
DATA BUOY COOPERATION PANEL

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TWENTY FIRST SESSION

ITEM: 5

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JCOMM ACTIVITIES RELEVANT TO THE DBCP

Second Session of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM-II)

(Submitted by the Secretariat)

Summary and purpose of document

This document reports briefly on the discussion and recommendations made during the Second Session of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (19-27 September 2005, Halifax, Canada) relevant to the Panel and its work.

ACTION PROPOSED

The panel is invited to note and comment on the information, as appropriate, and advise on any additional interactions with JCOMM which may be required.

- Appendices:**
- A. New structure of JCOMM: decided by JCOMM-II
 - B. Text for inclusion in the general summary of JCOMM-II, on Observations Programme Area

DISCUSSION

1. The second session of JCOMM (JCOMM-II) took place in Halifax, Canada, 19-28 September 2005, at the kind invitation of the Government of Canada. Two important events were associated with the session; i) the launching of the 1250th drifting buoy completing the drifting buoy array, which will be the first component of the Global Ocean Observing System to be fully implemented, and ii) the Scientific Conference, entitled "Operational Oceanography and Marine Meteorology for the 21st Century" which highlighted recent developments in operational systems and scientific and technological advances important to JCOMM.

Global Drifters 1250

2. A major milestone was achieved in the occasion of JCOMM-II, the Data Buoy Cooperation Panel (DBCP) deployed the 1250th Global Drifter near Halifax Harbour on 18 September 2005. With this deployment, the global drifting buoy array achieved its design goal of 1250 buoys in sustained service, and thus became the first component of the initial Global Ocean Observing System (GOOS) to be completed. To symbolize filling of the final global ocean coverage, a special ceremony and celebration was held on the tour vessel, Tall Ship Silva. The participants appreciated over 10 years of efforts made by DBCP Member Countries, to collectively build up the resources necessary to maintain 1250 buoys in sustained service. The Mercator Ocean Forecasting Center provided with a special bulletin of ocean forecast in the deployment area.

JCOMM Scientific Conference "Operational oceanography and marine meteorology for the 21st century"

3. Over 120 scientists from 30 countries participated in this conference. It had three sessions including i) Recent JCOMM results; ii) Future science and technologies for observations, iii) Future JCOMM Products and Services. The participants presented and agreed on:

- (i) Significant collaboration has been made in marine meteorology and oceanography for more than a century;
- (ii) Marine observations confirm that the ocean plays a dominant role in climate variability and change;
- (iii) Marine observations and services are being used by all parts of the marine community;
- (iv) JCOMM has significantly contributed to the establishment of global observing systems and end to end information systems;
- (v) It is needed to involve all participants and users in planning, development and implementation (developing nations, state and local governments, marine industries);
- (vi) There are still challenges to overcome, such as i) Fragility of existing systems; ii) Security of funding (much of present systems are funded by research programmes; iii) lack of integration with satellite observation such as in uncertainty assessment;
- (vii) Standardization should be accomplished in many part of ocean observations and data management.

4. Finally the Conference drew the message to JCOMM, that the next intersessional action plan should be made including the following items:

- (i) Articulate to governments the need for sustained funding for the observing system and its local, national and international infrastructure (users, including private sector can provide advocacy);

- (ii) Provide more homogeneous access to data and products;
- (iii) Give greater visibility for data and products;
- (iv) Adopt and implement new technologies while preserving continuity of information;
- (v) Support and facilitate the entry of autonomous ocean observing systems into EEZs;

5. It was also emphasized during the conference, that Private Sector and User Groups should be involved into JCOMM planning and development through the Management Committee and Expert Teams. Regional ocean observing systems and GOOS regional alliances also should be considered in the development of JCOMM. The participants finally noted the need to assess progress at JCOMM-III.

Organizational Structure:

6. Through considerable discussions during the second session, JCOMM decided that the overall framework would continue as designed in JCOMM-I for the next intersessional period, except for the Capacity Building Programme Area: The Commission decided to appoint Capacity Building Rapporteurs within the Observations, Services and Data Management Programme Areas, forming a cross-cutting team, and to establish a joint JCOMM-GOOS Task Team on Resources which will report to both JCOMM Management Committee and GOOS Scientific Steering Committee. It also decided to establish the Cross-cutting Team on Satellite Data Requirements, with rapporteurs of the Observations (one meteorological and one oceanographic), Services and Data Management Programme Areas (appointed by JCOMM Management Committee in consultation with the GOOS Scientific Steering Committee). The new structure is illustrated in Appendix A.

7. The Commission elected Dr P. Dexter (Australia) as its co-president for meteorology, and Dr J.-L. Fellous (France) as its co-president for oceanography, during the next intersessional period.

Issues in Observations Programme Area

8. The Commission was reported on accomplishment Observations Programme Area, including three implementation panels (DBCP, SOT, and GLOSS). The Commission expressed its considerable appreciation to all the members of the panels, task teams, and action groups, for their considerable efforts and support provided to the Commission, as well as for the substantial progress achieved over the past four years. The general summary and recommendations approved by the Commission are detailed in Appendix B.

9. The Commission noted with appreciation the dramatic increase in the number of drifting buoys reporting on the GTS, the recent extension of the TAO Array in the Indian Ocean) as well as the distribution of salinity data on the GTS from 25 moorings in the Pacific Ocean. It again emphasized that, to maintain the network of 1250 drifting buoys, DBCP is now heavily dependent upon the availability of deployment opportunities both by ship and by air, especially in the Southern Hemisphere. It urged Members/Member States to consider what deployment opportunities they might offer, and to convey that information to JCOMMOPS, which acted as a focal point in this regard. The Commission urged buoy operators and manufacturers to follow recommendations regarding moored buoy design and maintenance operations (<http://www.dhcp.noaa.gov/dhcp/safety.html>), which was made in the seventeenth session of the DBCP.

10. The Commission expressed its appreciation to the DBCP for developing and coordinating buoy networks. It agreed that the Panel's Technical Coordinator position was essential for the success of the Panel's activities, thanked those Members/Member States already contributing to the support of the position, and urged them to continue their existing contributions or new

Members/Member States to consider contributing. The Commission also invited VOS and ASAP sub-Panels or SOT Member States to investigate making contributions to the proposed trust fund when established. It endorsed the proposal to change the Terms of Reference for JCOMMOPS, and adopted Recommendation 6/2 (JCOMM-II) on the subject.

11. At the same time, the Commission agreed that new, longer term solutions for JCOMMOPS funding as a whole should be investigated to ensure the continuity of the position of technical coordinator of the DBCP and SOOP. It asked the Secretariats to investigate the feasibility with Members/Member States and to report to the JCOMM Management Committee.

11. The Commission noted the recommendation that JCOMM establish a trust fund for consumable expenditures, initially focused on XBTs. The Commission noted that the provision of ship time as well as expendables was necessary to build contributions to the global observing system by developing countries, and adopted Recommendation 6/1 (JCOMM-II) - Consumables for Ship-Based Observations, for the establishment and management of a JCOMM Trust Fund to provide a simple mechanism to help more countries contribute to the international observing system and complete the global XBT network (Appendix B).

12. The Commission recognized that the Argo programme would be ready to transition from a pilot project to a sustained part of the ocean observing system during the coming intersessional period. It noted that most Argo deployments relied and would continue to rely on research funding, and it urged Members/Member States to seek means for the continued long-term sustained funding of such deployments.

13. The Commission noted that there was significant international momentum for implementation of a composite global observing system consisting of: (1) the in situ networks; (2) continuous satellite missions; (3) data and assimilation subsystems; and (4) system management and product delivery. After wide consultation with the ocean observing system community, a five-to-ten year implementation plan for a global ocean observing system for climate was published in the GCOS *Implementation Plan for the Global Observing System for Climate in support of the UNFCCC* (GCOS-92); the plan was endorsed by the UNFCCC; and the ocean chapter endorsed as the ocean backbone of the Global Earth Observation System of Systems (GEOSS). The Commission noted that the system would support not only climate requirements but also global weather prediction, global and coastal ocean prediction, marine hazard warning, marine environmental monitoring, and many other non-climate users. It further noted that JCOMM was identified as the implementing agent, or a contributing implementing agent, for 21 of the specific actions listed in the GCOS-92 ocean chapter, and that these specific actions provided an excellent roadmap to guide the OPA work. The Commission recommended, therefore, that the OPA work plan should be based on implementing the ocean and relevant atmospheric actions within GCOS-92 for the next intersessional period. The GCOS-92 goals incorporate those that the JCOMM OPA and Argo had been pursuing for the past four years – global coverage by the moored and drifting buoy arrays, profiling floats, tide gauge stations, and ship-based networks (plus continuous satellite missions).

