocean Affairs Division
World Weather Watch-Applications
Department
World Meteorological Organization
7 bis, Avenue de la Paix
Case postale No 2300
CH-1211 GENEVE 2
Switzerland
Telephone: +41-22 730 84 49
Telefax: +41-22 730 80 21
E-mail: tmanabe@wmo.int

Annex II

Agenda

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I. Common session

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Organization of the session

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

2. Reports of the chairmen and the Secretariat

2.1 Report of the Secretariat
2.2 Report of the Observations Programme Area Coordinator
2.3 Report of the SOT chair

3. Reports on associated programmes and requirements for ship-based observation

4. Support infrastructure

4.1 Ship recruitment and servicing
4.2 Telecommunication Facilities and Procedures
    4.2.1 Telecommunication facilities
    4.2.2 Satellite communication systems costs
4.3 JCOMM in situ Observing Platform Support Centre

5. Operational Standards

6. Discussion of issues for the SOT panels to consider

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II. Scientific and Technical Workshop

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III. VOSP, Third Session

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IV. SOOPIP, Fifth Session

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V. ASAPP, Fourteenth Session

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I. Common session (continued)

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7. Panel summaries and issues

8. Overarching implementation plan

9. Review of TOR

10. National reports

11. Next session of the SOT

12. Review of SOT-II session report, action items, and recommendations

13. Closure

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II. Scientific and Technical Workshop

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1. Reports by members of the team: Instrumentation and observational practices
2. Reports by manufacturers: Observational equipment and telecommunication facilities
3. Evaluation
4. Scientific and operational applications of the data

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III. VOSP, Third Session

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1. Programme Review

1.1 Report of the chairman of the VOS panel including the review of action items
1.2 Monitoring report

2. Project review

2.1 Review of the VOSClim project
2.2 VOS coordination activities under EUCOS

3. Automation and software

4. Data Management

4.1 Review of MCSS including codes and formats
4.2 Metadata

5. Information exchange

5.1 Web site
5.2 Publications

6. Organizational Matters

6.1 TOR of VOSP

7. Future Work Programme and Implementation Issues

7.1 SOT coordination and integration issues
7.2 Action items

IV. SOOPIP, Fifth Session

1. Programme Review

1.1 Report by the SOOPIP chairman
1.2 Report by SOOP Coordinator
1.3 Monitoring report
1.4 SOOPIP-III Action items review

2. Implementation

3. Instrumentation and procedure evaluations

3.1 SOOP instrumentation and procedure evaluations
3.2 Proposal from the Ocean Carbon Pilot Project

4. Data Management

4.1 GTSPP overview and future direction
4.2 Real-time data exchange
4.3 Delayed mode data exchange
4.4 Quality control
4.5 Other measurement types

5. Organizational Matters

5.1 TOR of SOOPIP and Membership
5.2 SOOP Coordinator
5.3 Trust Fund

6. Information exchange

7. Future Work Programme

7.1 SOT coordination and integration issues
7.2 Action items

V. ASAPP, Fourteenth Session

1. Programme review

1.1 Report of the chairman of ASAP Panel including the review of action items
1.2 Report of EUMETSAT
1.3 Monitoring report
    1.3.1 Report of ECMWF
    1.3.2 Report of ASAP monitoring centre

2. Project review

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

3. Coordination of implementation

4. Organizational Matters

4.1 TOR of ASAPP and Membership
4.2 ASAP Trust Fund

5. Information exchange

5.1 Web site
5.2 Publications including ASAP annual report
5.3 Future data management

6 Future work programme

6.1 SOT coordination and integration issues
6.2 Action items

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Annex III

Intersessional Task Teams or Expert Groups Established by SOT-II

Task Team on VOS Recruitment and Programme Promotion (para I/4.1.2)

Tasks

- For the purpose of further encouragement of ship recruitment, address all the relevant issues based on recommendations (see para I/4.1.1) given by the same Task Team established by SOT-I and discussion at the VOSP-III (see para III/5.2.3and III/5.2.4).

    1. Develop a single page, preferably single paragraph, international “flyer” to simulate interest in observing ships under the coordination of SOT Chair.

    2. Present the power point presentation "The Partnership between the Maritime Industry, Marine Forecasting and Science" to major maritime shipping companies and ship owners associations under the coordination of the SOT chair, and report results to the SOT Chair.

    3. Develop “generic” pre-installation design standards that will eventually be available to ship builders and classification societies. The idea is to provide a future “pool” of potential VOS with a view of reducing the expenditure of resources for installations.

    4. Design an appropriate JCOMM/SOT Certificate of Appreciation for participating ships and others as appropriate, and develop criteria for issuing.

    5. Consider the potential for developing an international newsletter for observers on VOS, SOOP and ASAP vessels and make appropriate draft proposals for consideration at SOT III. The proposals should address the content, style, distribution and presentation format for such a newsletter, and the potential readership. Consideration should also be given to including the recently developed VOSClim Newsletter within the scope of the newsletter.

    6. Consider establishing communication mechanisms among VOS focal points and/or PMOs. A possible way would be to develop a VOS/PMO forum similar to the DBCP forum. This issue should be coordinated with the JCOMMOPS development plan.

Working procedure
- Work by email.
- Make the proposals available within six months for consideration by the chairs of the SOT and the three panels.
- If there was general agreement, then a decision could be made on those aspects for immediate action, and those which should be referred to SOT-III for further consideration.

Members
Steve Cook (convenor, USA)
Graeme Ball (Australia)
Dave Evans (Australia)
Pierre Blouch (France)
Julie Fletcher (New Zealand)
Gordon Mackie (U.K.)
Sarah North (U.K.)

Task Team on Satellite Communications System Costs (para I/4.2.2.4)

Task
- Based on the report of the task team to SOT-II, prepare a draft document for the WMO Executive Council on the issues and recommendations relating to satellite communications costs and the use of code 41, for review by JCOMM MAN-III and presentation to EC-LV by the co-president of JCOMM.

- Further consider, and collect information relating to, the cost disparities associated with the transmission of observations using Code 41 procedures to support the submission to the WMO Executive Council.

Members:
Sarah North (chair, U.K.)
Pierre Blouch (France)
A representative of KNMI (Netherlands)
David McShane (USA)
Andy Fuller (IMSO)
A representative of the WMO Secretariat

Expert Group on Instrument Testing (I/5.4)

Tasks

- 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,
- Prepare a JCOMM Technical Report containing this information, to be made widely available through relevant web sites (JCOMM, JCOMMOPS, VOS, DBCP, SOOP, SOT),
- Provide guidance for testing and intercalibration of other systems, designed to measure specific marine meteorological or oceanographic elements, to be undertaken by the Panels,
- Liaise closely with WMO/CIMO, both in the compilation of the information and also in assessing what additional work in this area might be required under JCOMM,
- 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.

Members:

Dave Evans (chair, Australia)
Steve Cook (chair of SOOPIP)
Julie Fletcher (chair of VOSP)
Jean-Louis Gaumet (chair of ASAPP)
Graeme Ball (chair of SOT)

Liaison members

Beth Horton (DBCP)
Phil Woodworth (GLOSS)
Ed Harrison (OOPC)
Tom Malone (COOP)
Peter Pissierssens (IODE)

Task Team on Metadata for WMO-No.47 (para III/4.2.5)

- Based on the report by the sessional group on Metadata for WMO -No.47 (see Annex XI), prepare a proposal to be submitted to the next session of the JCOMM Expert Team on Marine Climatology (tentatively, mid-2004) for its consideration.

Members:
Graeme Ball (chair, Australia)
Ron Fordyce (Canada)
Pierre Blouch (France)
Julie Fletcher (New Zealand)
Elizabeth Kent (United Kingdom)
Sarah North (United Kingdom)
David McShane(USA)

Annex IV

INMARSAT-C Land Earth Stations Accepting Code 41 Messages				
StationName	Country	IDNumber	NMC	AreaFromWhichReportsMayBesAccepted
Atlantic Ocean Region - East (AOR-E)				
Aussaguel	France	121	Toulouse	Atlantic Ocean and Mediterranean Sea
Goonhilly	United Kingdom of Great Britain and Northern Ireland	102	Met Office Bracknell	Atlantic East
Southbury	United States of America	101	Washington, D.C. (WASHDC)	Carribean Sea and Atlantic Ocean area north of Equator and west of 35°W. Also south of 60°S
Station 12	Netherlands	112	KNMI NL	From the entire Atlantic Ocean satellite region until regional INMARSAT-C CES's are available. Thereafter: from North Atlantic and North Sea.
Thermopylae	Greece	120	Meteo Athens	The Mediterranean Sea and Black Sea
Atlantic Ocean Region - West (AOR-W)				
Goonhilly	United Kingdom of Great Britain and Northern Ireland	002	Met Office Bracknell	Atlantic West
Southbury	United States of America	001	Washington, D.C. (WASHDC)	Carribean Sea and Atlantic Ocean area north of Equator and west of 35°W. Also south of 60°S
Station 12	Netherlands	012	KNMI NL	From the entire Atlantic Ocean satellite region until regional INMARSAT-C CES's are available. Thereafter: from North Atlantic and North Sea.
Indian Ocean Region (IOR)				
Arvi*	India	-	-	
Aussaguel	France	321	Toulouse	Atlantic Ocean and Mediterranean Sea
Jeddah	Saudi Arabia	315	Jeddah	From the Arabian Sea and Indian Ocean north of 10°S and west of 80°E
Perth	Australia	322	Melbourne	South of the Equator between longitudes 60°E and 140°E
Sentosa	Singapore	328	Singapore	WMO Region V between longitudes 80°E and 180°.
Station 12	Netherlands	312	KNMI NL	From the entire Atlantic Ocean satellite region until regional INMARSAT-C CES's are available. Thereafter: from North Atlantic and North Sea.
Thermopylae	Greece	305	Meteo Athens	The Mediterranean Sea and Black Sea

Yamaguchi	Japan	303	Meteo Tokyo	Western Northern Pacific area 100°E to 160°W and equator to 65°N
Pacific Ocean Region (POR)				
Perth	Australia	222	Melbourne	South of the Equator between longitudes 120°E and 120°W
Santa Paula	United States of America	201	Washington, D.C. (WASHDC)	WMO Region IV and that part of the Pacific Ocean east of 160°E and north of 25°S. Also south of 60°S.
Sentosa	Singapore	210	Singapore	WMO Region V between longitudes 80°E and 180°.
Yamaguchi	Japan	203	Meteo Tokyo	Western Northern Pacific area 100°E to 160°W and equator to 65°N

Annex V

Report of the Task Team on Satellite Communication Costs

Background

The cost development for those LES for which information was available to the team (i.e. Burum, Goonhilly, ex Raisting) showed rising cost burdens in recent years and significant differences in volume. The reasons for this included e.g.

- merging and relocation of certain national shipping companies headquarters to a new country and the consequent transmission of their combined fleet telecommunications (including code 41 OBS) through the LES of that country;
- merging of telecommunication companies (e.g. Germ / France Telecom in 2000) resulting in the closure of one LES and the forwarding of its code 41 OBS through another LES;
- regional restrictions introduced by some LESs leading to the routing of telecommunication flows through other LESs which still accept observations, and to a possible reduction in OBS transmissions.

The percentage of OBS of 'not-own' VOS through the allocated LES was approximately: UK 44% non UK VOS (£ 36.093 – ca. 55.600 €), NL 67 % non NL VOS (80.723 €), GR 68 % non GR VOS (2.484 €), DE no information

The risk is that some NWSs will impose restrictions on OBS acceptance through their allocated LESs which will make it more difficult to ensure free OBS flow and possibly lead to data losses.

A solution to this situation seems to lie in providing a better means of sharing the cost burden - as all meteorological services worldwide depend on, or take advantage of, marine meteorological data, (i.e. not only those who operate VOS or accept billing through their LES).

So far the Task Team has primarily addressed Inmarsat-C transmissions. Email transmission is however increasingly being requested by ships, and there are specific solutions already working (DE: Global Wireless service), or under consideration (GR). This may become more simple if e.g. Inmarsat-F (or comparable solutions) become a standard on board, as such services provide a permanent open transmission link. This would also avoid OBS transmissions being delayed.

However, although there are presently models which solve the problem of timeliness, GTS insertion and billing of NMSs with respect to email disseminated observations, this kind of service is not a general standard presently. So there remains concern about timeliness, regular availability, the allocation of bills and the question of keeping shipping companies free of costs.

Starting in 2007 the exchange of OBS data is expected to take place in BUFR codes. To the present knowledge an increase between 25% and 100% of the data volume is envisaged. This depends on the format of the BUFR message. It is clear, however, that the communication costs also will increase accordingly.

This issue may be subject of further consideration by the appropriate JCOMM Expert Teams to see at which end (ship /shore) the transformation into BUFR should be done.

Data Volume

The total OBS volume on GTS seems to be ca. 1.1million observations per year since 1996. This is a rough estimate, but provides a reasonable figure for further considerations.

* million is the volume available at Telecommunication Hub Offenbach / Germany and may differ from figures at other GTS Hubs.
* it may, however, differ from the net VOS – LES transmitted data volume due to re-insertions (duplicates) onto the GTS
* Insertions through the US were not subtracted as they are unknown (Note - AMVER/SEAS messages are sent as compressed binary transmissions, and are not sent via Code 41).
* Temp messages are not included in the figure of 1.1 million

The transmitted volume in terms of bits depends on the length of messages (completeness of OBS or OBS from automated board weather stations).

