DATA BUOY COOPERATION PANEL
TWENTY-FIRST SESSION

Buenos Aires, Argentina, 17-21 October 2005

FINAL REPORT

JCOMM Meeting Report No. 39

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO

WORLD METEOROLOGICAL ORGANIZATION

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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

A. ORGANIZATIONAL COMPONENT

1. ORGANIZATION OF THE SESSION

1.1. OPENING OF THE SCIENTIFIC AND TECHNICAL WORKSHOP

1.1.1 The Scientific and Technical Workshop with DBCP-XXI was opened in the conference room of the Regente Palace Hotel, at 09.30 hours on Monday, 17 October 2005.

1.1.2 On behalf of the Argentine Air Force, Comodoro D. Miguel Angel Rabiolo, Director General of the Servicio Meteorológico Nacional (SMN) and Permanent National Representative with WMO, extended a warm welcome to all participants in the forthcoming workshop and session. In doing so, Commodore Rabiolo congratulated the Panel on its fruitful and constant activities since 1985, as an official joint body of WMO and IOC. In the recent historic milestone of reaching the consolidation of an array of 1250 floats in operation, he noted that the joint efforts by WMO and IOC through the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) is a concrete example of future practice, and expressed his pleasure to exercise such a practice in Argentina through jointly hosting this session and scientific workshop with Servicio de Hidrografía Naval (SHN). Commodore Rabiolo finally wished a fruitful session and enjoyable stay in Buenos Aires.

1.1.3 On behalf of the Argentine Navy, Capitán de Navío D. Raúl Eduardo Benmuyal, Chief of the Servicio de Hidrografía Naval (SHN) welcomed participants to the meeting and to Buenos Aires. Given the influence of the oceans in global change and sustainable development, Captain Benmuyal stressed that it is essential to understand and predict global and regional oceanic conditions, as well as their interaction with the atmosphere, biosphere and the earth. He wished the Panel's activities would contribute to and influence the ongoing efforts for research and operation of global observing systems. He then expressed his pleasure to jointly host this session with SMN, and introduced Captain Luis Capurro, retired from the Argentine Navy, who was a pillar of the development of oceanography in the country and the region, and also took part in the creation of the Intergovernmental Oceanographic Commission (IOC). Captain Benmuyal also introduced Captain Javier Valladares who is actively leading the IOC Bureau as a vice-chairperson of IOC. He closed his remarks by wishing a pleasant stay of the participants.

1.1.4 Replying on behalf of the Panel, Mr David Meldrum, chairperson of the Panel, sincerely thanked Captain Benmuyal and Commodore Rabiolo for their kind words of welcome, and for agreeing to host the Panel session at short notice. The Panel's appreciation was also offered to Captain Capurro, a founding figure and former vice-chairperson of the IOC, for honouring the Panel by his participation in the official opening ceremony. Special mention was accorded to Ms Miriam Andrioli, Ms Paula Etala and their team of local organizers for the detailed preparations, and for arranging such agreeable surroundings for the Panel's session.

1.1.5 Mr Meldrum then moved on to note the long tradition and fine achievements of Argentina in the field of ocean observations, and the particular benefits that the Panel would draw from Argentina's experience in operational oceanography. The good will and collaboration that existed between the Naval Hydrographic Service and the National Weather Service had allowed Argentina to make effective progress in this area which, for most nations, had proved particularly challenging. For the Panel itself, good will and collaboration had been critical to its success by enabling individuals, organizations and even UN agencies to transcend traditional boundaries in the pursuit of common aims. Nonetheless many challenges lay ahead for the Panel if it were to maintain its position as a pivotal force in ocean observations.

1.1.6 In closing his address, Mr Meldrum reminded the Panel of its debt of gratitude to Mr Louis Vermaak, who had served as its vice-chairperson until his untimely death in May 2005.

Mr Vermaak had worked tirelessly for the Panel and had been a vigorous and vocal contributor to its activities and sessions. Over the years he had earned much respect and admiration both for his achievements and for his humanity: his enthusiasm and friendship would be greatly missed.

1.1.7 On behalf of the Secretary-General of WMO, Mr Michel Jarraud, and the Executive Secretary IOC, Dr Patricio Bernal, the Secretariat representative also indicated his special gratitude to Commodore Rabiolo and to Captain Benmuyal, as well as their staff, for the excellent arrangements made to ensure the success of the session. He noted with gratitude that the Argentinean Meteorological and Hydrographic Services had more than one hundred years of tradition, and were a good example of cooperation between oceanographers and meteorologists following the spirit of JCOMM. He then emphasized that, through JCOMM, the challenge for WMO and IOC would be to contribute in meeting the objectives of our respective Members' national development plans and those of the major international strategies, as well as striving for sustainable development and promoting scientific advances in marine meteorology and oceanography. Great needs for more involvement of the developing countries and countries with economies-in-transition were called for in this regard. The Secretariat representative concluded his remarks by assuring the continued commitment of WMO and IOC to support and strengthen the work of the DBCP through the Observations Programme Area of JCOMM.

1.1.8 The list of participants of the workshop is given in an appendix to the workshop proceedings, which are published as a separate DBCP Technical Document.

1.2. OPENING OF THE SESSION

1.2.1 The twenty-first session of the DBCP itself was opened by the Panel chairperson, Mr David Meldrum, at 14.00 hours on Tuesday, 18 October 2005, in the conference room of the Regente Palace Hotel. He welcomed participants again to the session and once more thanked the SMN and SHN for hosting it and providing such a congenial environment and facilities.

1.2.2 The list of participants in the session is given in *Annex I.*

1.3. ADOPTION OF THE AGENDA

1.3.1 The Panel adopted its agenda for the session, which is given in *Annex II*.

1.4. WORKING ARRANGEMENTS

1.4.1 Under this agenda item, the Panel decided on its working hours and other arrangements for the conduct of the session.

B. IMPLEMENTATION COMPONENT

2. IMPLEMENTATION REPORTS

2.1 TECHNICAL COORDINATOR

2.1.1 The Technical Coordinator, Mr Etienne Charpentier, reported on his activities for the Panel during the last intersessional period. As for previous years he was based in Toulouse, France, and employed by IOC of UNESCO. As agreed by the Panel at its 14th session, about one-third part of his time was spent on SOOP. Time spend on JCOMM was DBCP and SOOP related or consisted of JCOMMOPS development and operations.

2.1.2 During the period, he had stressed the following priorities:

(i) User assistance, including technical (e.g. Argos, insertion of buoy data on GTS);

(ii) Development and implementation at JCOMMOPS of the agreed upon buoy metadata collection scheme (funded by EGOS). The scheme was implemented in January 2005 and user manuals written. Some training was provided to buoy operators and manufacturers. The database is exported in XML format and made publicly available via JCOMMOPS FTP site;

(iii) Liaison and work with team responsible for development of BUFR compression within Argos GTS sub-system (implemented in September 2005);

(iv) Discussion and proposal with Meteo France of a BUFR template for buoy data;

(v) Discussion with Service Argos and participation in development team as GTS expert for a future Argos data processing system that will include GTS data processing capability and will eventually replace the existing Argos GTS sub-system in late 2006;

(vi) JCOMMOPS work, i.e. (a) operations and maintenance of the information system, (b) keeping the database up-to-date and consistent, (c) development of new tools and services, and (d) re-design of the web site and improved ergonomics;

(vii) Revision with Bill Scuba of the SVPB design reference manual;

(viii) Participation with the DBCP evaluation group in discussions regarding impact of reduced size barometer drifter upon quality of air pressure;

(ix) Proposal to organize a drifting buoy technology workshop whose goal would be to propose new technological developments that would permit extension of buoy lifetime by adjusting time resolutions to user needs in different weather and/or ocean conditions (smart buoy);

(x) Work with NOAA/PMEL and Service Argos to make sure that TAO salinity data can be processed and inserted on GTS by Service Argos;

(xi) Discussions with JCOMM/OCG of proposal to set up a pilot project for real-time distribution of metadata from SST and temperature profiles;

(xii) Renaming of the buoy-qc@vedur.is mailing list to buoy-qir@vedur.is in order to avoid SPAM; this was effected in January 2005 thanks to the Icelandic Meteorological Office hosting of the mailing list;

(xiii) Preparation of DBCP, SOT, and JCOMMOPS related documents for JCOMM-II. This included in particular the proposed resolution for changing the JCOMMOPS Terms of Reference in order to include overall SOT coordination;

(xiv) Drifting buoy (or Argo float) lifetime and network size management study with Argo Technical Coordinator. Specific web tools were developed;

(xv) Call for information on buoy calibration procedures;

(xvi) Liaison with DBCP Action Groups and participation at their meetings (IBPIO, NPDBAP, E-SURFMAR, IABP) and/or provision of reports on DBCP activities;

(xvii) Obtained information on tsunami buoys from NOAA/PMEL.

2.1.3 During the period, the Technical Coordinator attended the following meetings:

(i) Chennai, October 2004, IBPIO, NPDBAP, and DBCP-XX meetings

(ii) Paris, January 2005, visit to IOC and meeting with Keith Alverson

(iii) Geneva, January 2005, EGOS and E-SURFMAR DB/TAG meetings

(iv) Paris, February 2005, JCOMM 4th Management Committee meeting

(v) Brest, March 2005, JCOMM 3rd Ship Observations Team meeting

(vi) Silver Spring, April 2005

(vii) NOAA Climate Observing System review

(viii) Informal JCOMM Observations Coordination Group (OCG) meeting

(ix) San Diego, May 2005, NOAA/AOML, SIO and Pacific Gyre, mainly to work on revised edition of the SVPB design reference manual

(x) Seattle, June 2005, IABP meeting & visit PMEL

(xi) Halifax, September 2005, JCOMM-II

2.1.4 The Technical Coordinator then presented the status of buoy programmes. A major milestone was reached during the period as the drifter array is now completed with the symbolic deployment at JCOMM-II of the operational drifter number 1250 on 18 September 2005. In 3 years, the Panel has been capable of doubling the number of operational drifting buoys reporting on the GTS. Increased deployment rates had been required in order to reach the target. The rate should now slow down to the level required maintaining the network at the 1250 operational drifters level. The challenge for the next few years will be to increase the number of drifters capable of measuring air pressure. In June 2005, 1185 drifters reported on GTS from the world oceans. While 295 of these reported air pressure (i.e. same level as last year), efforts remain to be made in order to reach JCOMM/OCG target of 600 air pressure measuring drifters. Availability of deployment opportunities will also remain a challenge as well as deployment of buoys in data sparse areas.

2.1.5 202 moorings appeared in the DBCP status for June 2005. These correspond to moored buoys in the high seas for which status reports are being provided to the Technical Coordinator (e.g. TAO, NOAA/NDBC, MSC, E-SURFMAR, NIOT). Challenges for the next intersessional period and future years will be to complete tropical moored buoy array extensions in the Indian and Atlantic Oceans as well as establishing a good coordination with OceanSITES.

2.1.6 The Panel stressed that in order for Member States moored buoy programmes to appear on DBCP status, they should provide the Technical Coordinator on a routine basis (e.g. monthly) with an updated list of platforms they operate. Presently, only moored buoys in the high seas operated by USA (NDBC & TAO), Canada, Japan (TRITON), Brazil (PIRATA), India, and E-SURFMAR appear on DBCP status maps. The Panel was pleased to hear about the development of moored buoy programmes in Turkey and Peru (NAYLAMP), and offered technical assistance through the Technical Coordinator if needed **[Action]**.

2.1.7 Southern Ocean Buoy Programme (SOBP) was well on track as 79 units were operational in June 2005 for a target of 80. Panel Members were proposing to commit 126 barometer drifters for the next intersessional period. However, in the context of the DBCP implementation strategy, and JCOMM/OCG phased-in implementation plan, the typical target should eventually be in the order of 300 units in order to achieve a horizontal resolution of 500 km x 500 km.

2.1.8 The DBCP web site is maintained by the Technical Coordinator. However, for efficiency reasons, the most up to date information on the Panel's activities, monitoring tools, and support documentation, are now exclusively maintained via the JCOMMOPS web site.

2.1.9 The Panel agreed that it should work more efficiently through JCOMM/OCG towards standardization of instrumentation, instrument evaluation, and calibration procedures. As an initial step, it invited Panel members to provide information they have in this regard for running their own programme to the Technical Coordinator **[Action]**.

2.1.10 The full report of the Technical Coordinator is given in *Annex III*. The Panel thanked Mr Charpentier for the excellent work undertaken during the past intersessional period.

2.2 ACTION GROUPS AND RELATED PROGRAMMES

2.2.1 Under this agenda item, the Panel was presented with reports by its action groups, viz:

(i) The Surface Marine programme of the Network of European Meteorological Services, EUMETNET (E-SURFMAR) (verbal presentation by Mr Jean Rolland, representing the E-SURFMAR officers);

(ii) The Global Drifter Programme (GDP) (verbal presentation by Mr Steve Cook, GDP representative);

(iii) The International Arctic Buoy Programme (IABP) (verbal presentation by Ms Elizabeth Horton, on behalf of the IABP officers);

(iv) The International Buoy Programme for the Indian Ocean (IBPIO) (verbal presentation by Mr Graeme Ball, representing the IBPIO);

(v) The International South Atlantic Buoy Programme (ISABP) (verbal presentation by Mr Ariel Troisi, representing the ISABP);

(vi) The North Pacific Data Buoy Advisory Panel (verbal presentation by Mr Al Wallace, Co-chairperson of the NPDBAP);

(vii) The Tropical Moored Buoys Implementation Panel (TIP) (verbal presentation by Mr Paul Freitag, representing the TIP).

Summaries of the presentations are reproduced in *Annex IV*. As usual, the full reports of the action groups will be reproduced in the Panel's Annual Report. No report was tabled by the International Programme for Antarctic Buoys (IPAB) during the session, but one will be included in the Annual Report.

2.2.2 Some comments and discussion followed the above presentations:

(i) Some activities in the Arctic and Antarctic region were reported, in the context of the International Polar Year (IPY, 2007-2008). It was noted that the Panel should consider possible ways to elaborate the Panel's activities and profile in the Arctic/Antarctic region with this opportunity; for example, consider contributing one or more ICEX buoys for deployment in the polar regions;

(ii) The IBPIO noted that by September 2005, less than 40% of buoy reports generated in the Indian Ocean were available within 120 minutes. This was in contrast to about 80% of buoy reports available within 120 minutes from the North Atlantic region. The situation in the Indian Ocean was identified as a problem with the La Reunion LUT.

Coordination with OceanSITES

2.2.3 The Panel had received with interest the presentation by Dr Uwe Send, the co-chairperson of the OCEAN Sustained Interdisciplinary Timeseries Environment observation System (OceanSITES), introducing the OceanSITES project, its activities, and future plan. The full paper is reproduced in *Annex V*.

2.2.4 Dr Send explained that OceanSITES is the international project working towards the coordination and implementation of a global system of sustained multi-disciplinary timeseries observatories. Timeseries fill a unique gap in the sampling provided by other elements of the global ocean observing system, enabling co-located observations of many variables and processes in strategic or representative locations over long periods of time, with high temporal resolution, from (and including) the ocean surface to the seafloor. The scientific applications of such data are

to monitor, detect, understand, and predict changes and related processes in the physical climate state of the ocean, the carbon cycle, and the ecosystem. Operational applications include detection of events, initialization and validation of assimilation products, delivery of constraints or reference data for forecasts (especially biogeochemical and ecosystem relevant ones). There are a variety of technical applications, such as calibration and validation of data and products from other observing system elements.

2.2.5 OceanSITES has developed a rationale for timeseries observations, for needing a coordinated global network, and has defined a pilot project consistent with the needs and expectations of the sponsoring bodies GOOS, CLIVAR, and POGO. A major requirement for sites in the project is an open data policy. A global timeseries data management system is under construction via a subgroup of the OceanSITES steering team, including a data format coherent with other past and present efforts. The *in situ*, timeseries-based OceanSITES programme represents the logical next step in completing the Global Ocean Observing System. The main challenge is coordination and assuring sustainability of the system, via common advocacy, recruiting a user base, and sharing the operation among communities and countries.

2.2.6 The Panel received with interest the list of mutual interests by DBCP and OceanSITES, introduced by Dr Send, including:

(i) Sharing of expertise, technology, and experiences;

(ii) Sharing of resources (equipment, ships, cruises, etc);

(iii) Free sharing of data and homogeneous quality control procedures;

(iv) Coordinating data management activities;

(v) Advocacy at national/agency level;

(vi) Embedding timeseries observatory network in the global plan for the ocean observing system and GEOSS (common maps, percent completion, include in JCOMMOPS, etc).

The Panel considered that the above items were worth cooperating and collaborating with OceanSITES, and welcomed the proposal of OceanSITES to be an action group of DBCP. This proposal was approved under agenda item 3.

Information on Ship Observation Team (SOT)

2.2.7 The chairperson of SOT presented on overview of the work of the Ship Observation Team, its component programmes and panels and its relationship with JCOMM and DBCP.

Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS)

2.2.8 The Secretariat reported on the establishment of the tsunami warning system in the Indian Ocean region, following the 26 December 2004 Tsunami. After huge destruction in several countries around the Indian Ocean basin, all countries in the region acted quickly to start the process to establish a tsunami warning and mitigation system for the Indian Ocean region, to ensure that people would never again be caught unprepared for this rare but high-impact disaster. Taking into consideration the experience of the IOC in the Pacific region through its ICG/ITSU, the countries of the region requested IOC to take the lead of the UN efforts in the establishment of an Indian Ocean Tsunami Warning and Mitigation System (IOTWS).

2.2.9 IOC has collaborated closely with WMO and the International Strategy for Disaster Reduction (UN/ISDR), combining the specific expertise of each agency towards the establishment of IOTWS. The system would build national capacity to:

(i) Assess national tsunami risk (hazard assessment),

(ii) Establish national/regional warning centres against local/regional/basinwide tsunamis (warning guidance), and

(iii) Promote education/preparedness and risk reduction against tsunami hazard (mitigation and public awareness).

2.2.10 The Secretariat informed that IOC adopted Resolution XXIII-12 at the 23rd Session of the Assembly, establishing the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS). The First Session of the ICG/IOTWS was held in Perth, Australia, from 3 to 5 August 2005. The Government of Australia offered to fund and host the Secretariat of the ICG/IOTWS in Perth, Australia. The second session was held in Hyderabad, India, from 14-16 December 2005, and focused on preparing a comprehensive capacity building action plan, based on the ongoing activities of national assessment in tsunami warning capacities.

2.2.11 The Panel noted that, in the framework of ICG/IOTWS, IOC action elements included:

(i) Establishment of a governance system for the IOTWS,

(ii) Strengthening of a core observational network, based upon the GLOSS sea level system, and

(iii) Capacity building.

Whereas WMO focused on

(i) Upgrading the Global Telecommunication System (GTS), where needed, to address requirements of tsunami-related data communication;

(ii) Assisting development or enhancement of “multi-hazard” early warning systems of NMHS as well as coordination with space programmes/systems;

(iii) Collaboration with UNESCO/IOC on further developing tsunami related educational tools, materials;

(iv) Consolidating and contributing to multi-hazard early warning systems. In this context, WMO plans to hold a multi-hazard symposium in early 2006, as a first step toward multi-hazard global approach to early warning systems.

2.2.12 The Panel noted that JCOMM considered contributing within a wider framework of cooperation for tsunami and marine-related natural disaster reduction, within a global framework, as following:

(i) Analysis of potential for existing marine platforms and deployment facilities to contribute to a tsunami and other marine hazards early warning network;

(ii) Contribute to the development of guidance material for Members/Member States relating to the components and operations of a marine hazards warning service;

(iii) Coordination with IMO and IHO to ensure the dissemination of tsunami warnings and related information through GMDSS communication facilities for Maritime Safety;

(iv) Enhancement of the GLOSS network through the upgrading of some of the existing GLOSS stations to tsunami monitoring standard;

(v) 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;

(vi) 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.

2.2.13 The Panel welcomed the Recommendation 11/1 (JCOMM-II) - JCOMM Support for Marine Multi-Hazard Warning Systems, including Tsunami, which was adopted at its second session (September 2005, Halifax), noting that the IOC and WMO have complementary contributions to ensuring an operational, robust and accurate tsunami warning system, as part of a more comprehensive marine multi-hazard warning system. The Panel agreed that a number of components in the JCOMM structure, particularly the Observations and Services Programme Areas, could contribute to the development of a tsunami warning system as part of a more comprehensive marine multi-hazard warning system. It again noted that synergies could be created with SOT and DBCP in the deployment and use of multi-purpose deep ocean moorings for marine hazard detection. It also emphasized the potential contribution of the Panel to this initiative through JCOMMOPS, in ocean platform deployments and maintenance.

Technology Developments in Real-time Tsunami Measuring, Monitoring and Forecasting

2.2.14 The Panel noted with interest the report by Mr Paul Freitag, on tsunami forecasting technology under development at NOAA's Pacific Marine Environmental Laboratory (PMEL). It was based on the well-tested approach used in many other forecast systems – i.e., the integration of real-time measurement and modelling technologies. Real-time monitoring and measurement of sea-level data in the deep ocean was made by a seven-station network of DART (Deep-ocean Assessment and Reporting of Tsunamis) systems maintained and operated by NOAA's National Data Buoy Center.

2.2.15 The Panel noted that DART II, a new generation system developed at PMEL, had additional features and capabilities including bi-directional communications between sea floor systems and Tsunami Warning Centres. Three DART II systems have recently been deployed to bring the array to a total of 10 stations. As a result of the devastating impact of the 26 December 2004 Sumatra tsunami and the proven value of the DART array, the number of network stations will be increased to 39 by mid-2007. Additional information on the U.S. National Tsunami Hazard Mitigation Program is available at http://www.tsunami.noaa.gov. Technical information specific to the DART II system is available at http://www.pmel.noaa.gov/tsunami/Dart/dart_ref.html. The Panel thanked Mr Freitag for the informative presentation.

2.2.16 The Panel agreed that it had a duty to interact as closely as possible with the operators of tsunami warning systems, and asked its vice-chairperson for Asia, Mr K Premkumar, to act as its focal point for tsunami warning, and to keep it informed as to developments during the intersessional period **[Action]**.

2.3 NATIONAL REPORTS

2.3.1 The Panel had received written and verbal reports on current and planned buoy programmes from Argentina, Australia, Brazil, Canada, China, France, India, Japan, New Zealand, Peru, Republic of Korea, South Africa, Sweden, UK and USA. As usual, these written reports, as well as others submitted to the Secretariat before 30 November 2005, will be published in the Panel's Annual Report.

2.4 ARGO STEERING TEAM AND ARGO INFORMATION CENTRE

The Argo Technical Coordinator, Mr Mathieu Belbeoch, presented the status of the Argo programme to the Panel. After 5 years of implementation, the Argo network now includes almost 2100 active floats, with a global coverage and a free data distribution and sharing through the GTS and Argo Global Data Centres.

The float technology has improved year after year to reach a good level of reliability. The Argo Technical Coordinator introduced the latest technological developments, including new sensors, telecommunication systems and the plans for the future: dissolved oxygen sensors, SST, acoustic wind and rain sensors and Iridium communications.

Mr Belbeoch noted that Argo was currently a truly international programme with 20 participating countries and more than 50 regional initiatives. Bilateral collaboration, through float donations, was presented as a way to stimulate new participation.

The Argo Technical Coordinator then presented the development of the Argo Information Centre since its establishment in 2001. He introduced the new services and features provided by the AIC website, particularly including a new monitoring system with polar projections and a real-time sea ice edge layer.

The Panel was invited to present some Argo data use to the next Argo Science Workshop, to be held in Venice in March 2006 **[Action]**.

The Panel noted that Argo was still facing challenges to sustain its funding long enough to complete the array and to demonstrate its value, and that this required a continuous cooperation between research and operational communities. It also stressed that it was important to maintain AIC funding as the Argo Technical Coordinator's position was also necessary to maintain an appropriate level of support at JCOMMOPS, which created strong synergies through collaboration of DBCP and Argo Technical Coordinators.

The Panel thanked the Argo Technical Coordinator for the informative report and his activities.

2.5 EVALUATION SUBGROUP

2.5.1 The chairperson of the Evaluation Group, Ms Elizabeth Horton, reported on the activities of the Group, on the standard SVP-B and SVP-BW (WOTAN) drifters. Results for evaluation on both types of drifters continued to be good. New sea surface salinity drifters were tested, and the results from 2 manufacturers were very good, proving to be one of the more exciting developments during the intersessional period. Storm monitoring drifters continued to provide excellent data in the most difficult sea conditions, reporting reliably through tropical hurricanes and typhoons.

2.5.2 The development of another new drifter type was initiated, with a temperature cable down to 60 meters depth. After detection of problems with the cable, new tests were conducted. An operational test and evaluation deployment is scheduled for later in the year. It was noted that not all buoy manufacturers and operators are using the DBCP M-2 format as much as they might be doing, and they are urged to take into account efficiencies in data processing and transmission over the GTS and use the DBCP M-2 format whenever possible.

2.5.3 The chairperson of the Evaluation Group urged buoy operators to review Best Practices prior to the purchase of drifters, keeping in mind safety of those people tasked to carry out the deployments. For example, the drogues of SVP-B should be adequately secured **[Action]**. It also should be kept in mind that once the buoys were deployed (both mooring and drifting), it would be too late to resolve technical difficulties. Hence it would be more effective to detect problems and correct them while the instruments are still at the factory and for operators to verify transmission by satellite prior to deployment.

2.5.4 In light of major upgrades to the GTS data processing systems, the Panel urged manufacturers / buoy operators to send frequently used data formats to Service Argos to facilitate the implementation of the enhanced processing system **[Action].**

2.5.5 Ms Horton informed, with appreciation, that E-SURFMAR had provided the definitions of Ending Causes. The Panel agreed that this information should be merged into the list of

definitions which the Evaluation Group developed, and made available on the JCOMM website **[Action]**.

2.5.6 The Panel expressed its appreciation to the chairperson and the Evaluation Group for the work undertaken so far on its behalf. It accepted with appreciation that Ms Horton would continue to act as the chairperson of the Evaluation Group.

3. NEW ACTION GROUPS

3.1 The Panel noted the application of OceanSITES to be an action group of DBCP, and the white paper which introduced this project, activities, and future plan (see paragraphs 2.2.3 to 2.2.6, and *Annex V*).

3.2 The Panel welcomed the application and adopted OceanSITES as an action group of the DBCP.

4. REVIEW OF THE DBCP IMPLEMENTATION STRATEGY

The Future Mission of DBCP

4.1 The chairperson, Mr David Meldrum, initiated a discussion on the future mission and strategy of the Panel. The Panel had been created in 1985 to address particular concerns regarding the quality, quantity and timeliness of drifting buoy data circulating on the GTS, and had subsequently raised funds to appoint a Technical Coordinator (TC) to implement its work-plan. To a large extent, the problems facing the Panel in its early years have been solved, although it was clear that the continuation of the TC function was essential to its continued success. Nonetheless, the active debate on data buoy issues that had characterized early sessions, and had drawn fruitfully on the experience and capabilities of Panel members, was in danger of disappearing.

4.2 The view was expressed that the Panel had to act decisively to examine its current status and, if need be, redefine its mission so as to make best use of the considerable resources – financial, intellectual, reputational and manpower – that currently lay at its disposal. This was particularly true in light of the emergence of new coordination structures impacting on ocean observation, such as JCOMM and GEOSS, and the need for the Panel to be seen to be capable of satisfying their needs, particularly in the areas of new measurements and collaborative work. Many of the technical challenges that faced the Panel were common to other observing systems, and it was clear that the Panel could make effective contributions to the wider community in this area. In particular the Panel had demonstrated a unique capability in transitioning research technology to the operational arena, a process that had defeated many others, and which had made full use of the Panel's expertise, its cooperation with manufacturers and end-users, and the commitment of its members and of the TC.

4.3 The overarching financial context, in which there was increasing pressure on resources, and a clear need to demonstrate effective progress and value for money, might also impact the Panel's mission and procedures. Finally, given the Panel's reliance on its TC, and his status as its permanent employee, the Panel had to be mindful of its obligations as an employer, and ensure that it made adequate financial provision in this context.

4.4 In the discussion that followed, broad support for the sentiments expressed in Mr Meldrum's submission was tempered by a concern that any change in the Panel's stated mission or procedures, deemed necessary by the Panel, would need to be carefully assessed and implemented in order to avoid any possible negative impact on the Panel's capabilities, e.g. its ability to raise the funds necessary to support the essential TC function. The Panel therefore directed Mr Meldrum to consult with the vice-chairpersons and convene a small task team, representing as wide a constituency of the Panel's interests as possible:

(i) To critically examine the issues that had been laid before them;

(ii) To evaluate the Panel's strengths and weaknesses, and the opportunities and threats to which it was exposed;

(iii) To initiate an evolutionary planning activity as a matter of urgency, if deemed necessary;

(iv) To issue an interim report to the Panel before the close of the current session;

(v) To develop the plan during the intersessional period;

(vi) To report back to the Panel well in advance of the next session.

The membership of the task team is listed in *Annex VI*, together with the interim assessment that it reported to the Panel at the end of the session **[Action]**.

DBCP Implementation Strategy

4.5 Moving to the review of the Panel's implementation strategy, Mr Meldrum reminded the Panel that this was a dynamic document, and that, notwithstanding the work of the task team, suggestions from the Panel members were needed to keep it up to date. Accordingly, the Panel was invited to convey any suggestions to Mr Meldrum before 30 November 2005 so that an updated version of the strategy might be published on the Panel's website **[Action]**.

5. JCOMM ACTIVITIES RELEVANT TO THE DBCP

5.1 The Panel noted with interest a report on the Second Session of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM-II), which was held in Halifax, Canada, from 19 to 27 September 2005, including the discussion and recommendations made during the session which were relevant to the Panel's activities.

5.2 The Panel noted with pleasure the special ceremony for the deployment of 1250th Global Drifter near Halifax Harbour on 18 September 2005, in the occasion of JCOMM-II. 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 celebrated over 10 years of efforts made by DBCP Member Countries, to collectively build up the resources necessary to maintain 1250 buoys in sustained service.

5.3 The Panel was informed of the results of the JCOMM Scientific Conference: "Operational oceanography and marine meteorology for the 21st century". Over 120 scientists from 30 countries participated in this conference, proceeded with three sessions including i) Recent JCOMM results; ii) Future science and technologies for observations, and iii) Future JCOMM Products and Services. The participants finally drew the recommendations to JCOMM for the action plan for the next intersessional period, including:

(i) Articulate to governments the need for sustained funding for observing systems and local, national and international infrastructures (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.

The Panel also noted that the need to involve private sector and user groups into JCOMM planning was strongly emphasized during the conference.

5.4 The Panel noted that the overall framework and structure of JCOMM would continue as designed in JCOMM-I, except for the Capacity Building Programme Area: Capacity Building Rapporteurs within the Observations, Services and Data Management Programme Areas would form a cross-cutting team. A joint JCOMM-GOOS Task Team on Resources would be formed and report to both the JCOMM Management Committee and the GOOS Scientific Steering Committee. It was also decided to establish the Cross-cutting Team on Satellite Data Requirements, with rapporteurs for Observations (one meteorological and one oceanographic), Services and Data Management Programme Areas (appointed by the JCOMM Management Committee in consultation with the GOOS Scientific Steering Committee). The Panel welcomed new co-presidents of JCOMM, Dr P. Dexter (Australia) and Dr J.-L. Fellous (France).

5.5 The Panel noted that JCOMM emphasized the importance of the deployment opportunities both by ship and by air, to maintain the network of 1250 drifting buoys especially in the Southern Hemisphere. The Panel welcomed JCOMM's recommendation for its Members/Member States to consider what deployment opportunities they might offer, and to convey that information to JCOMMOPS, which acts as a focal point in this regard.

5.6 The Panel then noted 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.

5.7 JCOMM also expressed its appreciation to the Panel for developing and coordinating buoy networks, and providing Technical Coordinator's expertise for the success of improving operational oceanography. The Panel noted with pleasure that JCOMM urged Members/Member States to join or continue to contribute to the JCOMM Trust Fund, and invited VOS and ASAP sub-panels or SOT Member States to investigate making contributions to the proposed trust fund when established. JCOMM endorsed the proposal to change the Terms of Reference for JCOMMOPS, and adopted Recommendation 6/2 (JCOMM-II) on the subject (*Annex VII*). JCOMM further agreed that new, longer term solutions for JCOMMOPS funding as a whole should be investigated to ensure the continuity of the position of DBCP Technical Coordinator, and asked the Secretariats to investigate the feasibility with Members/Member States and to report to the JCOMM Management Committee.

5.8 During its second session, JCOMM 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 4-year JCOMM intersessional period. It noted that most Argo deployments relied on 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.

5.9 The Panel agreed with the conclusions of the discussion made at JCOMM-II, 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. The GCOS Implementation Plan for the Global Observing System for Climate in support of the UNFCCC (GCOS-92); and GEOSS 10-Year Implementation Plan were references mentioned in this regard. The Panel noted that JCOMM has been playing a significant role in the implementation of such plans, particularly through the activities of the Observations Programme Area.

6. SCIENTIFIC AND TECHNICAL WORKSHOP

6.1 Under this agenda item, the Panel reviewed briefly the results of the preceding workshop, which was held from 0900 hours on 17 October to 1300 hours on 18 October 2005. Twenty papers were presented during the workshop representing a broad global effort under three themes:

(i) Vision and Possibilities / Technological Developments – including novel or emerging demands for new or improved technology and network performance (applications pull); and developments in buoys / instruments (technology push);

(ii) Operational Enhancements – evaluation / analysis of operational performance or trials; data communications and data assimilation; performance and efficiency benchmarking; new systems and practices;

(iii) Applications of Collected Data – research and operational data applications; case studies, with a particular focus on the host country's region.

6.2 The Panel expressed its appreciation to the Workshop chairpersons, Mr Ken Jarrott (Australia) and Mr William Scuba (USA) for their excellent work in organizing and chairing the Workshop. It agreed that, as before, the proceedings should be published in the DBCP Technical Document series, on CD-ROM only, and also made available via the DBCP web site. Authors were requested to submit their papers via e-mail or CD-ROM to the Workshop chairperson, in electronic form (MS Office compatible format only), by 30 November 2005 at the latest **[Action]**. At the conclusion of the workshop, Mr Jarrott expressed special thanks to SMN and SHN for the assistance in the organization and smooth running of the Workshop.

6.3 The Panel further agreed that the 2006 workshop should focus again on applications of buoy data, with the same themes as those of the 2005.

6.4 The Panel noted with appreciation that Mr Jarrott would continue to act as the Workshop chairperson for 2006, in cooperation with Mr William Scuba (USA).

7. DATA AND INFORMATION EXCHANGE

7.1 REPORTS BY BUOY DATA MANAGEMENT CENTRES

7.1.1 Under this agenda item, the Panel reviewed the reports of the IOC International Oceanographic Data and Information Exchange (IODE) Responsible National Oceanographic Data Centre (RNODC) for drifting buoys, operated by the Marine Environmental Data Service (MEDS) of Canada; and of the JCOMM Specialized Oceanographic Centre (SOC) for drifting buoys, operated by Météo-France. A summary of the reports is reproduced as *Annex VIII*. As usual, the full reports of the data management centres will be published in the Panel's annual report.

7.1.2 The Panel noted that at the recent IODE meeting in April 2005, a resolution was adopted to abolish the system of RNODCs in response to a review of IODE activities and in particular, the lack of understanding and use of the RNODC system. The resolution instructed the chairperson of IODE to discuss with RNODC host centres how their operations, if considered essential for the international community, could be maintained and properly acknowledged. The Panel was reassured to hear that services provided by MEDS, as the RNODC for drifting buoys, were determined to be essential for the international community and as such will continue operating as an RNODC until the proper accreditation has been established.

7.1.3 Regarding specific problem reported by MEDS regarding 0°N, 0°E locations that had been erroneously produced by Service Argos in June 2005, the Panel asked Service Argos to investigate the cause of the problem in order to prevent such problems in the future **[Action]**.