Recommendations by JCOMM-II

14. The Commission adopted following Recommendations during its second session:
 - (i) Recommendation 5/1 – Guide to storm surge forecasting: In the context of the JCOMM's activities for marine hazards warning and mitigation, the Commission recommended to prepare a Guide to Storm Surge Forecasting, by technical advice and guidance of the Expert Team on Wind Waves and Storm Surges.
 - (ii) Recommendation 5/2 – The development of operational oceanographic products and services under JCOMM: The Commission recommended to further develop operational oceanographic products under JCOMM, under the guidance of the Services Programme Area, including re-development of the JCOMM Electronic Products Bulletin as a web portal

to JCOMM products and services. The operational oceanographic products were illustrated in OceanOps 04 and GODAE Symposium, including:

- A comprehensive User Requirement Document (URD)
- A comprehensive catalogue of existing operational or quasi-operational ocean products
- Guidelines for operational ocean product presentation, symbology and nomenclature.
- Development of a proposal for the required standardized data and metadata formats
- Development of a rolling implementation plan for the integration of new technological developments in data and product management
- An interaction mechanism between GODAE/JCOMM and the coastal modelling community, as well as defining requirements for modelling and product support for non-physical variables and processes, in cooperation with the GOOS Scientific Steering Committee
- Development of Capacity Building proposals regarding possible pilot projects and designated ocean product centres to support developing countries
- Addressing the question of the business case for operational oceanography

- (iii) [Recommendation 6/1 – Consumables for ship-based observations](#): The Commission recommended to establish a special trust fund for the bulk purchase and supply of consumables for ship-based observations. It requested to the Observations Programme Area Coordinator, in consultation with the Secretariat and relevant programmes chairmen, develop a relevant plan, and urged the Members/Member States to contribute to this fund.
- (iv) [Recommendation 6/2 – New Terms of Reference for JCOMMOPS](#): Considering the potential value of extending JCOMMOPS activities, as well as the need to make satellite information available, the Commission approved the new ToR for JCOMMOPS to enable the provision of extended support to SOT Coordination and to disseminate on the web site information provided by the Cross-cutting Team on Satellite Data Requirements. It also recommended that JCOMMOPS continue to be based in Toulouse, under the day-to-day supervision of the WMO and IOC Secretariats.
- (v) [Recommendation 7/1 – IOC Project Office for IODE](#): Noting successful organization of a first joint JCOMM/IODE/GOOS training event held at the Project Office in September 2005 (Digital Modelling Training Course 2005), the Commission recommended that the IOC Project Office for IODE (Ostend, Belgium) should be used for joint data management related activities of IOC/IODE, JCOMM, WMO, and other relevant organizations, on projects of mutual interest. The Commission also recommended further organization of training events.
- (vi) [Recommendation 7/2 – JCOMM Data Management Strategy](#): The Commission noted the urgent need for the development of a JCOMM data management strategy, and recommended that such a strategy be prepared jointly with IOC/IODE and WIS of WMO.
- (vii) [Recommendation 9/3 – Complementary guidelines for NAVTEX broadcasts](#): The Commission agreed to adopt some amendments to the Manual on Marine Meteorological Services (WMO-No. 558) and Annex VI to the WMO Technical Regulations, to add complementary guidelines for National Meteorological Services issuing marine weather forecasts and warnings via NAVTEX, including a list of common abbreviations to be used in such broadcasts.
- (viii) [Recommendation 9/2 – Guidelines for sea-ice charts](#): The Commission also adopted a recommendation for National Meteorological Services on guidelines for sea-ice charts, to modify the Manual on Marine Meteorological Services (WMO-No. 558).
- (ix) [Recommendation 9/3 – Modifications to the International Maritime Meteorological Tape \(IMMT\) format and Minimum Quality Control Standards \(MQCS\)](#): The Commission agreed

to amend the IMMT format and Minimum Quality Control Standards, in particular to cover additional requirements of the VOSclim Project, with these new versions of IMMT (IMMT-3) and MQCS (MQCS-V) to replace the existing versions from 1 January 2007.

(x) [Recommendation 10/1 – Marine Pollution Emergency Response System \(MPERSS\)](#): The Commission Agrees that the Marine Pollution Emergency Response System can now be considered operational, and agreed to establish an ongoing Expert Team on Marine Accident Emergency Support (ETMAES). It further recommended the amendment of Guide to Marine Meteorological Services (WMO-No. 471) as discussed in its second session, and requested the Expert Team to keep the implementation of and user response to the MPERSS under review, and to develop proposals for amendments as necessary.

(xi) [Recommendation 10/2 – Modifications to WMO-No. 47 – International List of Selected, Supplementary and Auxiliary Ships](#): The Commission adopted modification in definition and formatting in WMO-No. 47, and recommended that a version of the Extensible Markup Language (XML) should be developed and implemented for the future exchange of the metadata included in WMO-No. 47.

(xii) [Recommendation 11/1 – JCOMM support for marine multi-hazard warning systems, including Tsunamis](#): The Commission recognized that, to be sustainable and effective in the long term, tsunami warning systems should be developed and operated within the context of a broader marine multi-hazard early warning strategy. It decided, to develop and implement a plan of action to contribute to the implementation and maintenance of marine multi-hazard warning systems for all ocean basins, with relevant WMO technical commissions and subsidiary bodies of IOC, GOOS regional alliances and associations and IODE regional networks, as appropriate. It would include particular actions as following:

- Analysis of potential for existing marine platforms and deployment facilities to contribute to a tsunami and other marine hazards early warning network;
- Contribute to the development of guidance material for Members/Member States relating to the components and operations of a marine hazards warning service;
- Coordination with IMO and IHO to ensure the dissemination of tsunami warnings and related information through GMDSS communications facilities for Maritime Safety;
- Enhancement of the GLOSS network through the upgrading of some of the existing GLOSS stations to tsunami monitoring standard;
- Coordinate an effective link for exchange and dissemination of early warnings, contribute to the development of a fast warning system, especially in the maritime safety, utilizing both existing and new transmission facilities in order to reach the public and the relevant mitigation mechanisms;
- Coordinate with JCOMMOPS the arrangements for ocean platform deployments and maintenance, which should be used to provide extensive logistic and related support for tsunami detection networks.

Detailed discussions and decisions regarding this issue are to be reported under agenda item 2.2.3.

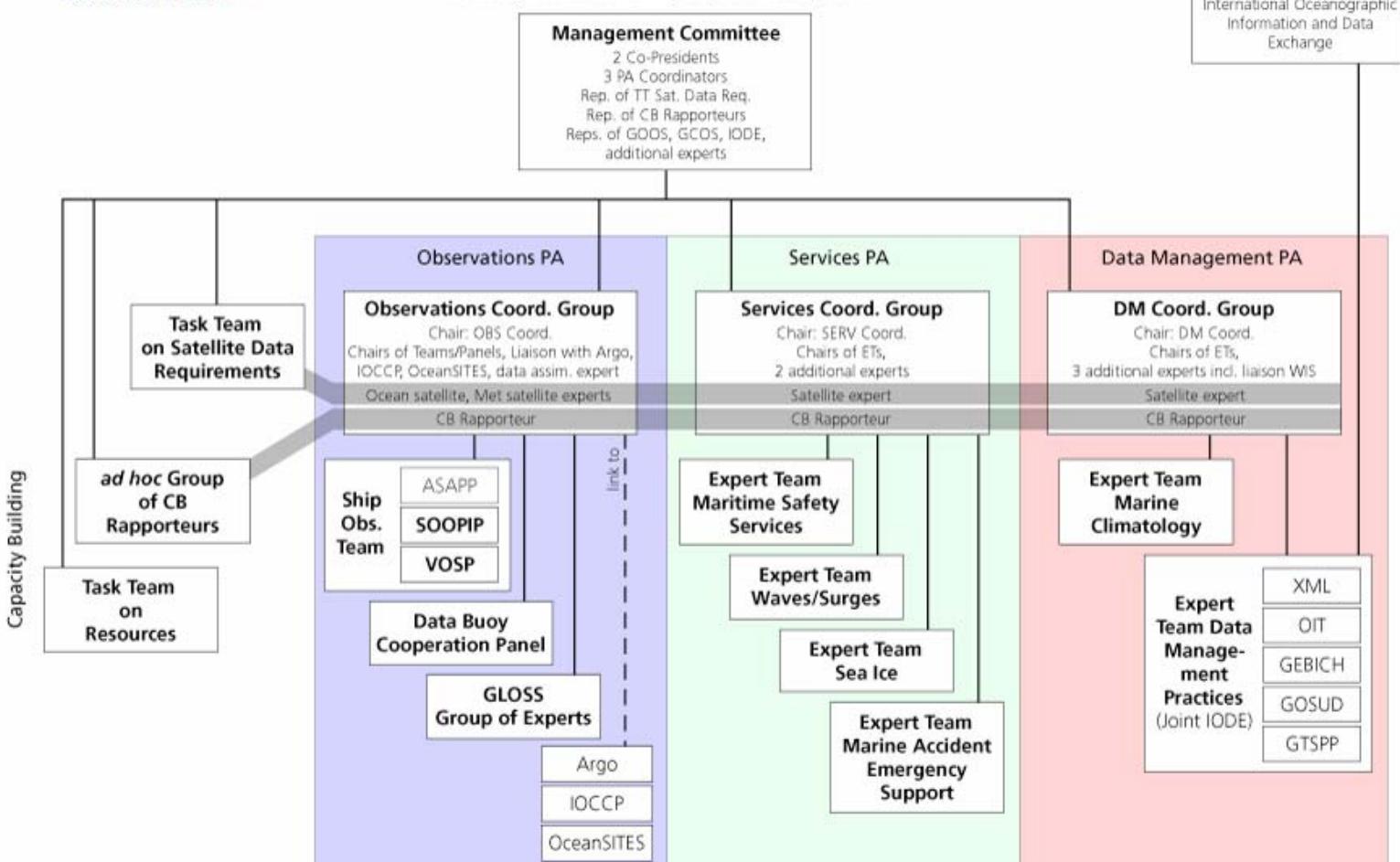
(xiii) [Recommendation 12/1 – The Global Earth Observation System of Systems \(GEOSS\)](#): The Commission recommended that the Members/Member States be urged to endorse the objectives of GEOSS, to become members of GEO, and to support its 10-year Implementation Plan to the maximum extent possible. It also encouraged the Members/Member States to ensure that each national coordination mechanism for GEO/GEOSS is fully informed of and consistent with existing and planned activities of JCOMM. The Commission further invited the GEO to recognize JCOMM as a key implementation mechanism for oceanographic and marine meteorological components of Earth Observation, providing global, intergovernmental coordination of implementation activities and regulatory and guidance material for operational oceanography and marine meteorology.