Transmission costs

Most communications sent using Code 41 (Inmarsat-C) are charged by the number of characters transmitted and are based on the number of units (1 unit = 256 bits).

Depending on the length of the OBS, 3-5 units are normally charged, as can be seen from the bills. An additional unit may be charged when transmission acknowledgements are requested. Although observers are usually requested not to use this service it is thought that some ships officers request acknowledgements for their ISO 9000 quality procedures.

Going strictly with the number of units needed for a complete FM-13 ship OBS (main part only) it ends up at 4 units per OBS and 3 units per message from an automatic (ABWSt) OBS.

To the knowledge of the team, the charge per unit varies between 0,13 and 0,24 Euro depending on the LES provider.

* Basis of this figures are charges from 4 European LES providers

An estimate of the total costs depends on several conditions:
- ratio of full size OBS and ABWSt created (limited size) OBS
- further development of this ratio (eg with the potential increase in automatic systems)
- net code 41 transmission (e.g. excluding the data circulated through other links e.g. SEAS)

taking the following scenario:
- 1.1 mill. OBS transmitted with code 41 via LESs
- ratio of full OBS to ABWSt OBS is 92 : 08
- 4 units used for full OBS, 3 Units used for ABWSt OBS
- charge per unit is at 0,19 Euro

the cost of the code 41 transmission would be at ca. 820.000 Euro per year worldwide (**Table1**) or 1.1 Gbits bits as a transmission volume.

This estimate will however need further refinement to include all NMSs being charged by code 41 transmissions via LESs.

Although this available information on data volume and costs is not complete, it is felt that for the purpose of this task team these tentative figures may be sufficient to act as a discussion basis for proposing alternative scenarios for a more adequate cost sharing scheme.

Three models are presented here for discussion:

Cost sharing scenarios

The improvement of cost sharing is an urgent matter, as there is a danger that overburdened NMSs will seriously consider restricting their LES services, with a consequent negative impact on marine data availability. The task team on satellite communication costs considered 3 alternative scenarios which are presented below. The scenarios were drafted on the assumption, that transmissions will remain free of charge to ships and that the GTS will continue to serve as data dissemination mechanism.

Scenario 1: "continuing the present situation"

The free choice of LESs accepting Code 41 flagged meteorological weather observations from sea. (as listed in WMO LES list of stations)..would continue under this scenario. The costs are borne by the allocated National Meteorological or Hydrological Services on a voluntary basis. They also insert the observations onto the GTS. No costs are incurred by the ship transmitting the observation.

Advantages:
- Ships have the freedom of choosing the LES (Table 1) of their choice
- Very often this will correspond to the shipping company's preferred communication link as switching between company Telecommunication link and Code 41 acceptance link is therefore unnecessary.
- A voluntary cost bearing by allocated Services, without a specific cost sharing scheme, is very simple

Disadvantages
- Costs are borne by only a few services who therefore carry an burden for the provision of basic marine meteorological observing systems
- Developments such changes in LES ownership and the merging of shipping companies, lead to an increasingly unequal cost-bearing scheme
- NMSs concerned, may take cost-reduction measures, such as accepting observations only from regions within limited areas, or may even refuse observations from ships other than from specified country.
- An increasing risk of data losses, as well demotivation of voluntary observers and a resulting decrease of observations on the GTS
- The system does not engender competition between individual Inmarsat suppliers, and it is difficult to draw any clear comparisons between their different charging regimes.

Discussion:

This present system has been working rather well – although at the very beginning of this system there was some discussion on a cost share issue because of the unequal global coverage of Code 41 accepting LESs. In the last 2-3 years this problem has become serious once again although triggered by slightly different reasons than previously. The aspects under "Disadvantages" highlight the need to consider new solutions.

Scenario 2: "every CM pays for its own VOS OBS-transmissions"

This would require a strategy to charge only those Services who create the costs. This is, for example, already the case for land stations where each service controls its own measuring networks and controls the costs. The bill allocation would need to be determined on the basis of ship identification. Ships would continue to remain free of costs.

Advantages:

- Principle of "*cost creating and bearing*": every one pays for the observations created by their own VOS
- Costs can be accurately calculated and managed by controlling the number of national VOS

Disadvantages:

- Countries may decide to reduce their fleets because of direct demonstrable cost-reductions.
- A potential negative impact on number of observations available from the oceans
- Unfavorable impact on the motivation of observers (normally they are requested to create as many observations as possible)
- An accounting system must be set up which is able to allocate each transmitted message to the country or service which recruited the ship concerned.
- An extra administration layer would need to be introduced at the LESs, as well as on the ships
- Additional instructions would be needed for observers
- LES's software would have to be exchanged by more complex software together with a worldwide tuning for uniformity.
- The system does not engender competition between individual Inmarsat suppliers, and is difficult to draw any clear comparisons between their different charging regimes.

Discussion:

This scenario provides several problems. The most troublesome being:

1. It is not clear how the costs could be attributed to the individual VOS operators, unless perhaps changes to the special access code 41 system were to be introduced so that a special access code could be applied to each operator for accounting purposes (e.g. code 41A for recruiting country No 1, 41B for the next country etc.). This would however introduce extra layers of administration and require additional training for observers
2. The operational need for as much data as possible from the world's oceans may be increasingly overruled by national budget constraints. This approach could therefore act as a disincentive for NMSs to maintain their fleets at the present size (and could therefore impact on the total observations received)

As the implications of this scenario do not seem to provide convincing basic improvements to the system, this approach is not recommended.

Scenario 3 "globally shared accounting"

The basic idea of this scenario is to develop a globally shared accounting whereby all users of maritime data pay the costs through a centrally administered WMO fund.
As the oceans cover more than 2/3 of the earth's surface almost all countries take advantage of marine meteorological data in running numerical models, providing forecasts and warnings, climatological products, marine services, etc. It is only fair therefore that each WMO member should contribute to a costs sharing scheme for data acquisition from these areas - not just those having a VOS fleet . Ships would continue to remain free of costs.

Two possible global scenarios are proposed;-

Scenario 3a - "totally independent of provider, or transmission technologies"

This concept involves a very simple and open system which avoids any unnecessary restrictions being imposed on ships, companies or providers **(Fig 1).**
The only new component of the system would be to introduce a VOS Transmission Costs Common Fund, shared by (ideally all) WMO members and administrated by WMO or a Responsible Member. All providers having transmitted OBS, could charge this common fund when presenting their bills.

Ships could send their OBS via any LES, email link or any other [Inmarsat] transmission facility of their choice, to a linked National Service or Agency for subsequent insertion into GTS. There are no costs to the acting parties so far, as. the acting provider would bill the common fund.

This system is totally independent of any changes in the commercial telecommunication provider world (e.g. fusions or bankruptcies) and it is completely independent of transmission technologies, (i.e. whatever system is installed on board an individual ship could be used).

The administration effort (e.g. checking the bills) is however greater with such a centralized solution than under the present procedures, where administration is handled by each individual NMSs. Summarizing the Pros and Cons:

Advantages:

- A fairer system of sharing the cost burden (all user of marine data would pay, not just those who are allocated to a specific LES, or who volunteered to maintain a VOS fleet)
- Every LES could remain available for code 41 messages
- All telecommunication/LES-providers would have just one focal point to send their bills to
- The possibility of including other transmission methods, e.g. email
- The solution is independent from any specific data link or Telecommunication provider
- It allows the possibility of further subsystems
- The risk of data loss could be reduced due to there being a more flexible choice of transmission links
- National tendencies to reduce the size of VOS fleets for cost aspects should be avoided, as a large world-wide account is more flexible to variations in the VOS fleet
- no need for periodic new tariff negotiations

Disadvantages:

- The administration for checking bills and providing feedback to ships whose transmissions are in error is great, and is focused at one location.
- Greater administrative effort would be needed to ensure funds are collected from each WMO member on time
- It would be difficult to negotiate beneficial discounts with the providers.

Discussion:

The advantage of this scenario lies in its flexibility and independence of any changes in the commercial provider world or any changes in technology. The necessary amendments to the present system would be minimal, and data streams are totally unrestricted.

The necessary centralized administrative facilities could also be borne from the VOS Transmission Costs Common Fund - and means for simplifying of procedures can be envisaged (e.g. accepting D91 format bills as a standard). This system would also be flexible enough to allow for the subsequent addition of additional systems, should they wish to join, e.g. the US SEAS system, or any arising future subsystem e.g. EUCOS.

The principal disadvantage of this scenario is that it fails to provide competition between providers and the consequent ability to negotiate special rates– although it is assumed that, for convenience, ships would transmit their OBS via the providers favored by their company (possibly at favourable rates). The creation of only one account for these transmission services would also make it simpler for any telecommunication provider to charge for their service. An individual accounting system according to message origin (ship, recruiting Service, etc.) as in scenario 2 would be avoided (despite the fact that many providers do not deliver this service at present). This system would be independent of any changes in LES ownership, and would not be affected by the changing strategies of telecommunication providers. It would also be totally independent from any technical transmission limitations or format changes, and would be open to the provision of new services, e.g. email links , etc.,

Scenario 3b: -"single provider solution"

This variant (**Fig 2)** also proposes a VOS Common Fund. The difference is that there would be only one provider to guarantee and manage the OBS transmissions worldwide and to make charges upon the common fund.

Advantages:

- A fairer share of the cost burden (all user of marine data would pay - not only those who are allocated to a specific LES, or who have opted to maintain a VOS fleet)
- The telecommunications provider has a single contact point for accounting
- National tendencies for restricting the number of VOS for cost considerations should be reduced as a single world-wide account would be more flexible to variations in the VOS fleet
- Special rates may be negotiatiable.

Disadvantagess;

- The LES's accepting OBS, would be restricted to those of the service provider
- Technical advances (e.g. Inmarsat services, email,etc.,) would be restricted by the capabilities of the chosen service provider
- Serious problems could arise should the service provider go our of business, for whatever reason
- There would be a need to periodically enter new negotiations and renegotiate contracts each time the provider changes
- Any changes to the service provider would affect the whole VOS fleet. For example, new LES-NMS links would need to be set up, which may necessitate a transition period possibly resulting in a consequent disruption to the data flow)
- The administration needed to check bills and to provide feedback (via the NMSs)to those ships whose transmissions may be in error is likely to be great and would be centralized at one location.
- Administrative effort would be needed to ensure that funds are collected from each WMO member on time.

Discussion:

The most obvious advantages of this solution would be the ability to negotiate favourable rates for OBS transmissions, and to have only one contact point for accounting. This would benefit all members involved. Whilst the principal advantages are the same as for of Scenario 3a are, the disadvantages are greater.

The possible restrictions on the number of available LES available form a single provider could be overcome if the contracted provider is willing to cooperate or sub-contract to other providers and LES worldwide in order to ensure that the full coverage of transmission services.

This concept would need periodical re-negotiations in order to preserve beneficial terms. In cases where the service provider is changed, or fails to provide a suitable service, the whole system would be subject to disruption during the ensuing transition period - All VOS would have to be advised of any changes and there may be reductions in the data flow; considerable management effort would be required in such situations. This situation might, however, be avoided by engaging a partner to act on behalf of WMO, managing all aspects of the services and associated costs with telecommunication providers worldwide, and negotiating beneficial rates for the contributing marine community.

This variant could also permit the use additional subsystems as in Scenario 3a.

Conclusion Scenario 3:

Scenario 3 and its sub-scenarios appears to offer the fairest solution; it should provide a feasible method of cost sharing, and a comprehensive means of ensuring data collection from all the oceans.

Scenario 3a seems to provide the most straight forward and solution and provides flexibility with respect to any changes in technology, or changes to the providers. It keeps the present procedure largely unchanged, but also permits the use of new transmission strategies in the future.

The strength of Scenario 3b seems to lie in the ability to negotiate favorable transmission charges, thereby minimizing transmission costs. A one-provider solution may, however, introduce certain complications to the adjustment and maintenance of the system, although the contracted provider would deal with all aspects of the marine data transmission worldwide. Nevertheless the actions of this provider would have to be controlled by the marine community.

Both globally shared centralized solutions present increased administrative effort (member billing, fund administration, bill checking, etc.,) and would have to be done at one location. This would therefore necessitate a dedicated post at WMO, or at a Responsible Member, which would additionally have to be borne from the VOS Transmission Costs Common Fund.