7.2 INFORMATION EXCHANGE

7.2.1 The Panel elaborated on all the media that it is using for information exchange purposes.

Web server, http://www.dbcp.noaa.gov/dbcp

7.2.2 The web site is hosted by NOAA/AOML in Silver Spring, USA. No major changes were made to the web site which includes comprehensive information about the Panel and its activities. New products or tools are now preferably implemented onto the JCOMMOPS web site (see item 8.5). All existing pages from the DBCP web site are also directly accessible via the JCOMMOPS web site through proper menu directory (Implementation, then Platforms, then DBCP). For facilitating web site maintenance, the Technical Coordinator proposed to move all static content of the DBCP web site to JCOMMOPS while keeping its existing URL. The Panel agreed and asked the Technical Coordinator to go ahead with the proposed changes **[Action]**.

7.2.3 The Panel reminded its Members and Action Groups (AG) to provide the Technical Coordinator with their annual reports (i.e. national reports and AG reports respectively) and deployment opportunity information in electronic form for inclusion in the JCOMMOPS web site.

News

7.2.4 JCOMMOPS News section includes a DBCP section directly accessible via:

http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/news?prog=DBCP

7.2.5 The following DBCP or JCOMMOPS news have been published during the last intersessional period:

(i) Drifter "1250" successfully deployed 18 September near Halifax

(ii) Deployment of buoys and floats from the Semester at Sea's MV Explorer

(iii) New version of SVPB design manual available (Rev. 2)

(iv) JCOMM Celebration of the Deployment of Global Drifter 1250

(v) Impact of TAO array anemometer height and wind data on ECMWF model

(vi) New JCOMMOPS web site released

(vii) Google Earth

(viii) Development of Marine Data Exchange Systems using XML

(ix) ATLAS tropical moorings GTS enhancements

(x) Buoy metadata collection scheme implemented at JCOMMOPS

(xi) New Price List for Argos Telecommunications

7.2.6 Panel Members interested in having news published via the DBCP news section are invited to provide the Technical Coordinator with 1 page of text plus one or two pictures.

Mailing lists

7.2.7 Mailing lists operated on behalf of the Panel include (i) dbcp@jcommops.org, general information on the Panel's activities, (ii) buoys@jcommops.org, exchange of information on buoy technology, (iii) dbcpeval@jcommops.org, DBCP evaluation group, and (iv) buoy-qir@vedur.is, DBCP QC guidelines for the reporting of GTS systematic errors. The latter which is operated by the Icelandic Meteorological Office, was renamed in January to avoid SPAM. More information on the mailing lists and how to register can be found at http://www.jcommops.org/mailing_lists.html#DBCP.

Publications

7.2.8 The Panel noted that the following DBCP publications had been revised during the last intersessional period: (i) Argos GTS Sub-system Reference Guide (No. 2, revision 1.6, 2005), (ii) SVPB Design Reference (No. 4, revision 2, May 2005), and (iii) DBCP Implementation Strategy (No. 15, fifth edition, October 2004). All revisions are available in electronic form via DBCP and JCOMMOPS web sites.

7.2.9 In light of latest technological developments and the launch of METOP in 2006, that will provide downlink capability for Argos, the Panel asked Service Argos to work with the Technical Coordinator to revise the Guide to Data Collections and Location Services using Service Argos (No. 3).

7.2.10 The Panel noted that the following DBCP publications were being edited for publication (CD-ROM): (i) DBCP Annual Report for 2004 (No. 26, also available via the web), and (ii) DBCP-XX Workshop proceedings, Chennai, October 2004 (No. 27).

7.2.11 The Panel agreed that the following publications needed to be edited **[Action]**: (i) DBCP Annual Report for 2005, and (ii) DBCP-XXI workshop proceedings.

Brochure

7.2.12 The Panel noted that the English version of the DBCP brochure was available via the web at http://www.jcommops.org/doc/DBCP/DBCP-Brochure.pdf. The brochure is available in paper format in English, Portuguese, and French. Panel Members interested to obtain copies should ask the Technical Coordinator. The Panel agreed that the brochure needed to be updated to reflect recent changes, i.e. (i) “1250” achievement, (ii) new action groups map (NPDBAP to be added), (iii) references to JCOMM, GEOSS, and GCOS-92, (iv) new updated graphics and picture of Panel Members. It asked the Secretariats to coordinates edition **[Action]**.and invited Panel Members to provide the resources for eventually funding the publication of the updated brochure.

7.3 BEST PRACTICES AND STANDARDS

7.3.1 The Panel considered that it was essential to maintain information on best practices and to develop standards as necessary. To that end, it invited Panel members to provide the Technical Coordinator with a list of practices and recommendations that they follow under their own buoy programmes in the view to eventually compile a set of DBCP recommended practices. The Panel agreed that these did not necessarily have to be developed in a detailed manner, such specific calibration procedures which might differ substantially from one country to the other and for different types of applications. The Panel also agreed that minimum specification and guideline documents that had been produced by EGOS (now E-SURFMAR) could be used as an excellent basis or even turned into DBCP documents. It asked the Technical Coordinator to seek permission from E-SURFMAR to use such documentation for defining DBCP best practices **[Action]**, to make suggestions to the Panel, and to report at the next Panel session.

7.3.2 The Panel agreed that the task of compiling a guide to best practices and standards should be entrusted to a Panel member, and thanked Mr Bill Burnett for his offer to undertake this duty, assuring him at the same time of the full support of other Panel members and the TC should he deem this necessary. **[Action]**

8. TECHNICAL ISSUES

8.1 QUALITY CONTROL

8.1.1 The Technical Coordinator reported on buoy quality information relay mechanism operations (DBCP QC guidelines) during the last intersessional period. Complete information regarding the DBCP quality control guidelines can be found at the DBCP web site at

http://www.dbcp.noaa.gov/dbcp/0qc.html. Systematic errors noticed by Principal Meteorological or Oceanographic Centres (PMOC) responsible for deferred-time Quality Control of GTS buoy data (i.e. data users, mainly NWP centres) are reported either via a mailing list (buoy-qir@vedur.is) which is maintained by the Icelandic Meteorological Service or via a dedicated web page at JCOMMOPS (http://wo.jcommops.org/cgi-bin/WebObjects/QCRelay). Such reports, e.g. bad sensor data, biased sensor, bad location, and proposed remedial action (e.g. removing data from GTS, recalibration) are automatically forwarded to the buoy operators or persons responsible for GTS distribution of the data (PGC). Thanks to this system, PMOCs don't have to know who the PGCs are. The system works because the Technical Coordinator, acting as a focal point, maintains at JCOMMOPS a database of WMO numbers and associated PGCs.

8.1.2 The Panel noted with appreciation that the Bureau of Meteorology (BOM) had started producing buoy monitoring statistics on a monthly basis since January 2005. Statistics are also produced by ECMWF, NOAA/NCEP, UKMO, Météo France, and MEDS (location quality). Specific QC tools are also provided via web pages by Météo France (http://www.shom.fr/meteo/qctools/), NOAA/NCEP (http://www.ncep.noaa.gov/NCO/DMQAB/QAP/qcflags/), and JCOMMOPS. Other centres are encouraged to actively participate in the guidelines either for global data, regional data or specialized data.

8.1.3 As decided by the Panel at its 20th session, in order to avoid SPAM, the mailing list has been renamed to buoy-qir@vedur.ir. This could be realized with kind assistance from the Icelandic Meteorological Office. The Panel thanked IMO for their contribution in this regard.

8.1.4 During the period August 2004 to July 2005, 129 status change proposals were made by PMOCs. Most of these proposals have been made via the web page directly instead of the mailing list. All proposals made via the web page have been automatically forwarded (i) to the mailing list, and (ii) Programme GTS Coordinator (PGC).

Air pressure

8.1.5 Mean RMS (Obs-FG) for drifting buoy air pressure data based on ECMWF buoy monitoring statistics now reaches a level of about 0.86 hPa. 75.9% of the RMS (Obs-FG) values are now lower than 1 hPa; another 20.8% between 1 and 2 hPa; 1.8% between 2 and 3 hPa; and less than 1% above 3 hPa. This enlightens actual quality of both first guess surface pressure field and observational pressure data from drifting buoys. Quality of SVPB air pressure data is similar as for global drifting buoy data.

SST

8.1.6 According to NCEP buoy monitoring statistics, RMS (Obs-FG) for SST data from drifting buoys is now at a level of about 0.57C. On the other hand, percentage of gross errors which was below 0.5% during the previous intersesisonal period then increased to a level slightly lower than 1% except in February 2005 where 4% of Gross Errors were noticed. It was at a level of about 0.6% in June 2005.

Wind

8.1.7 According to ECMWF buoy monitoring statistics, RMS (Obs-FG) for wind speed data now reaches a level of about 2.3 m/s. About 83% of mean RMS (Obs-FG) are less than 3m/s, about 6.7% between 3 and 4 m/s, and about 5.4% are larger than 4 m/s. since November 2003, percentage of gross errors remained lower than 1%. A peak of about 2% was however observed in February 2005. However, an increase in the percentage of RMS values larger than 3 m/s is observed: 15.8% in June 2005, 12.1% in July 2004, 11.1% in July 2003.

8.1.8 The number of accepted wind speed drifting buoy observations dropped regularly since August 2003 from about 25000 observations per month to about 8340 in June 2005. This is mainly due to a dramatic reduction in the number of drifting buoys deployed with wind measuring

capabilities. This drop, in conjunction with the fact that many of the wind speed measuring drifting buoys are now deployed in hurricane arrays explains the higher percentage of gross errors as well as the higher percentage of RMS larger than 3 m/s. As many of these buoys were using WOTAN technique, the Panel asked the DBCP evaluation group to look into this matter.

8.2 CODES

BUFR compression

8.2.1 The Panel noted with appreciation that BUFR compression capability had been implemented by Service Argos within its GTS sub-system on 6 September 2005 and that this became effective on 28 September 2005. The Panel thanked Service Argos as well as those who have been involved in the developments and tests, including ECMWF, Météo France, and Navoceano. JCOMMOPS BUFR decoder has been upgraded to deal with BUFR compression and is available via JCOMMOPS web site. Test BUFR reports can be obtained from the following FTP site: ftp://ftp.jcommops.org/gts/test/bufr/compressed.

Distribution of wave data in BUFR

8.2.2 The Panel had expressed concern at its previous session that there was no specific template for wave spectra for in situ wave observations defined at the moment. It had asked its Technical Coordinator to investigate the issue and to report at the next Panel session. The Technical Coordinator reported that he had worked with Météo France and Spain to draft a new template that would be consistent with the existing template for buoy data (i.e. wave data added at the end of the existing template), and would permit encoding of all directional and non directional wave data presently collected by Puertos Del Estado, Spain moorings, as well as those that can be encoded using FM-65-XI Ext. WAVEOB format.

8.2.3 The template now needs to be further studied by Spain and then to be submitted to the CBS Expert Team on Data Representation and Codes (ET/DRC). The Panel endorsed proposed changes in principle, and asked the Technical Coordinator to pursue the efforts in this regard, and in particular to submit the proposed template for discussion through the ET/DRC **[Action]**.

8.3 ARGOS SYSTEM

8.3.1 The Panel noted with interest a presentation by Mr Bill Woodward, President of Service Argos, on the present status of the Argos system. The two global ground stations at Gilmore Creek and Wallops Island continue to deliver STIP data from NOAA-12, NOAA-14, NOAA-15, NOAA-16, NOAA-17, and NOAA-18. Only two orbits per day continue to be delivered from NOAA-12 which is just enough to collect the minimum amount from the Orbitography beacons and enable location calculations to be made. TIP or real-time data are delivered to CLS/SAI immediately on reception now from 44 stations around the globe.

8.3.2 The two global processing centres continue to process more than nearly 700 playback and real-time datasets per day and the two centres are fully redundant. In 2004 the regional processing centre in Melbourne was shut down. It had become just as easy for the regional users in Australia to begin receiving their data via ADS or Telnet distribution from the Global processing centre in Toulouse. The Australian UserOffice facility is kept and serves Australian and NZ Users as before. At the same time a new regional processing centre was opened in Jakarta, Indonesia. Currently this centre is responsible primarily for managing fishing vessels in the Indonesian region. This centre and the other two regional centres in Tokyo and Lima continue to process data received by their antennas and they all operated continuously in 2004 without any problems.

8.3.3 The main communications link continues to be the internet and two parallel links exist each with a rate of 2Mbits/sec. Data encryption is an available option for those users selecting ADS as the mechanism to receive their data.

8.3.4 During 2004 96% of the real-time data was delivered to users within 30 minutes of it arriving at the satellite. 77% of the stored data is delivered to the users in three hours.

8.3.5 The Panel received the report by Mr Christian Ortega, representative of CLS/Argos, on the technical enhancement of the Argos System. The hardware and software improvements for 2004 continue to be dedicated to the Argos 2001 project – i.e. new user interface, added value services and rebuilding the processing system - and specifically included a new computer architecture that includes a development and validation component all aimed at the highest level of reliability. Today all of these computing facilities are located in the same room at CLS, but specific portions of them will soon be relocated a few kilometres away to the CNES centre; so in the case of a problem at one place, it will be possible to continue with the facilities of the other.

8.3.6 A substantial amount of work continued in support of the preparation of the Argos-3 new capabilities and more especially to addresses all changes needed in the ground segment to decode, process, store and make available to users the new generation messages that will be delivered by this instrument. These include the high data rate messages, the “zero bit” messages and the two-way messaging. The Master Beacon, compliant with the Argos-3 instrument, was accepted by CNES in March 2004. The Master Beacon installations in Svalbard and Fairbanks are scheduled for the third quarter of 2005. The new PTT/PMT test equipment was accepted by CNES and will begin to be used as the nominal one in September 2005.

8.3.7 A first generation of user PMTs has been ordered by CLS/Service Argos to Seimac, Ltd. These units include all the two-way capabilities implemented in the Bathy Systems prototype units developed prior ADEOS-II launch, plus the 4.8 kbit high data rate capability. 80 units will be available by mid-2006 to trigger manufacturers and users initial field tests and applications. In parallel, CLS/Service Argos is about to contract the development of a second generation PMT aiming at a low cost, single board unit to be commonly used in Argos applications.

8.3.8 Mr Ortega expanded on the capabilities that will be provided by the new processing system, which will be operational by mid-2006. This processing system will integrate the current basic Argos data processing and the GTS processing sub-system in a unique system thus providing to all applications enhanced capabilities. The system will be able to process multiplexed messages, to concatenate them and apply several decoding formats, validate the data using compression techniques and checksum. Also, the data will be made available either and both in satellite pass related messages - messages grouped by satellite pass, as per today – or in processed time-tagged observations. The new system will enable data access and delivery of both messages and observations by all data access capabilities provided by CLS/ Service Argos (ADS, telnet, web…). This will positively address the “classical” need expressed by users and manufacturers to access both raw and fully processed data. This system is also designed to easily integrate and process observations collected by other satellite systems.

8.3.9 The service provided to the DBCP community is being enhanced by the implementation of expert software tools, useful to tune PTT format and transmission parameters with users and manufacturers, the reinforcement of the science team at CLS to better address the GTS declarations and follow-up. Also actions – meetings, emailing, visits - are taken to improve coordination between users and manufacturers, to make sure users make the best of Argos capabilities. In this context, and also in view of the migration of the Argos programmes and declarations to the new Processing system, the manufacturers are asked to provide CLS/Service Argos with a list of their most used models of buoys and floats together with their data processing template or a reference ID number that has the appropriate processing.

8.3.10 As per the User requirements, it was indicated that the blind orbit problem was on the way to be solved by downloading the stored data (STIP) in the Svalbard NPOESS Antenna operated by NOAA (see 8.3.12 below). Preliminary tests are scheduled for late October 2005. The price issues – avoid two days accounting for over midnight spanning transmission and allow multi-country programme invoicing - were positively addressed by the new JTA Tariff. Requirements specific to DBCP were addressed by the new developments of the GTS sub-system.

8.3.11 The new data management and distribution tools, being implemented at CLS/Service Argos as the result of the Argos2001 developments, were presented. These include:

(i) ArgosDirect (former ADS with new features): to receive automatically over email, SMS/GPRS, FTP all data from the platforms or just alert messages;

(ii) ArgosShare: to share the observations collected with colleagues by programmes or platforms, by date windows or geographical areas;

(iii) ArgosMonitor: Monitor the status of the deployed platforms, their positions, the data collected and be informed of any changes;

(iv) ArgosWeb: Access data via the web and benefit from data displayed and downloadable on all new maps.

8.3.12 The NOAA Satellite and Information Service (NESDIS) representative, Mr. Darrell Robertson, provided a status on the current NOAA POES constellation. He noted that NOAA successfully launched NOAA-18 in May 2005, replacing NOAA-16 as the Operational afternoon satellite. NOAA is currently maintaining 6 POES satellites in various modes of operation and reported on the operational status, drift rates, and GAC playback schedules of each satellite. The NOAA Satellite and Information Service representative also presented ongoing activity to address a DBCP request to investigate solutions for collecting blind orbit data. NOAA reported it had expended $100K to modify equipment at Svalbard to address the DBCP requirement. As a result, IJPS Satellites (NOAA-18 and Metop and future spacecraft) will be collected by a separate antenna at Svalbard for normal recovery and blind orbit support, as agreed upon in the EUMETSAT/NOAA Memorandum of Understanding. NOAA has been currently testing the link from Svalbard to Suitland, Maryland. Testing of the internal communication lines and ingest by the NOAA Pre-Processor was under way. NOAA expected blind orbit support to be operational by March 2006.

8.4 NEW COMMUNICATION TECHNIQUES AND FACILITIES

8.4.1 As had become customary, the Panel was presented with an update on satellite communication technologies by its chairperson, Mr David Meldrum.

8.4.2 With regard to the Argos system, the Panel had noted with approval the report of Mr Darrell Robertson on the considerable investment by NESDIS in addressing the blind orbit support issues raised at previous Panel sessions. This was a good example of the way in which the Panel, CLS/Service Argos and NESDIS had worked together to address common aims, and the Panel thanked NESDIS for its continued responsiveness and commitment in this area. Mr Meldrum reminded the Panel that future developments in the NOAA polar orbiter system (NPOESS) and with Eumetsat's METOP system would inevitably impact on its activities, and that it needed to continue to engage in dialogue with the operators of these systems in order to ensure that data buoy activities were accommodated in the best possible way. It also needed to understand the new capabilities offered by the two-way Argos-3 system, although it would be some time, owing to launch schedules, before this system could fully replace the current Argos system.

8.4.3 With regard to other satellite systems, the Panel's attention was drawn to the imminent availability of a much more compact and less expensive Iridium data transceiver, and the emergence of new Iridium resellers (NAL and Service Argos - application pending), who would be able to provide a service more closely aligned to the needs of the Panel.

8.4.4 Finally, the Panel was reminded that the document describing developments in satellite communications was available on its website, and that this document was continually updated as new information came to light.

8.4.5 The Panel thanked Mr Meldrum for his review, and requested the Technical Coordinator to make the tabulated summary available on the DBCP web site **[Action]**. It considered that a regular review of communication options was central to its objectives, and requested Mr Meldrum to again present an updated report to its next session **[Action]**.

8.5 JCOMMOPS

Operations and maintenance of the information system

8.5.1 The Technical Coordinator reported on JCOMMOPS operations during the last intersessional period. After four years of relatively sustained developments, JCOMMOPS is now regarded as operational. JCOMMOPS operations involves (i) day to day technical coordination for the DBCP, SOOP, and Argo programmes, (ii) information system operations and maintenance, (iii) feeding the information system with appropriate data.

Developments

8.5.2 The Panel noted with appreciation the following developments had been undertaken during the last intersessional period. These lead to new JCOMMOPS operational monitoring products:

(i) The JCOMMOPS web site was entirely re-designed and re-structured to better serve the in situ met/ocean observing community in terms of support for implementation and operations, and in terms of monitoring. New ergonomy was introduced and the following main sections introduced, (i) implementation, (ii) monitoring, (ii) map room, (iv) instrumentation, and (v) data;

(ii) New dynamic mapping system with global equal cylindrical and universal Polar stereographic projections. A monthly map showing barometer drifting buoys by country added;

(iii) New Argo Information Centre web site consistent with JCOMMOPS look and ergonomy;

(iv) Link to JCOMM network status added (under monitoring section);

(v) Buoy metadata collection system operationally implemented as well as daily export of collected metadata in XML format through FTP site;

(vi) Scripts for uploading WMO Publication No. 47 in JCOMMOPS database;

(vii) New monitoring tools added, including (i) SOOP lines and line types, (ii) observational platform query, (iii) ships and WMO numbers query, (iv) GTS statistics & buoy monitoring statistics query, (v) lifetime statistics and network size evolution model.

Proposed new Terms of References for JCOMMOPS

8.5.3 Proposal to change JCOMMOPS Terms of References of JCOMMOPS so that the centre could eventually provide overall SOT coordination was discussed and agreed upon by the Panel at its previous session. This was also discussed and approved at the 4th JCOMM Management Committee meeting, Paris, 9-12 February 2005, and at the 3rd SOT meeting, Brest 7-12 March 2005. Proposed new Terms of Reference (ToR) were finally endorsed by JCOMM at its 2nd session, Halifax, 19-27 September 2005. JCOMM agreed that JCOMMOPS could also provide some support to the Satellite Expert Team on Data Requirements (i.e. information from the team and satellite rapporteur disseminated via the JCOMMOPS web site). The JCOMMOPS ToR was changed accordingly and a recommendation passed to that effect (See also *Annex VII*).

JCOMMOPS funding

8.5.4 The Panel noted that JCOMM-II had agreed that JCOMMOPS was an important structure to operate and maintain for facilitating observational programme coordination, implementation and operations at the international level. The Commission had also agreed that solutions should eventually be found for ensuring its long term funding (see also paragraph 5.7). Particularly, the Commission asked the OCG and the Secretariats to investigate feasibility for funding JCOMMOPS development and operations through specific budget line within the JCOMM Trust Fund instead of through individual DBCP, SOOP, and Argo Trust Funds. As there are DBCP, SOT, and Argo aspects within JCOMMOPS, any commitment to the trust fund could be earmarked either for JCOMMOPS as a whole, either for one of the three panels in particular, or even to one of the SOT sub-panels in particular. The level of services that a given panel would receive from JCOMMOPS would be discussed at the OCG level, and linked to the level of commitment earmarked in the trust fund for that panel. The Commission suggested establishing a review mechanism for JCOMMOPS activities and to report at JCOMM-III.

8.5.5 While appreciating the rationale for the establishment of a JCOMMOPS Trust Fund, the Panel was concerned that any action to reassign payments currently earmarked by members for the DBCP Trust Fund might imperil these contributions. The Panel had over the years established its reputation as a body which made effective use of the contributions made to it, principally through the employment of its TC, and was anxious to ensure that these funds continued to flow. In sounding this cautionary note, it nonetheless asked its chairperson to work with the JCOMM OCG and the Secretariats during the coming 4-year JCOMM intersessional period to explore options for allowing Panel contributors to participate in a wider funding activity that might eventually translate to direct contribution to a JCOMMOPS Trust Fund. **[Action]**

8.6 OTHER TECHNICAL ISSUES

8.6.1 Deployment opportunities and Strategies

Deployment opportunities

8.6.1.1 As discussed at previous DBCP sessions JCOMMOPS, acting as a focal point, is maintaining information on opportunities for deployment of drifting buoys and Argo floats by ship or air, servicing of moorings, and for observing ships. Information is useful for Members initiating new programmes, and for existing programmes deploying instruments in new area. Detailed information, including contact point can be found at:

http://www.jcommops.org/depl_opport/ depl_opport.html

The Panel recommended that they check information on opportunities that appear on the web site, to suggest any required changes, and to provide the Technical Coordinator with additional information as appropriate. Also, the list of National Focal Points for logistical facilities can be obtained from the JCOMMOPS web site at the following URL:

http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/usergroup?abbrev=NFP_LOGISTICS&option=detail

Deployment strategies

8.6.1.2 Recently, the Panel agreed to develop its implementation strategy in such a way that it is consistent with the JCOMM OCG phased-in implementation plan. Large efforts have been made in the last three years to basically double the number of drifting buoys reporting operationally at any time from the world oceans. This lead to deployment of drifter “1250” on 18 September 2005 near Halifax which commemorates completion of the drifter array.

8.6.1.3 The Panel agreed that efforts should now be placed on sustaining the network. The Panel also agreed that efforts made in recent years to increase the number of operational drifters to its current level was higher and that efforts will have to be made in order to sustain the network. This is because the number of drifters to deploy yearly will not be as high. The Panel however agreed that deployment opportunities, especially in the Southern Hemisphere, were difficult to identify, and that efforts should be made to seek new opportunities.

8.6.1.4 The Panel agreed in principle that its trust fund could be used to support collaborative arrangements such as purchasing ship time for drifter deployment. The Panel also recognized the enormous contribution by the SOT to assist with drifter deployments as much as possible. It thanked the SOT for this contribution.

8.6.2 GTS delays

8.6.2.1 The Technical Coordinator reported on the status of drifting buoy data GTS delays. Because many buoys now report back-hour and hourly data, and because there is not necessarily a satellite in view of the buoy at the time of the observation, many observations are already old when they are transmitted to the satellite once the latter is in view. As the DBCP had recently recommended to insert all available hourly data on GTS, this also lead to an increase of average delays. However, while the percentage of timely data dropped, the absolute number of such data didn't. In August 2005, Météo France received about 30% of the data in less than one hour, 50% in less than 2 hours, and 70% in less than 3 hours. Statistics provided by E-SURFMAR show better results for the North Atlantic Ocean, mainly because of a better coverage of Argos regional stations. These showed about 20% of the data received within 30 minutes, and 85% within 2 hours. Nonetheless, concerns were expressed that delays might be increasing in certain areas, and that the statistics presented to the Panel did not allow a definitive view to be taken on this important issue. Accordingly, the Panel chairperson undertook to perform a further study of GTS delays, aided by CLS/Service Argos and the TC **[Action]**.

Global network

8.6.2.2 It was reported that all orbits from satellites NOAA-15, NOAA-16, NOAA-17, and NOAA-18 were being downloaded by NOAA/NESDIS through the Argos global network while only 3 to 4 orbits were downloaded for NOAA-14, and only two for NOAA-12.

8.6.2.3 The Panel expressed concern that the blind orbit problem, due to end of Lannion operations in 2000, remained. NOAA/NESDIS facilities at Barrow, Alaska are still being enhanced, and required software upgrades might be implemented after 2006. The Panel thanked NOAA/NESDIS for its substantial commitment to test and develop facilities at Svalbard (see paragraph 8.3.2.

8.6.2.4 The Panel recognized that the loss of Lannion was partly compensated through (i) enhancement of the Argos network of regional stations, and (ii) use of the multi-satellite service which is now provided free of charge. However, as noted by some of the DBCP Action Groups (IABP, E-SURFMAR), related additional charges by Service Argos for multi-satellite data distributed through the so-called Automatic Distribution System (ADS) is in fact a deterrent from using that service. The Panel decided to place a recommendation to the JTA in this regard in order to eventually substantially limit impact of Multi-Satellite service on ADS charges.

Regional network

8.6.2.5 The Panel noted with appreciation the extension of the Service Argos network of regional receiving stations during the last intersessional period. Three stations were added: Bali, Indonesia; Hyderabad, India; and Tahiti, French Polynesia. CLS has plans to connect a station in Gabon.

8.6.2.6 The UK provided information on the status of connecting Malvinas/Falklands Islands LUT to the Argos network via the 64K telecommunication line to the UK Metoffice Headquarters in Exeter. The UK reported that funding for software development was now available to arrange for the transfer of Argos TIP data via FTP through this line. The Panel thanked the UK for its commitment in this regard. The status of the Marion and Gough Island LUTs remained unclear.

8.6.2.7 Service Argos statistics show that 55% of the Argos data sets collected via the regional network for NOAA-12, 14, 15, 16, and 17 are delivered to the users within 15 minutes and 85% within 30 minutes. The map in Figure 1 shows the percentage of data received via the 44 station regional network versus the global network. It shows that installation, operations, and connection of antennas in the South Atlantic (e.g. Gough, Saint Helena), and the Southeast Pacific Ocean (e.g. Easter Island) would substantially improve data timeliness in these regions. Simulations show that for a theoretical network of ocean stations split evenly over the oceans, about 80% of the Argos data would be available through the regional network in near real-time.

8.6.2.8 The Panel asked the Technical Coordinator to investigate possible LUT network extension on Gough/St Helena and Easter Island with Service Argos **[Action]**.

Multi-satellite service

8.6.2.9 The Panel recognized that introduction of the new JTA regulation to provide multi-satellite service for free to all Argos users had positively impacted both the quantity of data distributed on GTS and the delivery delays. However, for buoy users operating drifters in high latitudes, this impacted the Argos Distribution System (ADS) charges heavily. This had become a deterrent for them to use the multi-satellite service. The Panel therefore agreed to pass a recommendation with the JTA in order to mitigate the impact of multi-satellite service on ADS charges. For example, additional ADS charges due to multi-satellite service could be capped or a reduction co-efficient applied **[Action]**.

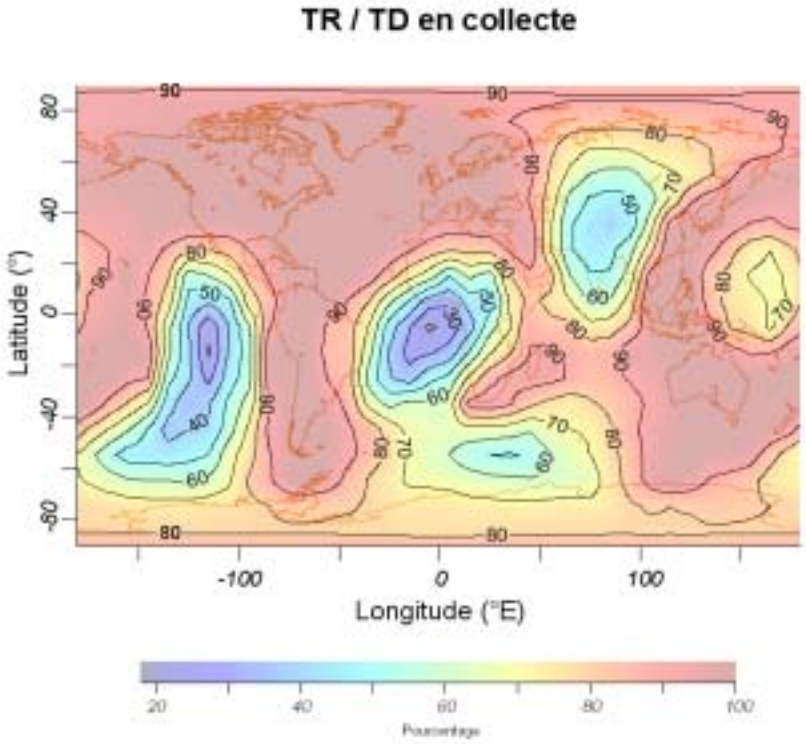

Figure 1: Percentage of Argos data received via the 44-station regional network compared to those received via the global network, September 2005

8.6.3 Vandalism

8.6.3.1 The Panel agreed that Vandalism remained a concern for many Panel Members and that action undertaken in previous years should be pursued. These included provision of information on data user through International Organizations such as the International Hydrographic Organization (IHO), the International Maritime Organization (IMO), and the Food and Agriculture Organization (FAO). For example, a leaflet on vandalism is available via the DBCP and JCOMMOPS web sites (http://www.dbcp.noaa.gov/dbcp/vandalism.html) and through the FAO web site News section. It asked the Secretariats to continue liaison with such organizations **[Action]**.

8.6.3.2 The Panel agreed that raising public awareness regarding the use of data buoys (e.g. hazard prevention and mitigation) could be effective in the long term and that this could be done most effectively at the national level. It asked the vice-chairperson for Asia, K. Premkumar, to investigate ways for visualizing buoy activities for the media, and to report at the next Panel session **[Action]**.

8.6.3.3 The Technical Coordinator explained that the JCOMMOPS web site could be used to share confidential information regarding buoy designs, preventing vandalism (via username/password connection to the web site). The Panel invited Panel Members to provide the Technical Coordinator with specific design recommendations in the view to compile a draft confidential document that could be shared amongst Panel members **[Action].**

8.6.4 Buoy metadata collection scheme

8.6.4.1 The Panel noted with appreciation that the web based buoy metadata collection system it had endorsed for development at its previous session, was operationally implemented at JCOMMOPS on 18 January 2005. The Panel thanked EGOS, now merged under E-SURFMAR as its Data Buoy Technical Advisory Group (DB-TAG) for funding the developments. Users and reference guides have been prepared and can be downloaded from the system home page (http://wo.jcommops.org/cgi-bin/WebObjects/meta).

8.6.4.2 The Panel also noted that the EGOS historical database has been uploaded into the JCOMMOPS database and that E-SURFMAR DB-TAG was now using it to notify new buoy deployments. It noted that IABP agreed to use it for the collection of its own metadata, that the Global Drifter Programme was using it through specific procedures that had been discussed between GDC and JCOMMOPS, and that managers of national buoy programmes, including in Australia, France, New Zealand, and Ukraine, had started using it. So far, the system had been presented and agreed upon by three buoy manufacturers (Technocean, Marlin-Yug, and Metocean). The Panel thanked these buoy operators, Action Groups, and manufacturers for their active participation in this exercise.

8.6.4.3 The Panel urged all other Action Groups, Panel members, buoy operators, and manufacturers to comply with it. As agreed at the previous DBCP session, notification by the manufacturers should be considered by them as a requirement and part of the services they provide to their customers. Manufacturers were also asked to clearly and precisely define in the database all the buoy models they are making. All buoy deployments should be notified through the web page by the buoy operators **[Action]**.

8.6.5 Metadata distribution in real-time

8.6.5.1 At its 20th session, the Panel had discussed and approved a proposal to establish a pilot project for real-time distribution of metadata regarding SST and temperature profile data. It was proposed to include a combination of (i) real-time distribution of a very limited subset of metadata along with observations, and (ii) provision of an extensive set of metadata through dedicated JCOMM global data centre(s) yet to be established. In any case, the Panel had agreed that there should be strong justification by the users for any metadata to be included in real-time

reports, and this need should be documented. The need for other metadata not necessarily included in the real-time reports should also be documented.

8.6.5.2 The Panel noted that the proposal had then been discussed and approved by the 4th JCOMM Management Committee, Paris, 7-12 February 2005, by the 3rd Ship Observations Team, Brest, 7-12 March 2005, and by the informal JCOMM/OCG meeting, Silver Spring, 28-29 April 2005. The Management Committee agreed that the issue had at least both OPA and DMA integration implications and should be placed under the responsibility of the OCG as the main challenge lied with the collection of the metadata from platform operators rather than with data management aspects which should be relatively straight forward, at least technically. It decided to establish an ad hoc working group as soon as possible and to organize a workshop with a fairly broad community representation (platform operators, modellers, scientific users, data centres, communications specialists). The workshop was tasked to (i) start the project, (ii) refine metadata categorization, (iii) establish rules to determine the categorization of metadata, (iv) scope out a metadata model framework for the organization of content, (v) clarify priorities (e.g. what observational systems to target first), (vi) look for candidate centres that might be willing to eventually implement a JCOMM dedicated metadata server, and (vii) establish a JCOMM *ad hoc* working group tasked to write specifications in detail and to finalize and formalize the project. The Management Committee meeting agreed that experts should attend at their own expenses. It tasked OCG to take practical steps for organizing the workshop, i.e. identifying appropriate experts, finding a meeting venue, drafting the agenda for the workshop, and issuing the invitations with assistance from the Secretariats for the latter. The Management Committee meeting agreed on the Terms of References for the ad hoc working group (see *Annex IX*).

8.6.5.3 The SOT agreed to identify during its intersessional period a common consistent set of metadata that is of use to XBT operators, and can be provided to scientific users, in advance of the JCOMM workshop. OCG eventually agreed on membership for the working group, including representatives from the users, data centres, platform operators, the industry, and national centres largely involved in collection and data processing of SST and temperature profile data. The workshop should be organized in early 2006.