Appendices: 2



JCOMM Structure

Proposed by the Sessional Working Group on Structure, JCOMM-II



TEXT FOR INCLUSION IN THE GENERAL SUMMARY OF JCOMM-II**6. OBSERVING SYSTEMS (*agenda item 6*)****6.1 Review of the work of the component groups, expert teams and rapporteurs (*agenda item 6.1*)*****General***

6.1.1 The Commission noted with interest the comprehensive report of the Observations Programme Area Coordinator and chair of the Observations Coordination Group, Mr Michael Johnson, on the work accomplished within the Observations Programme Area (OPA) during the past intersessional period, as well as proposals for future activities and developments. It expressed its considerable appreciation to Mr Johnson, to the chairs of the three implementation panels (Mr David Meldrum, Mr Graeme Ball and Dr Mark Merrifield), to the Rapporteur (Professor Hiroshi Kawamura) and to all the members of the panels, task teams, and action groups, for their considerable efforts and support provided to the Commission, as well as for the substantial progress achieved over the past four years.

Data Buoy Cooperation Panel (DBCP)

6.1.2 The Commission noted that the DBCP, by virtue of its pivotal role in the international coordination of drifting buoy and deep-ocean moored buoy networks, and through its eight Action Groups, constituted a major component of the JCOMM Observations Programme Area. The Panel was served by a full-time Technical Coordinator funded through voluntary contributions of some Members/Member States. The DBCP Terms of Reference had been changed in 2001 to reflect its reporting to JCOMM, and it had recently updated its implementation strategy to take into consideration the latest developments with regard to user needs expressed by GOOS, GCOS and the WWW, and the requirements of the ten year GEOSS Implementation Plan.

6.1.3 The Commission noted with appreciation the dramatic increase in the number of drifting buoys reporting on the GTS in the last two years (i.e. 716 in April 2003, 1043 in April 2005), and the commitments by Members/Member States to maintain a network of 1250 drifting buoys as of the present session, in line with OOPC requirements. It thanked Members/Member States for the additional commitments that had been made to achieve this and for their continuing support. In April 2005, 270 drifting buoys reported barometric pressure (compared to a target of 700), including about 78 in the Southern Ocean (compared with a target of 90), and the Commission encouraged Members/Member States to deploy more drifters with barometers to meet this target.

6.1.4 The Commission also noted with appreciation the recent extension of the TAO Array in the Indian Ocean (3 moorings in April 2005, with more than 30 planned) as well as the distribution of salinity data on the GTS from 25 moorings in the Pacific Ocean. It noted that the TAO/TRITON Array in the Pacific Ocean now included 67 buoys while the PIRATA array in the Equatorial Atlantic Ocean included 13 moorings. PIRATA was now in a consolidation phase, intended to demonstrate the utility of the data for climate forecasting and operational oceanography. The southwest extension of PIRATA was now in place and the southeast and northeast extensions were under review.

6.1.5 The Commission noted that in order to maintain the drifter array at a level of 1250 units, the DBCP was now heavily dependent upon the availability of deployment opportunities both by ship and by air, especially in the Southern Hemisphere. It urged Members/Member States to consider what deployment opportunities they might offer, and to convey that information to JCOMMOPS, which acted as a focal point in this regard.

DBCP - Data Telecommunication

6.1.6 The Commission noted with appreciation that many Local User Terminals (LUTs) had been connected to the CLS/Service Argos network of regional receiving stations. Data collected in near-real-time via these stations were processed through the standard Argos system and GTS distribution chain. The percentage of data received within one hour of collection by the satellite had increased since 2003 from 20% to 70%, due primarily to the recent development of the Argos network of regional receiving stations, and improvements in Internet connectivity.

6.1.7 The Commission noted recent changes with regard to Argos Tariff policy, and particularly the new "pilot project" which had been negotiated at the 24th Argos Joint Tariff Agreement meeting (Chennai, India, October 2004). The new rules and cost structure had permitted a dramatic increase in the number of drifter deployments during 2005.

DBCP - Data management

6.1.8 The Commission was pleased to learn that the FM 94-XII Ext. BUFR code had been successfully implemented within the Argos GTS sub-system in July 2003. All buoys which reported on the GTS from Service Argos in FM 18-XII BUOY format were now reporting in both formats, i.e. BUOY and BUFR. Buoy data would continue to be distributed in BUOY format for an undefined period, probably several years.

6.1.9 The Commission noted with appreciation that a web-based buoy metadata collection scheme had been implemented at JCOMMOPS for global use, and thanked the European Action Group for its financial contribution to this effort. It noted that an OCG proposal for real-time distribution of metadata for SST and temperature profile data had been discussed and agreed upon by the DBCP. An *Ad hoc* working group was being established by JCOMM and a workshop would be organized in 2006 to eventually establish a pilot project to implement a practical solution to the problem of metadata.

DBCP - Vandalism

6.1.10 The Commission noted with concern that acts of vandalism against data buoys continued to be a problem and had often resulted in loss of instruments. The Commission agreed that actions that had been taken by the DBCP in the last few years to prevent vandalism should be ongoing. These included provision of: (i) a vandalism leaflet via the DBCP web site; (ii) information to mariners; and (iii) information through other international organizations or commissions such as IMO, FAO, IHO, ITC.

DBCP - Instrument development and evaluation

6.1.11 The Commission recalled that instrument evaluation was conducted through the DBCP evaluation group, and that the group also dealt with standardization aspects of instrumentation, including recommendations for Argos message formats, and propositions for new technological developments. The latter included the storm buoy (higher resolution data transmitted during storms), and the smart buoy (increasing buoy life-time by transmitting data only when required) concepts.

6.1.12 The Commission noted that, in an endeavour to minimize accidents and satisfy health and safety requirements, the seventeenth session of the DBCP had made safety recommendations regarding moored buoy design and maintenance operations, including at sea. The Commission urged buoy operators and manufacturers to follow these recommendations (<http://www.dhcp.noaa.gov/dhcp/safety.html>)

DBCP- Information Exchange

6.1.13 The Commission noted that the DBCP maintained information on its current activities, status, and mode of operations through its web site and through the JCOMMOPS web site as well as through the technical document series now made available via CD-ROM. It noted that scientific and technical workshops systematically organized in conjunction with DBCP annual meetings proved successful in establishing useful communication between buoy operators, scientific and operational users, manufacturers, and satellite data telecommunication providers.

DBCP - Technical Coordinator

6.1.14 The Commission expressed its appreciation to the DBCP for developing and coordinating buoy networks. It agreed that the Panel's Technical Coordinator position was essential for the success of the Panel's activities, thanked those Members/Member States already contributing to the support of the position, and urged them to continue their existing contributions or new Members/Member States to consider contributing. At the same time, the Commission agreed with the recommendations of the Management Committee that new, longer term solutions for JCOMMOPS funding as a whole should be investigated to ensure the continuity of the position of technical coordinator of the DBCP and SOOP. It asked the Secretariats to investigate the feasibility with Members/Member States and to report to the Management Committee (see also discussions under agenda item 6.4).