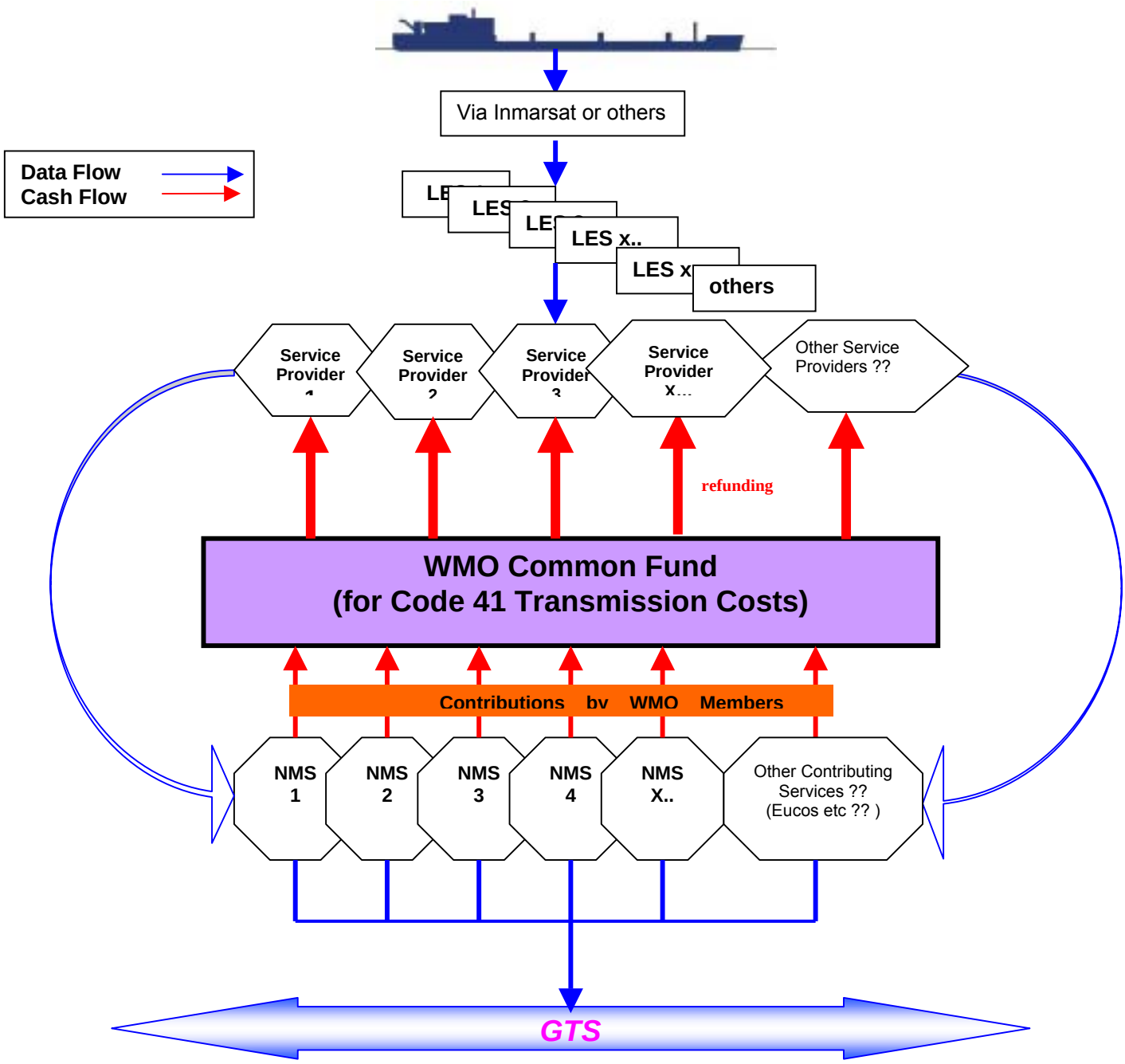
Implementation of a global cost sharing scheme at WMO level and by WMO coordinated fund, possibly based on GNI, therefore seems to present the most logical approach. However with such a solution, nations with higher GNP would inevitably suffer a greater burden than others. Nevertheless, in general, such nations are , also likely to have the largest VOS fleets; so that there may be some equivalency between the size of VOS fleets and a nations ability to contribute to a ”VOS Transmission Costs Common Fund“, (but not as strictly as in Scenario 2).

Recommendation

- SOT-II is invited to discuss the scenarios as presented by the Team, proposing changes, additions, adjustments as necessary, and to decide on further actions. In considering the proposals it should be ensured that the procedures for ships and observing officers should be maintained as simple as possible, and that any changes should cause the minimum of disruption.

- The Task Team on Satellite Communication Costs recommends that the meeting should pursue one of the global solutions proposed under scenario 3.

-



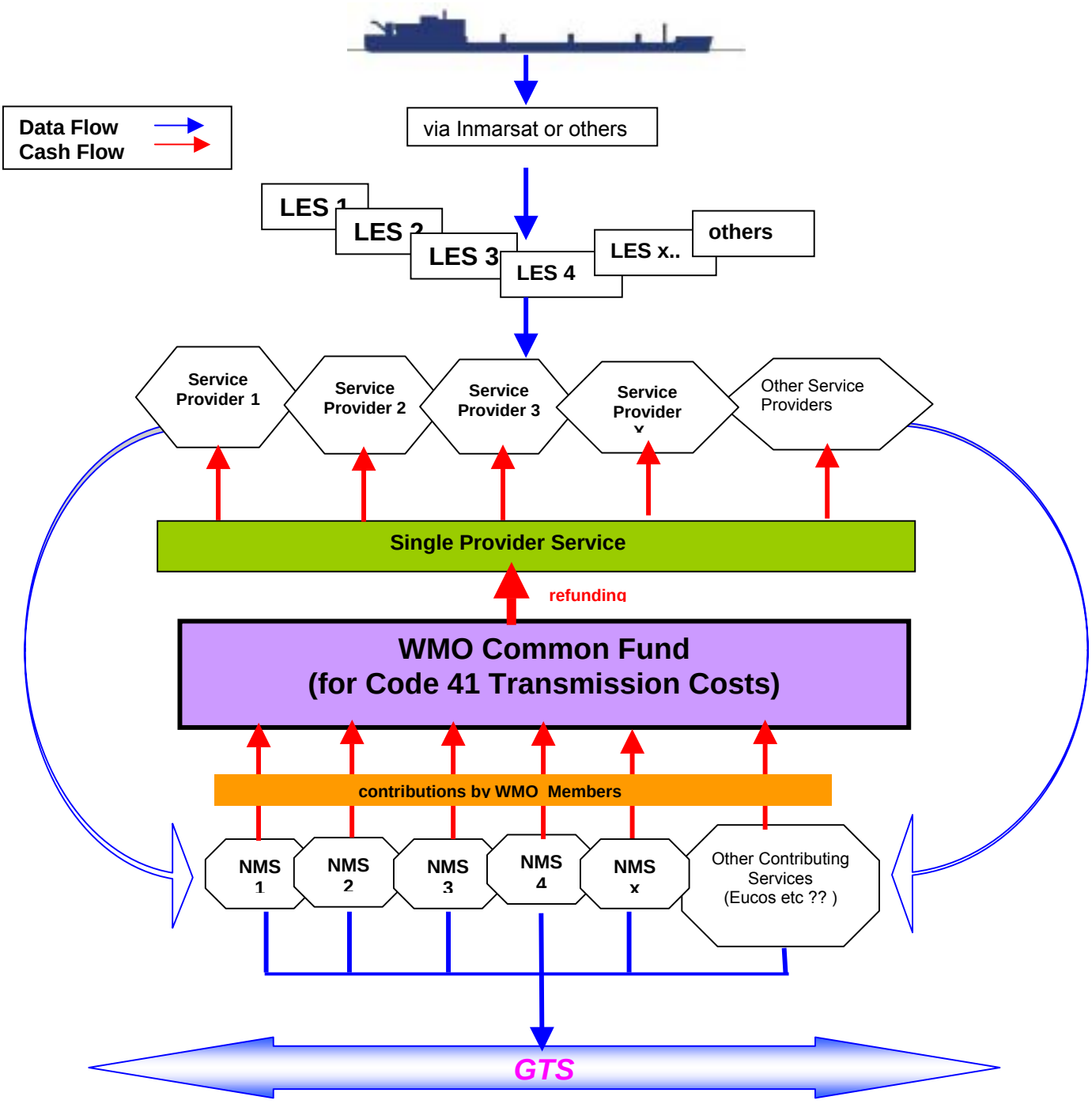
Advantages

- **Costs fairly shared**
- **No significant changes to present data flow**
- **Totally open system independent from provider**
- **Could permit new data technologies**

Disadvantages

- **Limited scope for competition between LESs**
- **Large Administrative Effort involved at a single location**

Fig.1: Scenario 3a „totally independent of provider or transmission technology“



Advantages

- **Costs fairly shared**
- **No significant changes to present data flow**
- **Special rates negotiable**

Disadvantages

- **Large Administrative Effort involved at a single location**
- **provider related transmission links only if not adequately negotiated**
- **problems when single provider changes**

Fig. 2: Scenario 3b „Single Provider Solution“

Table 1: Data / Volume Costs

OBS on GTS: **1.100.000**

line No								Euro	Euro			Euro	
1		Net Data Volume			Transmission Data Volume			Costs per Transmission		Global Costs			Global bits
2		Message	Bytes needed	bits needed	bits per unit	Number of units needed	Total number of bits needed for transmisssion of 1 message	Cost (€) per unit (*)	Cost (€) per Transmission of 1 message	OBS on GTS (%)	Number of messages (OBS) on GTS (total)	Transmission costs(€) for GTS data volume	Number of bits on GTS
3	Complete OBS (FM 13, created via TurboWin)	1	113	904	256	4	1024	0,19	0,76	92	1.012.000	769.120	1.036.288.000
4	Obs from Automated Ship Weather Station	1	83	664	256	3	768	0,19	0,57	8	88.000	50.160	67.584.000
5	Total OBS									100	1.100.000	819.280	1.103.872.000
6	Temp (tentative)	1	1231	9848	256	39	9984	0,19	7,41				

(*) as charged by France Telecom (LES Service)
other providers e.g. : 0,13 / 0,20 / 0,23 Euro

Task Team on Satellite Communications System Costs (ToR)

Tasks
- Consider the problem that the arrangement of the code 41 short code dialing procedure leads to a relatively small number of countries bearing the full burden for the cost of such data transmissions via Inmarsat C;
- Also take into account the possibility that this situation may become exacerbated if two or more of the LES are owned by the same company, in which case all the reports for all these LES will be channeled through, and paid for, by a single NMS;
- Address this situation, with the idea of some form of global cost sharing scheme being suggested, among other possible solutions;
- Prepare a report on the issue for consideration by SOT-II.

Members:
Volker Wagner (Chairman, Germany)
Michael Myrsilidis (Greece)
Theo van Stijn (Netherlands)
Sarah North (United Kingdom)
Andy Fuller (IMSO)

Annex VI

Report of the Task Team on JCOMMOPS (SOT Coordination)
Proposed Plan for SOT Coordination

The plan below considers the tasks that were included in the terms of references of the Task Team on JCOMMOPS (SOT coordination), as defined in Annex XX of the Final Report of SOT-1.

1) Develop a detailed development plan for SOT coordination activities, for the purpose of estimating and identifying the resources needed for JCOMMOPS development

a) In accordance with SOT ToR #3, establish a quality information relay mechanism between monitoring centres (e.g. UKMO) and ship operators. The goal is to facilitate, rationalize, and speed up delivery of quality information produced by the monitoring centres directly to the ship operators. With such facilities, monitoring centres don't have to know who the operators of the ships are. A centralized system linked to a database of call signs and ship operators will permit to make sure that the quality information is properly forwarded to the relevant ship operators. The proposal was discussed at OCG-1 meeting and also includes integration of so-called DBCP QC guidelines into JCOMM. It is proposed that JCOMMOPS provides the centralized facilities needed to operate the system. Work involved at JCOMMOPS is listed below:

   - Routinely update the JCOMMOPS database based upon WMO Publication 47. Publication 47 is formally maintained in a database at WMO, and is based on quarterly submissions from national VOS operators. The WMO database and JCOMMOPS databases will be made consistent due to the regular ingest of the WMO database content into the JCOMMOPS database.
   - In order to have a list of operating ships as up to date as possible at JCOMMOPS, it is proposed that VOS operators optionally provide JCOMMOPS on a monthly basis with the list of ship names they operate. In return, the list of operating ships will be made available on-line via JCOMMOPS.
   - The list of National Focal Points for the VOS and PMO, as well as the list of PMOs would need to be imported into the JCOMMOPS database. It should be possible for the Focal Points to log in the database via web form and change details relevant to their programme as necessary.
   - Dedicated web pages need to be developed. For example, the monitoring centre could submit individual quality information reports through a dedicated web page (i.e. a form which would include ship's Call Sign, some text describing the problem, and optionally a graphic visualizing the problem); quality information reports would then be automatically forwarded by email to the VOS operator and other designated persons (e.g. PMOs).
   - An alternative to the solution of monitoring centres providing quality information via a web form is to provide such information via a mailing list. Messages sent to the mailing list need to be standardized somehow (at least for the subject line) so that call sign can easily be extracted from the messages. JCOMMOPS would read the quality information messages from the mailing list, decode them to extract the ship's call sign, and automatically forward them to appropriate ship operators.

b) In accordance with SOT ToR #3, JCOMMOPS could provide a value-added service to the quality monitoring reports produced by the UK Met. Office. JCOMMOPS would add information such as ship name, name of the National VOS Focal Point, etc. A dedicated web form could be set up to query for specific ships, or for ships under the responsibility of a given country. JCOMMOPS could alternatively provide this information in a file, on a national basis, to VOS operators via FTP or email. This service would rely on VOS operators providing JCOMMOPS with a monthly list of ships (ship name and call sign) they operate.

c) In accordance with SOT ToR #2, JCOMMOPS could develop specific products to show how the successfully the requirements of the WWW are being met. This could be achieved by monthly Marsden Square maps for specific marine variables. Initially this could be done at

0000UTC (+/- 1 hour) for atmospheric pressure followed by SST, and later extended to include 1200UTC (+/- 1 hour). This could be enhanced by colour coding each square to graphically demonstrate how well the requirements are being met (e.g. square in green if sufficient observations). This should be done in conjunction with development of JCOMM metrics. Some products that might be more relevant to the VOS itself might be developed and proposed by JCOMMOPS.

d) In accordance with SOT ToR #5, JCOMMOPS could contribute to PMO operations by establishing an Internet forum for the exchange of information relating to ship inspections, particularly for vessels that operate away from their country of recruitment for long periods, and where the inspections are performed by foreign PMOs. Inspection details could be entered via a web form and stored in a database and automatically forwarded to the responsible VOS NFP. Another web form could permit access to historical inspection details.

e) In accordance with SOT ToR #9, JCOMMOPS could provide a consolidated list of deployment opportunities and national Focal Points. This would require the JCOMM list of NFP for logistic facilities to be made available. In the longer term, and based upon Pub 47 national ship routes, deployment regions could be defined and entered in JCOMMOPS database. Dynamic web pages could then be developed with a facility to search for specific deployment opportunities (this would require information on the region and period of interest, for which the application would return a list of potential ship routes and contact points). In addition to the description in text format of the ship routes (required for Pub. 47), VOS operators would be required to (approximately) define the route trajectories (as series of latitudes & longitudes).

f) Establish a VOS web site (done by BOM, http://www.bom.gov.au/jcomm/vos/).

g) Provision of information relevant for the SOT as a whole (i.e. not specific to one of the 3 Panels), JCOMMOPS acting as a gateway, e.g.
   - o SOT Home page (done by JCOMMOPS, http://www.jcommops.org/sot/)
   - o Design SOT logo (done by BOM)
   - o Design SOT brochure
   - o Information on Instrumentation made available via the web. However, the list of AWS used on ships should go on the VOS web site. JCOMMOPS can put information on the SOT web site provided that information is properly made available. Coordination between VOS and SOT web sites is required.
   - o Information on instrument evaluation.
   - o Information on data telecommunication, e.g. detail code 41 & requirements (e.g. explain that there must be no cost to the ship) (SOT ToR #4). JCOMMOPS needs detailed information on this issue in order to put information on-line (WMO can provide some as well as David Meldrum).

h) No specific requirements were discussed for the ASAP Panel. ASAP is already served by series of monitoring reports, and considering the size of the programme, requirements for coordination are considered well in hand at the moment.