8.6.6 Technology developments in coordination with users

8.6.6.1 Past experience with development and testing of the SVP Barometer drifter (SVPB) and Minimet has shown that dialogue and cooperation between oceanographers and meteorologists, research and operational communities, academic and private sector works. Developments so far have stressed on sensor developments. More recent work in the context of the DBCP evaluation group has shown that there is a potential for developing the drifting buoy technology in a way that addresses user requirements more closely (e.g. storm buoy, i.e. increasing time resolution in storm conditions). More was done on on-board software developments than on hardware developments in this regard. The smart buoy concept goes a step further: adjusting time resolutions and data timeliness to user requirements in such a way that electric power requirements are decreased in average. For example, time resolutions could be decreased in weather or oceanographic conditions where the data impact models the less, and perhaps increased in more sensitive area. Average buoy lifetime would be extended. This would eventually permit to have more operational buoys in the world oceans at any time while deploying the same number of units as before (i.e. constant hardware budget). Even a small 5% to 10% lifetime increase could lead to substantial benefits for the users.

8.6.6.2 In line with numerical weather prediction, climate variability, ocean modeling and climate forecast requirements, the Panel agreed to organize a workshop which goal will be (i) to analyze user requirements in terms of space and time resolutions as well as timeliness and to show how these requirements might depend on specific geographical, weather or ocean conditions, and (ii) suggest technological developments or modes of operation, including software and hardware, on-board and at data processing centres, that could be proposed in order to stay as close as possible to these requirements with the overall objective of increasing usefulness of the drifting buoy networks at constant cost. The Panel agreed that the workshop should include

representation from buoy operators, data users, buoy manufacturers, and satellite data telecommunication providers. User needs should be understood clearly by all actors. At the same time, users should understand all technical limitations. By bringing these communities together at a brainstorming workshop, followed by a question/answer session, one can expect to eventually come up with new ideas, practical solutions, and specific recommendations.

8.6.6.3 The Panel finally agreed to establish a small group, including the chairperson, the evaluation group chairperson, and the Technical Coordinator, tasked to prepare the workshop, propose an agenda and list of questions to be answered, and issue invitations. A list of questions should be prioritized as much as possible and circulated to Panel members before the end of the year in order to provide them with an opportunity to provide answers or to ask other questions **[Action]**. The Panel recommended that the workshop be held in a location that would ensure active participation from the user community. It therefore recommended that it should be held at ECMWF in March or April 2006. Experts are expected to attend at their own expense **[Action]**. Outcome of the workshop will be presented at the next Panel session **[Action]**.

C. ADMINISTRATIVE COMPONENT

9. REPORTS

9.1 CHAIRPERSON AND VICE-CHAIRPERSONS

Chairperson

9.1.1. The chairperson reported on a number of activities on behalf of the Panel during the intersessional period, covering administrative, promotional, technical and strategic issues. These are summarized below.

9.1.2. *Administrative issues*: Following discussions at DBCP-XX regarding a number of financial issues that faced the Panel and the employment of its Technical Coordinator, the chairperson had convened a meeting at IOC in December 2004 to address the problems that had been noted. This, and a subsequent meeting just prior to this session, were very positive, and the outcomes are reported under agenda item 10. Following the generous offer of Argentina to host the DBCP and JTA sessions at very short notice, the chairperson engaged in considerable activity, supported by a number of Panel members, to put in place adequate assistance for the local organizers. A number of letters were also written to the Secretariats dealing with purely administrative matters.

9.1.3. *Promotion of the DBCP*: The chairperson attended the annual review of the US Office of Climate Observation (OCO) in April 2004, at the kind invitation of its director, and presented the Panel, its activities and mission, to a large audience made up of a wide cross-section of the international climate, oceanographic and meteorological community. A similar presentation was delivered to the second session of JCOMM, held in Halifax, Canada, in September 2005. Unfortunately protracted airline delays resulted in the chairperson being unable to preside over the landmark deployment of Global Drifter 1250, which took place immediately before the JCOMM session.

9.1.4. *Technical matters*: A meeting of the JCOMM Observations Coordination Group, immediately after the OCO review, permitted the chairperson to interact with experts from other programme areas in identifying the technical challenges facing ocean observations, and the Panel's potential role in overcoming these challenges. Key amongst these was the development of optimal seeding and reseeding strategies for the deployment of free-drifting platforms, and the chairperson is seeking support for research in this area. The chairperson had also written to NOAA NESDIS on behalf of the Panel, in response to a request, in the context of NPOESS, for information on the required capability of future satellite data collection systems in support of data

buoy and other applications. The view expressed was that existing technologies (principally a mix of Argos and Iridium) were capable of meeting perceived needs, and that resources should be directed to enhancing the capabilities of these services rather than towards the development of completely new systems. Pressure had also been maintained on NESDIS and CLS/Service Argos to resolve the blind orbit deficiencies of the current Argos ground station network, and its serious effect on data timeliness for several key ocean areas (see paragraph 8.4). Similar presentations were made in regard to NEDSIS's proposed removal from service of a number of older satellites, which nonetheless still reported useful data, particularly from data-sparse areas, via the Argos LUT network.

9.1.5. *Structure and strategy*: Building on previous activities in helping design a new Argos tariff structure, the chairperson had submitted informal proposals to CLS/Service Argos on the cross-funding of non-profit activities from commercial operations, and the design of a tariff structure which more accurately apportioned costs according to system use. As has been indicated elsewhere in the documentation, the chairperson consulted a number of key players and strategic thinkers in initiating a re-examination of the Panel's mission and methods.

Vice-chairpersons

9.1.6. The vice-chairperson from Asia, Dr K. Premkumar, participated in the 7th Session of the IGOOS meeting of IOC held at Paris (4~7 April 2005). He noted with pleasure that the Executive Secretary of IOC noted DBCP as a major success in contribution to GOOS.

9.1.7. The vice-chairperson from Asia also travelled to the Pacific Tsunami Warning Centre as part of the Indian team to participate in the Asia Pacific All Hazards Workshop held in Honolulu from 6 to 10 June 2005, sponsored by USTDA and NOAA. The Indian proposal for an early warning system for ocean hazards has been well received and he had interaction with Dr Bernard, Mr Chris Meing and other officials of PMEL to know more about the DART BUOYS. He also constantly kept in touch with NDBC and PMEL to know more about the DART kind of system for installation in Indian seas.

9.1.8. The vice-chairperson from North America, Ms Elizabeth Horton, attended the following meetings during the intersessional period:

(i) SOT-III meeting in Brest, France in March,

(ii) IABP meeting in Seattle, Washington in June,

(iii) JCOMM-II in Halifax, Canada in September, and

(iv) IBPIO, NPDBAP and ISABP meetings in Buenos Aires, Argentina prior to the DBCP-XXI meeting in October.

The SOT-III report on the potential threat to commercial vessels transiting due to the posting of their locations on a globally accessible website, and also on increased security demands restricting the activities of Port Met Officers was of particular note. The vice-chairperson for North America provided input for the JCOMMOPS structure and for instrument standardization and calibration in preparation for JCOMM-II.

9.1.9. The Panel expressed its considerable appreciation to the chairperson and vice-chairpersons for the very valuable work which they had undertaken on behalf of the DBCP during the past intersessional period.

9.2 SECRETARIATS

9.2.1 The Panel noted with appreciation that the Secretariat had continued to undertake a number of activities on behalf or in support of the DBCP during the past intersessional period. These included continued management of the Panel's funds, as well as the employment and missions of the Technical Coordinator; close liaison with JCOMM, in particular in the development

of coordination and integration procedures; liaison with CBS on codes and other matters; liaison with other IOC and WMO technical commissions and regional associations (or equivalent bodies) on relevant issues; liaison with CLIVAR, GCOS, GOOS, SCOR and WOCE; presentations on the DBCP and other *in situ* marine observing activities to various forums; maintenance of the WMO buoy ID number register; and support to the DBCP Action Groups as required.

9.2.2 The Panel noted that the WMO Executive Council, at its fifty-seventh session (Geneva, June 2005) reviewed the problem of data transmission costs from VOS, and recognized that possible mechanisms for its solution were still under development. In this connection the Council noted that a partial solution to the problem of fairly distributing such costs was being developed by European countries participating in the E-SURFMAR programme. However, a global solution to the problem would be very difficult to achieve. It was also noted that there were potentially serious security risks associated with allowing VOS call signs and position data to be made freely available on external web sites not maintained by the National Meteorological Services. Because ship observations are regarded as essential data in Resolution 40 (Cg-XII), the problem was likely to persist. It was therefore agreed at the last JCOMM Ship Observations Team meeting (SOT-III, March 2005), that a report on the issue should be presented at EC-LVIII. The Council also encouraged the Members/Member States involved in the Earth Observations process to work to maintain references to the GCOS Implementation Plan, and advocate for a policy of free and unrestricted exchange of marine and oceanographic data in compliance with the Resolution 40 (CgXII).

9.2.3 The Panel was informed that that the WMO Executive Council noted the essential role of JCOMM in a number of existing and recent cross-cutting projects, including GEO, tsunami early warning systems and the International Polar Year (2007-2008). In this context, the Council encouraged IOC and WMO to take full advantage of JCOMM to support the implementation and operations of the Tsunami Warning System in the Indian Ocean and other regions at risk and requested to aim in all cases for a multi-hazard and integrated approach by collaboration with the NMHSs, GMDSS and relevant external partners including the Intergovernmental Coordinating Groups (ICG) of IOC, IMO and the ISDR.

9.2.4 The Secretariat informed that the IOC Project Office for IODE had opened on 25 April 2005, by the support of the Government of Flanders (Belgium) for the facility, and by the support of USA for temporary professional staff assistance. Ten training courses and related activities have already been planned for 2005, including a joint JCOMM–IODE–GOOS training course on numerical modelling and data management.

9.2.5 The Panel carefully reviewed the list of National Focal Points for the DBCP and the register of WMO buoy ID numbers, which were presented by the Secretariat. As agreed at DBCP-XVI, a list of national focal points for logistic support for JCOMM observing systems in general has been compiled and is maintained on the JCOMM web site.

Intergovernmental Group on Earth Observation (GEO)

9.2.6 The Panel received with interest a brief note on the GEO process. Since the first Earth Observation Summit (EOS-I, Washington, D.C., 30 July–2 August 2003), remarkable efforts have been made to develop a comprehensive, coordinated and sustained Global Earth Observation System of Systems (GEOSS). The EOS-I and the Second Earth Observation Summit (EOS-II, Tokyo, 25 April 2004) led the *ad hoc* intergovernmental Group on Earth Observations (GEO) to develop the GEOSS 10-Year Implementation Plan, describing the fundamental elements of an Earth Observation System and its principal expected benefits to a broad range of user communities. The Third Earth Observation Summit (EOS-III, Brussels, 16 February 2005) endorsed the GEOSS 10-Year Implementation Plan, and established the Intergovernmental Group on Earth Observations (GEO, to replace the *ad hoc* Group), to take steps necessary to implement GEOSS in accordance with its Implementation Plan. The GEO Secretariat, at the invitation of the WMO and with the support of the Swiss Government, was set up at the WMO Headquarters in Geneva.

9.2.7 The Panel was informed that fifty-eight countries and forty-three international / intergovernmental organizations were participating in GEO. Organization and structuring was under way concerning: GEO Plenary body, Executive Committee, and four Standing Committees including Capacity Building and Outreach; Architecture and Data, Science and Technology, and User Interface.

9.2.8 The Panel noted that the GEO 2006 Workplan had been under development, to (i) identify the fundamental objectives of GEO, (ii) outline the strategy the Secretariat intends to follow in order to strengthen political, organizational, and financial support for GEOSS, and (iii) provide a description of operational tasks for 2006. Considerable efforts have been made to develop this Workplan. In total, 107 targets were developed to gather information on ongoing and planned activities within the existing earth observation mechanism, under 9 socio-benefit areas. More than 200 experts identified in 9 societal benefit areas have participated in this process, by providing information on ongoing and planned activities within the existing earth observation mechanism. Among the 107 items, target number 34, under the area [Climate], reads “Support JCOMM to coordinate the implementation of and prepare regulatory and guidance information for an operational in situ ocean observing system”. It implies that the ocean component of GCOS-92 has been adopted by JCOMM as the design for its operational ocean observing system; therefore the JCOMM is recognized within the GEOSS framework as an implementation mechanism for oceanographic and marine meteorological components of Earth Observation, providing global, intergovernmental coordination of implementation activities.

9.2.9 The Panel noted with appreciation WMO and IOC efforts to the GEO/GEOSS process, by providing technical expertise in cooperation with the scientific community. JCOMM also adopted Recommendation 12/1 (JCOMM-II) - The Global Earth Observation System of Systems, recommending that 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 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. It 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.

9.2.10 The Panel particularly expressed its interest in GEO’s activity regarding the support to the tsunami warning system, through its ad hoc Working Group on Tsunami Activities. It was to support UN coordination for effective tsunami warning systems, as an integral part of a multi-hazard approach supported by GEOSS for disaster reduction at national, regional, and international levels. It therefore has sought for a way to add value to existing international efforts to establish tsunami warning systems. The Panel noted that it would potentially contribute to the GEO/GEOSS process in this field, either through JCOMM or through national coordination of each member country, and agreed to actively communicate with national coordination for GEO to fully inform the Panel’s activities and capabilities in this regard **[Action]**.

9.2.11 The Panel expressed its appreciation to the Secretariat for the informative presentation, and emphasized that the Panel should remain fully informed about this initiative.

10. FINANCIAL AND ADMINISTRATIVE MATTERS

10.1 FINANCIAL SITUATION

10.1.1 The panel considered the financial statements provided by IOC and WMO as follows:

(i) IOC Statement of Account 1 June 2004 ~ 31 July 2005;

(ii) Interim WMO Statement of Account as of July 2005;

(iii) Provisional statement of estimated income and expenditure to 31 May 2006 (WMO and IOC).

These statements are reproduced in *Annex X, Annex XI* and *Annex XII*.

10.1.2 The Panel noted that some DBCP-XX contributions had not yet been received, and the contribution from Japan appeared to have decreased by 3,000 USD this year. The Panel requested the Secretariat to investigate the situation and take necessary measures to receive the DBCP-XX contribution by the end of 2005 **[Action]**. The Panel also noted that the contribution from USA was transferred directly to IOC, to facilitate the contractual process of the TC's employment.

10.1.3 As reported to the Panel at its 20th session, a discrepancy of USD 13,527.27 had come to light in its UNESCO account. The Panel noted with pleasure that IOC has volunteered to rectify the error by making this amount available for the TC's activities from its regular JCOMM budget beginning in 2006.

10.1.4 Due to the unfortunate and sudden demise of Mr Louis Vermaak during the intersessional period, the twenty-first session was relocated to Buenos Aires, Argentina instead of Cape Town, South Africa. To help with the local arrangement at such short notice, WMO and several member countries including Canada, France, United Kingdom, and the USA volunteered to contribute additional funds on an exceptional basis. Whilst these contributions will show in the Panel's accounts for 2005-6 (to be reported at its next session), the Panel reaffirmed that funds would not normally be provided to host countries.

10.1.5 The Panel, while sympathizing with the difficult staffing circumstances that had existed in the Secretariat during the preparation of these accounts, nonetheless expressed its concern at the incomplete data that had been laid before it. It therefore requested Panel member Mr Frank Grooters to work with the Secretariat to finalize and clarify the presentation of the accounts as soon as possible **[Action]**.

10.2 CONTRACTS

10.2.1 The contracts established by IOC/UNESCO for the employment of the Technical Coordinator was considered and approved by the Panel.

10.2.2 The Panel recalled the Secretariat report at its twentieth session, informing that the contract for logistic support for the position of Technical Coordinator was to be transformed into a standing agreement between IOC and CLS concerning the occupancy of premises and the use of facilities granted to JCOMMOPS. The signed agreement is reproduced in *Annex XIII* to this report. The Panel approved the agreement noting that the terms and conditions were identical to the previous arrangement. At the same time, the Panel noted that the payment to CLS had been made as a form of reimbursement every year (that is, payment for year "Y-1" had been made in the year "Y"), so obligation for year "Y" should be considered in the provisional expenditure of year "Y".

10.3 FUTURE COMMITMENTS

10.3.1 The Panel recalled that, at its seventeenth session (Perth, October 2001), it had agreed on the following arrangement with its Technical Coordinator:

(i) Technical Coordinator would be requested to inform the chairperson, every year "Y" by the 1st of October, of his wish, or otherwise, to continue to work as Technical Coordinator of the Panel for the period 1 June "Y+1" to 31 May "Y+2". Should that information be a wish to continue, the Panel in turn would agree to retain him as Technical Coordinator, subject to the availability of funds;

(ii) At any time, should the Technical Coordinator decide to give up the position, he would be required to inform the Panel as soon as possible, and in any case preferably six

months in advance, of his decision, as well as to assist in the recruitment and training of his successor, in order to ensure as full continuity as possible in the work of the Panel's Technical Coordinator.

10.3.2 According to that arrangement, Mr Charpentier addressed the chairperson on 5 October 2005, to inform him of his intent to continue working as Technical Coordinator of the Panel for the period 1 June 2005 - 31 May 2006, in the case he was not appointed by another organization. However, he would assist in the recruitment process for a new Technical Coordinator, if he decided to move to another organization. The Panel therefore agreed to continue the employment of Mr Charpentier as its Technical Coordinator for the year 1 June 2006 to 31 May 2007. In doing so, it once more thanked him most sincerely for his work on behalf of the Panel, its members and JCOMM in general.

10.3.3 The Panel received the information that, in case the financial support for the TC post stopped, it would be obliged to provide indemnity of termination, and payment for accumulated leave and relocation cost. The indemnity of termination applies to employees of a fixed-term appointment after six years or more of service in the UN, who separate from their posts for organizational reasons. It is calculated on the basis of the number of years and months of service completed, and would be payable in accordance with the schedule in the UN Rules. The estimation for Mr Etienne Charpentier for the indemnity reached to USD 61,000, and estimation for accumulated leave and relocation to USD 35,000, by June 2005. This amount is anticipated to increase every year. The Panel is also obliged to take charge of the cost related to the recruitment of a new Technical Coordinator.

10.3.4 The Panel expressed concern at this information, in view of insufficient reserve within DBCP account currently, and agreed that the Panel should seriously consider raising funds to secure the employment arrangement of the Technical Coordinator. It also urged the TC to assist the Panel in this matter by endeavouring to ensure that his accrued leave be reduced to a reasonable level, as is the normal practice in most organizations **[Action]**.

10.3.5 The Panel reviewed the table of expenditures and income for 2004-2006 and the table of provisional contributions. The Panel agreed that the same publication policy as previous years should be applied in 2006 and future years. It also recommended to JTA-XXV to continue to fund the independent JTA chairperson position through the JTA, using the DBCP Trust Fund as a relay mechanism.

10.3.6 On this basis, and in view of the urgent need to raise funds related to the employment of the Technical Coordinator (see paragraph 10.3.3 and 10.3.4), the panel finally agreed to increase the contributions to the DBCP fund by 20% from DBCP-XX contributions, in general. The adopted budget for 2006/07 is given in *Annex XV*. The scale of provisional contributions required to balance expenditures under this budget is given in *Annex XIV,* on the assumption that contributions will again be received from SOOP participants similar to those in the current year.

10.3.7 Noting the importance of the services provided by the DBCP Technical Coordinator, the Panel again encouraged its members to increase their contributions every year, in principle, to cope with the natural increase of the expenditure. The Panel also requested its chairperson to work with the Secretariat during the intersessional period, to seek additional contributors from Member countries, action groups and/or manufacturers **[Action]**.

10.3.8 Overall, as foreshadowed in 10.1.5, the Panel was concerned that it was unable to plan effectively on the basis of the accountancy data available to it, and urged its member, Mr Frank Grooters, to engage actively with the Secretariat in defining a more detailed, accurate and verifiable accounting process, and to recruit additional Panel members to a financial task team as required **[Action]**.

10.4 REVIEW OF THE DUTIES OF THE TECHNICAL COORDINATOR

10.4.1 Under this agenda item, the Panel reviewed the existing arrangements for the employment of the Technical Coordinator, as well as the sharing of his activities between the Panel and the Ship Observations Team. As discussed under agenda item 8.5, the Panel decided that these arrangements were suitable for the foreseeable future, subject to review at each Panel session.

D. CONCLUDING COMPONENT

11. RECOMMENDATIONS TO THE ARGOS JTA

11.1 The Panel recalled that, under agenda item 2.2, the IBPIO reported it had experienced timeliness problems in drifting buoy data reception. The data from the La Reunion LUT were not received at CLS Argos, which led to receiving less than 40% of the reports within 120 minutes of the observation time. The IBPIO therefore recommended that CLS/Service Argos: (1) carefully monitor data streams from its LUTs; and (2) improve the timeliness of data reception from the Indian Ocean to be comparable with the North Atlantic. The Panel endorsed that recommendation.

11.2 Under agenda item 8.6.2, the Technical Coordinator had demonstrated that installing LUTs on the island of Saint Helena, in the South Atlantic Ocean, and on Easter Island, in the South East Pacific Ocean, would result in improving significantly the near-real-time data coverage of the world ocean (up to 80% of the Argos data would be available in near real-time through the regional network, for a theoretical network of ocean stations split evenly over the oceans). The Panel recommended that CLS/Service Argos consider the feasibility of installing such LUTs with a view to possibly including this activity within their development projects.

11.3 Under the same agenda item, the Panel had noted that, in the new JTA tariff policy, multi-satellite service was included within the standard service without any additional charge. However, when multi-satellite service was provided, Argos users were charged for the additional volume of information uploaded by them through Service Argos so called Automatic Distribution System (ADS). This remained a deterrent for benefiting from the multi-satellite service, which allowed reducing the data transmission delays. The Panel therefore recommended to the Argos JTA to consider how ADS distribution of additional data sets should be charged, in order to find a solution that could be acceptable by the Argos users.

11.4 Under agenda item 10.3, the Panel recommended to JTA-XXV to continue to fund the independent JTA chairperson position through the JTA, using the DBCP Trust Fund as a relay mechanism. The estimated cost for the JTA would be USD 15,000.

12. WORKPLAN

12.1 As in previous years, the Panel reviewed and updated its operating procedures, as well as the overall workplan for itself and the Technical Coordinator for the coming intersessional period. These workplans are given in *Annex XVI*.

13. ELECTION OF THE CHAIRPERSON AND THE VICE-CHAIRPERSONS OF THE PANEL

13.1 The Panel re-elected Mr David Meldrum as its Chairperson, to serve until the end of the next Panel session. It also re-elected Mr K Premkumar as its vice-chair for Asia, and Ms Elizabeth Horton as its vice-chairperson for North America, for the same period.

13.2 The panel elected Mr Ken Jarrott as its vice-chairperson for the Southern Hemisphere.

14. DATE AND PLACE OF THE NEXT SESSION

14.1 The Panel recalled its general policy to alternate, as much as possible, the annual meetings between hemispheres. It was therefore pleased to accept confirmation from the National Data Buoy Center and Office of Climate Observation, NOAA to jointly host the DBCP-XXII in Annapolis, Maryland USA, subject as always to a similar agreement by JTA-XXVI. Tentative dates for the session were agreed as 16-20 October 2006.

15. CLOSURE OF THE SESSION

15.1 In closing the session, the chairperson, Mr David Meldrum, thanked all participants for their active and constructive input to what had been a very successful session, and one which potentially marked a significant reassessment of the Panel's mission and activities. He particularly remarked that the support and active participation of Panel members had been essential to the successful outcome of the meeting. On behalf of the continually changing office-bearer and Secretariat team, he also thanked members for their guidance and forbearance.

15.2 Speaking on behalf of all participants, the chairperson once again expressed sincere thanks to Ms Miriam Andrioli, Ms Paula Etala, their colleagues, and the staff of the Regente Palace Hotel, for their outstanding support, at very short notice, which had contributed fundamentally to the cooperative spirit and success of the meeting, as well as to the enjoyment of all participants.

15.3 The Panel paid a special tribute to the late Mr Louis Vermaak (vice-chairperson, Southern Hemisphere), who had served the Panel long and well, and whose commitment, openness and integrity had made him a friend to all. He would be missed, not only as a key force in the Panel, but as a special person whose humanity and concern for others permeated his every action.

15.4 The twenty-first session of the Data Buoy Cooperation Panel closed at 1200 hours on Friday, 21 October 2005.

Annex I

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Annex II

AGENDA

A. ORGANIZATIONAL COMPONENT

1. ORGANIZATION OF THE SESSION

1.1 OPENING OF THE SCIENTIFIC AND TECHNICAL WORKSHOP

1.2 OPENING OF THE SESSION

1.3 ADOPTION OF THE AGENDA

1.4 WORKING ARRANGEMENTS

B. IMPLEMENTATION COMPONENT

2. IMPLEMENTATION REPORTS

2.1 TECHNICAL COORDINATOR

2.2 ACTION GROUPS AND RELATED PROGRAMMES

- 2.2.1 Action Groups
- 2.2.2 Coordination with OceanSites
- 2.2.3 Tsunami warning systems

2.3 NATIONAL REPORTS

2.4 ARGO STEERING TEAM AND ARGO INFORMATION CENTRE

2.5 DBCP EVALUATION GROUP

3. NEW ACTION GROUPS

4. REVIEW OF THE DBCP IMPLEMENTATION STRATEGY

5. JCOMM ACTIVITIES RELEVANT TO THE DBCP

6. SCIENTIFIC AND TECHNICAL WORKSHOP

7. DATA AND INFORMATION EXCHANGE

7.1 REPORTS BY BUOY DATA MANAGEMENT CENTRES

7.2 INFORMATION EXCHANGE

7.3 BEST PRACTICES AND STANDARDS

8. TECHNICAL ISSUES

8.1 QUALITY CONTROL

8.2 CODES

8.3 ARGOS SYSTEM

- 8.3.1 Argos constellation
- 8.3.2 Global and Regional Network of Receiving Stations
- 8.3.3 Argos GTS sub-system
- 8.3.4 Argos developments and future Argos GTS data processing system

8.4 NEW COMMUNICATION TECHNIQUES AND FACILITIES

8.5 JCOMMOPS

8.6 OTHER TECHNICAL ISSUES

8.6.1 Deployment opportunities and strategies
8.6.2 GTS delays
8.6.3 Vandalism
8.6.4 Buoy metadata collection scheme
8.6.5 Metadata distribution in real-time
8.6.6 Technology developments in coordination with users
8.6.7 Others

C. ADMINISTRATIVE COMPONENT

9. REPORTS

9.1 CHAIRPERSON AND VICE-CHAIRPERSONS

9.2 SECRETARIATS

10. FINANCIAL AND ADMINISTRATIVE MATTERS

10.1 FINANCIAL SITUATION

10.2 CONTRACTS

10.3 FUTURE COMMITMENTS

10.4 REVIEW OF THE DUTIES OF THE TECHNICAL COORDINATOR

D. CONCLUDING COMPONENT

11. RECOMMENDATIONS TO THE ARGOS JTA

12. WORKPLAN

13. ELECTION OF THE CHAIRPERSON AND THE VICE-CHAIRPERSONS OF THE PANEL

14. DATE AND PLACE OF THE NEXT SESSION

15. CLOSURE OF THE SESSION

Annex III

REPORT OF THE TECHNICAL COORDINATOR

1) Introduction

This report covers the period 1 September 2004 to 31 August 2005. During this period the Technical Coordinator (TC) of the Data Buoy Cooperation Panel (DBCP) was based in Toulouse at CLS, Service Argos, and was employed by the United Nations Educational, Scientific and Cultural Organisation (UNESCO). Regular or normal tasks are listed in paragraph 4; other tasks month by month are given in paragraph 3.

During the period, I worked for SOOPIP 1/3 of the time, spent about 3% of my time on Argo and about 10% on JCOMM & JCOMMOPS issues. Work spent on JCOMM was directly related to DBCP and SOOP activities. Work spent on Argo basically included supervision of Argo Coordinator, team work to develop JCOMMOPS, miscellaneous support. During the period CLS provided some staff support for routine tasks on DBCP related issues (user assistance, insertion of data on GTS, monthly reports, system monitoring).

The following issues were stressed upon during the period:

- User assistance
- Buoy metadata collection scheme (development, implementation, guides, training, XML & CSV export)
- BUFR compression within Argos GTS sub-system (liaise with development team, tests)
- Draft BUFR template for directional wave data (discussion, proposal)
- Future Argos GTS data processing system (liaise with development team, transition from old system to new one)
- JCOMMOPS development (new server, new web site, new products, maps, GTS statistics, buoy monitoring stats., platform query, site directory, search tool, …)
- JCOMMOPS information system operations & maintenance (database, web servers)
- SVPB design reference manual (DBCP pub. No. 4) updated
- Impact of smaller-size SVPB upon quality of air pressure
- Smart buoy concept and proposal for a drifting buoy technology workshop
- TAO Salinity data processing and distribution on GTS
- Establishment of working group for real-time distribution of SST and temperature profile metadata
- Buoy-qc mailing list renamed to buoyqir@vedur.is (SPAM issue)
- Documents prepared for JCOMM-II and submitted to WMO & IOC Secretariats (JCOMMOPS, metadata, DBCP, SOT)
- Lifetime study, model, and web tools developed
- Start compiling information on buoy calibration procedures
- Liaison with DBCP Action Groups
- Get information on Tsunami buoys from NOAA/PMEL

Paragraph 2 highlights recent DBCP activities.

2) DBCP highlights (As of August 2005)

2.1) Present status of buoy programmes

See graphics in Appendix B:

- Graph-1: Drifting Buoys reporting via Argos and those on GTS by country.
- Graph-2: Moored buoys in the high seas (plus US and Canadian buoys and buoys reporting via Argos) and those on GTS by country.

These graphs are also available at http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/ptfCountry. Dynamic monthly map is available from JCOMMOPS at http://w3.jcommops.org/WebSite/DBCP/.

Among the drifting and moored buoys which are reporting on GTS in BUOY and SHIP format, the following variables are being measured (valid for drifting and moored buoy data received from GTS at Météo France during the period 1 to 30 June 2005):

Table 2: Drifting Buoys and Moored Buoys in the high seas (including US and Canadian moorings) reporting on GTS in June 2005

Variable	Drifting Buoys	Moorings	Remark
Any variable	1157	199	
AT	37	194	
P	279	129	
U	0	113	
SST	1001	189	
Tend	231	104	
Waves	1	117	
Wind	28	178	
Sub/T	18	80	TAO, PIRATA, TRITON.

2.2) 20th DBCP session, Chennai, India, 18-22 October 2004.

Session: 20th DBCP session was held in Chennai, India, 18-22 October 2004, and hosted by the National Institute of Ocean Technology. 40 people attended the meeting, representing Australia, Canada, France, Malaysia, Netherlands, New Zealand, Republic of Korea, South Africa, United Kingdom, Ukrain, USA, plus WMO and IOC Secretariats, buoy manufacturers, and Service Argos.

Workshop: Scientific and technical workshop was held during the first 1 and ½ days of the meeting. Twenty papers were presented dealing with research and applications, operations, and technical developments and visions. Proceedings will be published on CD-Rom by the DBCP in mid-2005.

DBCP implementation strategy was reviewed and refined. The Panel plans to eventually reach the figure of 1250 drifting buoys operational by September 2005. This is impacting substantially deployment strategy as increased deployment opportunities are needed. The Panel agreed that air deployment opportunities offered from Member States navies were limited while these offered through other means were expensive. The Panel therefore agreed that it was de facto increasingly depending upon ship deployment opportunities. It considered establishing a trust fund for deployment opportunities, especially for the Southern Ocean and invited the Chairman to pursue the idea during the next intercessional period. As far as the southern Ocean Buoy Programme (SOBP) was concerned, it was planned to deploy 95 drifting buoys with barometers in the region during the period September 2004 to August 2005.

Action Groups: Report by IABP was presented by Elizabeth Horton. The Panel noted and accepted the application of the EUCOS Surface Marine Programme (E-SURFMAR) to be an Action Group of the DBCP, to replace EGOS. This became effective when E-SURFMAR took over from EGOS in January 2005.

Technological developments: Storm buoy concept was approved (adjusting resolutions based upon detected weather conditions). Smart buoy concept will be discussed during the next inter-sessional period. Interaction with data users will be needed in order to develop the best approach to design this cost effective drifter with appropriate transmission strategy that would substantially increase its lifetime.

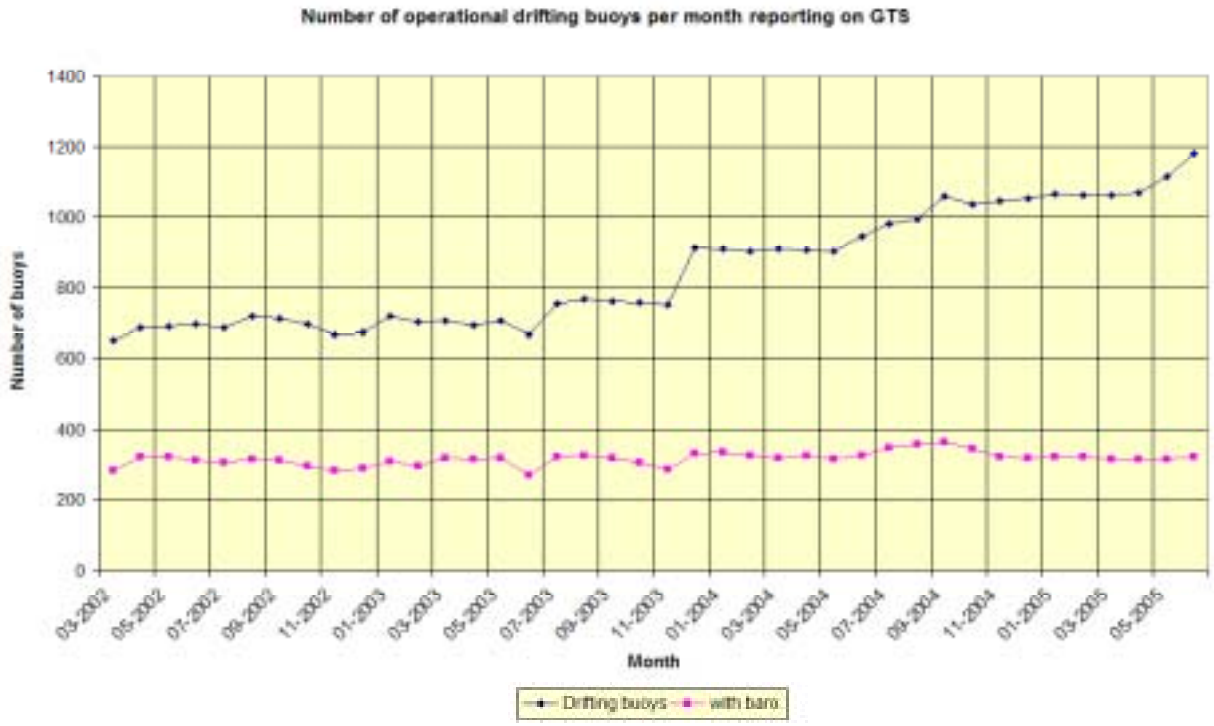
Vandalism: The Panel agreed that actions that have been taken is the last few years to prevent vandalism should be on-going (vandalism leaflet, information provided to mariners, provision of information through other international organizations or commissions such as IMO, FAO, IHO, ITC).

JCOMMOPS: The proposal to revise the JCOMMOPS Terms Of references in order for JCOMMOPS to eventually provide some coordination support to the JCOMM Ship Observations Team (SOT) was discussed and approved by the DBCP. New ToR will be presented at JCOMM-2 for approval. JCOMMOPS web site had been substantially upgraded in the last few months. Users are invited to visit new JCOMMOPS monitoring web pages (http://www.jcommops.org/).

David Meldrum was re-elected Chair. Vice chairs were also re-elected, i.e. K. Premkumar for Asia, Elizabeth Horton for North America, and Louis Vermaak for Southern Hemisphere.

2.3) Global Implementation

Graph 1 : Monthly evolution of the number of operational drifting buoys reporting on GTS from March 2003 to June 2005, and those reporting air pressure.