Ship Observations Team (SOT)

6.1.15 The Commission noted with appreciation the achievements of its Ship Observations Team (SOT), made up of the Voluntary Observing Ship Panel (VOSP), the Automated Shipboard Aerological Programme Panel (ASAPP), and the Ship Of Opportunity Programme Implementation Panel (SOOPIP). The challenge for the SOT was to maintain, coordinate and wherever possible integrate these programmes to support a developing range of well defined operational and research applications.

6.1.16 The Commission agreed that the Team had been effectively working towards establishing a truly coordinated global ship-based observing programme, which now provided an efficient mechanism for integrating and streamlining environmental monitoring from volunteer ships as well as for supporting efforts to enhance the quantity and quality of ship-based meteorological and oceanographic observational data.

SOT - SOOPIP

6.1.17 The Commission noted that the work of the SOOP Implementation Panel had suffered from an increase in the cost of XBT probes. At the same time, strong recommendations had been made in 1999 by the OOPC and CLIVAR Upper Ocean Thermal Review for SOOPIP to migrate its mode of operations from broadcast (low density) to line mode with 51 clearly identified frequently repeated and high density lines. The transition to line mode had begun during the last intersessional period in parallel with Argo implementation. The Commission noted with appreciation that the UOT plan proved successful as most of the SOOPIP lines were now operated in the recommended mode and the number of XBT probes deployed yearly began to rise again, to reach about 23000 in 2004 compared to 18500 in 2003. However, the Commission noted with concern that 14 UOT lines were still under sampled in 2004. It agreed that efforts remained to be made in order to identify enough resources to operate the programme at full speed and to recruit ships on all required lines. The Commission noted that SOT and OCG had recommended that JCOMM established a trust fund for consumable expenditures (see discussion under paragraph 6.3.13) and adopted a recommendation to that effect (see agenda item 6.6). The commission noted with appreciation that the SOT was organizing an International Indian Ocean

XBT training workshop in Goa, India, to build capacity and encourage participation in the region.

SOT - VOS

6.1.18 The Commission recognized that the VOS had traditionally been a nationally based effort, with individual countries each maintaining a VOS fleet. The inclusion of VOS under SOT had provided the opportunity to better coordinate and promote VOS activities at an international level, to the benefit of all VOS programmes. Through the work of the VOS Panel and the Task Teams, good progress has been made to improve global monitoring and reporting procedures for VOS. Measures had been introduced to enhance the communication between PMOs as well as VOS Focal Points.

6.1.19 The Commission noted that, whilst the vast majority of SHIP reports were still prepared manually by ship's officers, many ships now used electronic logbook software to compile observations e.g. TurboWin, SEAS, and that there had been a steady increase in the number of automated shipboard systems.

6.1.20 The Commission strongly supported the excellent work done by PMOs, which underpinned the VOS programme. The VOS Panel sought to strengthen their role by providing guidance on how to recruit more ships to VOS and VOSclim, how to improve the quality of SHIP data, and by addressing issues relating to day to day PMO operational concerns such as security and port access.

SOT - VOSclim

6.1.21 The Commission recalled that the primary objective of the VOSclim Project was to provide high quality ship based marine meteorological data and associated metadata to serve as a reference data set to support global climate studies, and that the VOSclim Project was developing best practices which should be adopted more widely within the Voluntary Observing Fleet. It noted that 113 ships had been recruited by December 2004 and that it was envisaged that the VOSclim target of 200 ships should be attained by mid-2006 at the current recruitment rate. Slower than expected implementation was, to some extent, due to PMO resource limitations and because of the many changes in the project focal points during the previous year. One goal of VOSclim was to assess data quality of instruments used on the VOS. The expertise of the PMOs in recruiting suitable ships and in responding to quality monitoring issues was recognized as being essential to the success of the project. Real-time transmission of the project observations, and real-time monitoring through the VOSclim Real Time Monitoring Centre (RTMC), established at the UK Met Office, had been operating efficiently. However there remained some problems to overcome with respect to the collection of the delayed mode project data and their subsequent transfer from the Global Collecting Centres (GCC) to the US National Climate Data Centre (NCDC), which was acting as the Data Assembly Centre (DAC) for the project. The Commission noted that the VOSclim project had now been established as a SOT VOS Panel Task Team, chaired by Ms Sarah North (UK). The SOT VOS Panel would replace the VOSclim Project management team. The Panel would evaluate the added value of VOSclim data, make recommendations with regard to the project's future, and consider whether the lessons learned from VOSclim could be used to improve overall VOS data quality.

6.1.22 The Commission noted that the VOSclim target of 200 ships was defined by practical rather than scientific considerations. It asked the Management Committee to ensure that an appropriate group of experts undertook a scientific review of the requirements for the VOSclim and VOS programs, for use in both numerical weather prediction and in climate studies, reporting back to the next session of the Commission.

SOT - ASAPP

6.1.23 The Commission recalled that the Worldwide Recurring ASAP Project (WRAP) had been established in early 2001 by the ASAP Panel as a means to enhance the availability of atmospheric profile data from remote ocean areas, in particular in the Southern Hemisphere, and that the project had been warmly welcomed by JCOMM-I. The project had been implemented and maintained as a collaborative effort involving the Australian Bureau of Meteorology, the Met Office (UK) and NOAA (USA), with the project leader, Capt. Gordon Mackie, funded through the ASAP Trust Fund. The Commission noted with appreciation that several voyages had been completed under WRAP, by two ships, during the intersessional period, and that the soundings taken in the Indian Ocean, when available, had been shown to have had a significant impact on upper air analyses.

6.1.24 At the same time, the Commission noted with regret that a decision had been taken in mid-2005 to discontinue WRAP. This decision was influenced by several factors, including the difficulties in recruiting and maintaining ships on the desired route, the low volume of upper-air data in relation to the time and money invested, and the unwillingness of other Members/Member States to participate in and contribute to the project. The Commission, while appreciating the reasons for the decision, nevertheless expressed its regret at its termination, and reiterated its belief in the value of in situ upper air profile data from the Southern Hemisphere oceans, in support of NWP, GCOS and research programmes such as THORPEX. It expressed its considerable appreciation to the WRAP participants for the work they had undertaken throughout the lifetime of the project, and requested the Ship Observations Team to continue to monitor the possibilities for its re-establishment at some future date, with enhanced support from a greater number of Members/Member States.

6.1.25 The Commission was pleased to note that the E-ASAP programme was commissioning new ASAP units on ships crossing the North Atlantic and Mediterranean areas, and was gradually integrating the existing European national ASAP ships under its programme. E-ASAP was operating 6 ships providing 1970 soundings in 2004, with the total of European ASAPs being 13 ships and 3950 soundings in 2004. It had established a target of operating 18 ships providing 5800 soundings per year by 2006. It was noted that every year, 90% of ASAP units were operating in the North Atlantic, with a recent increase in units operating in the Western Mediterranean.

SOT - cross cutting issues and integration

6.1.26 The Commission noted with appreciation that the SOT had addressed a number of cross-cutting and integration issues, oriented to ensuring the most effective and efficient use of volunteer ships as marine observation platforms, to allowing the incorporation of new programmes and their requirements, and ultimately to contributing to achieving the goals of JCOMM itself. Such issues included:

- “Volatility” in ship routing operations and recruitment, plus coordination of ship greetings and inspections. A Task Team on VOS Recruitment and Programme Promotion had been established. A single page recruitment flyer, recruitment PowerPoint presentation, and a generic SOT Certificate of Appreciation was produced. Mailing lists for the SOT, VOS, PMOs, and VOSclim had been created;
- Information exchange had been encouraged, particularly regarding instrument development and data applications. Web sites had been established, including for the SOT, hosted by JCOMMOPS; the VOS, hosted by the Australian Bureau of Meteorology; and the VOSclim, hosted by the US NCDC;

- The need for standardization on methods, data processing, and data management had been recognized and solutions proposed. Task Teams on: (i) Instrument Standards; and (ii) Coding had been established;
- A Task Team on Metadata for Publication No. 47 had been established and recommendations made, particularly regarding content and format of National submissions to Pub. 47 as well as the format of a revised version of the Publication. Action on this issue is taken under agenda item 10. The Commission strongly encouraged VOS operators to ensure that up to date metadata were regularly provided to the WMO Secretariat in the latest version, and that metadata were correctly formatted;
- The SOT had recognized that measurements of non geo-physical measurements, such as chemical and biological, should now also be considered by the SOT;
- Liaison and coordination with the ocean carbon community had begun, and especially with the International Ocean Carbon Pilot Project (IOCCP);
- The SOT had been working with other JCOMM teams on the definition of performance metrics;
- A Task Team on SOT Coordination had been established and action proposed. JCOMMOPS was providing full coordination to SOOP, and it was proposed that it could provide some coordination to the SOT as a whole (see agenda item 6.4);
- A Task Team on Satellite Telecommunication System Costs had been established and draft proposals made (see discussion under agenda item 7);

6.1.27 The Commission agreed that the SOT was providing essential support for the deployment of drifting buoy and Argo profiling floats and recommended that a good level of coordination between the different components of the observing system under the OPA was necessary;

6.1.28 The Commission agreed that maintaining an efficient and stable network of Port Meteorological Officers (PMO) was paramount to the success of the SOT implementation. It requested the Secretariat and the co-presidents to continue to keep the IOC and WMO governing bodies of the high importance of the PMO network so that they could convey this message to Members/Member States at an appropriate level.