2) The plan should include a specification of requirements (in particular for VOS and ASAP under JCOMMOPS, together with the integration aspects)

- See plan above.

3) The plan also should include an implementation plan to achieve full operational status

Table 1: Resources needed.

Topic	Dev. Time (man*days)	Dev. Cost* ($US)	Yearly operating time (man*days)	Yearly operating cost* ($US)
Regular update of JCOMMOPS database based upon WMO Pub. 47	5	2135	0.5*4=2	854
Importing monthly list of ships from VOS operators (optional for operators)	2	854	0.125*12=1.5	640.5
Make list of ships available (web, ftp, email)	5	2135	0.125*12=1.5	640.5
Quality information relay mechanism (when a ship's call sign is not identified in the database then a survey is needed in order to identify it, hence increasing required operating time)	10	4270	1*12=12	5124
Split monitoring report to specific VOS operators	5	2135	0.125*12=1.5	640.5
Marsden Square maps by variable	5	2135	0.125*12=1.5	640.5
Dedicated web application for PMOs to record ship inspection details.	10	4270	0	0
Application for providing information on deployment opportunities (database must properly be updated manually on a monthly basis)	10	4270	1*12=12	5124
Information portal on instrumentation	0.5	213.5	1	427
Information portal on Telecommunication system	1	427	1	427
Training of person who will make the developments	15	6405	0	0
Time spent by JCOMMOPS to train person who will make the developments	10	4270	0	0
SOT brochure design and preparation	10	4270	0	0
SOT brochure publication	/	???	/	???
Total	**88.5**	**37789.5**	**34**	**14518**

*Note: Cost in table above is computed based upon same level as cost for the Technical Coordinator of the DBCP and SOOP (i.e. total budget for salary and logistics support contract with CLS for office space, computers, secretariat, etc., i.e. cost per day is $111000 divided by 260 working days, i.e. about $427/day).

Table 2: Resources already spent and regarded as contribution in kind for SOT coordination.

Topic	Dev. Time (man*days)	Dev. Cost* ($US)	Yearly operating time (man*days)	Yearly operating cost* ($US)
SOT home page (by JCOMMOPS)	2	854	No hosting cost. Negligible maintenance cost. All related costs supported by JCOMMOPS	0
SOT logo (by BOM)	0.25	106.75	0	0
VOS web site (by BOM)	5	2135	No hosting cost. Estimated 2 days for	854

			maintenance (content). All related costs supported by BOM	
Total	**7.25**	**3095.75**	**2**	**854**

4) Define the scope and role of JCOMMOPS

JCOMMOPS Terms Of References need to be modified according to proposed plan above. Existing terms of references of JCOMMOPS are listed in annex II, and proposed new terms of references in annex III.

5) Take into consideration that entraining and coordinating science projects using VOS into the work of the SOT was seen as important and that this could be done through the use of JCOMMOPS as focal point and information source for the SOT (para 10.1).

This was indeed taken into account in the proposed plan above.

Terms of Reference for the JCOMM in situ Observing Platform Support Centre (JCOMMOPS) (existing)

Under the overall guidance and coordination of the JCOMM Observations Coordination Group, following the direction of the Data Buoy Cooperation Panel (DBCP), the Ships-of-Opportunity Programme Implementation Panel (SOOPIP), and the Argo Science Team (AST), JCOMMOPS shall:

(i) Facilitate the implementation of operational in-situ ocean observing systems associated with the above panels. Such systems, referred to below as relevant observing platforms, presently include drifting buoys, moored buoys on the high seas, floats, and surface and measurements from ships of opportunity;

(ii) Act as a focal point on all aspects of implementation and operation of relevant observing platforms;

(iii) Maintain information on relevant data requirements in support of GOOS, GCOS, and the WWW, as provided by the appropriate scientific panels and JCOMM Expert Teams and Groups;

(iv) Provide information on the status of networks of relevant observing platforms as compared with above requirements;

(v) Assist as appropriate with the development of cooperative arrangements for buoys and float deployments, and for the servicing of moored buoys in the high seas. Provide a single point of entry for information on deployment opportunities;

(vi) Assist as appropriate in relaying quality control information produced by relevant data centres to the responsible observing platforms managers;

(vii) Assist in the implementation of standard formats;

(viii) Make available to operators information on telecommunication systems which can potentially be used for real-time transmission of data from relevant observing platforms;

(ix) Assist in the clarification and resolution of issues between platform operators and telecommunications system operators;

(x) Assist in promoting the insertion of all available and appropriate data into the Global Telecommunications System;

(xi) Monitor and encourage the flow of real time data into appropriate permanent archives;

(xii) Provide information as required on the functional status of relevant observing platforms.

Terms of Reference for the JCOMM in situ Observing Platform Support Centre (JCOMMOPS) (proposed new ToR)

The JCOMMOPS was established by JCOMM-1 in 2001 to facilitate the implementation of operational in-situ ocean and marine meteorology observing systems associated with the Data Buoy Cooperation Panel (DBCP), the Ship Observations Team (SOT), and the Argo Science Team (AST). Under the overall guidance and coordination of the JCOMM Observations Coordination Group and following the direction of the DBCP, SOT and AST, the JCOMMOPS shall:

(i) Act as a focal point on all aspects of implementation and operation of relevant observing platforms, and provide assistance to platform operators for free and unrestricted exchange of data by, for example, provide information on telecommunications systems, clarify and resolve issues between platform operators and telecommunications system operators, encourage the implementation of standard formats;

(ii) Maintain information on relevant data requirements of the observational programmes in support of GOOS, GCOS, and the WWW as provided by the appropriate scientific panels and JCOMM Expert Teams and Groups and routinely provide information on the functional status of these programmes;

(iii) Provide a gateway for information on deployment and servicing opportunities of relevant instrumentation and operator contact information;

(iv) Provide information on these programmes, for example on instrumentation, instrument evaluation, information on data quality.

Annex VII

Report of the Sessional Group on JCOMMOPS

The sessional group met on 31/7/03 to consider the recommendations from the Task Team on JCOMMOPS established by SOT-I.

The team was composed of Graeme Ball (SOT chair) (Australia), Bob Keeley (Canada), Savi Narayanan (Canada), Jean Louis Gaumet (ASAPP chair)(France), Julie Fletcher (VOSP chair) (New Zealand), Steve Cook (SOOPIP chair)(USA), Etienne Charpentier(JCOMMOPS coordinator) and Peter Dexter (WMO Secretariat).

At present in excess of 6000 ships worldwide are participating in the Voluntary Observing (VOS) Programme. These VOS vessels have been recruited by some 21 countries and are serviced by the worldwide PMO network. These VOS ships provide regular reports in the FM13 SHIP code. NMS monitor the quality and quantity of reports from their national fleet, but currently there are no global monitoring tools to show the overall performance of the Global VOS.

Buoy and Profile Data from programmes under DBCP and SOOP are well monitored by the use of effective and efficient performance monitoring tools developed by Etienne Charpentier at JCOMMOPS. There is a need for similar monitoring tools to be developed for the Global VOS.

Tools are required to be developed to support the SOT coordination plan proposed by the Task Team on JCOMMOPS (see Annex VI), specifically:

1. Maps to show global distribution of VOS SHIP observations to help identify data sparse regions
2. Metrics to quantify SHIP performance by parameters eg AP, SST etc
3. Performance indicators to show timeliness of the receipt of SHIP observations

Annex VIII

Monitoring of Marine Surface Observations

MONTHLY SUSPECT LIST - SHIPS, FIXED BUOYS AND PLATFORMS
MONITORING CENTRE: MET OFFICE, UK
MONTH: MAY 2003

Monitoring procedures

Data monitored
All reports from each unique identifier for ships, fixed buoys and platforms.

Standard of comparison
Background field from the Met Office global model (the T+6 forecast from the previous model run).

Elements monitored

P	Mean sea level pressure (hPa).
SPEED	Wind speed (ms^{-1}).
DIRN	Wind direction (degrees).
SST	Sea Surface Temperature (^0C).

Parameters monitored

NOBS Total number of observations received at Bracknell over the GTS in the month. Only those observations received in time for use in the numerical models have been included, and the relevant cut-off times are 0715, 1315, 1915 and 0115 UTC for the observation times 0000, 0600, 1200 and 1800 UTC respectively. Identical reports having exactly the same position, time and observed value have only been counted once.

PGE Percentage of observations with gross errors over the period. These are observations which differ from the background value by An amount which is far in excess of the likely background error (15 hPa for pressure, 25ms^{-1} for wind and 10 ^0C for SST). The statistics for bias and standard deviation are calculated excluding these observations.

SD Standard deviation of difference of observations from background values excluding those with gross errors over the month relative to reference values provided by the UK numerical forecasting system (these are short-term forecasts or background fields). The background values have been interpolated to the observation position.

BIAS Mean difference of observations from background values excluding those with gross errors over the month relative to reference values provided by the UK numerical forecasting system (these are short-term forecasts or background fields). The background values have been interpolated to the observation position. Corrections have been made for known biases in the background fields, and the resulting estimates of the observation bias are thought to be accurate to about 0.5 hPa/ms^{-1} where there is a sufficiently large number of observations from the ship.
N.B. a positive wind bias indicates the observation is veered to the background.

RMS Root Mean Square difference of observations from background values excluding those with gross errors over the month relative to reference values provided by the UK numerical forecasting system (these are short-term forecasts or background fields). The background values have been interpolated to the observation position.

GROSS ERROR LIMITS

Pressure	15 hPa
Vector Wind	25 ms^{-1}
SST	10 ^0C

SELECTION CRITERIA

NOBS >= 20 , and one or more of the following:

1.|bias|	>= 4 hPa	(pressure),
	>= 5 ms^{-1}	(wind speed),
	>= 30 degrees	(direction),
	>= 3 ^0C	(SST).
2.SD	>= 6 hPa	(pressure),
	>= 80 degrees	(direction),
	>= 5 ^0C	(SST).
3.PGE	>= 25	

(NOTE. >= means 'greater than, or equal to')

N.B. Observations of wind direction are only included in the wind direction statistics if the observed OR background wind speed > 5 ms^{-1}

IDENTIFIER	ELEM	NOBS	PGE	SD	BIAS	RMS
CG2522	P	161	100			
CG2556	P	24	4	0.9	-11.2	11.2
CG2992	P	200	100			
C6QK	P	21	0	5.5	4.1	6.9
DICB	P	39	0	1.6	4.2	4.5
ELYD5	P	20	0	1.2	-4.2	4.4
KMJL	P	26	0	0.6	-4.4	4.4
KS011	P	33	52	2.7	-10.6	11.0
LAOL5	P	21	0	1.2	7.7	7.8
OUKN2	P	22	0	0.6	-6.6	6.6
UCJB	P	50	2	0.8	-4.3	4.4
UCJL	P	30	0	0.7	4.0	4.0
UCUC	P	40	100			
UDYG	P	52	4	5.3	-4.1	6.7
UFAA	P	56	0	1.1	6.0	6.1
UHLE	P	56	0	2.3	-8.3	8.6
VCLX	P	20	90	2.1	1.7	2.7
VDFP	P	24	96	0.0	-12.8	12.8
VTXG	P	27	0	1.1	4.9	5.1
V2AR5	P	57	0	0.9	-6.0	6.1
V2AZ5	P	20	0	6.6	-5.1	8.4
V2MH	P	75	0	1.0	-5.3	5.4
3FOC5	P	30	0	1.4	5.0	5.2
62114	P	52	0	0.6	6.0	6.0
62140	P	31	0	3.7	-4.3	5.7