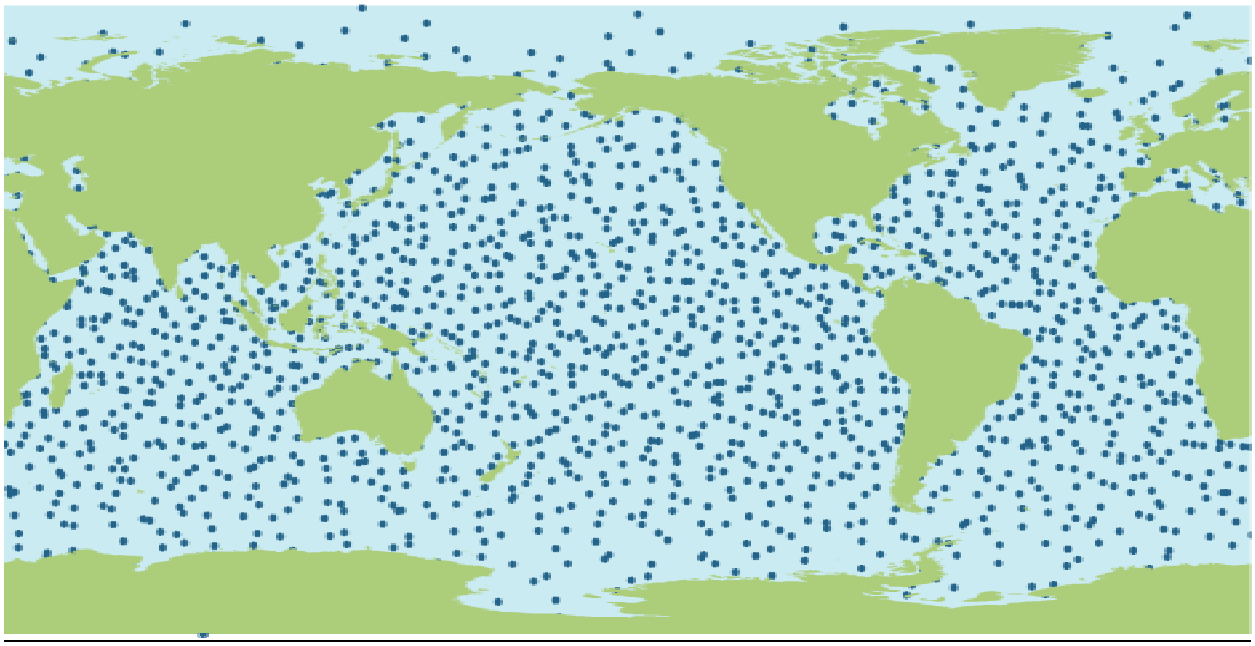
The graph below shows the evolution of the number of operational drifting buoys reporting on GTS from March 2002 to June 2005, and those reporting also air pressure.
Thanks to JCOMM/OCG phased-in implementation plan, associated funding, and active DBCP implementation nationally, and through the Action Groups, number of operational drifters

increased steadily since June 2003 to reach 1180 in June 2005, and hopefully final target of 1250 by September 2005. However, the number of operational drifting buoys measuring air pressure remained approximately constant during the same period at a level of about 320 barometer drifters.

Efforts for the next intersessional period will be to (i) maintain the drifter array at its 1250 number, and (ii) increase the number of barometer drifting buoys to its target of 600 units.

Map 1: Drifting and moored buoys reporting SST (orange dots) and air pressure (blue dots) in June 2005

Map 2 : Map showing a theoretical network of drifting buoys randomly distributed at a resolution of 500km x 500km



2.3.1) DBCP implementation strategy

Technical Coordinator discussed DBCP implementation strategy with OCG Chairman, and DBCP Chairman and the following issues were addressed:

(i) Funding to maintain the 1250 array
(ii) Deployment opportunities to maintain the array
(iii) Barometer drifters and number of them to be deployed (i.e. 700 in extra tropical regions)
(iv) Extending the tropical moored buoy array across the Indian Ocean
(v) Buoy technology workshop and smart buoy concept
(vi) Relationship and coordination with OceanSites

2.3.2) JCOMM

Time spent on integrated JCOMM issues was mainly related to JCOMMOPS development and operations, attending the JCOMM Management Committee meeting, Paris, February 2005, attending the informal JCOMM/OCG meeting, Silver Spring, April 2005, and preparing documents for JCOMM-II (JCOMMOPS, metadata, DBCP, and SOT).

2.3.2.1) JCOMMOPS.

JCOMMOPS development is realized in coordination with the Argo Technical Coordinator, Mathieu Belbéoch. During the period September 2004 to August 2005, JCOMMOPS was also assisted by following students:

- Marianne Barrailh, software developments, 3 years, ½ time as of September 2003
- Irène Bouguerra, graphic artist, July – September 2004
- Julien Bourcier, April – July 2005

The following was achieved during the considered period:

- Information system operations and maintenance with assistance from CLS, Service Argos.
- Keeping JCOMMOPS database up to date (platform and programmes status, statistics, list of GTS observations, platform locations, etc.).
- New Apple MacOSX server implemented and configured for WebObjects (dynamic web pages)
- New ArcIMS 9.0 Geographical Information System (GIS) implemented and configured
- JCOMMOPS web site completely re-designed and re-structured to include the more comprehensive information that existed on DBCP, SOOP, and AIC web sites, and to include new monitoring tools (platform query, lifetimes statistics and model, GTS statistics, buoy monitoring statistics, etc.).
- New mapping system implemented (GIS) with global equal cylindrical and universal Polar stereographic projections.

See DBCP session preparatory document dealing with JCOMMOPS for details.

2.3.3) Deployment opportunities

As part of JCOMMOPS activities, DBCP, SOOP, and Argo Technical Coordinators are routinely collecting information on deployment opportunities. Such information is made available via the JCOMMOPS web site at http://www.jcommops.org/depl_opport/depl_opport.html. Information is useful for buoy operators, and especially new ones, to make contacts in specific countries in order to seek new deployment opportunities. It can also be interesting for buoy operators willing to deploy buoys in ocean area where there are not used to do so to quickly identify available opportunities and make appropriate contacts.

Panel Members are invited to regularly inform JCOMMOPS about the deployment opportunities their country can offer.

2.3.4) Southern Hemisphere barometers

A Southern Ocean Buoy Programme (SOBP) is now part of the DBCP Implementation Strategy.

Target for the Southern Ocean here defined as the open ocean South of 40S used to be 80 barometer drifting buoys maintained operational at any time. However, in the context of the JCOMM/OCG phased-in implementation plan, the global target is to eventually equip about 700 drifting buoys with barometers in extra-tropical regions. Considering the total area of the Southern Ocean South of 40S (76970000 km2) new target would eventually be of about 300 units (at 500km x 500km resolution). The Panel is invited to discuss the overall level of commitment required in the region.

79 drifting buoys were reporting air pressure from area South of 40S in June 2005.
Main players are:

- Alfred Wegener Institute, Germany,
- Bureau of Meteorology, Australia
- Dunstaffnage Marine Laboratory, UK
- Météo France
- New Zealand Meteorological Service
- NOAA/AOML, USA
- South African Weather Service

Proposed commitments for the period September 2005 to August 2006 are:

Country	Buoys purchased	Additional upgrades	Total
Australia	5	8	13
France	0	9	9
New Zealand	5	5	10
South Africa	0	46	46
UK	3	0	3
USA*	45	0	45

*: For the period 9/2005 to 8/2006, USA plans to deploy 45 SVPBs in the region 40S-55S, i.e. 15 in the SA, 20 in the PO, and 10 in the IO.

AOML also offers to upgrade standard drifters (SST only) with barometers for about $US 1000 per unit (see http://www.dbcp.noaa.gov/dbcp/svpb_upgrade.html)

2.3.5) DBCP Action Groups

2.3.5.1) E-SURFMAR

EUCOS Surface Marine Programme (E-SURFMAR) took over from the European Group on Ocean Stations (EGOS) in January 2005. E-SURFMAR is now replacing EGOS as DBCP Action Group.

Area of interest: Ocean areas potentially impacting NWP over European countries. This basically covers the North Atlantic Ocean and the Mediterranean Sea.
Manager, E-SURFMAR: Pierre Blouch, Météo France
Chairman, Data Buoy Technical Advisory Group (DB-TAG): Jean Rolland, Météo France
Web site: http://esurfmar.meteo.fr (username/password required, ask Jean Rolland for details)
Status: Network of 50 drifting buoys in June 2005. 4 moorings (UK, France, Spain, Ireland).
Meetings: DB-TAG meets twice a year (December and June).

Financial compensations will be received by the countries deploying drifting buoys and maintaining moorings on behalf of E-SURFMAR.

Small non E-SURFMAR contributions by European countries are made which slightly increases the overall level of drifting buoys deployed by these countries compared to what it was with EGOS.

2.3.5.2) IABP

International Arctic Buoy Programme (IABP)

Chairman: Tim Goos, Meteorological Services Canada
Coordinator: Ignatius Rigor, University of Washington
Web site: http://iabp.apl.washington.edu/
Area of Interest: Central Arctic Ocean and its marginal seas, excepting Exclusive Economic Zones where agreements of the Coastal States have not been obtained.
Status: 33 IABP buoys were operational in the Arctic basin in June 2005. Eurasian Arctic sector continues to be data sparse.
Meetings: 15th IABP meeting was held in Seattle. Next meeting: Toulouse or Bremerhaven in early June 2006.

WHITE TRIDENT exercise which provides for the programme backbone needs commitment for at least 7 ICEX AIR buoys from participating countries. GPS receivers have been turned off on ICEX AIR buoys in order to save battery power and increase lifetime. This was possible because extra Argos locations are now provided free of charge. **It was noted that Argos multi-satellite service which is now provided free of charge does in fact increase cost to users as Service Argos charges for increased data distribution (ADS).**

There is a need to develop cheap seasonal ice buoys capable of surviving melt and freeze up conditions, ice stress, corrosion, bears. Buoys would measure at least air pressure and air temperature and survive for at least 3 years. Anemometers and thermistor strings would be nice. Expandability to measure other parameters such as ice albedo would be good. US Small Business Innovation Research (SBIP) proposal will be made by NIC.
IABP reviewed its operating principles, and made substantial changes compared to previous years. These include:

- Average spacing: Horizontal resolution targeted was changed from 500*500 km to 250*250 km.
- Recommended measured data now include: SLP, AT, ice motion, snow depth, ice thickness, ice temp, ocean temperatures and salinity.
- Deployment of instruments making additional measurements, data collection and dissemination from these instruments, will be facilitated by the programme (e.g. WS, WD, heat budget, surface chemistry, bathymetry are also desirable)
- Development and distribution of basic analized products; promotion of use of programme data and products
- Participants are responsible for GTS encoding and GTS distribution is required for appropriate data

2.3.5.3) ISABP

International South Atlantic Buoy Programme (ISABP)

Chairman: Alaor Moacyr Dall'Antonia Jr., MHS, Brazil
Vice-Chairman: Ariel Troisi, Argentina
Acting Coordinator: Gerrie Coetzee, SAWB, South Africa
Web site: http://www.dbcp.noaa.gov/dbcp/isabp/
Area of Interest: South Atlantic Ocean north of 55S plus Tropical Atlantic Ocean.
Status: 121 buoys reporting on GTS in June 2005.
Meetings: Last meeting was held in Rio de Janeiro, 23-27 August 2004. Meeting of the Executive Committee planned 14 October 2005 in Buenos Aires.

2.3.5.4) IBPIO

International Buoy Programme for the Indian Ocean (IBPIO)

Chairman: Graeme Ball, BOM, Australia
Vice-Chairman: K. Premkumar, India
Coordinator: Pierre Blouch, Météo France
Web site: http://www.shom.fr/meteo/ibpio
Status: 142 buoys were reporting from the Indian Ocean in June 2005. IBPIO maintains a network of about 100 drifting buoys in the Indian Ocean. 18 NIOT moorings also provide valuable data as well as four TRITON and ATLAS buoys from the TAO Array.
Meetings: 7th meeting was held in Chennai, 14-15 October 2004. 8th meeting, planned in Buenos Aires, 14 October 2005.

2.3.5.5) IPAB

WCRP International Programme for Antarctic Buoys (IPAB)

Chairman: Enrico Zambianchi, Istituto Universitario Navale, Italy
Coordinator: Christian Haas, AWI, Germany
Web site: http://www.antcrc.utas.edu.au/antcrc/buoys/buoys.html
Status: In June 2005, 35 drifting buoys were reporting on GTS in BUOY code from the Antarctic region (i.e. South of 55S). 14 of these buoys were reporting air pressure.
Meetings: 4th IPAB meeting was held in Bremerhaven, Germany, 5-6 September 2003. Next meeting: Dunedin, New Zealand, 3-4 December 2005.

2.3.5.6) GDP

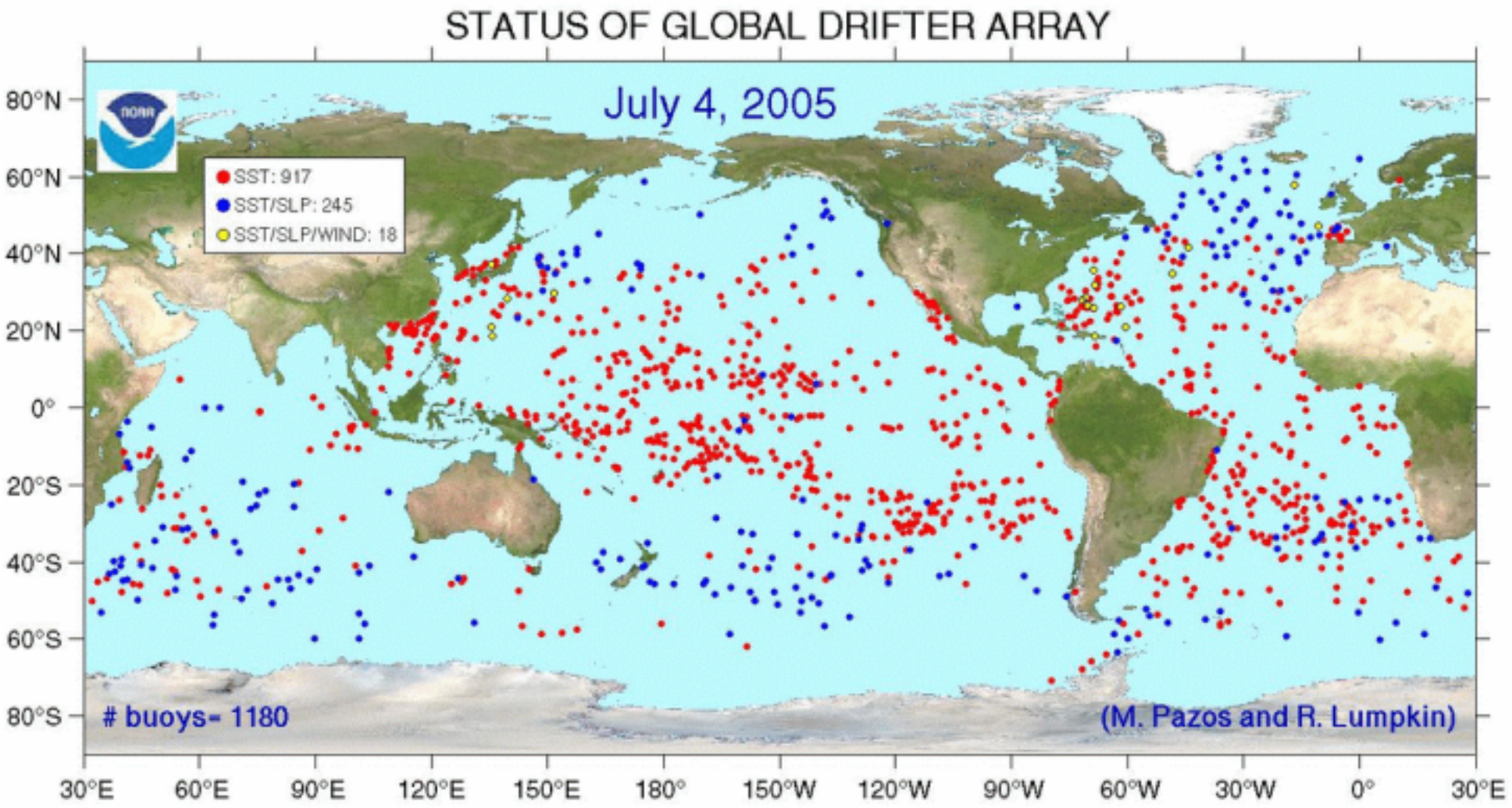
Global Drifter Programme (GDP)

Chairman: Rick Lumpkin, NOAA/AOML, USA
Manager, GDC: Craig Engler, AOML, USA
Web site: http://www.aoml.noaa.gov/phod/dac/gdp.html
Status: The Global Drifter Center (GDC, http://www.aoml.noaa.gov/phod/dac/gdc.html) is part of the NOAA's Global Ocean Observing System (GOOS) Center in Miami, Florida. Thanks to JCOMM/OCG phased-in implementation plan, drifter network increased substantially during the last intersessional period as we had 1180 drifters under the GDP in June 2005 (see map below) versus 996 drifters one year before.

The GDC supports the upgrading of SVPs to SVPBs by any country which desires to do so and it is working closely with those countries in coordinating the shipping and deployment of those upgraded drifters.

The GDC and its related Data Assembly Center (DAC) provides products through the following web site: http://www.aoml.noaa.gov/phod/dac

The GDC encourages other drifter programs to contribute their data to the DAC if those data are collected by the SVP WOCE type drifter with drogues set between 10 and 15 meters.


STATUS OF GLOBAL DRIFTER ARRAY
July 4, 2005
SST: 917
SST/SLP: 245
SST/SLP/WIND: 18
buoys= 1180
(M. Pazos and R. Lumpkin)
80°N
60°N
40°N
20°N
0°
20°S
40°S
60°S
80°S
30°E
60°E
90°E
120°E
150°E
180°
150°W
120°W
90°W
60°W
30°W
0°
30°E

2.3.5.7) TIP

Tropical Moored Buoy Implementation Panel (TIP)

Chairman: Mike McPhaden, PMEL, USA
Coordinator: Paul Freitag, PMEL, USA
Status: The TAO/TRITON Array includes about 70 moorings in the Equatorial Pacific Ocean. PIRATA (Pilot Research Moored Array in the Tropical Atlantic) which includes 12 moorings is now in a consolidation phase, 2001-2006 intended to demonstrate utility of the data for climate forecasting and operational oceanography. Possible southeast and SouthWest extension of PIRATA in cooperation with Brazil and South Africa is under review. Indian Ocean array now includes 4 moorings.

2.3.5.8) DBCP-PICES NPDBAP

DBCP-PICES North Pacific Data Buoy Advisory Panel (NPDBAP)

Co-Chairmen: NE Pacific: Al Wallace, MSC, Canada
NW Pacific: To be proposed by PICES
Coordinator: Craig Engler, NOAA/AOML
Area of Interest: North Pacific Ocean and marginal seas generally north of 30°N.
Status: The NPDBAP aims an operational network of about 120 buoys North of 30N in the Pacific Ocean. In June 2005, 61 drifting buoys were reporting on GTS from the region, including 24 reporting air pressure.
New web site at: http://npdbap.noaa.gov/

Meetings: Last meeting was held in conjunction with DBCP-20 meeting in Chennai, India,, October 2003. Next meeting is planned in Buenos Aires, 16 October 2005.

2.4) Information exchange

The technical coordinator achieved the following tasks regarding information exchange:

- Maintain DBCP web site (http://www.dbcp.noaa.gov/dbcp/).
- Update and maintain JCOMMOPS web site (see paragraph 2.3.2.1 for details).
- Maintain DBCP news section on JCOMMOPS web site.
- Monitor the mailing lists. Mailing lists are routinely being used by the Technical Coordinator and a few buoy operators to exchange information with the buoy community.
- Work with Iceland for renaming of buoy-qc mailing list to buoy-qir@vedur.is.
- Provide input, if needed, for DBCP publications (DBCP annual report, Implementation strategy)
- Update SVPB design reference manual with Bill Scuba (Pub. No. 4)
- Update Argos GTS sub-system reference guide (Pub. No. 2)
- Provide DBCP publications upon request

2.5) Metadata

2.5.1) Buoy Metadata collection scheme

Buoy metadata collection scheme has been implemented operationally at JCOMMOPS in January 2005. Community has been informed and a few buoy operators received some training. Users and reference guides have been written. Collected metadata are extracted from JCOMMOPS database and exported in XML & CSV formats.

2.5.2) Distribution in real-time of metadata for SST and profile data

Proposal to establish a working group and organize a workshop has been discussed with the Ship Observations Team, JCOMM Management Committee, and JCOMM Observations Coordination Group. See related preparatory document for details (agenda item 8.6.5).

2.6) GTS

2.6.1) GTS codes

BUOY: No changes. Buoy data continue to be distributed on GTS in BUOY code in parallel to BUFR.

BUFR compression: At the time of writing this report, BUFR compression is planned for implementation at the Argos GTS sub-system in August 2005. I have been working with development team and participated in tests. More details will be provided during the DBCP session.

BUFR template for wave data: I have been working with E-SURFMAR on extending existing BUFR template for buoy data to include directional wave data as well. Proposed template was inspired from WAVEOB format and from template presently being used by Puertos Del Estado, Spain, for GTS distribution of their wave data in BUFR.

See preparatory document on code matter for details.

2.6.2) GTS bulletin headers

Complete list of GTS bulletin headers used for GTS distribution of buoy data from Service Argos is given in Appendix A.

2.6.3) GTS distribution of buoy data

Identify buoy data which are not distributed on GTS and encourage buoy operators to authorize GTS distribution of the data when this is feasible. Provide technical assistance to buoy operators in this regard.

2.6.4) Argos & Argos GTS sub-system

TC work in this regard was related to the following issues:

- Follow developments of BUFR compression within the GTS sub-system; participate in tests.
- Testing, participate in the correction of bugs for TAO salinity computation algorithm with Argos GTS sub-system
- Follow developments, make suggestions, participate in tests, and database upgrade for the new Argos data processing system that will eventually replace the Argos GTS sub-system and the existing Argos data processing system (i.e. the two functions are merged) (2006).

See related preparatory document for details.

2.7) Quality Control

2.7.1) QC guidelines.

To avoid SPAM, buoy-qc mailing list has been renamed to buoy-qir@vedur.is. I have been working with the Icelandic Meteorological Office in this regard and informed the community of the change.

2.7.2) Buoy monitoring statistics

A comprehensive report describing algorithms and remaining discrepancies among statistics produced by UKMO, NCEP, Météo France, and ECMWF is available via the DBCP web site at http://www.dbcp.noaa.gov/dbcp/monstats.html .

Australian Bureau Of Meteorology (BOM) started producing buoy monitoring statistics on a monthly basis as of January 2005.

2.8) Impact studies regarding data buoys:

List of impact studies regarding data buoys is available through the DBCP web site (http://www.dbcp.noaa.gov/dbcp/impact.html). Anybody with information on past, present or future studies which are not listed in the web page is invited to submit details to the Technical Coordinator.

2.9) Buoy deployment notification scheme

Information on deployment opportunities is maintained by JCOMMOPS. See specific preparatory document regarding this issue for details.

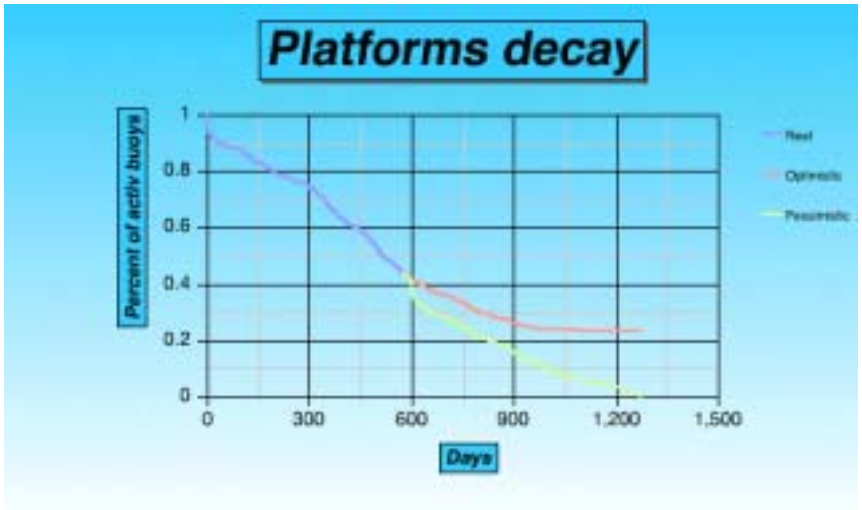
2.10) DBCP evaluation group.

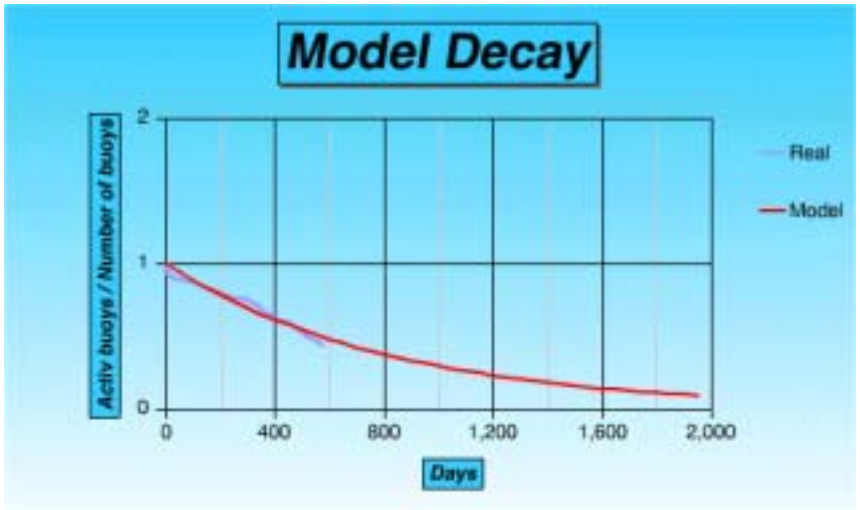
Web page describing the group is available at http://www.dbcp.noaa.gov/dbcp/eval_group.html. Mailing list for the evaluation group is dbcpeval@jcommops.org.

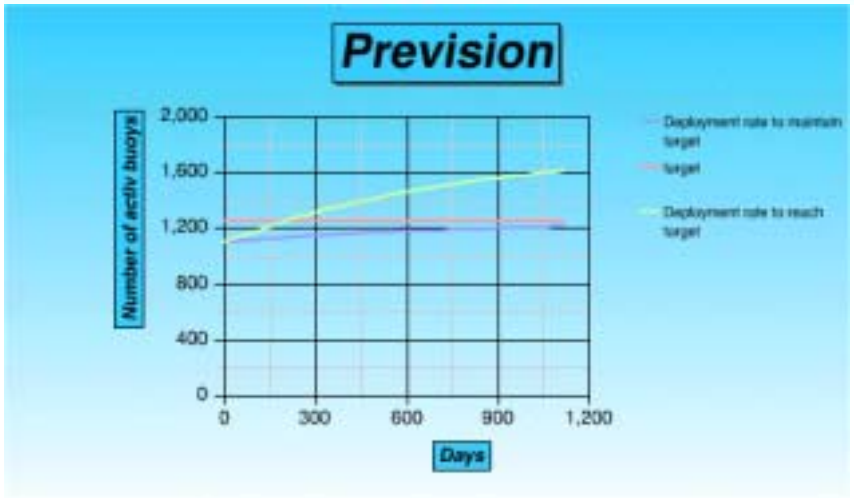
Issues where TC/DBCP has been active during the intersessional period:

- Quality of pressure data for mini-size SVPB (compared to regular-size one) and
- Smart buoy concept and proposal for organizing a buoy technology workshop in 2006 (see preparatory document).
- Lifetime study with student Julien Bourcier. Web based application developed permits to query JCOMMOPS database, look for actual lifetimes of selected buoys, and to model evolution of a buoy networks based upon (i) observed survivability and decay rate (exponential model), and (ii) proposed deployment rate (see example below).

See report by the chair of the evaluation group for details concerning its activities during the intersessional period.







Lifetimes for drifters of AOML Argos programme 7325 deployed in 2002 and 2003. Top/left diagram shows actual survivability of drifters (some of the drifters are still alive which explains the optimistic and pessimistic perspectives); top/right diagram shows exponential survivability diagram deduced (red curve) and how it fits with the reality (blue); bottom/left diagram shows actual network evolution for considered deployments (blue) versus model (red, same deployments but drifters dying according to the model and using random number generator); bottom/right diagram shows prevision of network evolution using an initial number of 1100 drifters, and a deployment rate of 800 drifters per year (yellow), 1250 target (red), and prevision of network evolution if using a deployment rate of 559 drifters per year which is the number required to maintain the array at a level of 1250 according to the model (blue).

3) Specific TC DBCP non regular tasks undertaken during the intersessional period

1. September 2004

1. Buoy metadata collection mechanism (with Marianne Barrailh)
2. Continue work with CLS on Argos 2001-phase 3 project (i.e. redesign of GTS sub-system)
3. Finish reports by TC/DBCP for DBCP-19 session. Place submitted documents onto DBCP web site. Prepare prensetations by TC/DBCP.
4. DBCP News Section ready; news added; Panel Members informed and invited to submit input. News added on TAO Indian Ocean expension
5. Implementation/Test of new version of Argos GTS sub-system, including TAO salinity, Campbell binary format, duplicates filtering, Argo specific features.
6. Provide Gary Meyers, Chair IOP, with information on SOOPIP implementation
7. Ask Gary for advice on required horizontal resolutions (E-W vs. N-S) for Indian Ocean lines
8. Provide WMO Secretariat with buoy status information for Regional Associations VI (Europe) and IV North America, Central America and the
9. Caribbean)
10. Provide MEDS with Java BUFR decoder
11. New JCOMMOPS logo
12. Provide input to METMAR Magazine (Météo France) on vandalism for publication
13. GTS and Argos delays
14. Update GTS sub-system reference guide (revision 1.4)
15. Barometer port discussions with Marlin-Yug
16. SOOP semestrial survey, Jan-June 2004, start processing input from participants

2. October 2004

1. 14-15 October 2004, Chennai, India, IBPIO meeting
2. 17 October 2004, Chennai, India, NPDBAP meeting
3. 18-22 October 2004, Chennai, India, DBCP-20 meeting
4. SOOP semestrial survey, Jan-June 2004, continue processing input from participants
5. Prepare mailing lists at JCOMMOPS for VOS National Focal Points and PMOs
6. Continue discussion on SOOPIP line horizontal resolution with Gary Meyers
7. Investigate and fix problem regarding TAO sub-surface temperature data that disappeared from GTS distribution
8. Request from Météo France to establish a web site to display VOS reports. Investigate feasibility at JCOMMOPS. Issue should be raised at SOT.

3. November 2004

1. Finalize DBCP workplan for next year
2. Finalize VOS & PMO mailing lists
3. SOOP semestrial survey, Jan-June 2004, finalize first draft
4. TAO salinity appears to be wrong. Work on correcting the problem with Service Argos.
5. Suggests topics of discussion for next SOOPIP meeting with SOT
6. Specific web page at JCOMMOPS providing information and links to JCOMM system analysis (http://www.jcommops.org/network_status/)
7. Comments/Suggestions regarding JCOMM strategy
8. Canadian LUT and Service Argos bad locations
9. Continue developments of a buoy metadata collection scheme; work on scripts for importing EGOS metadata database into JCOMMOPS database; refine definition of specific buoy types in JCOMMOPS database.
10. Possibility to organize workshop on buoy technological developments to better serve user requirements with the same resources.
11. Barometer upgrade web page updated on DBCP web site
12. Questions regarding drifters entering EEZ.

4. December 2004

1. 20-30 December: Vacation.
2. Article for MetMar on buoy vandalism
3. Continue work with CLS on Argos 2001-phase 3 project (i.e. redesign of GTS sub-system). Operational implementation planned early 2006.
4. Continue work on metadata collection scheme. Test export of JCOMMOPS metadata database in XML; provide China (JCOMM ODAS metadata centre) with sample XML files.
5. Provide technical information and a java BUFR decoder to MEDS.
6. JCOMMOPS web site improvements (site directory, database search tool, direct access to status maps).
7. Make further suggestions regarding establishing a pilot project to collect metadata in real-time for SST and temperature profile data (following request by GSC-7, then JCOMM).
8. Spanish buoys (Puertos Del Estado) now reporting on GTS in BUFR. BUFR template issue yet to be discussed.

5. January 2005

1. 17 January, Paris: Visit IOC and meet with Keith Alverson.
2. 18-19 January, Geneva: EGOS management committee meeting and hand over meeting to E-SURFMAR.
3. Continue work with CLS on Argos 2001-phase 3 project (i.e. redesign of GTS sub-system). Operational implementation planned early 2006.
4. Inform buoy operators about advantages of Argos multi-satellite service which is now provided free of charge.
5. Prepare text for GOOS web site on how to access in situ marine data.
6. Finalize buoy metadata collection system at JCOMMOPS. Operational implementation in late January.
7. Buoy quality information relay mailing list renamed to buoy-qir@vedur.is. Mailing list maintained by Icelandic Meteorological Office.
8. GTS distribution of aeroclipper data. Platform can be regarded as a drifting buoy.
9. Work with DBCP Chair & E-SURFMAR to organize a workshop on buoy technology with participation from data users.
10. Provide input for JCOMM MAN-IV meeting (JCOMMOPS & real-time metadata collection issue). Suggest practical steps for establishing a pilot project to collect metadata in real time for SST and temperature profile data.
11. Web tools to display SOOP lines and line types upgraded
    http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/soopLine
    http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/soopLineType
12. Prepare documents for SOT-3 meeting
13. Investigate with Maria Hood possible future cooperation between SOOP and IOCCP.

6. February 2005

1. 9-12 February 2005, Paris, JCOMM MAN-IV meeting.
2. Apple Xserve G5 dual-processor 2.3 GHz ordered for deploying JCOMMOPS dynamic web applications (WebObjects).
3. Argos Multisat service for all buoy users increases substantially number of BUOY reports distributed on GTS.
4. Tools to import routinely WMO Publication 47 in JCOMMOPS database
5. New search tools via JCOMMOPS web site: platforms, wmo numbers, ships, GTS statistics, buoy monitoring statistics.
6. Assistance to LMD regarding ECMWF BUFR encoding software (aeroclipper).
7. Change coefficients to IGRF2005 for Geo-magnetic variation model used by Service Argos.

8. Prepare user and reference guides for buoy metadata collection system and make it available via the web.
9. Provide username/passwords to buoy operators and manufacturers for using buoy metadata collection system and provide some explanations on how to use the system.
10. Finalize application to make collected metadata available in XML on a daily basis (ftp://ftp/jcommops.org/XML). Same data are also made available in CSV format (http://ftp.jcommops.org/CSV/).
11. Produce GLOSS map for 2004 and make it available on-line.
12. Preparation for SOT-III meeting.

7. March 2005

1. 3-4 March, visit of Steve Cook and Derrick Snowden at JCOMMOPS; discuss DBCP and SOOP issues and in particular preparation for SOT meeting.
2. 7-12 March 2005, Brest, 3rd JCOMM SOT meeting.
3. 17 March, visit of Julie fletcher and John Burman at JCOMMOPS
4. Explain buoy metadata collection system to buoy operators
5. Suggest evaluation of quality of air pressure from mini-hull SVPB (following comments by Sergey Motyzhev).
6. Continue work with CLS on Argos 2001-phase 3 project (i.e. redesign of GTS sub-system). Operational implementation planned early 2006.
7. Provide BUFR decoder to Météo France
8. Provide NOAA OCO with drifting buoy and float data for mapping project
9. Transfer some of SOOPIP web pages to JCOMMOPS
10. Investigate with Argo possibility to have DBCP meeting held in Peru in conjunction with Argo South American workshop
11. Configure new Mac OSX Xserv server and web configuration

8. April 2005

1. 25-29 April 2005, Silver Spring, OCO System review meeting and OCG informal meeting.
2. Continue work with CLS on Argos 2001-phase 3 project (i.e. redesign of GTS sub-system). Operational implementation planned early 2006.
3. Collect missing inputs for SOOP semestrial survey, January-December 2004. compile draft survey and seek comments.
4. 11 April, student Julien Bourcier starts 3 month training period at JCOMMOPS to work on platform lifetimes; study, suggest methodology and supervise work.
5. Buoy metadata collection: take user comments into account and correct bugs.
6. Provide IOC with feedback/comments on I-GOOS
7. Re-organize JCOMMOPS web site structure, particularly monitoring and mapping sections
8. New map showing barometer drifting buoys by country now routinely produced by JCOMMOPS on a monthly basis
9. Tune WebObjects application and source code, and move JCOMMOPS web site and other dynamic applications to new Mac OSX Xserv server.