6.1.29 The Commission noted with great concern that security issues arising from availability of ships locations via public Web sites had already lead to the loss of ships from national VOS fleets, and had already resulted in BBXX messages being stopped from distribution on the GTS. It urged its Members/Member States to urgently take any possible action to prevent making the ship positions available via the Web, including contacting the relevant organizations/companies and informing them of the security risk in making ship positions available, or other solutions involving the chain of communications to the GTS. JCOMM and SOT needs to develop a plan of action to stop leakages on ship positions and to monitor the effectiveness of these activities.

6.1.30 The Commission noted with appreciation the continued development of automation and integration of ship based observing systems as well as electronic logbook software, e.g. SAMOS, AVOS, BATOS, MILOS, MINOS, Automet, SEAS, Turbowin. It encouraged Members/Member States to continue these developments.

6.1.31 The Commission agreed that pilot projects would have to be considered for the design

and evaluation of new observation programmes, such as the IOCCP for pCO₂ and GOSUD for sea surface salinity monitoring programmes.

6.1.32 The Commission praised the efforts of the SOT to integrate its observing system in such an impressive way during the last intersessional period while recognizing that operating the ship based observing system was increasingly difficult due mainly to: (i) reduced availability of ships; (ii) security issues; (iii) lack of resources; and (iv) telecommunication costs. It urged Members/Member States to continue and strengthen their support to the different national components of the SOT.

Global Sea Level Observing System Group of Experts (GLOSS)

6.1.33 The Commission recognized the major importance of the GLOSS, both to a variety of operational activities in Members/Member States and to global climate studies, and noted the progress made as an international coordination mechanism for global high quality sea level observations together with important elements for: (i) assisting in maintaining the GLOSS Core Network of tide gauges of 290 stations; (ii) training in sea level measurements and analysis; (iii) development of scientific and technical training material on various sea level aspects; and (iv) facilitation of the provision of tide gauges and geodetic equipment (GPS) to developing countries.

6.1.34 The Commission noted that the present status of the GLOSS implementation, as measured in terms of data delivery from the GLOSS Core Network of stations, was reported annually by the Permanent Service for Mean Sea Level (PSMSL). An 'operational' station from a PSMSL viewpoint meant that MSL monthly and annual values had been received and checked as far as possible, and had been included in the databank. (See http://www.pol.ac.uk/pssml/gloss.status/status_oct2004.html). The Commission further noted that a more elaborate status summary was provided in the GLOSS Adequacy Report from 2003 (<http://unesdoc.unesco.org/images/0013/001302/130292e.pdf>), with progress being measured primarily in terms of data return for the various GLOSS data streams. The numbers had changed slightly since 2003; however, the overall conclusions given in the Adequacy Report were still valid, as summarized below:

- More than 55 Member States contributed data to the GLOSS;
- About 60% of the GCN was considered operational, with similar percentages for the various sub-networks (see the Adequacy Report for detailed assessments);
- Real time (daily) data were available from approximately 76 GLOSS stations;
- Fast (monthly) data are available from approximately 114 GLOSS stations;
- There has been considerable growth in the number of GLOSS stations that are linked to GPS or DORIS (75 at the time of the Adequacy Report);
- Historic data rescue activities have increased data holdings (over three million additional hourly data points were added through initiatives from the National Oceanic and Atmospheric Administration alone).

6.1.35 The Commission noted that GLOSS depended upon the work of data centres that were funded primarily from national resources. It acknowledged with appreciation those centres which played important international as well as national roles, including the Permanent Service for Mean Sea Level (PSMSL) in the UK; University of Hawaii Sea Level Center (UHSLC) in the USA which provides GLOSS and CLIVAR "fast" and "delayed-mode" coordination; and the British

Oceanographic Data Centre (BODC) in the UK which provided GLOSS and CLIVAR delayed-mode coordination

Highlights of GLOSS activities

6.1.36 The Commission noted with appreciation the many productive training courses, expert visits and other activities including provision of tide gauges that had taken place over the past intersessional period. These included: three training courses; a GLOSS Assessment Report (GAR); three technical expert visits; one GLOSS technical workshop and contributions to a number of conferences and related meetings; an update to IOC Manuals and Guides No. 14; multi-lingual versions of the GLOSS brochure, and the establishment of GLOSS Web sites for Africa and South America; the provision and installation of four new tide gauges, in Brazil, Ghana and Mozambique; as part of the ODINAfrica III project, eventual installation of some 12-15 tide gauges, many at GLOSS Core Network sites in Africa; and implementation of a joint project with IODE for a data archaeology survey of sea level records.

Future GLOSS activities

6.1.37 The Commission noted that a major new activity in the next four years would be coordinating the installation and upgrade of tide gauges in the Indian Ocean as part of the Indian Ocean Tsunami Warning System, using funds from Finland and ISDR. It further noted that GLOSS would continue to assist with advice and coordination on the sea level aspects of the OdinAfrica III project and would explore opportunities under the International Polar Year 2007-8 programme to help Member States upgrade the Arctic and Antarctic tide gauge networks, with many of the gauges that would be installed contributing to GOOS and GCOS.

6.1.38 The Commission noted with interest that, in association with the provision of tide gauges, several training courses were being planned, including those as part of the OdinAfrica project and the Indian Ocean Tsunami Warning System activity.

Argo

6.1.39 The Commission noted with interest the current status of the Argo profiling float project, a pilot project of OOPC, GODAE, GCOS, and GOOS and a part of the integrated global ocean observation strategy. Argo was a global network of profiling floats, surfacing and measuring temperature and salinity in most cases profiling to 2000 metres every 10 days, and transmitting their data in real time. It was important for climate research, for short-term ocean forecasting, and for ocean model development. It was designed to have a global 3° resolution coverage in the ice-free oceans, with 3000 active floats when complete.

6.1.40 The Commission was pleased to note that Argo had made tremendous progress during the intersessional period. Shortly before the session in September 2005, it reached a milestone with 2000 profiling floats reporting, 66% of the designed network, and truly global coverage including large parts of the Southern Hemisphere. Eighteen countries had participated in the Argo project by providing floats, and in total well over 30 countries participated through the provision of logistical or scientific support to the project.

6.1.41 The Commission noted that the Argo network was already making important contributions to climate research, where in some parts of the world ocean there were now more Argo profiles than historical hydrographic profiles; to short-term ocean forecasting through the use of Argo data in GODAE forecasting models; and to coupled ocean-atmosphere weather forecasting systems. The Argo project had met its goal of providing real-time data access, with 95% of floats

reporting their data on the GTS, 85% within 24 hours of the profile. This was part of an entire data management and quality control system developed for Argo.

6.1.42 The Commission recognized that maintenance of the completed array would require constant deployment in all regions of the world's oceans, of about 800 floats per year, and encouraged Members/Member States to maintain or increase their level of support to the Argo project.

6.1.43 The Commission recalled that Argo was managed as an internationally-coordinated pilot project by the Argo Steering Team (<http://www.argo.net>), and that it maintained close links with the JCOMM Observations Programme Area via the Coordinator and the Coordination Group. The Commission also noted the close cooperation between Argo and JCOMM through the Argo Information Centre, located at JCOMMOPS. The Argo Information Centre, among other tasks, had a successful record of cooperation with the SOT for deployment opportunities.

6.1.44 The Commission recognized that the Argo programme would be ready to transition from a pilot project to a sustained part of the ocean observing system during the coming intersessional period. It noted that most Argo deployments relied and would continue to rely on research funding, and it urged Members/Member States to seek means for the continued long-term sustained funding of such deployments. The Argo Programme was encouraged to report on the use and benefits of Argo data. This would be of value in making the case for sustained funding for Argo.

6.2 Remote sensing (agenda item 6.2)

WMO Space Programme

6.2.1 The Commission noted with interest that the Fourteenth World Meteorological Congress (Cg-XIV) had established a new major cross cutting Programme, the WMO Space Programme (Resolution 5 (Cg-XIV)), in response to the expansion in the availability of satellite data, products and services and in recognition of the increase in responsibilities for WMO in this area. Cg-XIV considered that the scope, goals and objectives of the new WMO Space Programme should respond to the considerable growth in the utilization of environmental satellite data, products and services within the expanded space-based component of the Global Observing System (GOS) that now included appropriate R&D environmental satellite missions. Cg-XIV also supported the WMO Space Programme Long-term Strategy reviewed at the third session of the Consultative Meetings on High-level Policy on Satellite Matters.