IDENTIFIER	ELEM	NOBS	PGE	SD	BIAS	RMS
A8BJ7	SPEED	34	0	4.6	5.8	7.5
BBXX KS0	SPEED	316	0	2.1	-5.4	5.7
C6KU8	SPEED	28	11	4.2	19.6	20.0
DQVJ	SPEED	60	0	4.3	5.5	7.0
ELTY4	SPEED	27	0	6.6	8.6	10.8
KS004	SPEED	112	0	1.8	-5.1	5.4
KS010	SPEED	184	0	1.3	-6.2	6.4
OWKF2	SPEED	53	4	6.0	6.3	8.7
SJEI	SPEED	20	0	5.9	5.2	7.9
UCTA	SPEED	76	1	3.9	-5.4	6.6
UDUR	SPEED	38	0	1.6	-6.7	6.9

IDENTIFIER	ELEM	NOBS	PGE	SD	BIAS	RMS
V2EN	DIRN.	20	0	42.7	31.9	53.3
23101	DIRN.	37	0	61.3	75.1	97.0
23168	DIRN.	34	0	21.3	86.4	89.0
42047	DIRN.	45	0	35.0	-30.0	46.1

IDENTIFIER	ELEM	NOBS	PGE	SD	BIAS	RMS
CGDS	SST	56	0	1.3	3.8	4.0
CG2522	SST	136	68	1.4	7.6	7.7
CG2960	SST	242	19	2.9	3.5	4.5
CG2992	SST	183	100			
CG8048	SST	48	100			
C6Q09	SST	21	0	1.9	3.4	3.9
DBBX	SST	529	49	1.0	0.1	1.0
DBBXX	SST	35	34	0.9	0.2	1.0
EIQN	SST	495	50	0.4	0.1	0.4
ELOG5	SST	42	0	1.3	6.4	6.5
ELWY3	SST	43	0	0.7	3.6	3.6
FNJI	SST	117	0	0.6	3.3	3.3
H9TA	SST	24	4	1.9	4.7	5.1
KS000	SST	121	31	1.1	0.5	1.2
KS008	SST	169	52	2.3	1.6	2.8
KS011	SST	117	7	3.9	6.4	7.5
KS014	SST	25	76	7.5	2.0	7.8
KS025	SST	204	32	0.7	0.5	0.9
LACF5	SST	65	0	1.3	3.4	3.7
PCIG	SST	34	0	0.4	-3.0	3.0
P3KT8	SST	33	0	1.2	4.6	4.8
SIWB	SST	24	0	0.4	5.2	5.2
S6JQ	SST	21	5	4.0	-4.5	6.1
UCEF	SST	26	12	3.1	-3.4	4.6
UCMQ	SST	24	0	1.4	-4.0	4.2
UCMS	SST	29	0	1.7	3.1	3.5
UIAC	SST	33	0	1.1	6.9	7.0
UINM	SST	38	3	0.7	3.6	3.6
VGNW	SST	24	25	2.3	1.3	2.6
VJRB	SST	21	0	0.5	-3.2	3.2
VOCJ	SST	211	12	2.0	6.1	6.4
V2AT1	SST	49	45	0.9	-8.7	8.8
V2IA1	SST	27	0	3.1	-3.0	4.4
V2PK	SST	31	0	1.9	3.0	3.6
V7DN3	SST	83	0	1.5	-3.3	3.6
WCW9126	SST	88	92	1.1	-0.2	1.1
WWU8	SST	37	100			
YJQL3	SST	31	0	0.9	-4.9	5.0
ZCBD2	SST	27	0	2.9	-4.2	5.1
3EJB9	SST	20	0	0.7	3.2	3.3

IDENTIFIER	ELEM	NOBS	PGE	SD	BIAS	RMS
44014	SST	672	0	1.1	-4.2	4.3

44150	SST	271	1	1.3	5.0	5.2
45008	SST	225	0	0.8	-4.1	4.1
45140	SST	347	100			
45142	SST	662	0	1.3	3.0	3.2
45147	SST	357	100			
45149	SST	659	0	0.7	-4.5	4.6
45152	SST	411	100			
46131	SST	654	100			
46146	SST	648	100			
46181	SST	657	100			

Annex IX

Status of Global VOS Automation
July 2003

Background

VOSP-II noted the importance of enhancement of automation of all aspects of shipboard procedures, from observation to message transmission, using already available software and hardware. The VOS Chair was tasked with collecting information on automation from VOS operators and collating this into a report for VOSP-III.

Details about the status of automation of National VOS were sought from National VOS Focal Points in April 2003. The responses from Focal Points were used in conjunction with information taken from National Reports prepared for SOT II in July 2003.

Present Status

The responses have been separated into two categories; countries with AWS on VOS vessels and countries using electronic logbook software for observation compilation. See Tables 1 and 2.

Whilst there has been a steady move towards using electronic logbooks eg. TurboWin on VOS ships, fully automated shipboard weather observing systems are still few in numbers.

Problems

Problems reported with respect to Automated systems on board VOS ships were:

- Difficulties in siting equipment for best exposure
- Problems in finding 'long term' ships – length of charter sufficient to warrant AWS installation
- Difficulties of route volatility

Julie Fletcher
Chair VOSP

Table 1 : Automated VOS Observations

Country	Number of Ships with AWS	Type of AWS	Communications	Manual Entry Facility
Australia	9	Vaisala Milos 500 AWS	Inmarsat C	Yes
Canada	13	AVOS – AXYS Environmental Systems	Inmarsat C	Yes
France	19	BATOS	Inmarsat C	Yes
Germany	23	Vaisala Milos 500 AWS	Meteosat	Yes
Ireland	1	Vaisala AWS	Meteosat	No
Japan	13	Koshin Denki Kogyo Co., Ltd (9) Ogasawara Keiki Seisakusho Co. Ltd (2) Nippon Electric Instrument Inc. (1) Brookhaven National Laboratory (1)	GMS	Yes
New Zealand	1	AWS based on Sutron 9000RTU	GMS	Yes
Spain	1	Vaisala Milos	Inmarsat C	Yes
United Kingdom	1	Christian Michelson Research AS Automet	Inmarsat C	No

Table 2 : VOS using Electronic Logbooks

Country	Electronic Logbook type	Number of Ships
Australia	TurboWin Turbo1	30 3
Canada	Seas Turbo	2 6
Croatia	TurboWin	3
Germany	TurboWin	315
Greece	TurboWin	2
Netherlands	Turbo1 TurboWin	100 100
South Africa	TurboWin	5
United Kingdom	TurboWin	82
United States	Seas	353

Annex X

MQCS for VOSClim
(Proposal)

VOSClim MQC		**Date: 06 May 2003**	
Element	Condition	Action	Remarks
87	HDG ≠ 000 – 360	Correct manually and Q_{22} = 5, otherwise Q_{22} = 4	
	HDG = ΔΔΔ, ///	Q_{22} = 9	
88	COG ≠ 000 – 360	Correct manually and Q_{23} = 5, otherwise Q_{23} = 4	
	COG = ΔΔΔ, ///	Q_{23} = 9	
89	SOG ≠ 00 – 99	Correct manually and Q_{24} = 5, otherwise Q_{24} = 4	
	SOG = ΔΔ, //	Q_{24} = 9	
	SOG > 33	Correct manually and Q_{24} = 5, otherwise Q_{24} = 3	Container vessels of the latest generation of are steaming 25 - 30 kts at full speed + 1- 3 kts by wind and/or current -> Max Value: 33 kts
90	SLL ≠ 00 – 99	Correct manually and Q_{25} = 5, otherwise Q_{25} = 4	
	SLL = ΔΔ, //	Q_{25} = 9	
	SLL > 32	Correct manually and Q_{25} = 5, otherwise Q_{25} = 3	Containers staks above main deck consist of max 6 - 7 layers. Height of a standard container: 2,591m + 10cm space between each layer -> 2,70 m per layer. Total height above deck 7 x 2,70 = 18,90 m. + freeboard**:** biggest German Gastanker: 7,5 m . It follows for SLL : 27m. Criterium: **SLL_{max} = 32 m** proposed to allow for bigger freeboard
91	s_L ≠ 0, 1	Correct manually and Q_{26} = 5, otherwise Q_{26} = 4	
	s_L = Δ, /	Q_{26} = 9	
	hh ≠ 00 – 99	Correct manually and Q_{27} = 5, otherwise Q_{27} = 4	
	hh = ΔΔ, //	Q_{27} = 9	
	hh > = 13	Correct manually and Q_{27} = 5, otherwise Q_{27} = 3	Assuming a max draft of 23 m -> minimum or ballast draft max: 23 x 0,5=11,5m -> hh_{max} = 11,5 m (23 x 0,6 = 13,8 m -> hh_{max} = 9,2) (see *); Criterium proposal**: hh>= 13 m** to allow for more flexibility
	hh < - 01	Correct manually and Q_{27} = 5, otherwise Q_{27} = 4	Difference Tropical Freshwater load line minus summer load line is far beyond 1 m (usually max 50 - 60 cm)

MQCS for VOSClim (Proposal) (cont.)

Element	Condition	Action	Remarks
92	RWD ≠ 000 – 360, **999**	Correct manually and Q_{28} = 5, otherwise Q_{28} = 4	analogous to El. 13 (dd=99) the case "variable wind" has to be reported. As RWD allows for 99 as a regular value, a new quantity has to be introduced. Proposal is 999 which is not yet existent in any WMO code table and which has to be considered as an IMMT speciality. (999 appears better than e.g. the German national use of "VRB")
	RWD = ΔΔΔ, ///	Q_{28} = 9	
93	RWS ≠ 000 – 999	Correct manually and Q_{29} = 5, otherwise Q_{29} =4	
	RWS = ΔΔΔ, ///	Q_{29} = 9	
	RWS > 110 kts	Correct manually and Q_{29} = 5, otherwise Q_{29} = 3	analogous to El 15 (ff > 80 kts) here: 80 kts + 30 kts max ships velocity -> max value RWS = 110 kts
RWD versus RWS			
	RWD = 000, RWS ≠ 000	Correct manually and Q_{28} or Q_{29} = 5, otherwise Q_{28} = Q_{29} = 2	analogous to El 13
	RWD ≠ 000, RWS=000	Correct manually and Q_{28} or Q_{29} = 5, otherwise Q_{28} = Q_{29} = 2	analogous to El 13

(*) The max value of hh probably appears, when tankers, bulkers or refrigerator ships are going in ballast. As the minimum or ballast draft (MD) is often very poorly known, the "Germanischer Lloyd" gave a thumb rule (personal communication) to estimate this quantity from the ship's draft (S) (summer max load line). It is: MD = ca. 0,5 to 0,6 x S.
Thus the max values for hh = S - MD are derived, when taking the factor 0,5. (**Fig. 3**); the biggest draft of German tankers presently is at 22,9 m.

Annex XI

Report of the Sessional Task Team on Metadata for WMO-No. 47

A sessional task team met to discuss Metadata on 30/7/2003

The team was composed of Graeme Ball (Australia), Ron Fordyce (Canada), Pierre Blouch (France), Julie Fletcher (New Zealand), Elizabeth Kent (United Kingdom), Sarah North (United Kingdom), David McShane(USA)

The team group discussed/considered some changes/additions to the Metadata for WMO-No.47.

A number of the groups were reviewed and some initial suggestions are as follows:

- The need to standardise the list of routes – this is a major task and the group felt that it would be easier to decide on the routes required if the use of this route information was known.

- Propose to add Number 95 – Automated Ships
- Propose to add Number 96 – Fixed Platforms

  Both these additions will have implications for WMO publications such as Guide to Manual on Marine Meteorological Services (WMO-No.471) and Manual on Marine Meteorological Services (WMO-No.558).

- Propose to add electronic barometer field under barometer type

- Propose to add 2 new fields - AWS name and software version
  - Electronic Logbook type and version

- Need to review Communications types – some can be deleted

- Need to add field for Date of Withdrawal/De-recruitment

- The instructions developed to support the VOSClim Recruitment Form be reviewed to support the additional fields proposed, and also be expanded to remove ambiguities in relation to existing fields.

The team will continue to discuss this topic during the inter-sessional period with a view to submitting a proposal to ETMC planned to be held in mid-2004.

Annex XII

Review of SOOPIP Action Items from SOT-I

Chair of SOOPIP

1. Give guidance to SOO operators on how to proceed and get as exact sampling assessment as possible using a performance indicator to be proposed by the SOOP coordinator.

→ Done. The SOOPIP Technical Coordinator working within JCOMMOPS has developed reporting and graphical tools that provide more comprehensive monitoring. Utilization of these tools has made the SOOP Semestrial Survey a more useful document and all are encouraged to make use of it.

2. Define ongoing requirements for the outcomes of pilot projects, which should be done through relevant science panels.

- Ongoing. Several issues carry over from year to year but are still relevant and need be addressed at the National level to successfully implement an integrated upper ocean thermal monitoring effort.
- As an operational system, mechanisms and procedures must be found to ensure data collected by operators conform to agreed upon basic standards, formats levels of data quality, etc.
- SOOP still relies heavily on the contributions of research agencies, which cannot commit to long-term support for operational programmes.
- Increased bandwidth must be developed in the real-time data distribution systems to enable the data transmission of full resolution XBT data.
- Evaluation and Accreditation should be undertaken within the new SOT Evaluation Group.
- Continued support recommended for the Technical Coordinator position.
- Data management and data collection must continue to be driven by user requirements and best scientific practice.
- Close coordination with the VOS, VOSClim and ASAP activities is strongly recommended to promote the more effective implementation of observations from commercial shipping in support of joint scientific objectives and to maintain the harmony and support of the maritime industry.
- Decreasing resources in support of the SOOP continue to be a concern for both JCOMM/GOOS and CLIVAR.