9. May 2005

1. 2-6 May 2005, San Diego, SIO, revise SVPB design manual with Bill Scuba; visit Pacific Gyre.
2. Finalize SVPB desing manual
3. Finalize SOOP semestrial survey, January – June 2004.
4. Finalize background document on JCOMMOPS for JCOMM-II.
5. Import GDC metadata file (from GDC web site) into JCOMMOPS database
6. Get list of mini-size drifters from GDC
7. Liaise with company in charge of new developments for the Argos GTS sub-system (BUFR compression)

8. Provide Elizabeth Kent with comments regarding proposal for compilation of retrospective ODAS metadata and blending with ICOADS
9. Drifter lifetime study with student Julien Bourcier
10. Start compiling information from buoy operators on calibration procedures
11. Begin document explaining rationale regarding JCOMMOPS location
12. Update SOOP operations guide to include information on ship visit rules
13. Make suggestions regarding DBCP-21 agenda (deployment strategies, technology workshop, OceanSites, Tsunami warning system, new Argos developments with regard to GTS data processing)
14. Prepare documents on DBCP, SOT, and JCOMMOPS for JCOMM-II
15. Provide OCO with drifters and XBTs data
16. Produce new monthly map showing barometer drifters by country
17. Provide contact point information (NOAA/PMEL) to Malaysia regarding Tsunami buoys
18. Edit DBCP document on implementation strategy, and include latest information. Publish document via the DBCP and JCOMMOPS web sites
19. Edit DBCP document on satellite data telecommunication systems (by David Meldrum). Publish document via DBCP and JCOMMOPS web sites.
20. DBCP brochure available on DBCP web site.
21. Louis Vermaak demise on 30 May 2005. Great loss for the DBCP and ISABP programmes. Louis was ISABP Coordinator.

10. June 2005

1. 3 June 2005, Seattle, visit PMEL to discuss GTS distribution of TAO data and JCOMMOPS/OSMC cooperation.
2. IABP meeting, Seattle, 6-8 June 2005
3. Inform buoy community about Louis Vermaak demise. Suggest ISABP to meet in Buenos Aires in conjunction with DBCP meeting as Louis was the Coordinator for the programme
4. Liaise with IBPIO and NPDBAP regarding organization of annual meeting in conjunction with DBCP meeting in Buenos Aires
5. SOT & JCOMMOPS web site updated to include SOT certificate of appreciation, VOS recruit presentation (by Steve Cook), and SOT-III final report.
6. Drifter lifetime study with student Julien Bourcier
7. Re-design and re-structure JCOMMOPS web site with student Marianne Barrailh. Implementation planned in July.
8. Work on proposed BUFR template for directional wave data based upon existing template used for GTS distribution of Spanish buoys and existing WAVEOB format.
9. Liaise with company in charge of new developments for the Argos GTS sub-system (BUFR compression)
10. Look for candidates to represent the DBCP at the next IPAB meeting in New Zealand, 12/2005
11. BOM now producing buoy monitoring statistics on a monthly basis.
12. Provide assistance to CLS, Service Argos regarding development of database scripts to transfer automatically technical files from the existing Argos GTS sub-system to the new Argos data processing system which is being developed (Argos 2001-phase 3)
13. SST & T profile metadata collection in real-time: look for candidates in the working group (OOPC, GOSUD, Argo DM, OceanSites)
14. Investigate feasibility for organizing a buoy technology workshop in 2006. Look for candidates (OOPC, ECMWF).
15. Turkey setting up a moored buoy programme (4 buoys initially). Provide technical assistance (satcomm).
16. Prepare documents for DBCP meeting: Information Exchange, Technical Development workshop, Deployment opportunities and strategies, buoy Metadata collection scheme, SST and T profile metadata distribution in real-time.
17. Get information from Christian Meinig, NOAA/PMEL, regarding new DART-II Tsunami monitoring buoy.

18. Send DBCP workshop announcement to DBCP mailing lists
19. I was asked by GDC to make a GDP presentation at CLIVAR workshop in Concepcion, Chile, October 2005.

11. <u>July 2005</u>

1. Provide assistance to CLS, Service Argos regarding development of database scripts to transfer automatically technical files from the existing Argos GTS sub-system to the new Argos data processing system which is being developed (Argos 2001-phase 3)
2. 11 July: participation in evaluation committee at Toulouse University for student Julien Bourcier's work on buoy lifetimes. Developped application has been integrated in JCOMMOPS web site.
3. 12 July: New version of JCOMMOPS web site implemented. New navigation, new look, more comprehensive information included. Lifetime computation and model component included in new web site.
4. Prepare documents for DBCP meeting: Code matters, JCOMMOPS, QC, TC report.
5. Accept that JCOMMOPS provides some technical advice regarding CLS, Service Argos, SIGMA project
6. IABP alerting DBCP that while Argos multi-satellite service is free, using it involves additional costs for Argos distribution system (ADS).
7. Liaise with Metoffice and Julie Fletcher regarding VOS quality monitoring and feedback
8. Check for ISABP status and possible meeting in Buenos Aires in conjunction with DBCP-21.
9. In preparation for DBCP meeting, collect information on South Ocean buoy deployments planned for 09/2005 to 08/2006 (SOBP).
10. 18-30 July: Vacation

- **<u>August 2005</u>**

1. Prepare documents for DBCP meeting: GTS delays and Argos ground receiving network.
2. JCOMMOPS moving to another office within CLS, Service Argos buildings
3. BUFR compression within Argos GTS sub-system. Participate in the tests with CLS and company in charge of the developments. Tests conclusive. Operational implementation planned in early September 2005.
4. Continue working on BUFR template for directional wave data
5. Continue collecting information on buoy calibration procedures.
6. Finalize document on impact of JCOMMOPS relocation.
7. Review draft WMO guide on methods of observations, and particularly part dealing with data buoys.
8. Prepare draft report and summary and compile annexes for DBCP annual report for 2004.
9. Evaluate new software module required for Pacific Gyre Minimet (exponential function) for implementation within Argos GTS sub-system.
10. Review Marlin BT technical file for GTS distribution of temperature profile data
11. Participation in Observing System Monitoring Centre (OSMC) discussions

4) Regular or normal tasks

4.1) Monitoring

Below are detailed the different monitoring activities that the TC DBCP undertook during this intersessional period:

4.1.1) Quality Control Guidelines

4.1.1.1) Reading QC messages

To read the QC messages from the BUOY-QC Internet mailing list as posted by the Principal Meteorological or Oceanographic Centres responsible for GTS buoy data quality control (PMOC). For rationalization purposes, all the proposals are stored and archived in a data base.

4.1.1.2) Contacting PGCs

To contact the PGCs: The QC guidelines have been automated, so most of the time status change proposals are automatically forwarded to the Principal GTS Coordinator (PGC) provided that he has an email address. In case the PGC has no email address, the TC DBCP contacts the PGC directly, and suggests him to implement the proposed change. The PGC should normally contact Service Argos and/or Local User Terminal (LUT) operators and request implementation of the proposed change. In case the PGC disagrees, the TC DBCP immediately sends a denial message on the mailing list.

4.1.1.3) Checking Argos files

To check Argos files and/or GTS data in order to ascertain whether suggested modifications have actually been implemented or not.

4.1.1.4) Feed back.

For sensors actually recalibrated, and on behalf of Service Argos, possibly provide feed back information onto the mailing list.

4.1.2) Specific problems.

To resolve specific problems related to GTS for given buoys, such as looking carefully at the data and the transfer functions. For example, I could be investigating why no or only a few messages are received at Meteorological Centres...

4.1.3) JCOMMOPS database.

Updating JCOMMOPS database in terms of content and consistency: list of the operational platforms and programs (on GTS or not), new programs, WMO numbers, monitoring statistics...

4.2) User assistance

As usual, I answered specific questions and resolved specific problems as needed or requested by users.

4.2.1) Principal Investigators (PI) or buoy programme managers:

PIs regularly request the TC DBCP to look at specific problems regarding their buoy data or request assistance for GTS distribution of the data. For example, I could be studying in detail Argos message formats and sensor transfer functions or I could obtain WMO numbers on their behalf. I could also simulate satellite orbits in order to estimate orbital delays.

4.2.2) Local User Terminals (LUT):

From time to time, LUT operators ask me to provide them with the transfer functions used with specific platforms so that they can also report to the GTS via their LUT.

4.2.3) Meteorological Centres

Meteorological Centres may contact me when they need information on given platforms drifting in an area of interest.

4.2.4) Secretariats:

Upon request, I provided WMO or IOC Secretariats with graphs and documentation.

4.2.5) Buoy manufacturers.

Buoy manufacturers regularly contact me to be included in the DBCP list of drifting buoy manufacturers (http://www.dbcp.noaa.gov/dbcp/1lobm.html). I may also discuss technical issues with them.

4.2.6) Individual users

Individual users contact me to obtain buoy information and/or seek information on how to obtain buoy data. I usually redirect them to adequate institution(s) (e.g. RNODC/DB).

4.2.7) Acting as a Principal GTS Coordinator

e.g. When the regular PGC is in vacation, I can replace hem/her and act as a PGC.

4.2.8) Focal point.

Directly or through the BUOY-QC Internet mailing list, I am acting as a focal point between the Meteorological Centres and the Principal Investigators when a specific action is required for a buoy reporting onto the GTS (e.g. remove the data from the GTS, recalibrate a sensor...).

4.2.9) Investigate various data loss problems.

4.3) Drifting Buoy Quarterly Report

Check the Drifting Buoy Quarterly Report which is issued, and distributed by CLS, Service Argos.

4.4) Global Telecommunication System (GTS)

4.4.1) Status for drifting buoys reporting onto the GTS:

Year	Operational drifting buoys	On GTS	% on GTS
July 1991	718	264	36.8%
July 1992	1162	474	40.8%
August 1993	1269	548	43.2%
September 1994	1246	587	47.1%
September 1995	1429	631	44.2 %
September 1996	1180	638	54.1%
September 1997	1159	581	50.1%
August 1998	1230	543	44.1%
July 1999	1270	728	57.3%
July 2000	1385	807	58.3%
July 2001	1338	763	57%
July 2002	919	459	49.9%
August 2003	1436	752	52.3%
July 2004	1727	950	55%
June 2005	2396	1157	48%%

See also graphs, tables, and maps in Appendix B
Météo-France provided me with Data Availability Index Maps on a monthly basis. The maps are useful to identify the data sparse ocean area for each kind of geo-physical variable and therefore to assist the various data buoy programmes in adjusting deployment strategies. The maps show clearly the impact of the TAO array ATLAS moored buoys (wind), of DBCP regional action groups such as the ISABP (air pressure), or of specific national programmes such as MSNZ (air pressure).

4.4.2) GTS bulletin headers:

All Local User Terminal sources comply with WMO regulations regarding GTS bulletin headers.

See Appendix A for a complete list of GTS bulletin headers used to date.

4.4.3) Quality Control.

The work of the TC DBCP concerning Buoy data Quality Control was related to the following topics:

Actually monitor the Internet Mailing List, and contact PGCs accordingly when those cannot be reached automatically.
Act as a PGC upon request.

Refer to related DBCP session agenda item (Quality Control of buoy data) for details.

4.4.4) New buoys on GTS

I am regularly contacting buoy programme managers of new programmes in order (i) to convince them to authorise GTS distribution of their buoy data, and (ii) to offer assistance for that purpose. Programme managers who spontaneously authorise GTS distribution of their buoy data, may regularly contact me for assistance.

The new GTS sub-system permits to process the data provided that adequate information is precisely implemented in the system. I am therefore studying in details technical files of buoys

with complicated Argos message formats. In some instances I obtain WMO numbers from National Focal Points or WMO Secretariat on behalf of the programme managers.

4.5) Argos GTS Sub-System

The regular work of the Technical Coordinator concerning the Argos GTS Sub-System is mostly related to the following topics:

- Monitor the system and look for possible problems.
- Make sure the problems are corrected.
- Training of the Argos Users' Guidance Office and work in conjunction with it regarding complex problems.
- Refer to related DBCP session agenda item (Argos) for details.

4.6) DBCP web server

The regular work of the Technical Coordinator concerning the DBCP web site is mostly related to the following topics:

- Keep regular files on the Web. Server up to date (transfer files).
- Tentatively keep links to other servers up to date.
- Refer to related DBCP session agenda item (Information exchange) for details.

4.7) TC statistics and graphs.

4.7.1) Maps

Production of monthly maps (JCOMMOPS), including:

Dynamic maps:

- Maintain monthly dynamic map: http://w3.jcommops.org/WebSite/DBCP
- Maintain daily dynamic map (drifter trajectories): http://w3.jcommops.org/WebSite/DBCP_RT

Static maps:

- Distribution by country of drifting and moored buoys in the high seas networks: http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/map?type=DBM_CNTRY
- Distribution by country of drifting buoys measuring air pressure: http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/map?type=DBPM_CNTRY
- Drifting and moored buoys in the high seas reporting SST and air pressure: http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/map?type=DBM_SPW
- Drifting and moored buoys in the high seas reporting SST, air pressure, and wind: http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/map?type=DBM_SP

4.7.2) Active drifting buoys

Using Argos files and data provided by LUT operators, I computed on a monthly basis, by country and by organisation, graphs showing the distribution of active GTS and non-GTS drifting buoys. It is particularly useful to see the evolution of the total number of drifting buoys deployed by the various countries involved, and the percentage of these reporting to the GTS. See graph-1 in Appendix B (distribution of active drifting buoys by country), graph-2 (distribution of active moored buoys in the high seas by country), and graph-3 (Evolution of number of air pressure observations distributed on GTS per month (from ECMWF monitoring statistics)).

4.7.3) Quality of air pressure.

I Computed on a monthly basis, the graph showing the distribution of the RMS (of Observation minus First Guess Field) of Air Pressure data according to ECMWF monthly monitoring statistics. This graph, which uses 6 months of data, gives a good estimate of the quality of the drifting buoy Air Pressure data. See graph-4 in Appendix B (evolution of mean RMS (Obs.-First guess) per month for global GTS air pressure data (from ECMWF monitoring statistics)), and graph-5 (histogram of distribution of RMS (Obs. - First Guess).

4.7.4) Air pressure from drifting buoy lifetime.

I Computed the graphs showing the distribution of lifetimes of Air Pressure measurements, using the ECMWF monitoring statistics.

4.8) Action Groups, Regional actions.

4.8.1) Action Groups.

I liaise with DBCP Action Group coordinators and reply questions from them, prepare DBCP reports for AG meetings (to be presented by the DBCP representative at the meeting), and possibly attend those meetings on behalf of the DBCP.

4.9) Miscellaneous

4.9.1) Drifting Buoy Quarterly Report.

I checked the Quarterly Report on Drifting Buoy and gave approval before CLS could send it to WMO and IOC.

4.9.2) Argos monthly status report.

I checked the Argos monthly status report to WMO which was prepared by CLS, Service Argos.

4.9.3) WMO/Argos number cross reference list and PGC list.

Monthly list of active buoy WMO numbers is available via JCOMMOPS through (i) a dynamic web page which permits to query the JCOMMOPS database (http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/wmo), and (ii) a file updated daily which can be downloaded from the JCOMMOPS ftp site.(ftp://ftp.jcommops.org/JCOMMOPS/GTS/wmo/wmo_list.txt).

The database includes WMO numbers for buoys transmitting on GTS via Argos, and Local User Terminals (LUT). For each WMO number, one can obtain the Argos or platform number, the drifting buoy owner, and the dates the WMO numbers have been introduced and removed from the system (Argos or LUT).

4.9.4) TC DBCP bimonthly report.

I provided the Chairman, vice-Chair of the DBCP as well as the WMO and IOC Secretariats with my bimonthly report.

4.9.5) List of buoy user requirements.

I am keeping this list up to date according to comments or information from buoy users.

4.9.6) Documentation, assistance.

I provided users with documentation or status reports concerning specific programs or experiments; I answered specific questions regarding the Argos System.

4.9.7) TC DBCP missions.

I prepared the various missions or meetings I had to attend.

4.9.8) Preparation of the DBCP session.

I prepared specific documents and the TC report for the DBCP annual session:

APPENDIX A

GTS bulletin headers being used for GTS distrib. of buoy data in BUOY code

- Table 1: Data distributed from the US Argos Global Processing Centre, Largo, USA

Bulletin header (BUOY)	Bulletin header (BUFR)	Deployment area	Remark
SSVX02 KARS	IOZX02 KARS	GDP	New
SSVX04 KARS	IOZX04 KARS	North Atlantic and EGOS	Same
SSVX06 KARS	IOZX06 KARS	Northern Hemisphere	Same
SSVX08 KARS	IOZX08 KARS	TAO, PIRATA	Was SSVX40 for TAO
SSVX10 KARS	IOZX10 KARS	Southern Hemisphere and ISABP	Same
SSVX12 KARS	IOZX12 KARS	Arctic, Antarctic, sea ice	Arctic, Antarctic merged
SSVX14 KARS	IOZX14 KARS	Indian Ocean and IBPIO	New
SSVX16 KARS	IOZX16 KARS	Navoceano	Same
SSVX18 KARS	IOZX18 KARS	Pacific Ocean	New
SSVX20 KARS	IOZX20 KARS	Navoceano	Same
SSVX22 KARS	IOZX22 KARS	Mediterranean sea	New
SSVX42 KARS	IOZX42 KARS	NOAA/NDBC, Southern Hemisphere	Was SSVX02
SSVX44 KARS	IOZX44 KARS	NE Pacific Ocean (USA, and Canada)	Was SSVX18
SSVX48 KARS	IOZX48 KARS	NOAA/NDBC, Northern Hemisphere	Was SSVX08
SSVX96 KARS	IOZX96 KARS	NDBC	Same

- Table 2: Data distributed from the French Argos Global Processing Centre, Toulouse, France

Bulletin header (BUOY)	Bulletin header (BUFR)	Deployment area	Remark
SSVX01 LFVW	IOZX01 LFVW	North Atlantic and EGOS	Same
SSVX03 LFVW	IOZX03 LFVW	Southern Hemisphere and ISABP	Same
SSVX05 LFVW	IOZX05 LFVW	Northern Hemisphere	Same
SSVX07 LFVW	IOZX07 LFVW	Arctic, Antarctic, and sea ice	Arctic, Antarctic merged
SSVX09 LFVW	IOZX09 LFVW	Indian Ocean and IBPIO	New
SSVX11 LFVW	IOZX11 LFVW	TRITON	New
SSVX13 LFVW	IOZX13 LFVW	GDP	New
SSVX15 LFVW	IOZX15 LFVW	Pacific	New
SSVX21 LFVW	IOZX21 LFVW	Mediterranean Sea	New
SSVX39 LFVW	IOZX39 LFVW	French West Indies	Was SSVX19

Backup procedure:

Backup procedure in case one of the two Argos global processing centres fails does not change. If one centre fails, the other centre processes all the data, i.e. the data it normally processed plus the data the other centre normally processes. Hence, when an Argos centre is in backup mode, it will generate bulletins with even and odd numbers (in normal mode, only even numbers are used by Largo, and odd numbers by Toulouse). In other words:

- In case the French Argos Global Processing Center in Toulouse fails, the US Argos Processing Center in Largo is switched to backup mode. In that case, GTS bulletins normally distributed from Toulouse under TTAAii LFVW bulletin headers

are distributed from Largo under TTAAii KARS bulletin headers (e.g. SSVX01 LFVW becomes SSVX01 KARS and is sent out from Largo).

- In case the US Argos Global Processing Center in Largo fails, the French Argos Processing Center in Toulouse is switched to backup mode. In that case, GTS bulletins normally distributed from Largo under TTAAii KARS bulletin headers are distributed from Toulouse under TTAAii LFVW bulletin headers (e.g. SSVX04 KARS becomes SSVX04 LFVW and is sent out from Toulouse).

Remark concerning GDP:
since GDP drifters deployed world-wide may also participate in a DBCP regional action groups (e.g. ISABP if deployed in the South Atlantic), we have to agree on a policy on what GTS bulletin header to choose. Considering that GDP header was created basically for tracking Lagrangian drifters, it sounds reasonable to recommend to have all Lagrangian drifters participating in GDP report under GDP bulletin header and not under the other DBCP Action Group it is participating in. For example, a Lagrangian drifter participating in both GDP and ISABP (South Atlantic) and which data are distributed from the French Argos Global Processing Center would report under SSVX13 LFVW (i.e. GDP) bulletin header, and not under SSVX03 LFVW (i.e. Southern Hemisphere).

- Table 3: Data routed from the National Data Buoy Center (NDBC),Mississippi, USA, based on data received from Service Argos Inc. (SAI), Landover MD, USA

Bulletin header	Deployment area
SSVX42 KWBC	NOAA/NDBC, Southern Hemisphere
SSVX48 KWBC	NOAA/NDBC, Northern Hemisphere

- Table 4: Data routed from the NOAA, Washington DC, USA, based on data received from Service Argos Inc. (SAI), Landover MD, USA

Bulletin header	Deployment area
SSVX12 KWBC	Arctic Ocean

- Table 5: Data routed from Edmonton Local User Terminal (LUT)

Bulletin header	Deployment area
SSVX02 CWEG	Arctic Ocean
SSVX03 CWEG	Hudson Bay
SSVX04 CWEG	NorthEast Pacific Ocean

- Table 6: Data routed from Halifax Local User Terminal (LUT)

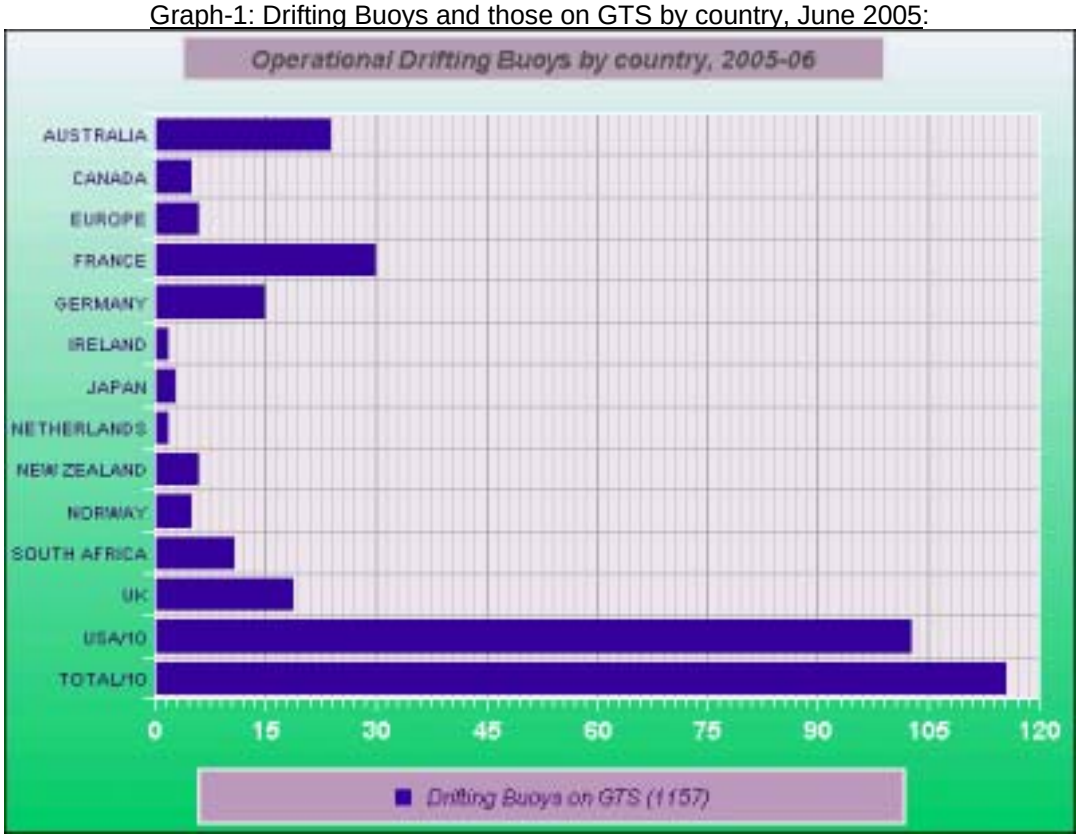
Bulletin header	Deployment area
SSVX01 CWHX	NorthWest Atlantic Ocean

- Table 7: Data routed from the Sondre Stromfjord Local User Terminal (LUT)

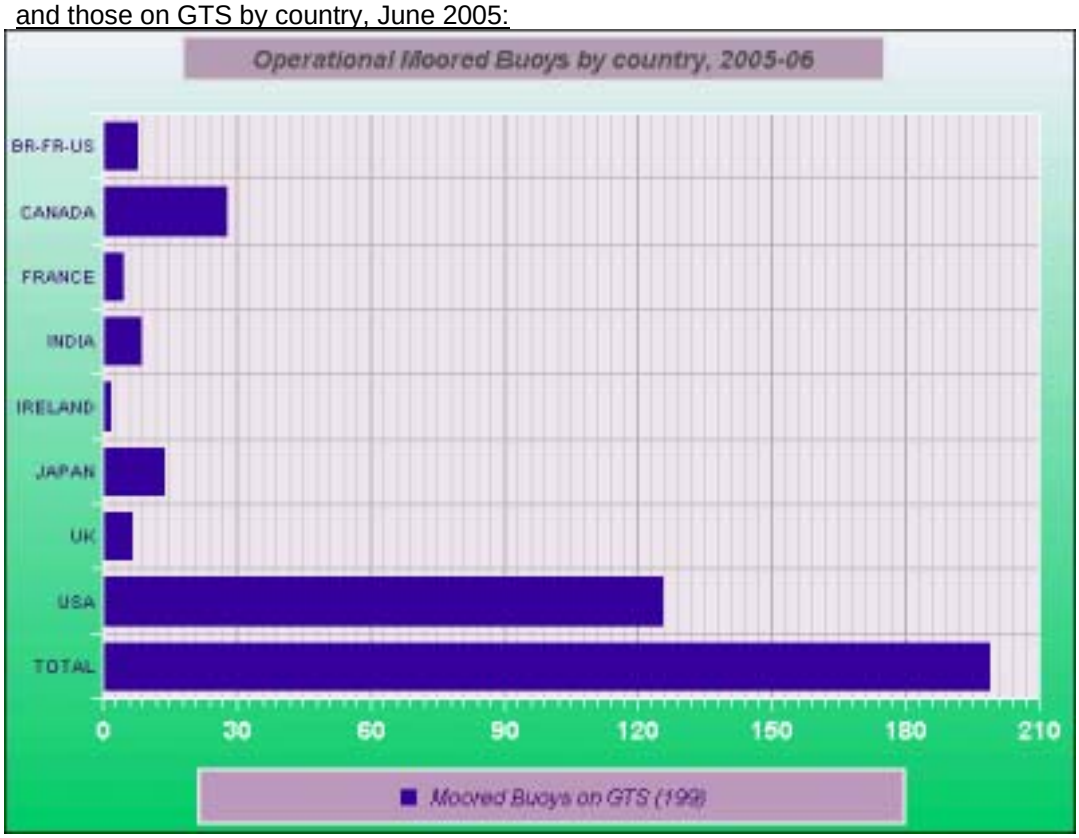
Bulletin header	Deployment area
SSVX01 BGSF	North Atlantic Ocean (EGOS)

APPENDIX B: Graphs

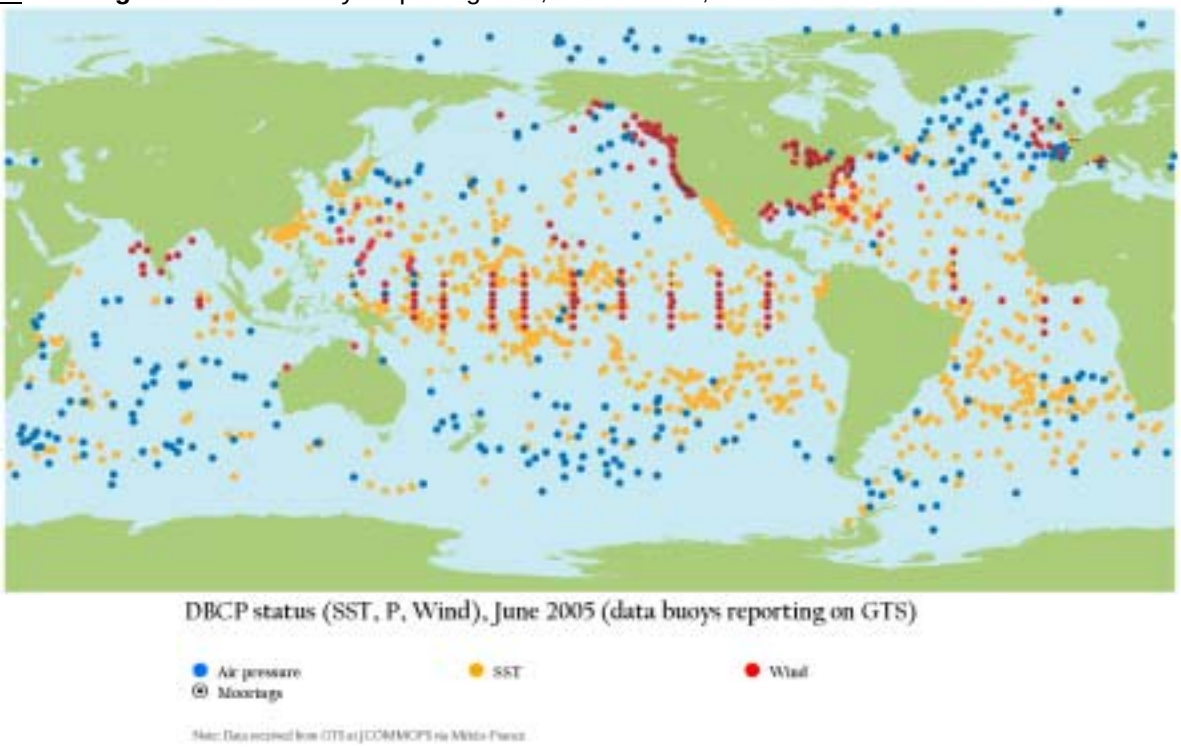
Graph-1: Drifting Buoys and those on GTS by country, June 2005:



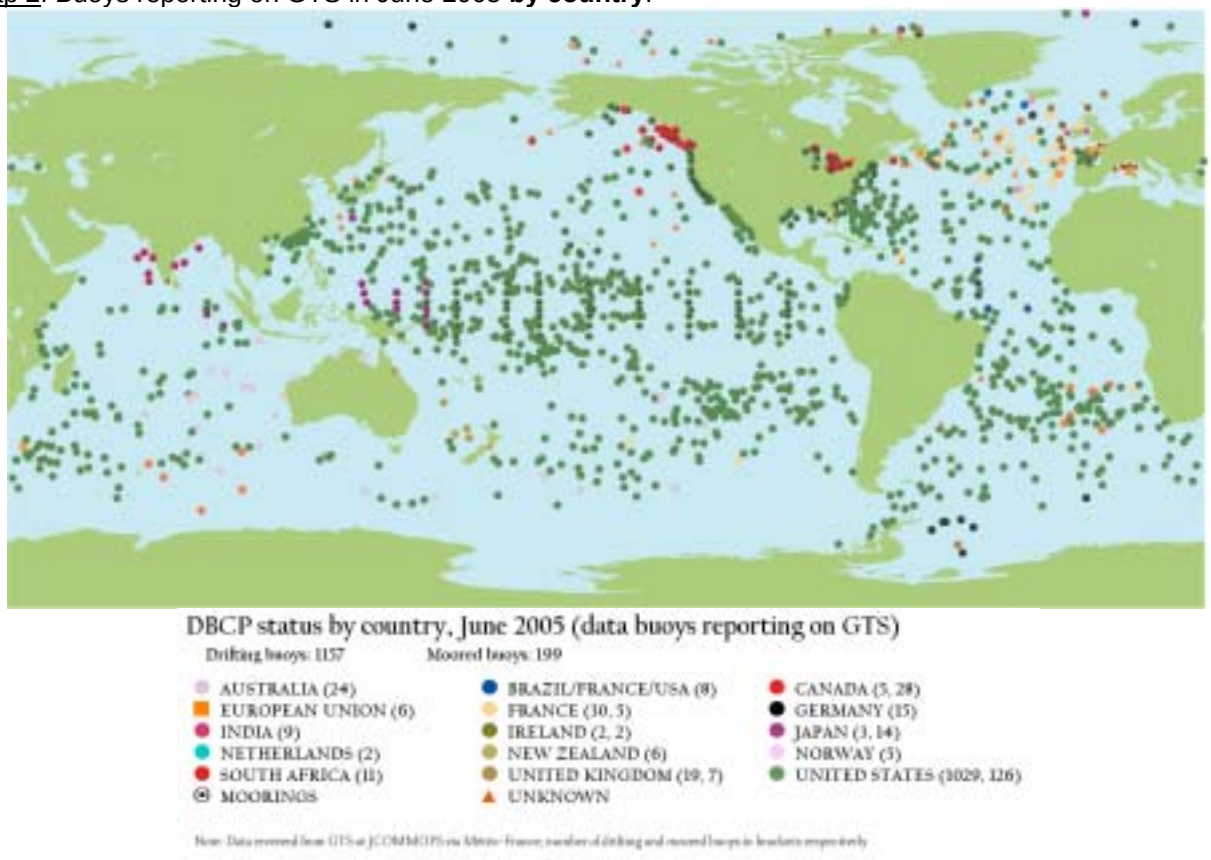
Graph-2: Moored Buoys in the high seas (plus US and Canadian buoys and moorings reporting via Argos) and those on GTS by country, June 2005:



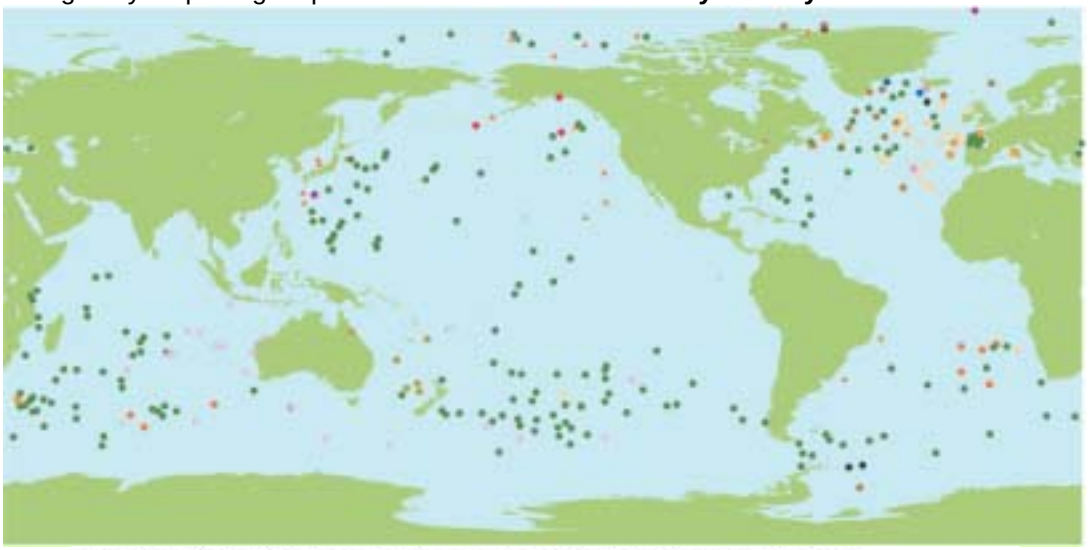
Map 1: **Drifting and Moored** buoys reporting SST, Air Pressure, or Wind on GTS in June 2005:



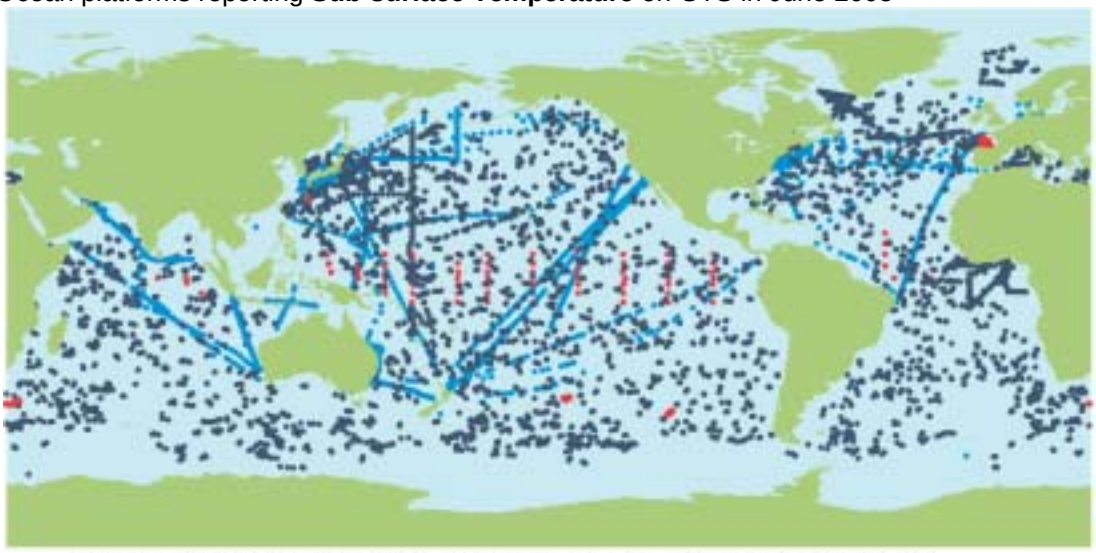
Map 2: Buoys reporting on GTS in June 2005 **by country**:



Map 3: Drifting buoys reporting air pressure on GTS in June 2005 **by country**:



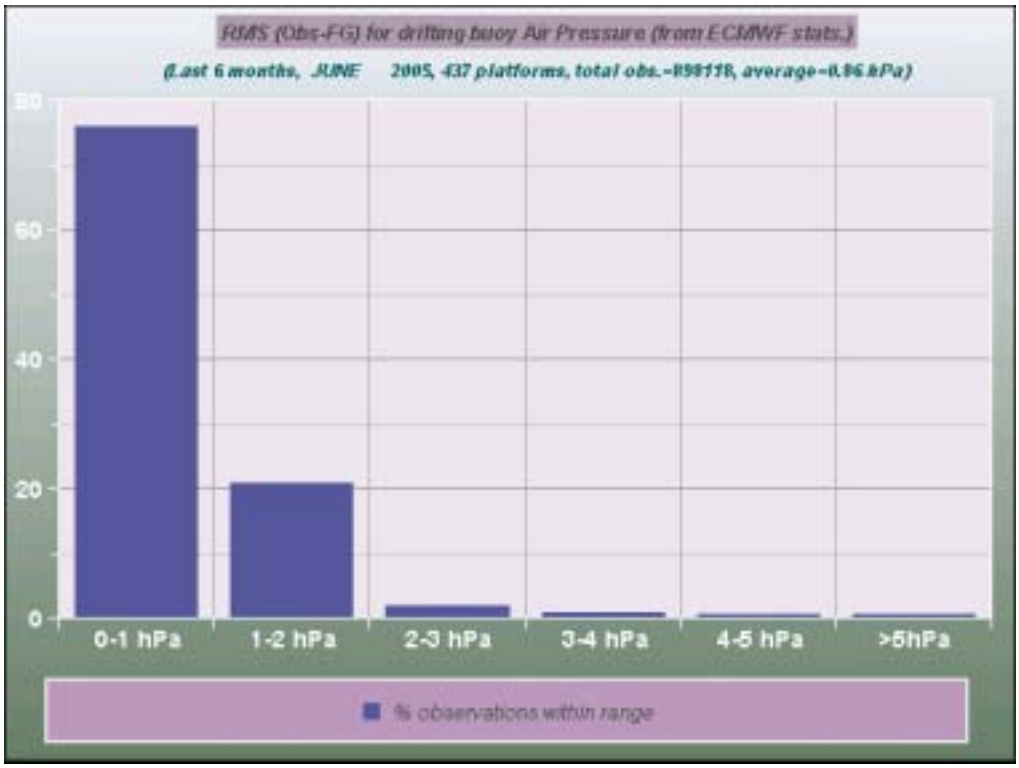
Map 4: Ocean platforms reporting **Sub-surface Temperature** on GTS in June 2005



Graph 3: Evolution of number of air pressure observations distributed on GTS per month for the period April 2002-June 2005 (from ECMWF monitoring statistics)

Graph 4: Evolution of mean RMS (Obs.-First guess) per month for the period April 2002 to June 2005 for global GTS air pressure data (from ECMWF monitoring statistics)

Graph5: Histogram of distribution of RMS (Obs. - First Guess) for the period 01/2005 to 06/2005.



Annex IV

ACTION GROUP REPORT SUMMARIES

THE SURFACE MARINE PROGRAMME OF THE NETWORK OF EUROPEAN METEOROLOGICAL SERVICES, EUMETNET (E-SURFMAR)

The European Group on Oceanic Stations (EGOS) was established on December 1st 1988, as a continuation of the COST-43 buoy programmes. On 1st April 2003, an optional integrated programme, E-SURFMAR, was established by the European Meteorological Network (EUMETNET) within the framework of its Composite Observing System (EUCOS). Its main objectives are to co-ordinate, optimise and progressively integrate the European activities for surface observations over the sea – including drifting and moored buoys, and voluntary observing ships. Fifteen EUMETNET members agreed to participate in the first four years of the programme (2003-2006).

According to a Memorandum of Understanding, signed in 2004 between the European Group on Ocean Stations (EGOS) and E-SURFMAR, it was agreed that, from 1st January 2005, E-SURFMAR would assume overall responsibility for the moored and drifting buoy networks managed by EGOS.

E-SURFMAR was adopted as an action group of the DBCP, replacing EGOS at the DBCP twentieth session.

Two E-SURFMAR Data Buoy Technical Advisory Group (DB-TAG) meetings were held in Geneva, January 2005 and in Hamburg June 2005.

Fifty six drifting buoys were deployed between September 2004 and August 2005 including (*) 19 upgrades of SVP drifters. Two drifters were also deployed in the Western Mediterranean Sea, as part of a trial to assess the lifetime of drifting buoys in this area.

The minimum number of operational drifting buoys at the end of each month in 2004-2005 was 44 (in March 2005) and maximum was 54 (in July 2005). The mean lifetime of the SVP-B drifters was approximately 12 months (372 days). The average age of the network was 239 days by the end of August. Fifty five buoys failed to report air pressure measurements.

The availability of data depends on the number of buoys operating in the area. Since mid-2003 an average of more than 1000 hourly observations per day had been reported on the GTS.The timeliness at HH+120 minutes is about 85%.

In accordance with the MOU between EGOS and E-SURFMAR the monitoring of the previous EGOS moored buoy network has been continued. Since mid-December 2004, the INM (Spain) had been reporting the data of the buoys operated by Puertos del Estado to the GTS in BUFR code. By the end of August, **15** K-pattern buoys and **12** Oceanor buoys were operating.

The availability of moored buoy data depends on the number of buoys operating. Since the beginning of 2005 an average of more than 200 hourly observations per day have been reported on the GTS from the 12 initial EUCOS buoys

The E-SURFMAR design study has recommended the deployment of an average of 175 SVP-B type per year. For financial reasons (buoys and transmission costs) this will take several years to achieve. However, the drifting buoy component will be fully integrated within E-SURFMAR in 2006, i.e. in addition to the drifting buoy purchases, all the Argos communication costs will be funded by E-SURFMAR. Within the allocated budget about 80 (including 30 upgrades) buoys will deployed in the E-SURFMAR area of interest.

At present, of the 4 E-SURFMAR moored buoys (K5 Lion, M1, Cabo Silleiro), only Cabo Silleiro is able to provide directional wave spectra data. Lion is providing omni-directional wave spectra. The E-SURFMAR design study has recommended that directional wave spectra should be provided by all four buoys. Development will therefore be needed before all the K series buoys are able to report directional wave spectra.

THE INTERNATIONAL ARCTIC BUOY PROGRAMME (IABP)

The 15 annual meeting of the International Arctic Buoy Programme was held on 6-8 June 2005 at the Polar Research Center of the Applied Physics Laboratory, University of Washington, Seattle, Washington. The meetings provide a forum to:

- Review the existing program
- Plan for the future
- Learn of each others activities through Participants Reports
- Map out areas of cooperation
- Learn of the evolving buoy science
- Learn of the host agencies activities

During the intersessional period, participants deployed a wide variety of instruments, including new developments e.g. the JAMSTEC/MetOcean POPS (Polar Ocean Profiling System) buoy. This instrument uses an Argo-style float attached to a tether to collect subsurface temperature and salinity profiles. The number of mass balance buoys to measure Arctic ice thickness increased, and the Alfred Wegener Institute Polar ice group improved on their system to map ice keels. The IABP was able to maintain a reasonably good coverage of standard variables, although the ice drifters are not lasting as long as they did previously due to changes in ice drift. MEDS, Canada made improvements to the quality of the data set and maintains a web page with near real-time access to the IABP data.

The data collected by participants is archived at the UW Polar Ice Center. In addition daily products are posted, analyses are carried out, and data and products are made available on the website. An extensive list of publications using IABP data is maintained.

Challenges remain to maintain the network for basic variables and to add sensors to collect additional meteorological and oceanographic data. To this end, IABP participants submitted a number of proposals for the International Polar Year project, and a large number of these proposals were accepted. It is the hope of the Programme participant that IPY will allow for recruiting of new members to the IABP, in particular because the group has been effective in monitoring the High Arctic and has a lot of experience and expertise that they are pleased to share.

An exact time and place for the next meeting will be decided by the programme management committee during the next intersessional period.

THE INTERNATIONAL BUOY PROGRAMME FOR THE INDIAN OCEAN (IBPIO)

The eighth Programme Meeting of the IBPIO was held at Buenos Aires, Argentina, preceding DBCP-21. The IPBIO reported that 76 drifting buoys were deployed during 2004-2005, which was an increase over the previous year. Despite this increase, there was had been a decrease in the deployment of buoys fitted with barometers. This was reflected in the number of drifting buoys reporting air pressure on the GTS at the end of September 2005, which had dropped below 50. The panel consolidated its deployment plans and committed to deploy 183 buoys in 2005-2006, including 98 buoys fitted with barometers.

The IBPIO noted that by September 2005, less than 40% of buoy reports generated in the Indian Ocean were available within 120 minutes. This was in contrast to about 80% of buoy reports available within 120 minutes from the North Atlantic region. The situation in the Indian Ocean was identified as a problem with the La Reunion LUT.

The IBPIO recommends that DBCP raise at JTA: (1) the need for Argos to carefully monitor the data streams from its LUTs; and (2) improve the timeliness of data from the Indian Ocean region to be comparable with the North Atlantic region.

THE INTERNATIONAL SOUTH ATLANTIC BUOY PROGRAMME (ISABP)

The intersession period September 2004 to September 2005 has been very successful. Data coverage presents its maximum in the area between 20S and 40S, with gaps off the West coast of Africa centered at 20N and the Angola Basin between the Equator and 15S. In the period 262 drifters were deployed consisting of 231 SVP and 31 SVPB. The main contributions to the deployments were from GDC, Navoceano, South African Weather Service, Brazil and Argentina. The programme was able to maintain a monthly average of drifters reporting on GTS close to 200.

Future plans include the maintenance of the array in the Tropical Atlantic, mainly by GDP and Navoceano. In the Sub-Tropical region Brazil with GDP will focus on the western part of the region. In the Southern Atlantic GDP, South Africa and Argentina will do all the deployments.

Argentina will continue maintaining two moored buoys in the Southwestern Atlantic, Brazil, US and France will continue their efforts maintaining the PIRATA array while South Africa will maintain fixed platforms on Gough, Marion, Tristan da Cunha and Southern Thule Islands.

Participants are constantly encouraged to increase their contributions. In turn, some participants expressed their concerns as some efforts as deployment opportunities are not receiving a visible acknowledgement.

An extraordinary Steering Committee took place during DBCP 21 and Mr Johan van der Merwe was appointed as Programme Coordinator.

ISABP information is available on the Web site: http://dbcp.noaa.gov/dbcp/isabp.

THE GLOBAL DRIFTER PROGRAM (GDP)lobal Drifter Program (GDP)

Directors: Peter Niiler/Rick Lumpkin
Data Assembly Center Manager: Mayra Pazos
Operations Manager: Craig Engler
Web page: http://www.aoml.noaa.gov/phod/dac/gdc.html

The Global Drifter Center is located within the Atlantic Oceanographic and Meteorological Laboratory, Physical Oceanography Division and is a branch of NOAA's Global Ocean Observing System (GOOS) Center and Global Climate Observing System (GCOS), a scientific project of the DBCP; and is the principal component of the Global Surface Drifting Buoy Array.

The objective of the GDP is to maintain a global 5ºx5º array of ARGOS-tracked Lagrangian surface drifting buoys to meet the need for an accurate and globally dense set of in-situ observations: mixed layer currents, SST, atmospheric pressure (winds and salinity). Provide data processing system for scientific use of these data to support short-term (seasonal-to-interannual) climate predictions as well as climate research and monitoring.

During the intersessional year the GDP deployed 958 Drifters culminating in September, 2005 with the deployment of the 1250th Drifter and thereby successfully completing the first fully implemented component of the Ocean Observing System for Climate.

The actual deployments were as follows:

North Pacific	75
North Atlantic	24
Tropical Oceans	449
Extra-tropical Oceans	78
Southern Oceans	113
Consortium Research	219
Total	985

The GDC supports the upgrading of SVP's to SVP-B's by any country which desires to do so and it is working closely with those countries coordinating the shipping and deployments those upgraded drifters.

The GDC encourages other drifter programs to contribute their data to the GDC Data Assembly Center if those data are collected by the SVP WOCE type drifter with drogues set between 10 and 15 meters.

THE NORTH PACIFIC DATA BUOY ADVISORY PANEL (NPDBAP)

The NPDBAP was officially accepted as an entity reporting to the DBCP and PICES at the DBCP 18 meeting held in October 2002. This is the third Annual Report as an official body of the DBCP.

The 4th meeting of the NPDBAP was held on Sunday, October 16th 2005, from 14:00 to 17:00, prior to the Twenty-first session of the Data Buoy Co-operation Panel (DBCP – XXI) .The meetings was held at the Regente Palace Hotel, Buenos Aires, Argentina. Panel and DBCP representatives from Canada, PR of China, Korea, United States and the WMO were in attendance.

The 2004 Annual Report was presented by the technical coordinator. Web page reviewed by the chairman. It was noted that the website requires some updates. In particular contact information, web links to JCOMMOPS and panel programs.

During the period Sept 1, 2004 to August 31, 2005 an average of 64 drifting buoys per month reporting to MEDS in the North Pacific Ocean (30.00N to 65.00N and 110.00E to 110.00W). These buoys produced approximately 28,000 messages per month. These numbers are roughly the same as last year with 66 buoys and 24,000 messages per month. Tables 1 and 2 provide information on the inventory of active buoys. As of August 2005, 109 buoys were reporting, 28 with barometric pressure, which are shown in bold text in Table 1. Figures 1 to 5 show breakdowns of the number of buoys in operation and the number of messages received during the period. The tables and figures were compiled by MEDS and are available on the NPDBAP web site which can be found at: http://npdbap.noaa.gov

THE TROPICAL MOORED BUOYS IMPELMENTATION PANLE (TIP)

The TAO/TRITON (Tropical Atmosphere Ocean/Triangle Trans-Ocean Buoy Network) moored buoy array is a central component of the ENSO Observing System, deployed specifically for research and forecasting of El Niño and La Niña. The Array consists of 55 ATLAS moorings maintained by the United States, 12 TRITON moorings maintained by Japan, and 5 subsurface ADCP (Acoustic Doppler Current Profiler) moorings (4 by the United States and 1 by Japan).

PIRATA (Pilot Research Moored Array in the Tropical Atlantic) is nearing the end of a 5-year (2001-2006) consolidation phase, during which the array had been maintained in a 10-mooring configuration and evaluated for its utility in support of research and operational forecasting. The array is supported by the United States, France and Brazil. Three additional moorings to the southwest of the array were deployed in August 2005. Four additional moorings to the north and east of the array are planned for deployment in 2006 and 2007.

TAO/TRITON data return remains good, with an overall value for real-time primary data availability of 90% for the time period 1 October 2004 to 30 September 2005. Damage to moorings and sensors due to fishing activity results in relatively lower data return in the far eastern and far western portions of the Pacific basin. PIRATA real-time data return for the same time period was 72%. Two moorings in the Gulf of Guinea were lost in 2004, presumably due to fishing activity in the area.

Progress towards the establishment of an Indian Ocean moored buoy array was made with the deployment of 4 surface ATLAS moorings and one subsurface ADCP mooring in October/November 2004 through the combined support of the United States and India. These moorings complement previously established TRITON moorings and a subsurface ADCP mooring maintained by Japan. An additional ATLAS mooring deployment is planned for late 2005 or early 2006. Real time data return from the Indian Ocean ATLAS moorings for the time period 1 October 2004 to 30 September 2005 was 56%. The lower rate of data return in the Indian Ocean was due to vandalism associated with fishing activity in the area.

Several enhancements to the submission of TAO, PIRATA, and Indian Ocean ATLAS data onto the GTS were made in 2005. First was the addition of daily mean salinity data. The second was that all ATLAS systems were switched to multi-satellite status. As a result, the volume of hourly surface meteorological data on the GTS increased by a factor of two. A third enhancement was that the transmission schedule for ATLAS moorings was increased from 8 to 16 hours. As of September 2005 the number of hourly surface met data on the GTS has increased by roughly an additional factor of two. The increase in transmission schedule also provides better definition of diurnal variability.

Management of the TAO portion of TAO/TRITON officially transferred from the Pacific Marine Environmental Laboratory (PMEL) to the National Data Buoy Center (NDBC) in October 2004. PMEL's data processing, quality assessment, and web delivery/display software have been installed at NDBC. Parallel processing at both installations will continue through 30 September 2006. A refreshed ATLAS system using more commercially available components will be developed and tested in 2006.

More information on TAO/TRITON and PIRATA, along with data display and dissemination are available on the web at www.pmel.noaa.gov/tao.

Annex V

OCEAN SUSTAINED INTERDISCIPLINARY TIMESERIES ENVIRONMENT OBSERVATION SYSTEM (OCEANSITES)

An international project to build a coordinated global network of multidisciplinary deep-ocean timeseries observatories

DRAFT White Paper, Part A

April 2005

Executive Summary

OceanSITES is the international project working towards the coordination and implementation of a global system of sustained multi-disciplinary timeseries observatories. Timeseries fill a unique gap in the sampling provided by other elements of the global ocean observing system, enabling co-located observations of many variables and processes in strategic or representative locations over long periods of time, with high temporal resolution, from (and including) the ocean surface to the seafloor.

The scientific applications of such data are to monitor, detect, understand, and predict changes and related processes in the physical climate state of the ocean, the carbon cycle, and the ecosystem. Operational applications include detection of events, initialization and validation of assimilation products, delivery of constraints or reference data for forecasts (especially biogeochemical and ecosystem relevant ones). In addition there are a variety of technical applications, such as calibration and validation of data and products from other observing system elements.

OceanSITES, through its international steering team, has developed a rationale for timeseries observations and for needing a coordinated global network, and has defined a pilot project consistent with the needs and expectations of the sponsoring bodies GOOS, CLIVAR, and POGO. A major requirement for sites in the project is an open data policy. A global timeseries data management system is under construction via a subgroup of the OceanSITES steering team, including a data format coherent with other past and present efforts.

Detailed information about presently 90-100 sites is continually being collected and provided in an appendix to this white paper (Part B), and used to construct maps of the current and future system, providing information about data access and disciplines covered by the observatories.

The in situ, timeseries-based OceanSITES program represents the logical next step in completing the Global Ocean Observing System. Much of the technology is available and many elements are in place already. The main challenge is coordination and assuring sustainability of the system, via common advocacy, recruiting a user base, and sharing the operation amoung communities and countries.

Introduction

The need for a sustained ocean observing system for both research and operational applications is widely recognized and was clearly articulated during the OceanObs99 and OceanOPS04 conferences in St.Rafael and Toulouse. This is a result of the growing awareness that the ocean is a key component of the global climate, weather, and ecosystem, a major source of living resources and biodiversity, and is central for shipping, offshore exploitation, tourism and coastal protection. The focus of ocean and climate research now is on change and variability, and the predictability thereof, and no longer on describing and understanding its mean state and functioning. At the same time, operational monitoring and forecasting systems are entering a new era, integrating satellite and in-situ data, covering a wide range of time and space scales, and using more complex models which frequently include ecosystem components now.

The essential ability to detect and understand changes and events in the ocean, and to predict or mitigate their impact on climate, on the ecosystem, society, and the economy, has lead many nations to start the development of or to contribute to the development of an Integrated Ocean Observing System – examples are the European GMES program, the US IOOS, and the global GEO (Group on Earth Observations) efforts. Such a system needs to be sustained, global, multidisciplinary, and the data freely available to everybody.

The challenge of this observing system is formidable since the oceans are a vast and hostile environment, only the surface and few parameters are accessible with space-based remote sensing, the interplay of physical and biogeochemical parameters is important, and an extreme range of space and timescales (meters to thousands of kilometers, hours to decades) need to be covered. In many respects however, we are ready to implement the required observing system – many of the tools and technologies exist, the knowledge of the ocean functioning allows sensible planning and development, and the modelling capabilities have reached a point to make full use of the observations expected. Work on the implementation of various elements of an integrated ocean observing system is already underway and at different stages of progress, in the research and operational communities.

In response to the need for an ocean observing system that encompasses both lagrangian and eulerian in-situ observations, CLIVAR and GOOS (through their COOP and OOPC bodies at the time), as well as POGO, in 2000 requested the initiation of an international timeseries project that is global in scope and that would complement the already much advanced ARGO project of a profiling float network around the globe.

To take on this charge, an international steering team was created under the sponsorship of the above organizations. At its first meeting in May 2001 this team defined a timeseries pilot project, now called OceanSITES. The project has been working towards the implementation of a preliminary global array of long-term multi-disciplinary timeseries observatories. This document describes the project and the activities of the associated International Steering Team. It is designed as an evolving document that is updated and refined regularly, adding new information, new sites, new developments and decisions. The most current document can be found on the OceanSITES website www.OceanSITES.org .

Rationale

The science community, operational programs, policy makers, and society need an observing system for the global ocean, climate and ecosystem in order to detect changes, to describe and quantify them, to understand them, to develop a capability to predict them, and to initialize and validate forecasts of them.

The natural way to observe changes or events in the past have been fixed (Eulerian) timeseries at a point, and most historical records are of this type (weather/climate/sealevel observations at established stations, ocean weather ships, repeat hydrography records like at Bermuda). Nonetheless, the overall ocean observing system needed now has to provide a global 4-D description of the oceanic variables of climatic and societal relevance. Fixed-point timeseries can provide unique 2-D cuts through this space (time and depth) for many variables at selected locations, resolving a wide range of temporal variability and sampling the water column from the surface to the bottom. They are an important complement to and fill a gap left by other components of the observing system, like remote sensing, profiling floats, surface drifters, sections with gliders

and with vessels. For this reason, timeseries have been identified as an essential part of the Global Ocean Observing System (GOOS).

Timeseries techniques are well suited for regular observations of critical or hard-to-sample regions and periods, like straits, boundary currents, boundary layers, ice-covered areas, or storm seasons. They are also required for resolving rapid changes or processes, such as diurnal cycles or sudden events. In addition, due to the size and weight of many of the sensors, timeseries frequently are the only approach for observing multidisciplinary variability. The following summary lists selected application areas where timeseries are of particular value or can make a unique contribution.

General application fields of timeseries data

- variability in the earth system and the interactions between the subsystems (atmosphere, cryosphere, ocean, solid earth, land)
- role of the ocean in climate: processes of climate variability (e.g. uptake, storage and transport of heat, freshwater and CO_2) and impacts in the ocean (ecosystem regime shifts, etc)
- health of the ocean
- detection of changes and events in the ocean: physical (currents, convection, upwelling), biological (blooms, fish populations), pollution (spills, runoff), climatic (MOC, El Nino), seismic (earthquake, tsunami)
- observation of processes operating in the time-depth dimensions (e.g. water mass formation, nutrient entrainment, species aggregation, vertical carbon export)

Science applications - to monitor, detect, understand and predict:

- CO_2 concentrations and air-sea fluxes (diurnal, event-driven, seasonal, interannual)
- ecosystem productivity, fluxes, and changes
- biomass variability, incl. zooplankton and fish abundance
- water column carbon flux and particle export
- linkage between biological, chemical and physical/climatic parameters at one place
- surface meteorology, incl. air-sea fluxes, aerosols/pollutants, and wave spectra
- flows and conditions (physical, biogeochemical) in straits, passages, overflows, choke points
- thermohaline changes, water mass transformation (mixed-layer, convection)
- rapid or episodic changes (mixed-layer, blooms, convection, MOC, etc)
- mass/heat transports and other integrals (heat content) at fixed places: boundary currents, over/throughflows, overturning circulation
- ocean bottom processes and events: seismic, geodetic, electromagnetic, bottom pressure signals, tsunamis
- benthic community structure changes

Operational applications

- initializations in critical regions of short-term prediction or climate forecasting (ENSO)
- detection of events in monitoring/prediction systems
- constraints (e.g. transports, statistics) for assimilation runs
- biogeochemical reference data for forecasting systems
- validation and assessement of forecast products

Technical applications - to reference, calibrate, validate,... :

- air-sea fluxes
- remotely sensed variables (SST, SSS, wind, chlorophyll)
- sensor calibration for VOS and floats
- development and validation of biogeochemical models
- model statistics, physics and parameterizations (and their variability)
- providing sound signals for float naviation, acoustic tomography
- testbed for new instrumentation

In addition there may be purely instrumental reasons and needs for mooring approaches, like the deployment of heavy sensors such as in-situ analyzers, sound sources, and others.

Technology

Mooring and instrumentation technology makes it possible now to effectively deploy and maintain unmanned observatories that will autonomously carry out diverse measurements over extended periods of time while providing much of the data via satellite in near real time. Moorings have relatively large payloads and can be equipped with battery packs or power generators, making them well-suited to support an array of sensors and instruments from users in diverse disciplines. Moorings can place instruments at the sea surface, through the water column, and on the sea floor. These attributes make moorings a key resource for observing cause and effect, such as between surface heat loss and sinking of surface water, and interrelationships between diverse fields, as between upper ocean mixing and the bloom of phytoplankton.They also make them uniquely suited for sampling critical regions like straits, boundary currents, boundary layers, or ice-covered regions.

Traditionally, moored timeseries observatories come in two types. Since the 1960s, scientists have used subsurface moorings to observe ocean currents and water properties. These are instrumented cables, anchored to the seafloor and attached to buoyant floats, that reach upward toward, but not to, the sea surface. In contrast, surface moorings have surface floats with downward-hanging cables. The surface floats additionally provide a platform for sensors that measure meteorological and radiation parameters. Many sensors on surface buoys or near the surface now perform reliably for periods of six to 12 months. Both types of mooring technologies have matured to the point where they can measure both atmospheric and oceanic changes as frequently as once per minute and can take oceanographic measurements meter-by-meter in the water column. Both are now capable of sustained operation for long periods of time. An intermediate approach has occasionally been used, where a loose tether with a small surface buoy is attached to a subsurface mooring. The main purpose of this is to provide data telemetry and support lightweight instruments near the surface.

A new class of moorings is in the design phase now for the US Ocean Observatories Initiative (OOI). These are very large spar-type moorings, which would carry diesel generators and very high data rate satellite transmission systems. They are meant to deliver high power and high bandwidth data communication to the seafloor, and survive even the extreme weather and sea state at high latitudes in the ocean.

One drawback of moorings has been the limited number of fixed depths at which sensors are deployed, especially for expensive and heavy instruments or samplers. This is being addressed now with various approaches for moored profiling systems. Profilers on subsurface moorings are approaching operational status. These devices, fitted with a suite of oceanographic sensors, move vertically along conventional mooring cables, returning measurements of water properties and ocean currents at very closely spaced intervals throughout the water column. In each deployment, these instruments can make approximately 200 top-to-bottom ocean profiles—akin to those obtained from ships. More recent efforts are under way now to profile the upper 100-200 meters with larger multidisciplinary sensor packages and provide data telemetry. One option are underwater winches which raise and lower a buoyant package from a subsurface float to the surface and back.

Certain types of observations at fixed places may soon be carried out with autonomous gliders. They can be programmed to dive down and up while holding position, thus acting like a (“virtual”) mooring without a wire. A limited set of light-weight, low-power sensors is available for these vehicles.

Data telemetry

Many applications of ocean timeseries observatories will require near-realtime data transmission to shore. Various options now exist for satellite data telemetry, many of them bi-directional. All of them necessitate a surface buoy or a system that at least regularly breaks the surface to establish communication. An alternative available in select locations is to connect moorings to undersea cables which provide communication to shore. The underwater data transfer to/from the sensors in the moorings is more challenging in some sense. Electrical or fiberoptic communcation leads within a mooring wire are still the exception and represent high-end high-cost solutions. Inductive telemetry along the mooring wire or acoustic modem communication through the watercolumn are techniques that are routinely available now.

The need for telemetry has several origins. Operational systems that require observations to detect events, to initialize or constrain assimilations, or to validate forecasts, clearly have a

requirement for data delivery on timescales that matches those of the phenomena being modelled and predicted. Another purpose of telemetry lies in the ability to communicate back to the instruments. This is of interest for adaptive sampling (responding to events detected), or for sensor adjustments (calibrations, saving power, changing firmware, etc). Communcation to shore also allows early detection of problems and failures, allowing the initiation of repair procedures/missions, thus reducing data gaps which is essential in routine and operational systems that users come to rely upon. Finally, data telemetry is a safeguard for the data obtained for the case of complete instrument loss at an advanced stage of a deployment period.

Need for a coordinated global network

A major international effort is under way to establish a global ocean observing system (GOOS), which would routinely collect data to monitor and understand the role of the ocean in the global climate system. The reach of GOOS is global and it will combine a variety of instrumentation, including satellite systems providing broad coverage of the ocean surface, sampling from ships, surface drifters and profiling floats which move vertically as they drift, and timeseries observatories at strategic sites in the ocean. The fixed-point Eulerian observatories are uniquely suited for fully sampling 2 of the 4 dimensions (time and vertical) with high resolution and for complementing other planned elements of the ocean observing system. In particular the ability to carry out simultaneous sustained in-situ measurements of physical, biogeochemical, and ecosystem quantities make moored observatories the prime methodology for occupying the different physical, carbon cycle, and ecosystem regimes or provinces of the world ocean.

There is an appreciable number of timeseries sites already that are being operated individually around the globe, see later figure 1. However, as single sites the visibility and impact of many of them in the science and operational communities is relatively small. Their value and power would be multiplied by integrating them into a coordinated global network of ocean observatories.

A major reason for the limited impact of timeseries sites is that large-scale or global issues are not yet being addressed in a coordinated approach. Many global change topics and operational applications require global systems, such as for the detection of patterns, the propagation of signals, thermohaline transport changes, observation of CO2 uptake and release regimes, ecosystem regime shifts. The different research and operational communities (CLIVAR, GOOS, carbon, etc) are attempting within their fields to implement coordinated observing systems for such purposes, but frequently any one of them cannot muster enough critical mass for advocating or implementing a system of ocean observatories. Thus, at best, the result is a collection of largely single, PI-driven timeseries sites at locations of national or personal interest, and frequently a timeseries comes to an end when the individual runs out of resources or interest.

Implementing and maintaining a global network is only feasible if true sharing of resources (hardware, ships, expertise, funding, technology) across countries and communities is invoked. This requires an international effort, but it is feasible as other projects such as ARGO have demonstrated. OceanSITES is intended to provide this context, in terms of guidance, information exchange, visibility, common advocacy. Having the mandate from several communities and countries in turn gives more recognition and weight to the global system being built. This is expressed already by increased requests from other programs and communities to use the plans, maps, and rationales which OceanSITES has developed, and by requests from projects or PI's to contribute to the system and thus enhance their role and visibility at a national or international level.

An overriding factor in reaching users and providing visibility is the existance of a coordinated and integrated data management system. Few users in science and none in the operational community will look for data from timeseries sites, that need to be accessed in different places and formats, that have no uniform and documented quality control, and whose existence and availability depends entirely on a single PI or project. The power and value of a timeseries system comes from making access to the whole network possible as a single data set, in a standard format, and from a unique portal. This requires an international effort which has also been initiated by OceanSITES.

A global timeseries data system

One governing principle of OceanSITES is to make all data publicly available, if possible in real-time, otherwise as soon as processed. To reach the users, this should be implemented via a single portal and in a standard format. Developments are now under way in a subgroup of

OceanSITES to establish a global timeseries data management system. The initial path will consist of creating two global data servers (GDACs) which mirror their data holdings, one at Coriolis/IFREMER in France and one at COADS in the US. A draft multidisciplinary timeseries data format has been defined with the goal to be consistent with past efforts and present plans in WOCE, Clivar, the carbon community, at US.DMAC, Ocean.US, NVODS, COADS, ARGO, GOSUD, and others.

The operators of specific timeseries sites will provide data to the GDACs in the agreed format on a routine basis, from where they will be publicly available, initially via a single ftp server, later in a more distributed way via web based tools and LAS servers. The format is being tested now, with WHOI, the Animate project, UCSB, Bermuda, SOEST, MBARI, and NIOZ going to contribute data to the GDACs from some of their sites. Extensive contacts are maintained with other groups developing data formats and architecture, and there are increasing signs that some of them would be willing to follow and adopt the OceanSITES approach once it exists and has been proven successful.

Benefits and users

A global array of timeseries stations will be of benefit to a broad community of research scientists, operational agencies, policy makers, and other users.

In the research and development community, high temporal resolution, long duration, and multi-variate data sets from a timeseries observatory array will be used to observe changes in the physical climate, in biogeochemical cycles and in ecosystem dynamics on many timescales. The data are important to relate these changes to forcing factors and to interdepencies between the physical and biogeochemical parameters, to develop an understanding and predictive capability of the processes involved, and to detect unkown and unexpected changes and events. As such they are especially valuable for interdisciplinary studies in earth system science.

Various sensors are now available or under development which can also obtain timeseries of variables relevant for fisheries research and resource management, and ultimately for the fishing community. These include optical and acoustic systems for bulk biomass estimation and discrete counting of zooplankton and fish abundance. Routine delivery of such data will develop a user base in the fisheries community.

Timeseries data will also be indispensable for the development, validation, and initialization of the next generation of ocean and climate analysis and prediction models, in particular those which include ecosystem components. These models will be important in assessing the current state of the ocean environment; for forecasting its evolution on daily, seasonal, and longer time scales; and for determining the ocean's role in mediating anthropogenically forced greenhous gas warming. Already now, the global ocean data assimilation efforts (like GODAE or multidisciplinary projects) and reanalysis programs like CLIVAR GSOP are looking to timeseries to provide validation data at key locations and for key variables. Here the idea of ecological provinces is useful, since the currently available biogeochemical data are insufficient to test, validate, or constrain models in the typical regimes.