6.2.2 Cg-XIV agreed that the main thrust of the WMO Space Programme Long-term Strategy should be:

“To make an increasing contribution to the development of the WWW GOS, as well as to the other WMO-supported Programmes and associated observing systems (such as AREP's GAW, GCOS, WCRP, HWR's WHYCOS and JCOMM's implementation of GOOS) through the provision of continuously improved data, products and services, from both operational and R&D satellites, and to facilitate and promote their wider availability and meaningful utilization around the globe.”

6.2.3 The Commission noted that the main elements of the WMO Space Programme Long-term Strategy were agreed as follows:

- Increased involvement of space agencies contributing, or with the potential to contribute to, the space-based component of the GOS;

- Promotion of a wider awareness of the availability and utilization of data, products - and their importance at levels 1, 2, 3 or 4 - and services, including those from R&D satellites;
- Considerably more attention to be paid to the crucial problems connected with the assimilation of new data streams in nowcasting, numerical weather prediction systems, reanalysis projects, monitoring climate change, chemical composition of the atmosphere, as well as the dominance of satellite data in some cases;
- Closer and more effective cooperation with relevant international bodies;
- Additional and continuing emphasis on education and training;
- Facilitation of the transition from research to operational systems;
- Improved integration of the space component of the various observing systems throughout WMO Programmes and WMO-supported Programmes;
- Increased cooperation amongst WMO Members to develop common basic tools for utilization of research, development and operational remote sensing systems;

Additional emphasis on recommendations for data management for satellite data.

6.2.4 The Commission also noted that Cg-XIV had considered the progress and results from the sessions of the Consultative Meetings on High-level Policy on Satellite Matters. Congress had stressed that the WMO user community and space agencies should be represented at the highest level at the sessions. The Consultative Meetings would continue to provide advice and guidance on policy-related matters and would maintain a high level overview of the WMO Space Programme. Congress agreed that CBS should continue the lead role, in full consultation with the other technical commissions, for the new WMO Space Programme.

6.2.5 The Commission noted that the WMO Space Programme Implementation Plan for 2004-2007 as contained in Section 4 and Annex III to the report of the fourth session of the WMO Consultative Meetings on High-level Policy on Satellite Matters had been approved by the fifty-sixth session of the WMO Executive Council and that the Implementation Plan provided further details to the WMO Space Programme Long-term Strategy as approved in the WMO 6LTP by Cg-XIV.

6.2.6 The Commission noted with appreciation that WMO, through its Space Programme, had acted as a catalyst to greatly improve the utilization of satellite data and products. The Virtual Laboratory for Education and Training in Satellite Meteorology (VL) had already made a considerable impact through its "Centre of Excellence". The Commission was pleased to see the integration of the new R&D constellation into education and training activities. It also noted that the WMO Space Programme Long-term Strategy and associated Implementation Plan provided for increased utilization of the VL to the benefit of Members/Member States, especially for fuller exploitation of R&D data, products and services, as well as those from new and existing operational meteorological satellite systems.

6.2.7 The Commission noted that the WMO EC-LVI had strongly supported the development of the space component of an integrated global observing system and requested the WMO CBS, as a matter of urgency especially in light of the emerging new activity for a Global Earth Observation System of Systems (GEOSS), to further its development through its role as lead technical commission for the WMO Space Programme, in consultation with all other relevant WMO and co-sponsored bodies.

IOC Remote Sensing Strategy

6.2.8 The Commission noted with interest that the twenty-second session of the IOC Assembly called for a strategy on the use of remote sensing in oceanography (Resolution XXII-13), in recognition of the needs of developing countries to have access to and to make more use of the data from earth observation satellites. The Executive Council at its thirty-seventh session endorsed a "Plan for the Use of Remote Sensing in Oceanography by Developing Countries". The Commission noted that the plan to improve the use of remote sensing in oceanography had six main elements:

- (a) Sponsored attendance of developing country representatives at space-based conferences;
- (b) Sponsored course in remote sensing techniques, for developing countries;
- (c) Support for regional development of remote sensing for IOC programme applications;
- (d) International coordination of capacity building activities with space agencies;
- (e) Development of training materials;
- (f) Leveraged financial support for capacity building initiatives in remote sensing.

6.2.9 The Commission noted with interest that the IOC, in partnership with CEOS and IGOS partners and the UNESCO Crosscutting Project on remote sensing in Africa, had sponsored a number of activities to further this plan, including support given to: the UNESCO Bilko Project on Developing Training Capacity for Coastal and Marine Remote Sensing and the UNESCO Remote-Sensing Project in Africa; several regional training courses (e.g., satellite altimetry, Kenya 2004; Pan Ocean Remote Sensing Conference, Chile 2004; ICSU's Committee on Space Research, Morocco 2005); and grants for travel, research and fellowship. The Commission welcomed this information on IOC activities, and encouraged JCOMM to support as appropriate IOC activities to facilitate access to and application by Member States of data from ocean satellites.

JCOMM involvement and actions

6.2.10 The Commission noted with interest and appreciation the report of the JCOMM Satellite Rapporteur, Professor Hiroshi Kawamura, recognizing that over the past two decades, satellite remote sensing had become a mature technology for measurements of many ocean variables. The role of ocean satellites in an ocean observing system for climate had been clearly stated at OceanObs99. Subsequently, the IGOS Partnership had published its "Ocean Theme" document, to plan the transition from research to operational environmental prediction of the oceans, critically linked to the availability of operational ocean satellites.

6.2.11 The Commission recognized that potentially, many users of satellite-derived information were located in coastal areas, and that the role of the GOOS Regional Alliances was crucial in facilitating the access and application of ocean satellite data by such users. Applications in coastal areas in particular required satellite products with high spatial resolution and rapid delivery times, which posed additional requirements on the satellite operators.

6.2.12 The Commission noted and supported the significant role played by the rapporteur during the intersessional period with regard to the Coordination Group for Meteorological Satellites (CGMS). In particular, the rapporteur had ensured that a new permanent action of the CGMS was to consider the IOC satellite data requirements, including those of the GRAs as noted above. The Commission further noted with appreciation the work undertaken by the rapporteur, in conjunction

with the JCOMMOPS Coordinator, to develop a statement of guidance on how well the observing system, in situ and space-based, met the data requirements for marine services (see also discussion under agenda item 4.2).

6.2.13 With regard to the coming intersessional period, the Commission supported the proposal by the Management Committee to establish a Cross-cutting Team on JCOMM Satellite Data Requirements, consisting of four satellite experts, each responsible for one PA (two for OPA), and reporting directly to the Management Committee. Further information on and action taken in this regard is found under agenda item 14.1.

6.3 Status of the in situ observing system, including enhancements since JCOMM-I and additional enhancements needed to match requirements (agenda item 6.3)

6.3.1 The Commission noted that there was significant international momentum for implementation of a composite global observing system consisting of: (1) the in situ networks; (2) continuous satellite missions; (3) data and assimilation subsystems; and (4) system management and product delivery. After wide consultation with the ocean observing system community, a five-to-ten year implementation plan for a global ocean observing system for climate was published in the GCOS *Implementation Plan for the Global Observing System for Climate in support of the UNFCCC* (GCOS-92); the plan was endorsed by the UNFCCC; and the ocean chapter endorsed as the ocean backbone of the Global Earth Observation System of Systems (GEOSS). A fundamental requirement detailed by GCOS-92 was achievement of global coverage by the *in situ* networks. The Commission noted that at the time of JCOMM-I in 2001 the total global system was 34% complete; by JCOMM-II in 2005 the system was 55% complete.

6.3.2 The Commission recognized that although the backbone system specified by GCOS-92 was designed to meet climate requirements, marine services in general would be improved greatly by implementation of the global coverage called for by this design. The Commission noted that the system would support global weather prediction, global and coastal ocean prediction, marine hazard warning, marine environmental monitoring, and many other non-climate users. It further noted that JCOMM was identified as the implementing agent, or a contributing implementing agent, for 21 of the specific actions listed in the GCOS-92 ocean chapter, and that these specific actions provided an excellent roadmap to guide the OPA work. The Commission recommended, therefore, that the OPA work plan should be based on implementing the ocean and relevant atmospheric actions within GCOS-92 for the next intersessional period. The GCOS-92 goals incorporate those that the JCOMM OPA and Argo had been pursuing for the past four years – global coverage by the moored and drifting buoy arrays, profiling floats, tide gauge stations, and ship-based networks (plus continuous satellite missions).