3. Review the monitoring products generated by JCOMMOPS and GTSPP to determine if there is any significant overlap.

→ Done. Both products contribute individually to the overall monitoring effort. The GTSPP product is delivered, by email, usually a month after the fact and identifies problem ships by call sign and plot observations along standard route envelopes. This product requires that each operator use it as a reference tool to identify perpetual problem ships for corrective action. It also provides a quick “look see” at what the global coverage was for the previous month. As it is sent as an email it acts as a “tickler” to give quick check on the past months activity or lack thereof.

→ The JCOMMOPS map products are of better quality but require significant searching and effort to seek out which ones are interested in monitoring. The JCOMMOPS products are more useful when saved and incorporated into presentation graphics. The large files being interrogated seem to take longer to load and display.

→ In conclusion both seem to have their benefits and suggest they continue to be maintained. Apparently the GTSPP and JCOMM representatives have looked into the

issue and come to terms with regard to overlap. No other action is required unless a more comprehensive comparison between the two products identifies significant overlap. I would suggest that each SOO operator send their comments to me stating their opinion as to the value of each product.

4. Proceed with the recruitment of a new WRAP ship to operate a required high-density line from Australia to South Africa.

→ Done. In regard to the 'new' WRAP ship at the moment there is not one, although agreement for participation from a Geneva-based company (second largest container fleet in the world) and MetWorks. One of those ships, the MSC NURIA, was partly equipped for WRAP when she was on the route to Australia via S. Africa, but the Company reorganized their sailings and cut out any sailings to Australia via S. Africa. Consequently, we had to discharge WRAP equipment installed earlier. However, depending on the results of SOT-II, another ship will be identified as a participant in the new future.

→ Another company has agreed to host the WRAP (a UK based container company), but they want to charge a full year's salary for one of their cadets to undertake the WRAP soundings, and this is just not acceptable to WMO (or to the ASAPP for that matter).

SOOPIP members and SOO operators

1. Continue reviewing the metadata needed for VOS, SOOP and ASAP vessels with a view to a possible extension of the survey form in future to all SOT vessels

→ Ongoing.

2. Prepare their national reports in integrated form on this template, and submit these to the Secretariat by March each year

→ Done.

3. Use the SOOP internet technical forum and upload useful information (e.g. instrument evaluation)

→ Continue.

4. Routinely provide the Coordinator with required information such as list of ships they operate or with the information on changes in ship recruitment

→ Continue.

5. Provide the SOOP Coordinator with data/metadata to be used for computing sampling indicators for each line on a semestrial basis

→ Continue.

6. Systematically and carefully check that information in the data they provide to the Coordinator is correct

→ Continue.

7. Investigate the reason why the USA did not provide the counts of duplicates in its inputs to the BATHY monthly report.

→ Done. The monthly SOOP report does not include a count of duplicate products because exact duplicates are rejected from the database from which generates the reports. The monthly report submitted includes all profile data from all known GTS sources routed to the GOOS Centre by the NOAA Telecommunications Gateway. Our software is not sophisticated enough to detect a duplicate record submitted by more than one GTS source. Specifically, a record submitted by Canada, which is also submitted by France, will be counted twice and not recognized as a duplicate.

8. Under the guidance of the SOOPIP chair, decide how to proceed and get as exact a picture of the situation (sampling assessment using a performance indicator) as possible

→ Done

9. Carefully check the number of transects achieved on each line, as well as the number of probes deployed

→ Done.

10. Check the way the ships' crews were actually proceeding to probe deployments (especially regarding the periodicity of the deployments) and correct possible shortcomings through proper training

→ Done.

11. Provide the technical coordinator with information regarding shipping lines potentially available for recruitment in the region related to Kenya

→ Done.

12. Contribute data to the project of establishing the surface salinity network

→ Done.

13. Keep track of possible developments in the field of sea surface current measurements and report on the topic at further panel's sessions, as necessary

→ Continue.

14. Install improved meteorological systems (such as the US IMET system) on-board ships ensuring high density XBT routes, as well as on ships equipped with pCO2 measurement capability, or similar oceanographic sampling

→ Ongoing

15. Consider adequately training and/or giving advice to PMOs with regard to greeting and servicing ships-of-opportunity

→ Ongoing.

16. Advise of opportunities and implement further XBT/CTD comparisons in high latitudes wherever possible and provide data to NIO for analysis.

→ Ongoing.

17, Identify general opportunities and undertake XBT/CTD comparisons in the inter-sessional period and report results to the SOOPIP Chair and Technical Coordinator.

→ Ongoing.

18. Prepare guide to XBT/CTD evaluations to be placed on the web site.

→ Done.

19. Make better use of the SOOP technical forum established by JCOMMOPS for the exchange of information on instrument and procedures issues.

→ Continue.

20. Take caution if considering using the Z-60-16-II and Z-60-16-III XBT recorders due to problems observed with measurements in the surface layers.

→ Done.

Technical Coordinator

1. Define and compute sampling indicators (e.g. regularity of sampling, completeness of line sampling along the whole transect, adequate spacing between drops according to the type of line, adequate number of transects) for each line based upon the data/metadata provided by the SOOP participants on a semestrial basis

→ Done.

2. Make proposals regarding possible performance indicators within a few weeks
Review the status of the SOOP home page, of the Best Practices Guide and of SOOP Implementation Plans.

→ Done.

3. After the completion of the work of the Task Team on JCOMMOPS, have JCOMMOPS act as focal point and information source for the SOT and publicise this role of in the science community, in conjunction with information on the SOT itself, its status and work

→ Done.

4. Include SOT national reports submitted by operators and complied by the Secretariat on the JCOMMOPS web site.

→ Ongoing.

Secretariat

1. Upgrade WMO guidance material dedicated to PMOs to include extensive guidance relating to both SOOP and ASAP operations as appropriate

→ Still to be implemented

2. Make necessary arrangement for SOOPIP contributions for 2002.

→ Done

Annex XIII

Financial Statement by IOC
for the year 1 June 2001 to 31 May 2002

(all amounts in US $ unless otherwise specified)

BALANCE (from previous years)			**28,659**
FUNDS TRANSFERRED FROM WMO (relevant to the period)			
	(05.04.2001)	118,000	**118,000**
	(15.10.2001)	FF 59,000	**FF 59,000**
		in US $:	**8,259**
	TOTAL RECEIPTS		**154,918**
EXPENDITURES			
Technical Co-ordinator's employment:			**98,160**
	Salary:	?	
	Allowances:	?	
	Relocation (yearly provision):	?	
Technical Co-ordinator's missions:			**14,030**
	Yokohama/Tokyo (28 May - 6 June 2001)	736	
	Akureyri (20-24 June 2001)	1,692	
	Paris (27-30 June 2001)	897	
	Hyderabad (24-28 July 2001)	2,118	
	Perth (15 October - 2 November)	2,545	
	Brest (18-20 November 2001)	542	
	Geneva (27 January - 1 February 2002)	1,625	
	Goa (23 February - 4 March 2002)	1,838	
	La Jolla (20-28 April 2002)	2,255	
	Adjustment on previous missions	-219	
Contract with CLS/Service Argos			**€ 12,200**
		in US $:	**11,199**
	TOTAL EXPENDITURES		**123,389**
BALANCE (at 1 June 2002)			**31,530**

World Meteorological Organization

Data Buoy Co-operation Panel
Interim Statement of Account as at 30 June 2003

	US$		US$
Balance from 2001			-1,984
Contributions Paid for Current Biennium			295,267
Total Funds Available			293,283
Obligations Incurred			
Consultants	212,545		
Travel	55,429		
Bank charges	21		
Postage	847		
Contribution to JCOMMOPS Data Devt	5,000		
Payment to IOC/ Logistic Support	10,000		
Support Cost	2,838		
			286,680
Balance of Fund		US $	6,603
Represented by.			
Cash at Bank			15,533
Exchange Adjustments			-5,112
Unliquidated obligations-prior years	-3,784		
Unliquidated obligations-current year	-		-3,784
Accounts Payable			-
		US $	6,637

CONTRIBUTIONS	2002	2003	Total
Australia	13,500	12,500	26,000
Canada	12,015	10,000	22,015
CLS/France (for ARGOS JTA Chairman)	10,000		10,000
FAO	10,000		10,000
Germany	5,000		5,000
Greece	2,200	2,200	4,400
Iceland	1,500	1,500	3,000
Ireland	1,118	1,290	2,408
Japan	10,000	10,000	20,000
Netherlands	1,575		1,575
New Zealand	1,000	719	1,719
Norway	1,575	1,575	3,150
South Africa	3,000		3,000
United Kingdom	19,000		19,000
USA	86,000	78,000	164,000
TOTAL	177,483	117,784	295,267

Prepared on 7 July 2003

EXPENDITURES AND INCOME FOR 2000-2004

	Actual 2000 and 2001 (2 years)	Estimated 2002 (1 year)	Estimated 2003 (1 year)
		USD	
Expenditures			
Technical Coordinator (Salary, Travel and Logistics)	252,000	126,000	126,000
Travel (chair, vice-chairs and JTA chair)	16,881	11,998	15,000
JTA chairman	14,460	7,485	8,000
Publications	25,416	0	6,000
CLS/equipment	5,000	0	10,000
WMO/charges	9,679	4,996	1,500
WMO marine programme refund		18,000	
Contingencies			2,325
TOTAL	323,436	168,479	168,825
Income achieved/required to balance expenditures			
Contributions	281,909	176,483	164,550
Carry forward from Previous biennium	37,798	-3,729	4,275
Carry over to next biennium	-3,729	4,275	
TOTAL	323,436	168,479	168,825

TABLE OF CONTRIBUTIONS

DBCP

	2001-2002	**2002-2003**	**2003-2004**
AUSTRALIA (including JTA chair support 2001 and one-off payment 2002)	13,500	13,500	12,500
CANADA (including one-off payment 2002)	10,000	12,015	10,000
FRANCE	9,435 (FRF 70,000)	(10,000) (FRF 70,000)	10,000
GREECE	2,200	2,200	2,200
ICELAND	1,500	1,500	1,500
IRELAND	1,168 (IR£ 1,000)	1,118 (IR£ 1,000)	1,200
JAPAN	5,000	5,000	5,000
NETHERLANDS	1,575	1,575	1,575
NEW ZEALAND	500	1,000	1,000
NORWAY	1,575	1,575	1,575
SOUTH AFRICA	3,000	3,000	3,000
UNITED KINGDOM (including JTA chair support 2001 and one-off payment 2002)	16,000	18,000	16,000
USA (including JTA chair support 2001 and one-off payment 2002)	69,000	76,000	69,000
JTA (for JTA chair support)		10,000	10,000
TOTAL	**134,453**	**(156,483)**	**144,550**

SOOPIP

	2001-2002		2002-2003		2003-2004
Germany	5,000		5,000		5,000
Japan	5,000		5,000		5,000
USA	10,000		10,000		10,000
TOTAL	**20,000**		**20,000**		**20,000**

TOTAL INCOME FROM CONTRIBUTIONS

	2001-2002		2002-2003		2003-2004
TOTAL	**149,956**		**(176,483)**		**164,550**

Annex XIV

WORLD METEOROLOGICAL ORGANIZATION

ASAP TRUST FUND

Interim Statement of Account as at 30 June 2003

		SFR
Balance from 2001		3,181
Contributions received		29,578
Contributions received for WRAP project		43,622
Prior Years' Adjustment for Support cost overcharge in 2001		2,933
Total Receipts		79,314
Obligations		
Consultancy WRAP Proj	23,050	
Travel	10,000	
Travel - WRAP Proj	3,359	
Transfer from NOAA for E-ASAP	15,033	
Printing	870	
Equipment-Other (WRAP proj. -Palliser Bay)	12,214	
Support Costs (7%)	4,517	
Total Obligations Incurred		69,043
Exchange adjustments		33
Total funds available		10,238
Represented by:		
Cash at Bank		24,202
Less: Unliquidated Obligations	13,964	
		10,238

Contributions	**2002**	**2003**	**Total**
Denmark	2,000	-	2,000
Iceland	500	500	1,000
United Kingdom	-	1,500	1,500
USA, including for E-ASAP soundings	20,078	5,000	25,078
Total	22,578	7,000	29,578

ASAPP ESTIMATED INCOME AND EXPENDITURE 2003/4

Income

	SFR
Funds available at 30 June 2003	10,238
Contributions 2004	10,500
WRAP contribution	44,000
TOTAL	64,738

Expenditure

Publications (including brochure)	3,000
Travel, promotion and general support activities	8,000
Contract for WRAP Project Leader	12,000
WRAP (consumables, etc.)	40,000
WMO charges and contingencies	1,500
Carry over to 2005	238
TOTAL	64,738

Table of Provisional Contributions 2004

Iceland	500
United Kingdom	1,500
USA (USD 5,000)	8,500
TOTAL	10,500

Annex XV

Procedure for the Preparation of ASAP Annual Report

Layout
FOREWORD

CONTENTS

1. Report
2. Tables
3. Figures

ANNEXES

I National Reports
II Monitoring Reports
III Other relevant Information
IV Summary of ASAP costs

Report Preparation Timetable

January: Secretariat to circulate ASAP operators and monitoring centres, requesting input to the report to be submitted to the chairman and Secretariat by end of February

March: Chairman to prepare text of report and send to Secretariat for publication

April/May: Publication of the report and distribution to EC, operators and others

Annex XVI

Report on the Second International PMO Workshop
London, 23-25 July 2003

1. It was considered that this workshop was useful in many aspects, including especially the exchange of views and experiences between the various national Met Service PMO networks. With the increasing requirements and tasks that would appear to involve the work of Port Met Officers, their role is becoming even more important and perhaps focused than hitherto. As has been intimated in the past, it is far better to reduce the number of visitors (in US terms the “greeters”) who meet ships on arrival. It is increasingly important that the Port Met Officer Network is stronger rather than what is happening in some areas – being reduced.