Instrument developers also use timeseries observatories to test their new equipment, both for logistical reasons ("moorings of opportunity") and because a wide array of validation measurements is available from the ongoing observatory observations. Also ground-truthing for some types of remote sensing can only be provided via timeseries on a routine basis, thus routine delivery of such data would develop a user community in the remote sensing applications.

Forecast centers are another user group of timeseries data. These include weather, ocean, and climate forecasters, but also cover short event-related forecasts like the effects of earthquakes/tsunamis, harmful algal blooms, oil-spill prediction, and others. They all have a need for timeseries observations covering a wide range of timescales and parameters.

Outreach and education agencies would be attracted to a network of (real-time) ocean observatories which can be used to monitor changes, differences, and connections between physical, CO_2, and ecosystem conditions in different provinces of the ocean.

Policy makers, including fisheries management, and climate assessment agencies such as the Intergovernmnetal Panel for Climate Change (IPCC) would be users of ocean observations that detect global change in the climate or ecosystem and that allow initialization, validation, and generation of forecast models relating climate change and its impact on society and the economy.

Ultimately, society benefits from a well-coordinated reference timeseries network to the extent that it contributes to the development of science-based analysis and forecast products that can used by decision makers in government and the private sector as well as by ordinary citizens who seek reliable information on matters relating to the earth's environment.

Definition and criteria for timeseries sites in the system

The global timeseries observatory system will be multidisciplinary in nature, providing physical, meteorological, chemical, biological and geophysical timeseries observations. The data will be publicly available as soon as received and quality-controlled by the owner/operator, or by a data acquisition center performing this task on his behalf. An international Steering Team provides guidance, coordination, outreach, and oversight for the implementation, data management and capacity building.

A number of criteria have been agreed upon, which need to be fulfilled by a site in order to qualify for being part of the system:

Defining criteria:

1) Included are sustained in-situ observations at fixed geographic locations of ocean/climate related quantities at a sampling rate high enough to unambiguously resolve the signals of interest. "Sustained" means a plan/committment for longer than one project/proposal period and intention to pursue funding from "observing system programs" when available. Wherever possible, the observations should be achieved with autonomous instrumentation, in a moored or virtually moored mode. Where/while this option is not available (certain variables, logistical constraints, etc), ship-occupied timeseries may qualify an alternate approach, if at least seasonal variability can be resolved. The rationale for this mooring-based goal is that only in this mode can high temporal resolution be achieved, which is critical for various applications or events (diurnal cycle, convection, blooms, seismic, etc). Also, only this way can the long-term goal of unattended operation over many years be approached or remote glider-based methods be explored.
2) Transport sections using whatever technique are included in choke points and major boundary current systems (moorings, gliders, ship ADCP, tomography, etc)
3) Coastal timeseries are included when they are instrumented to have multidisciplinary impact on the global observing system and if they are not part of a national coastal buoy network.
4) Any implemented site fulfilling the criteria will become part of the system but has to deliver its data into the system and to demonstrate successful operation and value after 5 years.
5) Real-time data telemetry of operational variables will be pursued, i.e every effort will be made if it is technically feasible and/or if there are operational users. The rationale for this requirement is: a) Monitoring of instrument functioning (essential for the goal of uninterrupted timeseries); b) event-driven sampling; c) Some end users having a requirement for real-time data (ocean forecasting, real-time assimilation, event detection, monitoring for and fulfilment of conventions); d) real-time data access being helpful for outreach and publicity (the TAO array is a good example).
6) Data should be made public in near real-time for real-time data or as soon as processed and post-calibrated; quality control standards, data formats, and data centers need to be established

The pilot project

At the initiation of the project in 2001, a five-year pilot phase was agreed on. During this period the project will work towards the implementation of a preliminary global array of long-term multi-disciplinary timeseries observatories by coordinating present timeseries efforts, developing a basis for advocacy for support of the timeseries array, and demonstrating the feasibility and utility of a global system.

During the pilot project key gaps in the global array are being identified and planning efforts started to address how to fill them. The project will also foster multi-community and multi-national implementation efforts. Data management procedures and infrastructure for the project will be set

up. Routine provision of data to users and identification of products of use to end users will be carried out.

In parallel, the steering team will inform the oceanographic community about the pilot project and future plans and will recruit contributors and users for the timeseries data sets. The committee will coordinate its Eulerian focused program within the context of GOOS as well as the other large programs mentioned earlier (i.e., CLIVAR, NOAA Climate Change, ARGO, GODAE). The steering team will also promote international participation and funding through the various programs mentioned here in addition to POGO in order to complete the global network.

The initial implementation of the OceanSITES network consists of all operating sites and those under implementation, satisfying the criteria of long-term operation, temporal resolution and deep-ocean locations. It will be continually updated by the Steering Team. The Steering Team will review and may reject sites that do not convincingly demonstrate a scientific or operational merit, that do not adhere to the open data policy, or that are not willing to coordinate with other nearby sites in terms of logistics, shared hardware and overall implementation.

This is the ”Initial OceanSITES System”. It will be used to make a convincing case for the global timeseries array to users, to funding agencies, to policy makes, and to the public. At the end of the pilot project the intent is to review all operating sites and to indicate the merit of maintaining them in an operational array.

The Steering Team

The science and technology of oceanic timeseries observations has developed in an uncoordinated way over the past several decades, with a range of approaches and implementations appropriate to specific aims but not necessarily leading to the best use of resources or the best use of the data obtained. In order to rectify the situation it was recommended at the OceanObs meeting in 1999, and endorsed subsequently by CLIVAR and GOOS bodies, that a steering team should be formed. Such a team was immediately established in 2001, sponsored by CLIVAR, GOOS, and POGO. The team is able to represent the various disciplines involved in eulerian observations; physical, chemical, biological, biogeochemical and geophysical. Many of the major timeseries programs either current or in planning involve members of the team or have close links to them, and furthermore the members are able to represent all countries with significant observatory programs. Because of the breadth of their collective expertise the team is able to address most of the key issues involved and hence derive a coherent and mutually supportive framework for the future.

The terms of reference of the science team are as follows:

- Define an initial set of locations for a global array of long-term timeseries stations for multi-disciplinary observations at the sea surface, in the ocean, and on the sea bottom
- Develop the rationale for establishing and maintaining each element of the array, including recommended and minimum required measurements
- While initially building on existing PI-driven sites or continuing previous/existing timeseries, carry out a critical review of these and identify gaps in the network and synergy between programs (e.g. CLIVAR and DEOS)
- Continually review the set of locations in the light of new requirements, insights or interests of participants and programs
- Consider resources, logistics, data delivery (real-time, delayed-mode)
- Coordinate the implementation
- Coordinate data transmission/formats/streams/management
- Liase with complementary programs (ARGO, ocean assimilation/prediction, interdisciplinary groups, etc) and ensure integration into the overall observing system
- Consider funding mechanisms for sustained observations, and work, with the help of the sponsoring and supporting bodies, towards national commitments for supporting the sites.

Capacity building, including the transfer of mooring technology to other institutions and nations, is another topic that will be taken up in cooperation with POGO.

The group meets approximately annually, the meeting reports are available from the OceanSITES website. A number of guests are usually invited to the meetings to provide very specific expertise where required.

Co-chairs: Uwe Send (USA/Germany), Bob Weller (USA)

Members: Ed Boyle (USA), Francisco Chavez (USA), Tommy D. Dickey (USA), Dave Karl (USA), Tony Knap (Bermuda), Yoshifumi Kuroda (Japan), Richard Lampitt (UK), Roger Lukas (USA), Mike McPhaden (USA), Liliane Merlivat (France), Rodrigo Nunez (Chile), John Orcutt (USA), Sylvie Pouliquen (France), Svein Osterhus (Norway), V.S. Murty (India), Hendrik van Aken (Netherlands).

In addition, a data management group has been initiated, which so far is only working via email towards implementing a common data format and establishing first versions of global timeseries data centers.

Chair: Sylvie Pouliquen (Coriolis)

Members: Thierry Carval (Coriolis), Lesley Richards (BODC), Maureen Edwards (ANIMATE project), Songnian Jiang (UCSB), Rod Johnson (Bermuda), Andrew Dickson (SIO), Maria Hood (IOC), Paul Freitag (TAO), Steve Manganini (WHOI), Nan Galbraith (WHOI), Steve Hankin (US.DMAC/PMEL), Reiko Michisaki (MBARI), Scott D Woodruff (COADS), Jun Naoi (JAMSTEC), Steve Diggs (WOCE center SIO), Jim Swift (WOCE center SIO), Katy Hill (CLIVAR), Sharon Decarlo (SOEST), Peter Hamilton (NVODS), Taco de Bruin (NIOZ).

Status of the global system

The following maps (and corresponding tables in the appendix) reflect three stages of the global timeseries observatory system, based on information collected by the Steering Team. Figure 1 shows sites that are currently operating, figure 2 shows those that are funded and being implemented or where there is a high likelihood of implementation over the next few years. Figure 3 contains all sites that have been recommended by various groups, and may thus be considered a longer-term vision. The color code in figures 1 and 2 reflects the data policy and data availability. More layers of maps will be generated in the future which will interactively (on the OceanSITES website) show where individual types of observations are being collected. The tables in the appendix give basic information about each site.

A second part of this white paper (Part B) has been assembled and will soon be available on the website, which gives a 1-2 page description of each site, with more detailed scientific, technical, and operational information. That document has over 100 pages and is therefore not circulated with the present Part A of the white paper.

The maps, tables, and Part B are continually updated in order to reflect any newly received information.

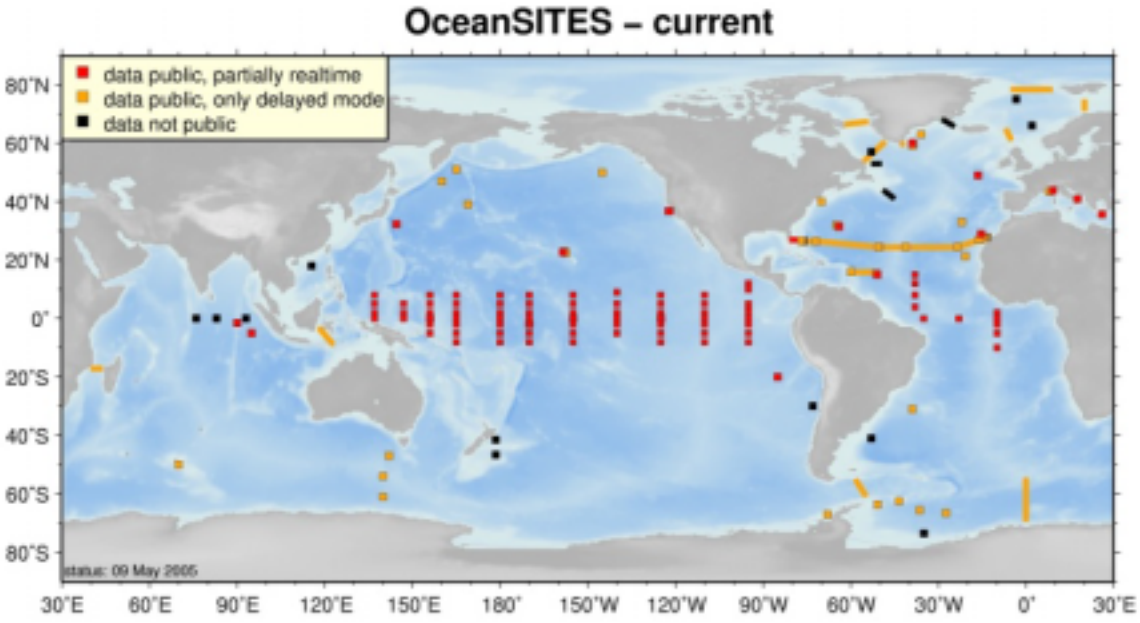


Figure 1: *Currently operating timeseries sites. Squares denote single observatories, bars are used for transport sections.*

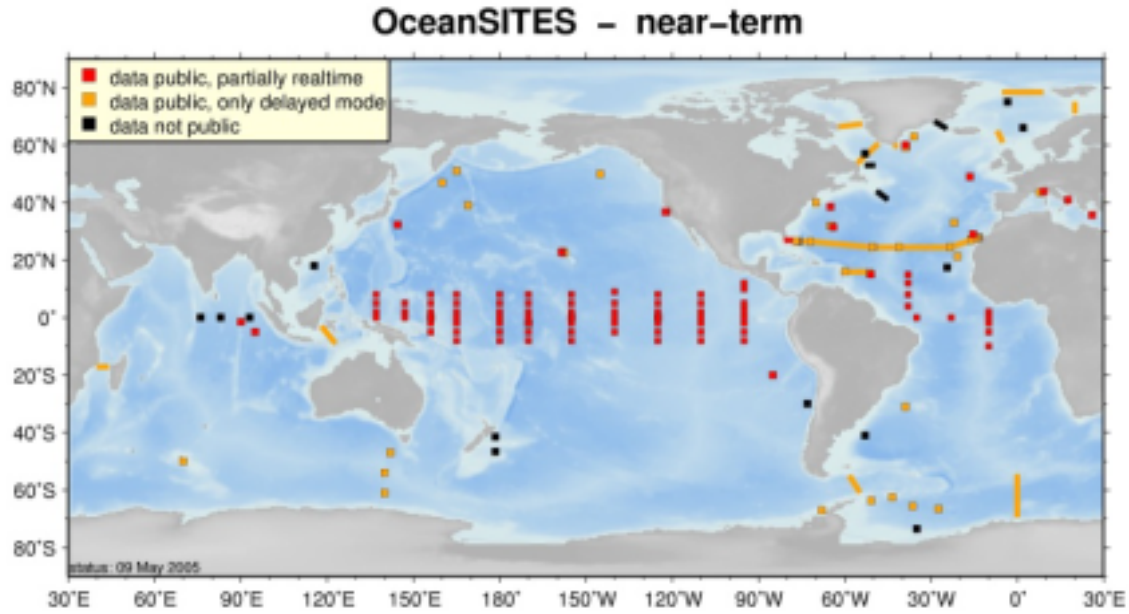


Figure 2: *Timeseries sites which are operating, or funded and being implemented, or which have a high likelihood of being implemented in the next few years. Symbols as in figure 1.*

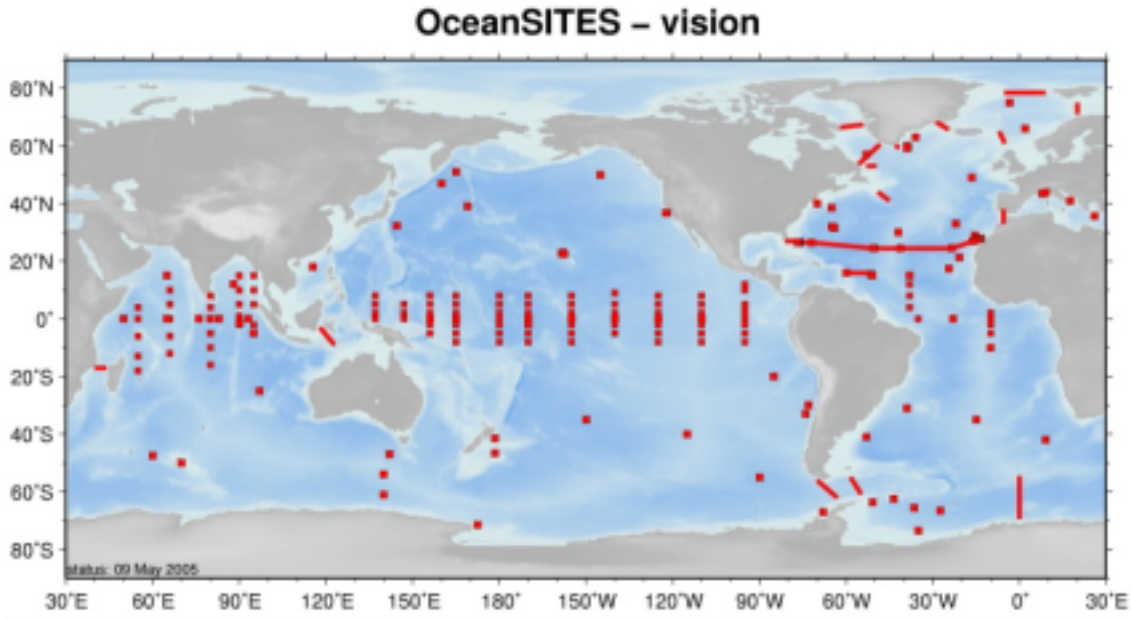


Figure 3: *All timeseries sites from figures 1 and 2 plus those that have been recommended by various groups. Symbols as in figure 1.*

The plan forward

The global timeseries network will provide the oceanographic and atmospheric community with interdisciplinary data sets that will be critical for a broad range of applications, ranging from short-range operational forecasts to climate change and biogeochemical cycling to ecosystem variability to declining fish populations. It will be the key component of the Global Ocean Observing System (GOOS) that provides high temporal and vertical resolution, long-term interdisciplinary data sets collected at the surface, at depth, and on the seafloor.

Implementation and planning capitalizes upon several successful disciplinary and interdisciplinary timeseries programs already operating. These programs serve as the initial basis for the comprehensive global timeseries network and as starting points for the pilot project. The planned global array includes some locations in severe environments, such as in the Southern Ocean. It also includes the plan to field more diverse instrumentation that will require greater power and provide greater volumes of data. In addressing these and other technical challenges, there is great synergy with the U. S. National Science Foundation's (NSF) Ocean Observing Systems Initiative (OOI). One goal of the OOI is to develop and provide for deployment the buoys, moorings, and related core instrumentation and hardware required to occupy blue water, including those that are presently beyond our capability due to the severity of the environment.

At present several well-coordinated programs are in the implementation phase that have a global perspective that links well to our efforts to implement the timeseries array. Among these are the World Climate Research Program's Climate Variability (CLIVAR) program, the global carbon cycle program, and the U.S. and international effort to examine the Dynamics of the Earth Ocean System (DEOS), which advocates multidisciplinary seafloor observatories. These programs include long timeseries stations as a key element of the observational plans to address their research objectives, and both programs have the desire to understand global variability and change over time scales that extend out to centennial and longer. Links have been made with users of timeseries data, including the numerical weather and climate prediction communities and satellite remote sensing communities; the timeseries data is being used for calibration and validation and examination of errors in the models.

Research programs have helped establish a number of the present timeseries stations, including the TAO array, the surface flux reference sites off northern Chile and in the Caribbean. In these three cases, the support for these sites has transitioned to the U.S. National Oceanic and Atmospheric Agency's (NOAA) Climate Observations Program. This program has encouraged the planning and implementation effort of the Timeseries Science Team, and a dialog with this program and similar long term ocean observing programs in other nations and in the international

organizations is a key commitment of the Timeseries Science Team. Included in the links to be fostered are those with those planning the national contributions to the international GOOS, the international coordinators of the GOOS, the international Data Buoy Cooperation Panel (DBCP) and the Joint Technical Commission on Meteorological and Oceanographic Observations (JCOMM) of the World Meteorological Organization (WMO) and the International Oceanographic Commission (IOC). The operational observing planning efforts complement the research programs as they add the perspective of additional observations, such as surface waves, to be made in support of transportation, safety, and human well-being.

The international collaboratory of directors of oceanographic institutions around the world, the Partnership for Ocean Global Observations (POGO), has identified the global timeseries array as a high priority in its advocacy for support. Its continued support is essential in achieving the goals of our project and in transitioning from P.I. driven to network driven implementation, and from short-term project funding to sustained national-level funding. Explaining the timeseries array and garnering long term support are key goals at present where POGO can help. The pilot project was developed as the focus for the near term. It will demonstrate the feasibility and utility of well-resolved, long-term interdisciplinary ocean timeseries data sets, drawing on presently funded sites.

In parallel, the Timeseries Steering Team will work to identify the plan for the future global network of timeseries sites. The team will coordinate its Eulerian focused program within the context of GOOS as well as the other large programs mentioned earlier, for example, within the context of complementary observational Lagrangian (Argo) and remote sensing (e.g., WCRP Satellite Working Group) assets as well as global data assimilation (GODAE) and other observational and modeling programs. The steering team will also promote international participation and funding through the various programs mentioned here in addition to POGO in order to complete the global network and to develop long-term funding strategies. In the post-pilot phase (subsequent 5 years) work would focus on completion of the deployment of the global array using new capabilities developed by the OOI and other activities, with occupation of high value sites identified by research and operational priorities. New sites would be considered, and operational support would be advocated for sites of proven benefit.

The vision is to go beyond the Ocean Weather Stations of the 1950's and at the end of the next decade have in place a a global array of timeseries stations to advance understanding of the ocean's role in the earth system, predictive capability, and human well-being.

Contact information

The OceanSITES Steering Team maintains a website (http://www.OceanSITES.org). This provides more information about the efforts to plan and implement the global timeseries network, as well as presentations, meeting reports, and other documentation. A central email address exists to contact the steering team at oceansites@ifm-geomar.de. The Steering Team is cochaired by Uwe Send (usend@ucsd.edu) and Bob Weller (rweller@whoi.edu).

Appendix: Tables of all sites

Initial Atlantic Ocean Sites

A1: data public, partially real-time | A2: data public, delayed mode | A3: data not public |
B: under discussion for implementation | C: recommended

Site	Lat / Long	Status	Discipline	Contact
Fram Strait	78.5N 9E-5W	A2	physical, ice	Fahrbach, Eberhard (AWI)
Greenland Sea	75N 3.5W	A3	physical	Budeus, Gereon (AWI)
Barent-Sea	72-74N 20E	A2	Phys.	Boscolo, Roberta (Harald Loeng)
Denmark Strait overflow	68-66N 29-24W	A3	phys.	Quadfasel, Detlef (IfM-HH); Valdimarsson, Hedin (Iceland)
Davis Strait	66.5N 62W - 67.5N 54W	A2	physical	Lee, Craig
OWS M, Norwegian Sea	66N 2E	A3	physical, meteorology, biogeochemical	Osterhus, Svein (Norway)
SE-Greenland (ASOF-W)	63-63.5N 35.5-36.8W	A2	Phys.	Boscolo, Roberta (Bob Dickson)
SE Greenland	63N 36W	A2	Phys.	Watson, Andy
Iceland-Faroe Ridge	63.3-62.7N 6.1W	A2	Phys.	Boscolo, Roberta (Bogi Hansen)
Irminger Sea OVIDE	59.7N 41.8W - 59.8N 42.6W	A2	physical	Lherminier, Pascale
CIS, Central Irminger Sea	60N 39W	A1	physical, biogeochemical	Send, Uwe, Müller, Thomas J.
S Irminger Sea	59.59N 38.58W	A2	physical	Pickart, Bob; Hogg, Nelson
Irminger Sea	59N 40W	A2	Physical, biogeochemical	van Aken, Hendrik
Bravo, Labrador Sea	57N 53W	A3	Physical	Fischer, Jürgen (IfMK)
AR7W, Labrador Sea	53.7N 55.6W - 60.6N 48.2W	A2	physical, CO2	Clarke, Allyn (BIO)
Labrador Sea export	53N 50-53W	A3	Phys., convection	Fischer, Jürgen (IfMK)
PAP, Porcupine Abyssal Plain	49N 16.5W	A1	Physical, biogeochemical	Lampitt, Richard (SOC)
Grand Banks boundary current	44-41N 45-49W	A3	Phys.	Fischer, Jürgen (IfMK)
Station W	40N 70W	A2	Physical, biogeochemical	Toole, John; Curry, Ruth
Gulf Stream extension	38.5N 65W	B1	Physical, meteorological	Weller, Robert
North Atlantic DEOS	30N 42W	C	geophysics, meteorol., physical, biogeochemical	OceanSITES-Team
K276 (Azores Front/ Madeira)	33N 22W	A2	Azores Front/Madeira Abyss. Plain, physical/biogeochem.	Müller, Thomas J. (IfMK)
BATS/ Hydrostation S	32N 64.42W	A2	phys., met., geophys., biogeochem., biological/ecological	Knap, Anthony; Lomas, Michael
BTM	31.72N 64.17W	A1	physical, meteorology, biogeochemical, ecological (CO2 planned for 2005)	Dickey, Tommy Sabine, Chris (CO2)
OFP	31.83N 64.17W	A2	Biogeochemical, sediment trap	Conte, Maureen
ESTOC, Canary Islands	29N 15.5W	A1	physical, meteorology, biogeochemical	Meinecke, Gerrit (Uni Bremen)
Florida Transport	27N 77-81W	A1	Physical	Meinen, Christopher
Rapid @ 26.5N	26.5 N 81W-16W	A2	Phys., 2 moorings with telemetry	Cunningham, Stuart A. (SOC)
Abaco	26.5N 76.85W 26.5N 76.5W 26.5N 72W	A2	Physical	Johns, W. ; Beal, L.
Cape Blanc	21.28N 20.8W	A2	Bio-geochemical mooring site, modelling, long-term planned,	Meinecke, Gerrit (Uni Bremen)

Cape Verde, TENATSO (Tropical Eastern North Atlantic Observatory)	17.4 N 24.5 W	B3	physical, biological, meteorological, biogeochemical, atmospheric chemistry possibly geophysical	Wallace, Douglas (IfM)
CLIVAR/MOVE deep transport	16N 50-60W	A2	Phys.	Send, Uwe
CLIVAR/MOVE western site	16N 60W	A2	Physical	Send, Uwe
CLIVAR/MOVE eastern site	15.5N 51.5W	A2	Meteorology, physical	Send, Uwe
NTAS	15N 51W	A1	Meteorology, physical	Plueddemann, A. (WHOI)
PIRATA	15N 38W	C	flux reference on existing PIRATA mooring	McPhaden, Mike (PMEL); Merlivat, Liliane (LODYC)
PIRATA	0N 23W	C	Biogeochemical sensors on existing PIRATA mooring	McPhaden, Mike (PMEL); Merlivat, Liliane (LODYC)
PIRATA	10S 10W	C	flux reference on existing PIRATA mooring	McPhaden, Mike (PMEL); Merlivat, Liliane (LODYC)
VEMA channel	31S 39W	A2	Physical	Müller, Thomas J. (IfMK)
South Atlantic DEOS	35S 15W	C	geophysics, meteorol., physical, biogeochemical	OceanSITES-Team
Gibraltar transport	36N 5.5W	C		OceanSITES-Team
DYFAMED	43.42 N 7.87 E	A2	Physical, meteorology, biogeochemical	Marty, Jean-Claude (LOV)
Cretan Sea (E1-M3A)	35.66N 25.99E	A1	Met., phys., bio.	Nittis, Kostas
Adriatic Sea (E2-M3A)	41N 17.5E	A1	Met., phys., bio.	Nittis, Kostas; Cardin, Vanessa
Ligurian Sea (W1-M3A)	43.8N 9.2E	A1	Met., phys.	Nittis, Kostas; Bozzano, Roberto

Initial Pacific Ocean Sites

A1: data public, partially real-time | A2: data public, delayed mode | A3: data not public |
B: under discussion for implementation | C: recommended

Site	Lat / Long	Status	Discipline	Contact
PAPA, Station P, Line P	50N 145W	A2	met; phys., biogeochem., biol., O2, nutrients, DIC, zooplankton	Freeland, Howard ; Whitney, Frank
Northwest Pacific (HiLaTS)	51N 165E 47N 160E 39N 169E	A2	biogeochemical, physical, biological	Honjo, Susumu (WHOI); Honda,Makio (JAMSTEC)
California Current MBARI	36.75N 122W 36.7N 122.38W	A1	Phys., met., CO2, biochem.	Chavez, Fransisco (MBARI)
Kuroshio Extension Observatory (KEO)	32.3 N 144.5 E	A1	Met., phys., biogeochem. (CO2 planned for 2005)	Cronin, Meghan; Johnson, Michael; Sabine, Chris (CO2)
HOT – Station ALOHA	22.75N 158W	A2	meteorology; physical, biogeochemical	Lukas, Roger (UH/SOEST); Karl, David (UH/SOEST); Santiago-Mandujano, F.
HOT – MOSEAN (H-A mooring)	22.75N 158.1W	A1	Biogeochemical, physical, meteorological, optical, CO2	Dickey, Tommy (UCSB); Karl, Dave (UH/Soest); Sabine, Chris (CO2)
WHOTS	22.75N 157.9W	A1	Met., phys.	Weller, Robert (WHOI); Plueddemann, A.(WHOI); Lukas, Roger (UH/SOEST)
South China Sea	18N 115.5E	A3	meteorology; physical (SEATS-program)	Yang, Yih; Tseng, Chun-Mao
TRITON	0N 156E	A1	Met., phys. (biogeochem. Possible for future)	Kuroda, Yoshifumi (JAMSTEC)
TAO/TRITON	0N 165E	C	flux & biogeochemical sensors on existing TAO/TRITON mooring	McPhaden, Mike (PMEL)
TAO/TRITON	0N 140W	C	flux & biogeochemical sensors on existing TAO/TRITON mooring; CO2 planned for 2005	McPhaden, Mike (PMEL)
TAO/TRITON	0N 110W	C	flux reference on existing TAO/TRITON mooring	McPhaden, Mike (PMEL)
TAO/TRITON	0N 170W	C	flux reference on existing	McPhaden, Mike (PMEL)

			TAO/TRITON mooring	
TAO (CO2)	0N 125W	A1	pCO2 on existing TAO mooring	Sabine, Christopher (PMEL)
TAO	0N 155W	A1	Phys., met., CO2, biochem.	Chavez, Fransisco (MBARI)
TAO	2S 170W	A1	phys., met., CO2, biochem.	Chavez, Fransisco (MBARI)
Stratus Ocean Reference Station	20S 85W	A1	meteorology; physical	Weller, Robert (WHOI)
deep water off Chile	30S 73W	A3	physical	Pizarro, Oscar
200nm off Chile	33S 74W	C	physical	
South Pacific DEOS	35S 150W	C	geophysics, meteorol., physical, biogeochem.	OceanSITES-Team, Dickey, Tommy
South Pacific DEOS	40S 115W	C	geophysics, meteorol., physical, biogeochem.	OceanSITES-Team, Dickey, Tommy

Initial Indian Ocean Sites

A1: data public, partially real-time | A2: data public, delayed mode | A3: data not public |
B: under discussion for implementation | C: recommended

Site	Lat / Long	Status	Discipline	Contact
Arabian Sea	15N 65E	C	meteorology; physical, biogeochemical	OceanSITES-Team; Yu, Lisan
Bay of Bengal	12N 88E	C	meteorology; physical, biogeochemical	OceanSITES-Team; Yu, Lisan
NIOT moored buoy program (Arabian Sea & Bay of Bengal)	not yet available	A3	met., phys. (15-20 buoys)	VSNMurty
Indonesian throughflow	3N-12S 116-125E	A3	several locations, physical	Gordon, Arnold; Huber, Bruce
Indian Ocean monsoon array	0N 50E 0N 65E 0N 80E	C	physical, meteorology	Meyers, Gary (CSIRO)
IO OOS moorings	0N 93E 0N 83E 0N 77E	A3	Phys.	VSNMurty
Indian Ocean buoy array	not yet available	C	meteorological, physical	Mcphaden,Michael (PMEL)
TRITON north	1.5S 90E	A1	meteorology; physical	Kuroda, Yoshifumi (JAMSTEC) ; (Yukio Masumoto (JAMSTEC))
TRITON south	5S 95E	A1	Meteorology; physical	Kuroda, Yoshifumi (JAMSTEC) ; (Yukio Masumoto (JAMSTEC))
Mozambique Channel	17°S 40-43°E	A2	Physical	Ridderinkhoff, Herman; van Aken, Hendrik
Indian Ocean DEOS	25S 97E	C	Geophysics, physical, meteorol., biogeochem.	OceanSITES-Team

Initial Southern Ocean Sites

A1: data public, partially real-time | A2: data public, delayed mode | A3: data not public |
B: under discussion for implementation | C: recommended

Site	Lat / Long	Status	Discipline	Contact
SE Pacific	???	C	Meteorology	Speer, Kevin
SW of Capetown	42S 9E	C	Meteorology	Speer, Kevin
Southern Indian Ocean DEOS	47.5S 60E	C	geophysics, physical, meteorol., biogeochem.	OceanSITES-Team
Kerguelen CLIOKER	50S 70E	A2	Physical (monthly CTD), data-delay of 2 years	Park, Y.H.
south of Tasmania	47S 140E 54S 140E 61S 140E	A2	physical, biogeochemical, sediment trap	Trull, Tom
Ross Sea	71.5S 172.5E	C	bottom water overflow, physical, 6 to 12 moorings	Orsi, Alex TAMU
off New Zealand	41.5S 178.5E 46.5S 178.5E	A3	phys., met., CO2, biogeochem., particle flux, chlorophyll	Boyd, Phillip
AAIW formation region	55S 90W	C	meteorology, physical, CO2	Talley, Lynne (SIO)

Marguerite Bay (RotheraTS)	67S 68W	A2	Physical, biogeochemical, biological (weekly CTD)	Meredith, Michael
Drake Passage transport	56-62S 70-63W	C	10 physical moorings	Provost, C.
Drake Passage	54.94S 58.39W 60.85S 54.71W	A2	Phys., BPR,IES (POL)	Hughes, Chris
Malvinas Confluence	41S 53W	A3	French Malvinas/Falklands current mooring array.	Provost, C.
Weddell Sea (northwestern Station)	~ 62S 44W – 64S 42W	A2	bottom water, physical, several moorings, mass/heat/freshwater flux	Gordon, Arnold; Huber, Bruce
Weddell Sea (southwestern Station)	73.5S 35W	A3	ISW overflow, physical, 2 moorings	Osterhus, Svein (Norway)
Weddell Sea / Greenwich Meridian	54.5S-69.4S 0E	A2	physical, several moorings	Fahrbach, Eberhardt (AWI)
Weddel Sea proper	66.6S 27.5W 65.6S 36.4W 63.7S 50.9W	A2	physical, sea ice	Fahrbach, Eberhardt (AWI)

Annex VI

THE FUTURE STRATEGY OF THE DBCP – AN INITIAL REPORT FROM THE TASK TEAM

1. Introduction

As noted under agenda item 4, the Panel recognised that many of the tasks that had initially been identified for it had now been accomplished, that its annual sessions were less productive than before, and that it was in danger of being superseded by other structures, such as might be created within the context of GEOSS. Nonetheless, the Panel still enjoyed considerable good-will and prestige, and had many resources at its disposal, not least its full time technical coordinator.

In the wide-ranging discussion on its future mission that followed an initial presentation by its chair, the Panel instructed the chair to consult with the vice chairs and convene a small Task Team, representing as wide a constituency of the Panel's interests as possible:

(i) to critically examine the issues that had been laid before them;

(ii) to evaluate the Panel's strengths and weaknesses, and the opportunities and threats to which it was exposed;

(iii) to initiate an evolutionary planning activity as a matter of urgency, if deemed necessary;

(iv) to issue an interim report to the Panel before the close of the current session;

(v) to develop the plan during the intersessional period;

(vi) to report back to the Panel well in advance of the next session.

2. Membership

Etienne Charpentier (DBCP TC)
Elizabeth Horton (DBCP vice chair)
David Meldrum (DBCP chair)
K Premkumar (DBCP vice chair)
Sid Thurston (USA)
Julie Fletcher (NZ)
Ken Jarrott (DBCP vice chair)
Carter Ohlmann (USA)
Jean Rolland (France)
Ariel Troisi (Argentina)

The Task Team met in the evening of 20 October, agreed that the issues that had been raised needed to be addressed, undertook a 'Strengths, Weaknesses, Opportunities and Threats' (SWOT) analysis, and presented the following brief interim report the following morning.

3. Interim report

- The issues are real and the Panel must act promptly to preserve and develop its status and influence in ocean affairs;
- The Panel's strengths lie in its employment of a dedicated Technical Coordinator, its action groups, and in its established record for transitioning observing systems from research instruments to trusted operational tools, a process which had defeated many;
- The Panel's weaknesses lie in its lack of visibility at high level, e.g. in the GEO process, and the perception that its sessions had become mundane and bureaucratic;
- Opportunities for the Panel lie in implementing new observing systems and platforms, and in developing optimal deployment strategies;
- The main threats to the Panel were seen as the assumption of its role by another body, the loss of its TC, and the danger of overextending the Panel's sphere of activities in an unconsidered way.
- Finally, the Task Team chair undertook to produce a succinct capability statement describing the Panel's scope and strengths, with a view to engaging a wider community of sponsors, decision makers and end users in the Panel's activities.