6.3.3 The Commission also acknowledged that continuity in the observing system was of central importance for climate applications, accepted the GCOS *Climate Monitoring Principles* as best practice, and noted that the work of the DBCP, SOT, and GLOSS GE would be conducted in accordance with the GCOS *Climate Monitoring Principles* wherever possible. The Commission also noted the importance of oceanographic and meteorological observations carried out at coastal stations. These observations are essential for the analysis and development of prognostic products for risk assessment and prevention and mitigation of hazards affecting populations and economies of coastal states. Development of this information is one of the JCOMM objectives for the OPA during the next intersessional period.

6.3.4 The Commission noted that tide gauge stations and moored buoys for tsunami and storm surge warnings were a priority for the international global observing system as well. Opportunities for JCOMM OPA support to the international marine hazard warning system included real-time reporting from GLOSS tide gauge stations, coordinated deployment of ocean buoys and floats, and the use of common platforms and logistics infrastructure for multiple observational purposes. The Commission recommended that implementation of observational components in

support of the international comprehensive marine hazard warning system would also be a main requirement driver for the OPA work plan over the next four years (see agenda item 11.5 for related action).

6.3.5 The Commission recognized that, in addition to linkage with the Argo programme, it was now clear that JCOMM needed to coordinate with several other global programmes for efficient and effective observing system implementation. The OPA was developing these links, and maintaining appropriate coordination would be important over the next four years with the international Ocean Sustained Interdisciplinary Timeseries Environment Observation System (OceanSITES) programme, the International Ocean Carbon Coordination Project (IOCCP), and the international comprehensive marine hazards warning system.

6.3.6 The Commission acknowledged with appreciation the major milestone that had been achieved by the DBCP in 2005, with the global drifting buoy array reached its design goal of 1250 buoys in sustained service, thus becoming the first component of the Global Ocean Observing System (GOOS) to be completed. The DBCP deployed Drifter 1250 on 18 September 2005 from Halifax, and the Commission acknowledged with appreciation the special deployment ceremony and celebration that had been held just prior to JCOMM-II to commemorate this significant milestone and offered its particular thanks to NOAA, Service Argos, CMOS and Environment Canada for hosting this historic event.

System-wide monitoring and performance reporting

6.3.7 The Commission noted that a major challenge for the OPA was to develop easy-to-understand performance reports that could help in evaluating the effectiveness of the observing system and help in efforts to convince governments to provide the funding needed to meet global implementation targets. It further noted that it would not be possible to achieve global coverage of the Earth's oceans with existing resources. Governments needed to commit additional resources if JCOMM was to achieve global coverage. The Commission noted with appreciation that JCOMMOPS and the OPA were working to develop standard base maps showing required global coverage against what was presently in place, to evaluate observing system status and effectiveness, and to develop summary reports illustrating how advancements toward global coverage improved the adequacy of the observational information.

6.3.8 The Commission noted that a standard map projection and colour coding had been accepted by the OPA for reporting system status and progress. The Commission encouraged all Members/Member States to use these conventions for mapping their JCOMM contributions.

6.3.9 The Commission noted that in addition to platform statistics calculated by JCOMMOPS, quarterly performance reports were now available for sea surface temperature, sea surface salinity, temperature profiles, and salinity profiles. The OPA was working to incorporate reports for other ocean variables that had been specified by GOOS and GCOS, and access to these reports was via JCOMMOPS at www.jcommops.org/network_status.

6.3.10 The Commission noted with interest that a demonstration project was underway to routinely report observing system monitoring and performance metrics in cooperation with the GOOS Project Office of IOC. A consolidated Progress Report with Contributions by Countries was available at www.jcommops.org/network_status which listed the 64 countries and the European Union that maintained elements of the composite ocean observing system, and the number of in situ platforms and expendables contributed by each country. All JCOMM Members/Member States were invited to routinely review this report and provide corrections as needed to opa@jcommops.org. It was further noted that the observing system contributions were included in this report if they provided data to the international community in accordance with WMO and IOC data policies; elements that did not share data freely and openly were not included in this report.

6.3.11 The Commission noted that a web page was under development that provided a single entrance portal to link to all web sites being maintained by countries contributing to implementation of the global ocean observing system. This single entrance portal was intended to illustrate to users the “system of systems” that was being implemented by JCOMM and partners. The Commission noted that this portal to national center Web sites was available through the JCOMMOPS access point: www.jcommops.org/network_status. It encouraged Members/Member States to review the Web site and provide corrections as needed to opa@jcommops.org.

Funding to meet implementation targets

6.3.12 The Commission acknowledged that JCOMM must help in efforts to convince governments to provide the funding needed to meet global implementation targets. It recognized that global coverage could not be achieved with the resources that were presently being applied. It recalled that the baseline GCOS-92 system was only 55% complete, and that much work remained to be done and additional resources were needed. The Commission recognized that one way the OPA could help was to develop easy to understand statistics and reports that the decision makers would be able to use to justify new funding, and encouraged OPA efforts in this regard to continue.

6.3.13 The Commission noted that the OPA had suggested a special project for helping to finance expansion of the ocean system. The establishment of a common fund for consumables would initially be focused on XBTs but other expendables could be added in time. The Commission noted that the provision of ship time as well as expendables was necessary to build contributions to the global observing system by developing countries. The need for countries to support the SOOP XBT programme was a concern of JCOMM-I, and included the concern that countries were beginning to divert resources from the XBT programme to pay for other new programmes such as Argo. It recalled Recommendation 2 (JCOMM-I) that strongly recommended Members/Member States to “increase the resources committed to supplying expendables for ship observations in support of international implementation plans.”

6.3.14 The Commission adopted Recommendation 6/1 (JCOMM-II) - Consumables for Ship-Based Observations, for the establishment and management of a JCOMM Trust Fund to provide a simple mechanism to help more countries contribute to the international observing system and complete the global XBT network.

6.4 JCOMMOPS development (agenda item 6.4)

6.4.1 The Commission noted with appreciation that the development of JCOMMOPS had been conducted efficiently since its formal establishment at JCOMM-I. It recalled that JCOMMOPS was based on existing DBCP, SOOP, and Argo international coordination mechanisms, included the Argo Information Centre (AIC), was staffed with two persons in Toulouse, France, employed by IOC of UNESCO, and was funded through voluntary contributions from Member States. The Commission agreed that the infrastructure put in place and the synergy between the DBCP and SOOP Technical Coordinator on one hand, and the Argo Technical Coordinator on the other hand had permitted rapid, and cost-effective development of numerous Web based monitoring tools using modern technology such as dynamic Web pages linked to a comprehensive data-base, and a Geographical Information System (GIS).

6.4.2 The Commission agreed that JCOMMOPS provided essential day to day technical support as well as programme status and monitoring information facilitating: (i) decision making by programme managers; and (ii) implementation and operations of major JCOMM components of the operational or pre-operational *in situ* ocean observing system. It agreed that the Centre also acted as a portal (i.e. relay) for observational programme information also available elsewhere.

6.4.3 The Commission recalled that, at its first session, it had requested the OCG to consider the benefits and efficiencies that could be realized by extending the terms of reference of JCOMMOPS to also include support for VOS and ASAP. The Commission agreed with the conclusions and recommendations of the OCG to this effect.

6.4.4 The Commission also agreed that JCOMMOPS could act as host location for information developed by the satellite rapporteur and Task Team on Satellite Data Requirements as well as for satellite information. The Commission therefore agreed to change JCOMMOPS Terms Of References to reflect this, bearing in mind that such services could only be made available provided that additional resources are committed.

6.4.5 The Commission agreed that JCOMMOPS should be eventually given an institutional visibility and financial support. To that end, the Commission agreed in principle to investigate feasibility for funding JCOMMOPS development and operations through a dedicated JCOMM trust fund instead of through the DBCP, SOOP, and Argo, and asked the Observations Coordination Group and the Secretariats to investigate this during the next intersessional period. It endorsed a review of JCOMMOPS activities and a report at JCOMM-III.

6.4.6 The Commission expressed its considerable appreciation to the DBCP, SOOP, and Argo, and especially the Member States contributing to their respective trust funds, for providing the resources required to operate the proposed centre. It strongly recommended that Member States continue to fund JCOMMOPS, and in particular the DBCP/SOOP and Argo Technical Coordinator positions. The Commission also invited VOS and ASAP sub-Panels or SOT Member States to investigate making contributions to the proposed trust fund when established. It endorsed the proposal to change the Terms of Reference for JCOMMOPS, and adopted Recommendation 6/2 (JCOMM-II) on the subject.

6.5 Instrument standardization and calibration (agenda item 6.5)

6.5.1 The Commission recalled that JCOMM-I had “*agreed that there was a developing requirement to establish properly resourced procedures for evaluating and possibly accrediting instrumentation and procedures used operationally by JCOMM observing system components..... In a similar vein, the Commission recognized a need to work towards implementation of mechanisms to ensure that data collected by observing system operators conformed to agreed upon basic standards, formats, and levels of data quality.*” JCOMM-I had requested the Management Committee to address these issues during the intersessional period.