2. During the workshop there was a strong recommendation from those attending that rather than have a ten year gap between Port Met Officer Workshops/Conferences, such sessions should be held at more frequent intervals, say three to four years.

3. The bottom line is therefore clear, and hearing various presentations that have been made during these two weeks, the Port Met Officer numbers should be maintained, if not increased. The Port Met Officers are the main contact and liaison point between the ship owner, ship manager, shipping company, shipping industry, and the scientific community. They know the shipping companies, they know the ships, they know through their contacts with the shipping industry which ships will be changing their trading patterns, their ownership and all the other variants that exist in modern day shipping, sometimes at very short notice. They therefore form a very important intelligence service which must be of benefit to both the meteorological and oceanographic communities. It is therefore, urged that the PMO network be maintained at a high level.

Annex XVII

List of Action Items

Chairs of SOT, VOSP, SOOPIP and ASAPP

para	action	by whom	with whom	when
I/3.5(i)	Develop a plan of contributions to the efforts that will be needed to maintain global deployment of both the recommended surface drifting buoy (5x5 coverage) and Argo profiling float (3x3) arrays	SOT and panel chairs	OPA Coordinator, Secretariat	
I/3.5(ii)	Develop a plan for reporting all VOS and SOOP observations in real time (with minimal human intervention)	SOT and panel chairs	OPA Coordinator, Secretariat	
I/3.6	Liaise with relevant SOT members, with a view to developing the plans proposed in paragraph I.3.5 above, in liaison with the Observations Programme Area Coordinator	SOT Chair	Secretariat, OPA Coordinator	
I/4.1.1(i)	Coordinate the development of a single page, preferably single paragraph, international “flyer” to simulate interest in observing ships	SOT Chair	TT on VOS	
I.4.1.1(iv)	Coordinate that the presentation of the above mentioned presentation to major maritime shipping companies and ship owners associations and receive and analyse the results to be reported by the Task Team on VOS	SOT Chair	TT on VOS	
I/4.3.8	Prepare an updated plan on JCOMMOPS development for consideration by the OCGII (tentatively April 2004) on the basis of the report of the sessional task team on this issue	SOT chair	JCOMMOPS Coordinator	by OCG-II
II/1	Organize a technical workshop in conjunction with SOT-III	SOT chair	Secretariat	by SOT-III
III/5.2.2	Investigate the possibility of nominating an expert to contribute to the preparation of Chapter 2.1.4 “Marine measurements " of the WMO *Guide to Climatological Practices* (WMO-No. 100)	VOS chair	Canada, Secretariat	
IV/1.2.7	Contact two data centres for ADCP data, to investigate if they were willing to continue this function on an ongoing basis, in support of JCOMM	SOOPIP chair		Immediately
IV/1.3.1.9	Bring this to the attention of the OOPC, with a view to obtaining their advice regarding an appropriate transition mechanism	SOOPIP chair	OOPC chair, OPA Coordinator	OOPC-VIII
IV/5.3.2	Investigate the possibilities for identifying and obtaining resources required to develop and maintain the expanded functions of JCOMMOPS, and to prepare a proposal to expand the existing SOOP Trust Fund to an overall SOT Trust Fund, for consideration by the Observations Coordination Group	Chairs of SOT, VOSP, SOOP, ASAPP	Secretariat and technical coordinator	by OCG-II
V/2.2.2	Liaise with Gordon Mackie regarding the possible recruitment of the WRAP ship to SOOP	SOOPIP chair	Gordon Mackie	
V/3.1	Invite interested national agencies to request the Panel for further information about opportunities for ASAP implementation	ASAPP chair	Secretariat	
V/5.2.1	Prepare a separate ASAP Annual Report as described in *Annex XV*	ASAPP chair	Secretariat and operators	
V/5.2.2	Keep the brochure under review at future sessions	ASAPP chair	Secretariat	at future sessions
V/5.2.2	Make the brochure available, in pdf format, on the VOS and SOT/ASAP web sites	SOT chair	JCOMMOPS coordinator, Secretariat	

para	action	by whom	with whom	when
V/5.3.1	Prepare a short paper on ASAP data flow and data management, for consideration by the JCOMM Data Management Coordination Group at its session in 2004	ASAPP chair		by DMCG-II
I/7.2(ii)	Undertake the necessary redesign of the SOT national report template	SOT chair		by late 2003
I/7.2(iii)	Prepare a design for a full SOT Annual Report, for consideration by SOT-III	SOT and panel chairs	Secretariat	by SOT-III
I/7.2(iv)	Coordinate preparation of input relating to overall SOT data management procedures and facilities, for consideration by the JCOMM Data Management Coordination Group, in consultation with the panel chairs and the VOSClim Project Leader	SOT and panel chairs, VOSClim Project Leader		by DMCG-II
I/8.1	Prepare a short descriptive document on the SOT, giving its objectives, structure, status and working procedures, in consultation with the Panel chairs, which might also eventually serve as the basis for SOT brochure	SOT chair and panel chairs	Secretariat	
I/9.1	Keep the TORs under review at future sessions	SOT and panel chairs	Secretariat	
I/11.2	Finalize the exact dates and venue of SOT-III	SOT Chair	Secretariat	as soon as possible

SOT and panel members, ship operators and PMOs

para	action	by whom	with whom	when
I/3.5	Make every effort to improve the quality of their observations of VOS and SOOP	VOS and SOOP operator		
I/3.5(iii)	Implement the 'next steps' plan to concentrate XBT deployments along a set of 41 high resolution (HRX) and frequently repeated (FRX) lines	SOOP operators		
I/4.1.1(iii)	Use the Power Point presentation "The Partnership between the Maritime Industry, Marine Forecasting and Science", whenever possible to promote recruitment	ship operators		
I/4.1.1(v)	Use the developed "Basic Ship Visit and Rider Rules" as a training tool for all interaction with participating vessels	PMO's, scientific support staff etc		
I/5.3	Include long-term field testing based on long-lifetime sensors in instrument intercomparisons.	Panels		
II/2	Provide Elizabeth Kent (Southampton Oceanography Centre) with information on both current and historical VOS practices and instrumentation.	VOS focal points		
III/1.2.6	Regularly (ideally monthly) provide the Met Office with lists of their VOS	VOS focal points		
III/1.2.7	Advise the Met Office of their e-mail addresses, so that they can be added to the distribution list of monthly monitoring statistics	VOS focal points and ship operators who wish to receive copies		
III/7.1.8	Report the type and version of the electronic logbook should be reported in footnotes of metadata (WMO-No. 47), as an interim procedure	VOS operators		
III/7.1.9	Start using the revised version of Turbowin	VOS operators		as soon as revised version is ready
IV/1.1.3	Contribute to and make use of reporting and graphical	SOOPIP		

para	action	by whom	with whom	when
	tools as a resource for determining future deployment plans	members		
IV/1.3.1.7	Make efforts to include transect information in the submitted data, as this was not always the case in previous submissions and as such information is required to compute some of the SOOPIP line sampling indicators	SOOP operators		
IV/1.3.1.8	Use the results presented through the monitoring by the SOOP coodinator as a basis for approaching governments for the additional funding support required to fully implement the identified system requirements	SOOP operators		
IV/1.3.2.4	Follow the procedures described in para IV/1.3.2.4 for those lines where at least one indicator says that the line is not correctly being sampled	SOOP Operators		
IV/1.3.2.6	Check with the Coordinator that the information in the database of the line definitions is accurate	SOOP operators		
V/1.3.1.1	Make the user community aware of the monitoring results presented by the ECMWF, which demonstrate clearly the overall value of ASAP	ASAP operators		
V/3.2	Make the concern regarding the continuance of the LORAN-C system widely known	Operators	Secretariat	
V/5.2.1	Prepare a separate ASAP Annual Report as described in *Annex XV*	ASAP operators	Secretariat, ASAP chair	
I/10.1	Submit national reports in electronic form to the Secretariat	Participants	Secretariat	immediately

Technical Coordinator

para	action	by whom	with whom	when
I/3.13	Make an appropriate link between the Web sites of the IOCCP and SOOP	JCOMMOPS Coordinator		Immediately
I/3.13	Prepare for possible contribution of compiled data sets of measurements by voluntary ships of the carbon network	JCOMMOPS coordinator	Secretariat	
I/4.3.8	Prepare an updated plan on JCOMOPS development for consideration by the OCG-II (tentatively April 2004) on the basis of the report of the sessional task team on this issue	JCOMMOPS Coordinator	SOT chair	
IV/1.2.7	Start working on BUFR for other data types, such as XCTD and ADCP data, with a view to providing input to the next meeting of the CBS Expert Team on Data Representation and Codes, scheduled for November 2003	SOOP coordinator	Bob Keeley	by the meeting of the CBS Expert Team
IV/1.2.7	Provide any assistance required by operators and users in how to encode, transmit and decode in BUFR, as appropriate	SOOP coordinator		
IV/1.2.7	Use the JCOMMOPS site as a portal to the definitive updated version of the WMO-No.47 maintained by WMO and available on the WMO web site.	SOOP coordinator	Secretariat	
IV/5.3.2	Investigate the possibilities for identifying and obtaining resources required to develop and maintain the expanded functions of JCOMMOPS, and to prepare a proposal to expand the existing SOOP Trust Fund to an overall SOT Trust Fund, for consideration by the Observations Coordination Group	SOOP coordinator	Chairs of SOT, VOSP, SOOP, ASAPP, Secretariat	by OCG-II
V/5.1.1	Prepare a simple static web page for ASAP, accessible through JCOMMOPS and the SOT page	JCOMMOPS coordinator	ASAP chair	
V/5.2.2	Make the ASAP brochure available, in pdf format, on the VOS and SOT/ASAP web sites	JCOMMOPS coordinator	SOT chair	

Task Teams and Expert Group established by SOT-II

para	action	by whom	with whom	when
I/4.1.1(i)	Develop a single page, preferably single paragraph, international “flyer” to simulate interest in observing ships	TT on VOS	SOT chair	
I/4.1.1(ii)	Develop a Marine Observing Newsletter that will reside on and be supported by the SOT Web Page as a mechanism that can be visited, downloaded and printed or copied and emailed to any appropriate prospective participant (i.e. shipping companies, ships officers, agents, educational institutions and scientists).	TT on VOS	SOT chair	
I/4.1.1(iv)	Present the presentation "The Partnership between the Maritime Industry, Marine Forecasting and Science”, to major maritime shipping companies and ship owners associations and report results to the SOT Chair	TT on VOS		
I/4.1.1(vii)	Design (and to develop criteria for issuing) an appropriate JCOMM/SOT Certificate of Appreciation for participating ships and others as appropriate	TT on VOS		
I/4.2.2.4	Prepare a formal submission on the issue of the satellite communications system costs for consideration by the MAN-III and then by WMO Executive Council (EC-LV).	TT on Satellite Communications System Costs	Secretariat, Management Committee	by MAN-III and EC-LVI
I/5.3	Give guidance for testing and intercalibration of other systems, designed to measure specific marine meteorological or oceanographic elements, to be undertaken by the relevant panel (in a similar manner to the testing of atmospheric profilers)	EG on instrument	Secretariat	
I/5.4	Liaise with CIMO in addressing issues on instrument	EG on instrument	Secretariat	
III/4.2.5	Prepare a proposal on the revision of WMO-No.47, to be submitted to the next session of ETMC	TT on Metadata		
III/5.2.3	Consider issuing an international newsletter regarding VOS. VOSClim newsletter might also be expanded for use with all VOS	TT on VOS		
III/5.2.4	Consider establishing communication mechanisms among VOS focal points and/or PMOs.	TT on VOS		

Other bodies, individuals

para	action	by whom	with whom	when
I/3.5(i)	Develop a plan of contributions to the efforts that will be needed to maintain global deployment of both the recommended surface drifting buoy (5x5 coverage) and Argo profiling float (3x3) arrays	OPA Coordinator	SOT and panel chairs, and Secretariat	
I/3.5(ii)	Develop a plan for reporting all VOS and SOOP observations in real time (with minimal human intervention)	OPA Coordinator	SOT and panel chairs, and Secretariat	
I/3.5(iv)	Assist the WMO in the maintenance of the VOS ship metadata needed by the VOSClim project	Members/Member States concerned		
I/3.6	Liaise with relevant SOT members, with a view to developing the plans proposed in paragraph I/3.5, in liaison with the Observations Programme Area Coordinator	OPA Coordinator	SOT Chair, Secretariat	
I/3.13	assist the IOCCP in resolving the issue of long delays in obtaining proper permission to make	Members concerned	Secretariat	

para	action	by whom	with whom	when
	measurements in territorial waters			
I/3.15	Continue the work to develop a Statement of Guidance relating to the marine component of the GOS and JCOMM requirements for marine observational data (see also section 3.1 of the SOT-I final report	Management Committee	Secretariat	
I/4.1.1(vi)	Initiate development of "generic" pre-installation design standards that will eventually be available to ship builders and classification societies	Steve Cook	TT on VOS	
I/4.2.1.13	Present an updated report on developments in satellite communications systems to the next SOT session	David Meldrum	through arrangement of the Secretariat	
I/4.2.2.4	prepare a formal submission on the issue of satellite communications system costs for consideration by the MAN-III and then by WMO Executive Council (EC-LV).	Management Committee	TT on Satellite Communications System Costs, Secretariat	by MAN-III and EC-LVI
III/1.2.5	Start monitoring the additional variables	RSMC Bracknell		late 2003
III/2.2.9	Bring the concerns expressed by SOT-II to the EUCOS Surface Marine Programme	Pierre Blouch		
III/4.1.3	Carefully consider the requirement and availability of the Marine Climatological Summaries Scheme	Expert Team on Marine Climatology (ETMC)		ETMC-IX
III/4.1.5	Submit a proposal on the revision of the MQCS to the next ETMC session	GCC Germany		ETMC-IX
III/4.2.1	Consider the possibility to assist future updates of the data base by providing a compatible, web-based data entry interface	NDBC	Secretariat	
III/4.2.3	Address the issue of the potential value of associating marine climate data and metadata within a single data base system such as Distributed Oceanographic Data System (DODS)/OPeNDAT	ETMC	and Secretariat	
III/5.1.3	Post the ASAP brochure on the VOS web site	Graeme Ball		immediately
III/5.2.2	Iinvestigate the possibility of nominating an expert to assist in the preparation of Chapter 2.1.4 "Marine measurements " of the WMO *Guide to Climatological Practices* (WMO-No. 100)	Canada	VOS chair, Secretariat	
III/7.1.6	Bring the concern expressed by SOT-II regarding MAROB to the NWS	David McShane		immediately
III/7.1.9	Develop a revised version of Turbowin so that non-reduced wind will be widely reported	KNMI		
IV/1.2.7	Start working on BUFR for other data types, such as XCTD and ADCP data, with a view to providing input to the next meeting of the CBS Expert Team on Data Representation and Codes, scheduled for November 2003	Bob Keeley	SOOP coordinator	by the meeting of the CBS Expert Team
IV/1.3.1.5	Make further recommendations to the SOT regarding how practically to ensure the transition from the current mode of SOOP operations to the full FRX/HDX UOT-1999 mode	OOPC		OOPC-VIII
IV/1.3.1.9	Bring this to the attention of the OOPC, with a view to obtaining their advice regarding an appropriate transition mechanism	OOPC chair, OPA Coordinator	SOOPIP chair	OOPC session
V/2.2.2	Discuss with the head of the Kenya Meteorological Department about the possibilities for Kenyan participation in WRAP	Ali Mafimbo		immediately

para	action	by whom	with whom	when
V/2.2.2	Proceed with the recruitment and implementation of a MSC vessel as the next WRAP	Gordon Mackie		immediately
V/2.2.2	Liaise with SOOPIP chair regarding the possible recruitment of the WRAP ship to SOOP	Gordon Mackie	SOOPIP chair	

Secretariat

para	action	with whom	when
I/3.5 (i)	Develop a plan for contributions to the efforts that will be needed to maintain global deployment of both the recommended surface drifting buoy (5x5 coverage) and Argo profiling float (3x3) arrays	SOT and panel chairs, OPA Coordinator	
I/3.5(ii)	Develop a plan for reporting all VOS and SOOP observations in real time (with minimal human intervention)	SOT and panel chairs, OPA Coordinator	
I/3.6	Liaise with relevant SOT members, with a view to developing the plans proposed in paragraph I.3.5 above, in liaison with the Observations Programme Area Coordinator	SOT and panel chairs, OPA Coordinator	
I/3.13	Assist the IOCCP in resolving the issue of long delays in obtaining proper permission to make measurements in territorial waters	Members concerned	
I/3.13	Prepare for possible contribution of compiled data sets of measurements by voluntary ships of the carbon network	JCOMMOPS coordintor	
I/3.15	Continue the work to develop a Statement of Guidance relating to the marine component of the GOS and JCOMM requirements for marine observational data	Management Committee and	
I/4.2.1.6	Include in the list of Inmarsat LES accepting code 41 messages, an extra column to show forthcoming changes to LES status		
I/4.2.1.13	Make an arrangement so that David Meldrum will present an updated report on developments in satellite communications systems to its next session	David Meldrum	
I/4.2.2.4	Prepare a formal submission on the issue of the satellite communications system costs for consideration by MAN-III and then by WMO Executive Council (EC-LV).	TT on Satellite, Management Committee	by MAN-III and EC-LVI
I/5.3	Give guidance for testing and intercalibration of other systems, designed to measure specific marine meteorological or oceanographic elements, to be undertaken by the relevant panel (in a similar manner to the testing of atmospheric profilers)	EG on instrument	
I/5.4	Liaise with CIMO in addressing issues on instrumentation	EG on instrument	
II/1	Publish the full texts of the presentations of the workshop as a JCOMM Technical Report, on CD-ROM only		late 2003
II/1	Organize a technical workshop in conjunction with SOT-III	SOT chair	
III/4.2.1	Investigate the possibility to make individual national updates available on the web site as simple ASCII flat files, as an interim measure		
III/4.2.1	Continue to discuss with NDBC regarding their possible assistance to future updates of the data base, by providing a compatible, web-based data entry interface	NDBC	
III/4.2.2	Consider the archival of historical No. 47 metadata for climate studies, in addition to the timely delivery of up to date VOS metadata		
III/4.2.3	Address the issue of the potential value of associating marine climate data and metadata within a single data base system such as Distributed Oceanographoc Data System (DODS)/OPeNDAT	ETMC	
III/5.2.2	Iinvestigate the possibility of nominating an expert to assist in the preparation of Chapter 2.1.4 “Marine measurements " of the WMO *Guide to Climatological Practices* (WMO-No. 100)	Canada VOS chair	

para	action	with whom	when
	Canada, VOS chair and Secretariat		
IV/5.2.1	Continue to maintain and support the position of the SOOP Coordinator, under the general conditions established and maintained by the DBCP		
IV/5.3.1	Take necessary actions regarding the SOOP component of the expenditure and income estimates for 2003/4		
IV/5.3.2	Investigate the possibilities for identifying and obtaining resources required to develop and maintain the expanded functions of JCOMMOPS, and prepare a proposal to expand the existing SOOP Trust Fund to an overall SOT Trust Fund, for consideration by the Observations Coordination Group	Chairs of SOT, VOSP, SOOP, ASAPP, technical coordinator	by OCG-II
V/3.1	Invite interested national agencies to request the Panel for further information about opportunities for ASAP implementation	ASAPP chair	
V/3.2	Make the concern regarding the continuance of the LORAN-C system widely known	Operators	
V/4.2.1	Take necessary actions regarding the ASAP Trust Fund, based on the draft budget		
V/5.2.1	Prepare a separate ASAP Annual Report as described in *Annex XV*	ASAP chairman and operators	
V/5.2.2	Keep the brochure under review at future sessions	ASAPP chair	
I/7.2(i)	Consider organization of a third international PMO workshop within a 3-4 year time frame		next financial period
I/7.2(i)	Bring the concern at the gradual degradation of PMO networks to the attention of the WMO Executive Council	JCOMM co-president	EC-LVI
I/7.2(ii)	Send the revised SOT national report template in late 2003, with requests for the 2003 national reports, to be completed and returned by April 2004		late 2003
I/8.1	Prepare a short descriptive document on the SOT, giving its objectives, structure, status and working procedures, in consultation with the Panel chairs, which might also eventually serve as the basis for an SOT brochure	SOT chair, panel chairs	
I/9.1	keep the TORs under review at future sessions	Chair	
I/10.1	Published national reports in electronic form as a JCOMM Technical Report	participants	
I/11.2	Finalize the exact dates and venue of SOT-III	SOT Chair	as soon as possible

Annex XVIII

List of Acronyms and Other Abbreviations

AIC	Argo Information Cerntre
AOPC	Atmospheric Observations Panel for Climate (GCOS/WCRP)
Argo	Array for Real-time Geostrophic Oceanography programme
ASAP	Automated Shipboard Aerological Programme
ASAPP	Automated Shipboard Aerological Programme Panel
AST	Argo Science Team
BATHY	Bathythermograph report
BMRC	Bureau of Meteorology Research Centre (Australia)
BUFR	Binary Universal Form for Representation of Meteorological Data
BUOY	Report for Buoy Observations (GTS)
CAVASSO	Project for Atlantic VOS pCO_2 measurement
CBS	Commission for Basic Systems (WMO)
CIMO	Commission for Instruments and Methods of Observation (WMO)
CLIVAR	Climate Variability and Predictability (WCRP)
CLS	Collecte Localisation Satellites
CMM	Commission for Marine Meteorology (WMO)
CNRS	French National Centre for Scientific Research
CSIRO	Commonwealth Scientific and Industrial Research Organization (Australia)
CTD	Conductivity-temperature-depth probe
DAC	Data Assembly Centre
DBCP	Data Buoy Cooperation Panel (WMO-IOC)
DCS	Data Collection System
DMCG	Data management Coordination Group
DODS	Distributed Oceanographic Data System
E-ASAP	EUMETNET ASAP
ECMWF	European Centre for Medium-Range Weather Forecasting
EEZ	Exclusive Economic Zone
EGC	Enhanced Group Code
EGOS	European Group on Ocean Stations
ETMC	Expert Team on Marine Climatology
EUCOS	EUMETNET Composite Observing System
EUMETNET	The Network of European Meteorological Services
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
GCC	Global Collecting Centre (for the MCSS)
GCOS	Global Climate Observing System
GMDSS	Global Maritime Distress and Safety System
GNI	Gross National Income
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
GOS	Global Observing System (WWW)
GPS	Global Positioning System
GTS	Global Telecommunication System (WWW)
GTSPP	Global Temperature Salinity Profile Programme
ICSU	International Council for Science
IFREMER	Institut Francais de Recherche pour l`Exploitation de la Mer
IGBP	International Geosphere-Biosphere Programme
IGOSS	Integrated Global Ocean Services System
IHDP	International Human Dimensions Programme on Global Environmental Change
IMO	International Maritime Organization
IMSO	International Mobile Satellite Organization
INMARSAT	International MobileSatellite Organization
IOC	Intergovernmental Oceanographic Commission (of UNESCO)

IOCCP	International Ocean Carbon Coordination Project
IODE	International Data and Information Exchange (IOC)
IRD	Instituit francais de recherche scientifique pour le dévelpment en coopération (ex ORSTOM)
JAFOOS	CSIRO/BMRC Joint Australian Facility for Ocean Observing System
JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
JCOMMOPS	JCOMM in situ Observing Platform Support Centre
JMA	Japan Meteorological Agency
LES	Land Earth Station (Inmarsat)
MCSS	Marine Climatological Summaries Scheme
MEDS	Marine Environmental Data Service (Canada)
MQCS	Minimum Quality Control Standards
MSC	Mediterranean Shipping Company
MSG	METEOSAT Second ¨Generation
NDBC	National Data Buoy Centrer (NOAA)
NCDC	National Climatic Data Center (NOAA)
NCEP	National Centers for Environmental Prediction (NOAA)
NMS	National Meteorological Service
NOAA	National Oceanographic and Atmospheric Administration (USA)
NODC	National Oceanographic Data Centre
NWS	National Weather Service (NOAA)
OeanObsS99	First International Conference for the Ocean Observing System for Climate
OCG	Observations Coordination Group
ODAS	Ocean Data Acquisition Systems
ONR	Office of Naval Research (UN Navy)
OOPC	Ocean Observation Panel for Climate (of GOOS, GCOS, WCRP)
PMO	Port Meteorological Officer
QC	Quality Control
RCC	Rescue Coordination Centres
RIC	WMO Regional Instrument Centre
RM	Responsible Members (MCSS)
RTMC	Real Time Monitoring Center
RSMC	Regional Specialized Meteorological Centre
SBSTA	Subsidiary Body for Science and Technological Affairs (UN FCCC)
SCOR	Scientific Committee on Oceanic Research
SEAS	Shipboard Environmental Data Acquisition System (USA)
SHIP	Report of Surface Observation from Sea Station
SOC	Southampton Oceanography Centre (U.K.)
SOLAS	International Convention for the Safety of Life at Sea
SOO	Ship-of-Opportunity
SOOP	Ship-of-Opportunity Programme
SOOPIP	JCOMM Ship-of-Opportunity Programme Implementation Panel
SOT	Ship Observations Team
SSS	Sea Surface Salinity
SST	Sea Surface Temperature
SURFA	Surface Flux Analysis Project
TEMP-SHIP	Upper-level temperature, humidity and wind report from a sea station
TESAC	Temperature, Salinity and Current Report
TIP	Tropical Moored Buoy Implementation Panel
TOGA	Tropical Ocean and Global Atmosphere (WCRP)
TOR	Terms of Reference
TRACKOB	Code for reporting marine surface observations along a ship's track
TSG	Thermosalinograph
TT/QCAS	Task Team on Quality Control and Automated Systems (SOOPIP)
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

UNFCCC	UN Framework Convention on Climate Change
UOP	Upper Ocean Panel (CLIVAR)
UOT	Upper-Ocean Thermal Project (WOCE)
UOT-1999	Upper Ocean Thermal Review
URL	Universal Resource Locator
VOS	Voluntary Observing Ship
VOSP	Voluntary Observing Shop Panel
VOSClim	Voluntary Observing Ships Climate Subset Project
VSOP-NA	VOS Special Observing Project-North Atlantic
WCRP	World Climate Research Programme (WMO/IOC/ICSU)
WMO	World Meteorological Organization
WRAP	Worldwide Recurring ASAP Project
WWW	World Weather Watch (WMO)
XBT	Expendable Bathythermograph
XCTD	Expendable conductivity-temperature-depth probe