6.5.2 The Commission was pleased to note, that in response to the request from JCOMM-I, and following the subsequent advice from the Management Committee, the Ship Observations Team had discussed the subject in detail at its first, second and third sessions (respectively, Goa, February 2002, London, July 2003 and Brest, March 2005). To address the various issues identified during these discussions, and to prepare some definitive advice for JCOMM, the SOT had established a small *ad hoc* Task Team, comprising representatives from its different panels as well as from the DBCP, to:

- (a) Compile information on existing activities, procedures and practices within JCOMM relating to instrument testing, standardization, calibration and intercomparison, as well as the standardization of observation practices and procedures;
- (b) Using guidance contained in existing guides including the WMO *Guide on Instruments and Methods of Observation* (WMO-No. 8), communicate with manufacturers regarding new technologies and recognized equipment problems;

- (c) Prepare a JCOMM Technical Report containing this information, to be made widely available through relevant Web sites (JCOMM, JCOMMOPS, VOS, DBCP, SOOP, SOT);
- (d) Provide guidance on testing and the calibration and intercomparison of marine meteorological and oceanographic observing systems;
- (e) 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;
- (f) Liaise closely with IOC in the preparation of a wider compilation of existing instrumentation and observing practices standards in oceanographic observations in general, with a view to inputting an appropriate contribution from JCOMM.

6.5.3 In addition, the SOT had recognized that operational programmes required that the user could be assured of certain levels of documented data quality, and that the data were easily accessible and in standard formats. This had implications for data standardization between and across the separate panel activities. It was recognized that in many cases there were successful quality monitoring and standard data assurance procedures in operation in each programme, such as the marine surface data monitoring undertaken by the Met Office (UK) on behalf of CBS, and data quality monitoring by GTSPP for SOOP, and the ASAP monitoring by ECMWF and Météo-France, and through the EUMETNET E-Surfmar and E-ASAP programmes. However, there was a need to ensure that appropriate documentation on these was made easily available and accessible across the JCOMM programme areas. Another issue related to data quality assurance for complementary observations, and how to integrate monitoring and assessment generally under JCOMM.

6.5.4 The Commission supported the approach adopted by the SOT, and requested that the study being undertaken should be completed as soon as possible, with the results published as a JCOMM Technical Report, as proposed. The Commission also agreed with the additional considerations noted in paragraph 6.5.3 above, which it agreed cut across all JCOMM Programme Areas. It therefore requested the Management Committee to again address the issue, with a view to providing a broader input from JCOMM in support of the wider IOC study.

6.6 Formal decisions or recommendations proposed for the Commission (agenda item 6.6)

6.6.1 Under this item, the Commission approved the draft text for the final report of JCOMM-II relating to the whole of agenda item 6 as given above. The Commission also adopted Recommendation 6/1 - Consumables for Ship-Based Observations (see paragraph 6.3.14 above) and Recommendation 6/2 (JCOMM-II) - New Terms of Reference for JCOMMOPS (see paragraph 6.4.4 above).

DRAFT RECOMMENDATION

Rec. 6/1 (JCOMM-II) – CONSUMABLES FOR SHIP-BASED OBSERVATIONS

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

- (1) Recommendation 2 (JCOMM-I) - Resources for Ship-Based Observations,
- (2) Final report of the third session of the Ship Observations Team, JCOMM Meeting Report No. 35,
- (3) The report of the Observations Programme Area Coordinator to JCOMM-II,

Recognizing:

- (1) That many components of the operational, in situ ocean observing system coordinated by JCOMM are currently well short of requirements, including in particular the XBT network coordinated by the Ship Observations Team,
- (2) That currently only a small number of Members/Member States contribute to the maintenance of the observing system,
- (3) That the cost of the purchase and supply of consumables (such as XBTs) represents a major obstacle to the enhanced involvement of maritime countries in the system;

Considering:

- (1) That the implementation of the observing system could be enhanced through the establishment of a simple mechanism to encourage more countries to contribute to the system and complete the global XBT and other networks,
- (2) That considerable cost savings could be achieved through the bulk purchase and supply of consumables for ship-based observations, including in particular XBTs,
- (3) That the provision of consumables from a common pool would greatly assist maritime countries wishing to contribute to the implementation and maintenance of the observing system, in support of national, regional and global interests and programmes;

Recommends:

- (1) That a scheme for the bulk purchase and supply of consumables for ship-based observations be developed, and a special trust fund be established for that purpose;
- (2) That Members/Member States which are in a position to do so, contribute to this trust fund, in support of the full implementation and maintenance of the ocean observing system coordinated by JCOMM, and the enhanced involvement of maritime countries in this work;
- (3) That at the same time, Members/Member States continue to procure and supply consumables for ship-based observations through their existing national procedures;

Requests:

- (1) The Observations Programme Area Coordinator, in consultation with the chairman of the Ship Observations Team, the co-presidents of JCOMM, the JCOMM Secretariat and relevant Members/Member States, develop a plan for the bulk purchase and supply of consumables for ship-based observations, for consideration and approval by the Management Committee;
 - (2) The Secretary-General of WMO and the Executive Secretary IOC to support the implementation of this plan through the establishment of a special trust fund for this purpose.
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DRAFT RECOMMENDATION

Rec. 6/2 (JCOMM-II) – NEW TERMS OF REFERENCE FOR JCOMMOPS

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

- (1) The JCOMM terms of reference and especially those related to the development of observing networks,
- (2) Recommendation 6 (JCOMM-I) – Establishment of a JCOMM in situ Observing Platform Support Centre (JCOMMOPS),
- (3) The final report of the first session of the Ship Observations Team, Goa, February 2002, JCOMM Meeting Report No. 11,
- (4) The final report of the first session of the Observations Coordination Group, La Jolla, April 2002, JCOMM Meeting Report No. 13,
- (5) The final report of the second session of the Ship Observations Team, London, July 2003, JCOMM Meeting Report No. 24,
- (6) The final report of the twentieth session of the DBCP, Chennai, October 2004, JCOMM Meeting Report No. 33,
- (7) The final report of the fourth session of the JCOMM Management Committee, Paris, February 2005, JCOMM Meeting Report No. 34
- (8) The final report of the third session of the Ship Observations Team, Brest, March 2005, JCOMM Meeting Report No. 35

Considering:

- (1) The requirement for JCOMM to be active in a process in which oceanographic and marine meteorological observing system elements transition to a fully integrated system,
- (2) The need for integrating at the international level a number of activities regarding operation and implementation of in situ marine observing systems,
- (3) The success of JCOMMOPS development and work, based on DBCP, SOOP and Argo technical coordination facilities, thanks to resources provided by Members/Member States through the DBCP, SOOPIP and Argo,
- (4) The potential value of extending JCOMMOPS activities to include some services to support SOT Coordination, as proposed by the second session of the Ship Observations Team,
- (5) The need to make satellite information available, and in particular results from the work of the Cross-cutting Team on Satellite Data Requirements;

Recommends:

- (1) To modify the JCOMMOPS Terms of Reference to enable the provision of extended support to SOT Coordination and to disseminate on the web site information provided by the Cross-cutting Team on Satellite Data Requirements;
- (2) That the new JCOMMOPS Terms of Reference should be as given in the annex to this recommendation;
- (3) That JCOMMOPS continue to be based in Toulouse, under the day-to-day supervision of the WMO and IOC Secretariats;

Requests Members/Member States, where possible, to commit the resources required to support JCOMMOPS.

Annex: 1

Note: This recommendation replaces Recommendation 6 (JCOMM-I), which is no longer in force.

ANNEX TO RECOMMENDATION 6/2 (JCOMM-II)

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

Under the overall guidance of the JCOMM Observations Coordination Group and following the direction of the Data Buoy Cooperation Panel, the Ship Observations Team, the Argo Steering Team, and the Cross-cutting Team on Satellite Data Requirements, the JCOMMOPS shall:

- (i) Act as a focal point for implementation and coordination of observing platforms monitored by the above programmes and provide assistance to platform operators for free and unrestricted exchange of data by, inter alia, providing information on telecommunications systems, clarifying and resolving issues between platform operators and telecommunications system operators, and encouraging the implementation of standard formats;
 - (ii) Maintain information on relevant data requirements for observations in support of GOOS, GCOS, and the WWW as provided by the appropriate international scientific panels and JCOMM Expert Teams and Groups, and routinely provide information on the functional status of the observing systems;
 - (iii) Provide a gateway for information on instrumentation deployment and servicing opportunities, and on operator contact information; and
 - (iv) Provide information on the observational program, including on instrumentation, on instrument evaluation, and on data quality.
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