Annex VII

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**.**

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.

Annex VIII

SUMMARY OF REPORTS BY DATA MANAGEMENT CENTRES

Responsible National Oceanographic Data Centre (RNODC) for Drifting Buoys

As part of its role, RNODC-MEDS acquires, processes, quality controls and archives real-time drifting buoy messages reporting over the Global Telecommunications System (GTS), as well as delayed mode data acquired from other sources. All data are made available to the international scientific community through an online request system. Although MEDS was officially recognized as an RNODC in 1986, its archive started in late 1978 with the First GARP Global Experiment (FGGE) program.

At the recent IODE meeting in April 2005, a resolution was adopted to abolish the system of RNODC's in response to a review of IODE activities and in particular, the lack of understanding and use of the RNODC system. The resolution instructed the Chair of IODE to discuss with RNODC host centres how their operations, if considered essential for the international community, could be maintained and properly acknowledged. The services provided by MEDS as the RNODC for drifting buoys were determined to be essential for the international community and as such will continue operating as an RNODC until the proper accreditation has been established.

During the last inter-sessional period, MEDS has archived an average of 515, 000 BUOY reports per month from an average 1170 buoys per month. This is an increase of 150,000 reports (41%), and of 187 buoys (19%) from last year. Currently, MEDS has about 34 million records containing close to 14.5 Gigabytes of data from 1978-2004. 14 observations per day per drifting buoy was received monthly in average. Most buoys are reporting SST, about 35% reporting pressure and approximately 5% reporting wind and air temperature. Only a few buoys are reporting salinity. Water temperature and drogue depth measurements have greatly increased in the past 10 years while dry bulb temperature has stayed roughly the same.

MEDS performs its QC on a monthly basis and as such, it takes anywhere between one and six weeks for BUOY data to be added into the archive. Last year on average, the delay between reception and update was 24 days. With the increasing number of messages received each month, the QC process takes longer and therefore increases the time it takes to update the archive. This, along with a growing need for real-time drifter data in a more timely manner, has prompted MEDS to look at increasing the frequency of archive updates.

At DBCP-18, MEDS agreed to participate in the DBCP QC guidelines to monitor the quality of location data distributed on the GTS. Each month, statistics on the number of erroneous positions are sent on the buoy-qir@vendur.is distribution list with a link to SVG maps in three projections to visualize the data. The Arctic, Antarctic and the rest of the world maps display buoy tracks of the previous month and allows the user to “mouse over” tracks to determine which buoys are reporting erroneous locations. MEDS sent its first message in October 2002. In June 2005, these maps proved useful indicating a problem with position transmissions. This problem appeared to occur only on June 27 in which many GTS messages reported buoys with erroneous positions of 0,0. This caused the statistics for the Southern Atlantic region to be misleading for the month of June by indicating a large increase in the number of buoys and messages in that area. MEDS reported that of the BUOY messages received during the year, 99% of the locations were quality flagged as good, with only 1% doubtful. None were modified or flagged as inconsistent or erroneous.

MEDS had noticed a large amount of duplicate and semi-duplicate buoy messages distributed over the GTS and has enhanced their duplicate software to deal more effectively with this issue. The new duplicates analysis combines and filters the GTS messages. Messages are combined which contain the same header information, such as buoy ID, observation date/time, position etc., but each having only a partial compliment of the complete set of measurements being reported, as shown in the example. The system also screens out redundancies by filtering out messages that are duplicates in everything except observation time. For these messages, if the difference in time is within a half hour, only one is kept, which is determined by a priority list of the

source of the data, the LUT (Local User Terminal). The current duplicates analysis procedures have been in place since July 2004 and remove approximately 10% of the total messages as duplicates or redundancies. All data in MEDS real time drifting buoy archives have been reprocessed by these procedures.

MEDS quality control analysis for real time drifting buoy data continues to use both automated checks and visual inspection. Past practices in automated tests for buoy drift position and speed where corrected. These used to compare the time of a message position to the time of the measurement observations and set a data flag of doubtful where these were different by some specified interval. This, however, led to approximately half of the archive flagged with positions as doubtful, which was misleading. All data in MEDS real time drifting buoy archives were reprocessed for the track (date/time, latitude and longitude) position and speed test. The speed re-analysis of the track now takes into account the QC flags sent with the data such as QL, quality of location and QA, the class of buoy location.

MEDS and Global Drifter Center (GDC) located at AOML have been cooperating since the inception of the WOCE-SVP programme. AOML carries out quality control on the data and generates the interpolated files. Every 6 months, the data is forwarded to MEDS who function as the archive and distribution centre. In 2001, the GDC reprocessed all their data (1979-2000) and forwarded it to MEDS to update their archives. MEDS also received three annual updates since then to include data up to December 2003. MEDS updated the system that handles the SVP data. New archives were created and store additional observational data than just surface temperature. An issue concerning reusing buoy IDs was also dealt with. Previously, the SVP was carried out under the World Ocean Circulation Experiment (WOCE) which ended in 2002. A new section, Surface Drifters as part of CLIVAR, was added to MEDS website to replace the former SVP section under WOCE. All data received by AOML under the SVP programme is available on the website for download as well as maps and inventories of buoys by year.

Drifting buoy data are being reported on the GTS in both BUOY and BUFR format. A connection has been established to the Canadian Meteorological Center (CMC) to receive the BUFR messages via FTP and MEDS has been successful in splitting out the BUFR data into single messages. New software is currently being written to read and write BUFR format which will eventually replace the existing BUOY decoder. Functionality related to new editions and data compression still need to be added. MEDS intends to have the BUFR software put into production by the end of 2005.

For the next intersessional period, MEDS plans to:

- Complete and implement the new software to read and write BUFR format.
- Look into increasing the frequency of BUOY archive updates and
- Redesign the Drifting Buoy/RNODC section of the website for easier maintenance and to include more graphs and statistics on the archive and its contents.

Specialized Oceanograhic Centre (SOC) for drifting buoys

The SOC for Drifting Buoys has been run continuously during year 2004-2005. SOC is made of Météo-France teams in Toulouse and Brest as well as teams involved in the inter-agency program Coriolis (Ifremer leading the program, and in charge for delayed mode aspects, portal to external users, etc.). A daily collection and archiving of buoy reports from the world ocean is performed by Météo-France. Collaboration within the Coriolis project (www.coriolis.eu.org), with JCOMMOPS and also Argos are main aspects of this SOC, beside regular exchanges with other data centres, measurements teams and agencies, and with users.

Météo-France operates quality control procedures on drifting buoys data. Warning messages are sent to the buoy-qir@vedur.is mailing list of Internet when a problem appears (e.g. bad location detected, wrong acceleration and loss of drogue, sensor drift, etc.) or when a modification seems needed (i.e. to recalibrate or to remove a sensor from GTS) via JCOMMOPS interface. Statistics on comparisons with analysis fields are set up for each buoy. Monthly statistics are sent to the buoy-qir@vedur.is mailing list too.

Buoy data QC tools developed by Météo-France are available on the Internet (www.meteo.shom.fr/qctools) to help buoy operators to check their buoys: Monthly statistics carried out by 4 meteorological centers for individual buoys; Plots of data and differences with model outputs; Blacklists of buoys reporting dubious air pressure values or being perhaps ashore can be seen.

In addition to the products linked to buoy QC, the SOC for Drifting Buoys produces monthly products for buoys, moored buoys, drifting buoys, ships. Data are delivered on request, or on a regular basis and via Internet (http://esurfmar.meteo.fr/doc/o/daim). Examples are given for the last year.

- the time evolution of reports for wind and for pressure respectively for all BUOY reports (showing all buoys, moored buoys and Drifting Buoys) and SHIP reports. The number of BUOY reports has increased, presumably due to the new Argos tariff agreement (multi-satellite option). Interestingly, the number of moored buoy reports increases for wind but shows a decrease for pressure starting in April 2005.
- the time evolution of WAVEOB reports and sensors. The number of WAVEOB reports regularly increases, with a strong seasonality.
- mapping position plot charts and Marsden square distribution are produced for BATHY, TESAC, SHIP, BUOY and TRACKOB. (each month)
- Marsden square distribution charts of mean monthly data availability (top) and percentage of BUOY reports compared to SHIP + BUOY reports (bottom) for wind, pressure, air temperature, sea surface temperature (each month)

Since the 1st of January 2002, Météo-France has been providing the Coriolis Data Centre with surface current data computed thanks to SVP drifter tracks. Coriolis contributes to the French operational oceanographic project with in-situ data. Buoy positions, get from the GTS, are interpolated every 3 hours. Surface current data are computed over 6 hours, on a weekly basis. Data are flagged with drogue presence indexes. Since mid-2004, wind speed and wind stress data from ECMWF analysis model coupled with sampled surface current data are delivered too and used by operational oceanography centers (such as Mercator, French component of the GODAE).

Charts will be displayed following the JCOMM / JCOMMOPS specifications for monitoring of the observing system.

Annex IX

TERMS OF REFERENCE FOR THE AD HOC WORKING GROUP ON ESTABLISHMENT OF A PILOT PROJECT TO COLLECT METADATA FROM SST AND PROFILE DATA IN SITU MEASURING PLATFORMS

The Working Group shall:

(i) Effectively start the pilot project by organizing a workshop, consolidating its membership and electing a chair-person;

(ii) Categorize metadata, establish the catalogue, and provide justification in terms of data assimilation in numerical models and operational applications for each of the proposed metadata fields in these categories.

(iii) For metadata which distribution would be required along with the observational data, review BUFR tables and templates and list any required additions and modifications to the templates.

(iv) Work with identified contact points for each concerned data processing systems and national centres to investigate and report on implications in terms of development cost and subsequent running costs for routinely producing and distributing in real-time BUFR reports that include required metadata in addition to the observations. Suggest alternate solution if needed (e.g. for VOS data).

(v) Possibly investigate how GTS distribution of data collected via Iridium could be realized and investigate financial implications.

(vi) For metadata which distribution would not be required along with the observational data, define dictionary and format for the exchange of such metadata. Investigate level of compatibility and feasibility to merge such a database with JCOMM ODAS metadata database as defined by JCOMM Expert Team on Marine Climatology (ETMC).

(vii) Make sure that the defined model can potentially be extended to other variables than SST and temperature profile data, and consider existing standards when making recommendations regarding any international standard applicable to the issue (e.g. Marine XML, or Content Standard for Digital Geospatial Metadata of the US Federal Geographic Data Committee).

(viii) For metadata which distribution would not be required along with the observational data, liaise with appropriate JCOMM/DMA, JCOMM/OPA sub-Panels, and Argo, to suggest how they would be made readily available to centralized and operational JCOMM database and distribution system and how they would eventually be made available to the end users (procedures and protocols). Sub-group is also invited to consider integration that is taking place in the oceanographic community regarding metadata (e.g. Argo, GOSUD, and OceanSites are integrating their metadata NetCDF formats and distribution systems).

(ix) Identify one or more centre willing to host such a database and associated distribution system, and possibly willing to support associated development and running costs as a contribution in kind to the project (if not, evaluate costs).

(x) Write specifications for the pilot project, and make final recommendations to OCG regarding development feasibility, schedule and funding

(xi) Suggest other solutions if needed

Annex X

IOC STATEMENT OF ACCOUNT FOR 2004-2005

Mr. Charpentier Salary, Mission and Other Costs

(Statement of Account from 1 June 2004 to 31 July 2005)

(Expressed in US Dollars)

Balance Brought Forward as at 1 June 2004 :		**101 383,02**	
Funds Received from WMO in October 2004		78 000,00	
Funds Received from NOAA in March 2005		102 500,00	281 883,02
Deduct:			
Disbursements			
Salary :			
	6/2004-12/2004	81 136,25	
	1/2005-7/2005	84 690,92	165 827,17
Missions :			
	Iceland - 29/06/2004 to 30/06/2004	2 434,95	
	Geneva - Switzerland - 07/07/2004 to 09/07/2004	1 847,50	
	Chennai - India - 14/10/2004 to 23/10/2004	2 822,80	
	Geneva - Switzerland - 17/01/2005 to 19/01/2005	1 900,40	
	Paris - France - 08/02/2005 to 12/02/2005	1 906,17	
	Brest - France - 07/03/2005 to 12/03/2005	2 766,92	
	correction prior year expenditure	2 074,50	15 753,24
Sub-contract :			
	"Collecte Localisation Satellites" - paid in August 2004		14 667,88
Cash balance as at 31 July 2005			**85 634,73**

Authoritative figures are those contained in the financial statements prepared by the UNESCO Comptroller.

Annex XI

INTERIM WMO STATEMENT OF ACCOUNT AS OF JULY 2005

World Meteorological Organization

Data Buoy Co-operation Panel
Interim Statement of Account as at 31 July 2005

	US$	US$
Balance from 2003		125 361
Contributions Paid for Current Biennium		234 731
Total Funds Available		360 092
Obligations Incurred		
Consultants	9 903	
Travel	10 942	
Transfer to Marine Programe	12 000	
Contribution to JCOMMOPS Data Devt	6 527	
Payment to IOC/ Logistic Support	204 000	
Bank charges	199	
Support Cost	2 434	
		246 005
Balance of Fund		US $ 114 088
Represented by.		
Cash at Bank		104 111
Exchange Adjustments		9 977
		US $ 114 088

CONTRIBUTIONS RECEIVED	2004	2005	Total
Australia	16 875	13 500	30 375
Canada	12 500	12 500	25 000
CLS Service ARGOS	10 000		10 000
France*	36 633	73 746	110 379
Germany	5 000		5 000
Greece	2 200		2 200
Iceland	2 250		2 250
India		3 000	3 000
Ireland	1 517		1 517
Japan	10 000	2 000	12 000
Netherlands	1 970		1 970
New Zealand	2 395	2 000	4 395
Norway	395		395
South Africa	3 750		3 750
USA	22 500		22 500
TOTAL	127 985	106 746	234 731

* The contributions from France received in 2004 includes their contributions for the years 2001-03.
* The contributions from France received in 2005 includes their contributions for the year 2004, and integrated European contribution from E-SURFMAR, replacing the previous individual contributions from France, Germany, Greece, Iceland, Ireland, Netherlands, Norway and UK.

Prepared on 27 September 2005

Annex XII

PROVISIONAL ESTIMATE OF INCOME AND EXPENDITURE UNTIL 31 MAY 2006
(WMO and IOC)

Income/Balance

WMO Cash balance as at 31 July 2005		114 088.00
IOC Cash balance as at 31 July 2005		85 634.73
IOC replenishment (active as of 1 January 2006)		13 527.27
Arrear contribution		23 750
CLS	15 000	
SOOPIP(through Germany)	5 000	
South Africa	3 750	
		237 000

Obligation

TC Salary (8/2005 ~ 5/2006, provision by UNESCO)	123 000[1)]
TC Missions (8/2005 ~ 5/2006, provisional)	15 500
Payment - logistic supports (covering the period 6/2004 ~ 5/2005)[1)]	14 900
Payment - logistic supports (covering the period 6/2005 ~ 5/2006)[1)]	14 900
JTA chairman	15 000
Travel (Chairman, etc)	10 000
Publication	2 000
Support Cost (WMO), etc	2 000
	197 300

Balance at the end of Y=2005 operation (provisional) **39 700**

1) Applied UN exchange rates of August 2005, between USD and EUR.

Annex XIII

AGREEMENT BETWEEN IOC/UNESCO AND CLS CONCERNING THE OCCUPANCY OF PREMISES AND THE USE OF FACILITIES GRANTED TO JCOMMOPS

The United Nations Educational, Scientific and Cultural Organization (UNESCO), represented by the Assistant Director General of UNESCO and Executive Secretary of the Intergovernmental Oceanographic Commission (IOC) (hereinafter referred to as UNESCO/IOC), on the one hand, and the Collecte-Localisation-Satellite (hereinafter referred to as CLS) represented by its General Manager, on the other,

Recalling

(1) the establishment in 1985, jointly by IOC and the World Meteorological Organization (WMO), of the Drifting Buoy Cooperation Panel (DBCP) (later on renamed *Data* Buoy Cooperation Panel);

(2) the acceptance by the DBCP, at its first session (Toulouse, October1985), of the offer by CLS to provide accommodation and local logistic support for the DBCP technical coordinator, subject to the negotiation of a suitable contract;

(3) the subsequent establishment by the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), at its first session (Akureyri, Iceland, June 2001), of a JCOMM in situ Observing Platform Support and Operations centre (JCOMMOPS), based upon the then existing international coordination mechanisms hosted by CLS in Toulouse, and whose staff presently consist of two UNESCO staff members;

Noting

(1) that the Argos system, managed by CLS, continues to be a unique satellite-based, environment-only-oriented, system for data collection and platform location,

(2) the efforts undertaken by CLS, under the guidance and with the financial assistance of the DBCP, to develop, maintain and improve, since the early 90's, a computerized sub-system dedicated to the operational transmission of meteo-oceanographic data over the WMO Global Telecommunication System (GTS), as well as, more recently, through other means, such as the World Wide Web (WWW),

Agree on the following:

Article I

1. CLS shall place at the disposal of UNESCO/IOC rent free for use by JCOMMOPS one office located in its headquarters and convenient for the daily work of two JCOMMOPS staff members, that is of a minimum surface of twenty square meters and adequately furnished with two desks, chairs and storage facilities. The office shall be equipped with two telephones and associated telephone lines with unrestricted use.

2. CLS shall provide the JCOMMOPS staff members with:
   - (i) one Dell laptop micro-computer per person, with the usual necessary sofware;
   - (ii) unrestricted access to the World Wide Web;
   - (iii) unrestricted use of CLS printers, photocopying and scanner machines, faxes and other such equipement;
   - (iv) unrestricted use of CLS desk stationery (paper files, notebooks, pens, etc.) and the possibility of ordering specific such items if necessary;
   - (v) unrestricted acces to all CLS common areas;
   - (vi) access and free use of CLS meeting rooms with advanced notice;

(vii) access to the canteen and cafeteria located in the protected area of the "Centre national d'études spatiales" (CNES) during opening hours.

3. CLS shall provide JCOMMOPS staff members with:
   (i) the hosting and backing up of JCOMMOPS data bases in CLS computers;
   (ii) access to CLS intranet and data storage facilities in CLS network directories;
   (iii) hardware and software (including related assistance) necessary to discharge their tasks as defined by JCOMM, including the maintenance and updating of JCOMMOPS website, namely:
      (a) one server (for the time being, a Carri Proserver RK Xeon with bi-processor Intel Xeon 2.4 GHz, 4 GO memory, 100 GO hard disk), to be replaced every 3 years;
      (b) yearly maintenance and upgrade of the Geophysical Information System (GIS) (for the time being, ArcIMS software of the Environmental Systems research Institute – ESRI);
      (c) yearly JCOMMOPS participation inthe Oracle licence held by CLS;
      (d) yearly subscription to the Global Maritime Boundaries Database (GMDB) of Veridian, plus option for ports;
      (e) miscellaneous sofware upgrade or new software, as required.

Article II

1. UNESCO/IOC shall reimburse CLS on a yearly basis, subject to the availability of funds, a fixed part of the costs associated with the obligations undertaken by CLS as described in Article I above, namely a total amount not exceeding 25,000 € (twenty five thousand euros), as follows:
   (i) 20,000 € (twenty thousand euros) for the obligations described in Article I 1., I.2. and I.3. (i) and (ii) above, as long as JCOMMOPS will be staffed by two people;
   (ii) 5,000 € (five thousand euros) for the provision of hardware and sofware described in Article I.3 (iii) above.

2. The yearly reimbursement referred to under paragraph1. of this Article shall be made upon the submission by CLS of a detailed and signed statement of accounts on the use of the funds to be paid in by UNESCO/IOC under the present Agreement. That statement of accounts shall cover the period beginning on 1 June of the preceding year and ending on 31 May, and shall reach UNESCO/IOC by 15 July at the latest.

Article III

1. CLS represents that the office(s) and the facilities described in Article I above may lawfully be used by UNESCO/IOC for the purposes indicated in the present -Agreement and agrees that UNESCO/IOC shall peaceably and quietly have, hold and enjoy them as long as the present Agreement will remain in force without any unlawful interruption or disturbance.

2. UNESCO/IOC shall take good care of the office, facilities and equipment described in Article I above, normal wear and tear excepted.

Article IV

1. UNESCO/IOC undertakes to normally maintain the office and facilities in good repair and tenantable condition. CLS shall be responsible for any and all major repairs. For this purpose, and subject to UNESCO/IOC's agreement, CLS shall have the right, upon reasonable prior notice to UNESCO/IOC, and at reasonable times, to enter, inspect and make any such necessary maintenance and repair, and may enter the office whenever reasonably necessary to make urgent, emergency repairs.

2. CLS undertakes full and sole responsiblity for the payment of all taxes and for any other charges of a public nature which are or may be assessed in the future against the office and facilities used by UNESCO/IOC.

Article V

Nothing contained in this agreement shall be deemed a waiver, expressed or implied, of any immunity from suit or legal process, or of any privilege, exemption or other immunity enjoyed by UNESCO/IOC, whether pursuant to Agreement between the Government of the French Republic and UNESCO regarding the Headquarters of UNESCO and the Privileges and Immunities of the Organization on the French territory, or other convention, law or decree of an international or national character or otherwise.

Article VI

1. CLS shall provide and maintain at its own cost public liability insurance which should hold UNESCO/IOC harmless from claims against it as occupant and user of the office(s) and facilities referred to in Article I above and cover any loss, injury or damage occurring to UNESCO/IOC staff by the mere fact of being hosted in those offices. CLS shall keep the offices insured for all risks, including fire, explosion, civilstrife, as well as earthquake, flood or other natural phenomenon under a comprehensive policy.

2. UNESCO/IOC shall maintain adequate insurance to cover liability to third parties for injury, loss, illness, death or damage to their property resulting from occupancy and use of the office(s) and facilities referred to in paragraph 1 above attributable to the negligence or wilful misconduct on the part of its officials, contractors or agents.

Article VII

The present Agreement shall enter into force upon signature by the parties, it being understood, however, that UNESCO/IOC’s reimbursement as defined under article II above will be deemed to cover also the period between 1 June 2004 and 31 may 2005.

Article VIII

1. This Agreement may be revised at any time by mutual written agreement upon the request of either party. The new terms agreed upon shall then apply to the periods beginning on 1 June immediately after they have been modified.

2. This agreement may be terminated by mutual consent or by either party on 60 days notice in writing to the other party.

3. The obligations assumed by the parties under this agreement shall survive the termination of the agreement to the extent necessary to permit the orderly conclusion of activities, the withdrawal of personnel, funds and property, the settlement of accounts between the parties hereto and the settlement of contractual liabilities that are required in respect of any personnel, subcontractors, consultants or suppliers.

Article IX

In the event of a dispute, the parties shall make a good faith effort to settle it amicably. In the event an amicable settlement cannot be reached, any dispute arising out of, or relating to the present Agreement, shall be settled by binding arbitration by a sole arbitrator appointed by mutual agreement, or, failing this, by the President of the International Court of Justice at the request of any party.

Article X

This Agreement contains a complete statement of UNESCO/IOC's commitment regarding the present agreement. If the conditions set forth above are acceptable to CLS, please sign, date and return to

UNESCO/IOC two copies of the present Agreement. If CLS's acceptance is not received before *[to be completed]*, UNESCO/IOC's proposal written down in this Agreement shall be considered as null and void.

Date: 09 JUN 2005

Signed:

Patricio Bernal
Assistant Directof General of UNESCO
Executive Secretary IOC

Date: 21/06/2005

Signed:

Christophe Vassal
General Manager of CLS

Annex XIV

EXPENDITURES AND INCOME FOR 2004-2006

	Actual 2004 – 2005	Estimated 2005 - 2006	Estimated 2006 – 2007
		USD	
Expenditures			
Technical Coordinator's Salary and Travel	194,000	102,500*+67,600	**105,000*+68,000**
Payment for TC's logistic support	10,000 +25,024	15,000	**15,000 (~€ 12,200)**
Travels (DBCP/JTA chairs)	11,000	10,000	**10,000**
JTA activities including chairman's salary	9,991	15,000	**15,000**
Publications			**2,000**
JCOMMOPS development	6,527	3,473	**3,473**
Refund to WMO	12,000		
Contingencies			**10,289**
sub-total	257,542	102,500+111,073	**105,000*+123,762**
WMO/charges	1% (2,575)*	1%(1,111)	**1% (1,238)**
TOTAL	260,117	214,684	**230,000**

* Contribution from US (USD 90,000) and SOOPIP (USD 12,500) made directly to IOC, thus no charge was made for those contributions

Income achieved/required to balance expenditures*			
Contributions	183,563	208,414	**212,326**
Carry forward from previous biennium	(108,997)	32,443 +13,527** (IOC)	**39,700**
Carry over to next biennium	32,443	39,700	**(22,026)**
TOTAL	260,117	214,684	**230,000**

* Assuming 0% increase from 2005 contribution to 2006 contribution
** replenishment from IOC regular budget

Annex XV

TABLE OF PROVISIONAL CONTRIBUTIONS

DBCP

	2004-2005	2005-2006	2006-2007
AUSTRALIA	16,875	13,500	16,200
CANADA	12,500	12,500	15,000
FRANCE	12,211 (€ 10,000)	E-SURFMAR	E-SURFMAR
GREECE	2,200	E-SURFMAR	E-SURFMAR
ICELAND	2,250	E-SURFMAR	E-SURFMAR
INDIA		3,000	3,000
IRELAND	1,517 (€ 1,250)	E-SURFMAR	E-SURFMAR
JAPAN	5,000	2,000	2,400
NETHERLANDS	1,970	E-SURFMAR	E-SURFMAR
NEW ZEALAND	2,395	2,000	2,400
NORWAY	395	E-SURFMAR	E-SURFMAR
SOUTH AFRICA	3,750	3,750**	4,500
UNITED KINGDOM		E-SURFMAR	E-SURFMAR
USA	90,000	90,000*	108,000*
E-SURFMAR		49,164 (€ 40,000)	48,076 (€ 40,000)
JTA	10,000	15,000**	15,000
TOTAL	**160,063**	**190,914**	**214,576**

* Contribution made directly to IOC
** Arrear contribution to be made.
*** Applied UN exchange rates of October 2005, between USD and EUR.

SOOPIP

	2004-2005	2005-2006	2006-2007
Germany	5,000	5,000**	5,000
Japan	5,000	0***	5,000
USA	12,500	12,500	12,500
TOTAL	**22,500**	**17,500*** **	**22,500**

** Arrear contribution to be made.
*** Need to confirm

TOTAL INCOME FROM CONTRIBUTIONS

	2004-2005	2005-2006	2006-2007
TOTAL	**182,563**	**208,414***	**237,076**

* Need to confirm

Annex XVI

DBCP WORKPLAN FOR THE NEXT INTERSESSIONAL PERIOD

(actions arising from this Panel session are indicated in bold)

IMPLEMENTATION & TECHNICAL WORKPLAN

No.	Task	Carried out by	Supported/assisted by	Reported to/Due date
1	Analyse programme information & other data as appropriate & in particular in accordance with DBCP global programme implementation strategy.	TC	Chair, Vice-Chairs	Chair for presentation to the Panel/Ongoing
2	Assist in the planning & implementation, as appropriate, of the ocean data buoy component of GOOS, GCOS & CLIVAR.	DBCP	Members	Panel/Ongoing
3	Implement database of buoy programme information on JCOMMOPS web server.	TC		Panel/Ongoing
4	Identify sources of buoy data not currently reported on the GTS & determine the reason for their non-availability.	TC, CLS	Members Secretariats	Chair & Panel for information/Ongoing
5	Update & amend, as necessary, the DBCP World Wide Web server, including up to date information on existing & planned data telecommunication systems. Technical Coordinator to place tabulated summary of satellite data telecommunication systems on the DBCP web site.	TC	Chair NOAA/AOML	Panel/Ongoing
6	Continue investigation regarding developments in communication technologies & facilities, relevant to the collection of sensor &/or location data from buoys. David Meldrum to present an updated report on satellite data telecommunication systems at the next Panel session .	Chair TC	Members	Panel/Ongoing
7	Develop & implement cooperative buoy deployment strategies, in particular with the GDP, to provide buoy networks which serve both research & operational applications.	AG, GDC	Members TC	Panel, GDP/Ongoing
8	**Monitor the operation of the Argos GTS processing sub-system & arrange for modifications as necessary. Monitor implementation by Service Argos of new Argos data processing system, and in particular GTS related part.**	**TC**	**CLS**	**Panel & users/Ongoing**
9	Keep up-to-date with the latest buoy technical developments.	Operational services Chair, vice-Chairs TC	Members	Panel/Ongoing
10	Coordinate operations of DBCP QC guidelines.	TC	Members Operational services	Panel/Ongoing
11	Follow up & possibly assist in implementing requirements expressed by the buoy users within the Argos system.	CLS	TC	Panel, meeting on JTA/Ongoing
12	Support, as required, existing DBCP action groups (E-SURFMAR, IABP, IPAB, ISABP, IBPIO, GDP, TIP, DBCP-PICES NPDBAP, OceanSites), and provide assistance on request to other internationally coordinated buoy programme developments.	TC Secretariats	Chair	Panel/Ongoing
13	Coordinate with IOP implementing strategy for the Indian Ocean Observing	IBPIO	Chair	Panel/Ongoing

No.	Task	Carried out by	Supported/assisted by	Reported to/Due date
	System as far as data buoys are concerned.		TC Secretariats	
14	Encourage other centres to act as PMOC	Members	TC	Panel/Ongoing
15	Check existing information on deployment opportunities that appears on JCOMMOPS web site. For countries that do not appear in the web page, provide the Technical Coordinator with information the deployment opportunities they might provide (maps & point of contact) for inclusion on the JCOMMOPS web server.	Members	TC	Panel/Ongoing
	Act as it's a focal point for tsunami warning, and to keep it informed as to developments during the intersessional period	**Vice chair for Asia K. Premkumar**		**Panel/Intersessional period**
16	Produce table of national commitments in the Southern Ocean (by next Panel's session).	TC	Members	Panel/Intersessional period
17	Provide (e.g. monthly) the Technical Coordinator with the list of moored buoys they operate and which are reporting in SHIP or BUOY format. This list must be provided in an electronic form in a format suitable for automatic data processing. Format to be defined with TC.	Members	TC	Panel/Ongoing
18	Enhance buoy safety through improved design (refer recommendations) and keep the Panel informed about related changes.	Manufacturers, Members	Members, TC	Panel/Ongoing
19	Continue actions with other International Organizations for preventing vandalism.	Secretariats		Panel/Ongoing
20	**Provide confidential information on vandalism-proof designs to the Technical Coordinator for sharing through protected (username/password) web access (JCOMMOPS)**	**Members**	**TC**	**Panel/Ongoing**
21	**Vice Chair for Asia to investigate ways for vizualizing buoy activities for the meida**	**K. Premkumar**		**Panel/Intersessional period**
22	Insert information on vandalism into UN Atlas and submit article to relevant journals such as "Fishing News International.	Chair		Panel/Intersessional period
23	Make sure that metadata that can be included in BUOY section 4 are routinely provided to Service Argos for actual GTS distribution.	Buoy operators	Service Argos	Panel/Ongoing
24	**Submit proposed BUFR template for buoy wave data to CBS ET/DRC. Investigate flagging of GTS data in BUFR reports.**	**TC**	**CBS ET/DRC**	**Panel/Intersessional period**
25	Update implementation strategy. This includes Panel working proactively to maintain its position as an authoritative and influential force in ocean observations. Panel Members to provide Chair with comments on the implementation strategy document by 30 November 2005.	Chair	Members	Panel/30 November 2005
26	Suggest News for DBCP web site and send one page of text plus optionally one image and/or one icon to the Technical Coordinator for inclusion in the News section.	Interested Members	TC	Panel/Ongoing
27	Inform the Technical Coordinator of use of other satellite data telecommunication systems than Argos.	Members		Panel/Ongoing

No.	Task	Carried out by	Supported/assisted by	Reported to/Due date
28	Continue development of JCOMMOPS.	DBCP & Argo TCs	Members Secretariats CLS	Panel/Ongoing
29	Maintaine close links with SOT members so that support on deployment opportunities can be obtained from the SOOP and VOS Panels of SOT.	Chair	TC	Panel/Ongoing
30	**Installing and/or connecting LUTs at Easter Island, and Saint Helenas (or Gough Island), to the Argos network of ground receiving stations will be investigated. Connection of existing LUT at Malvinas/Falkland will continue to be pursued by South Africa and UK.**	**TC, Service Argos**	**South Africa, UK**	**Pane/Intersessional periodl**
31	**Comply with buoy metadata collection scheme. Manufacturers to clearly and precisely define all the buoy models they make in the JCOMMOPS database by using developed web application at JCOMMOPS.**	**Members Buoy operators Manufacturers**	**TC**	**Panel/Ongoing**
32	**Assist with implementation of Peruvian and Turkish moored buoy programmes if required**	**TC**		**Panel/Intersessional period**
33	**Define best practices and standards for the Panel, and in particular regarding calibration procedures. Existing minimum specifications by EGOS can be used as a basis.**	**Bill Burnette**	**TC, E-SURFMAR**	**Panel/Intersessional period**
34	Document calibration procedures and provide information to the Technical Coordinator.	Members		TC, Panel/Ongoing
35	**Best practices to be reviewed prior to drifter purchase, keeping in mind safety of people tasked to carry out the deployments (e.g. drogues adequately secured). For operational applications (e.g. Hurricane drifters), satellite transmission, and proper GTS data processing should be tested prior to deployment.**	**Members**	**Evaluation group, TC**	**Panel/Ongoing**
36	**Urged manufacturers to provide Service Argos with list of most used buoy models and formats they operate.**	**Manufacturers, Service Argos**	**TC**	**Service Argos/Ongoing**
37	**Merge E-SURFMAR definition of ending causes with evaluation group set of definitions**	**TC**		**Panel/Intersessional period**
38	**Service Argos to investigate causes [0°N, 0°E] location problem that occurred in June 2005**	**Service Argos**	**TC**	**Panel/Intersessional period**
39	**Redesign DBCP web site and move it to JCOMMOPS**	**TC**		**Panel/Intersessional period**
40	**Investigate quality of records of WOTAN wind speed data**	**Evaluation group**		**Panel/Intersessional period**
41	**Perform further study on delays**	**Chair**	**Service Argos, TC**	**Panel/Intersessional period**
42	**Prepare specific questions for the user and technology workshop to be prioritized and circulated to Panel Members. Provide answers to the questions or suggest new questions.**	**Chair, Members**	**TC**	**Chair/End 2005**

ADMINISTRATIVE WORKPLAN

No.	Task	Carried out by	Supported/assisted by	Reported to/Due date
1	Maintain summary of requirements for buoy data to meet expressed needs of the international meteorological & oceanographic communities.	TC	Members Secretariats	Chair for presentation to the Panel/Ongoing
2	Maintain a catalogue of existing ongoing ocean data buoy programmes	TC	Members Secretariats	Chair & Panel for information/Ongoing
3	Maintain a list of national contact points for the DBCP & within other relevant bodies with potential for involvement in DBCP activities.	Secretariats	Members	Chair & Panel for information/Ongoing
4	If deemed necessary, make proposals for coordination activity as a result of the above actions to address items 2 to 6 in the terms of reference of the DBCP.	Chair, TC	Secretariats Others as appropriate	To Panel for consideration & appropriate action or for direct action by Chair/Ongoing
5	Arrange for the circulation of information on the Panel's activities, current & planned buoy programmes & related technical development/evaluations, including via distribution of existing DBCP publications to potential Argos GTS users.	TC	Chair Secretariats CLS	Wide circulation by Secretariats & CLS/Ongoing
6	Continue the arrangements (including finance) to secure the services of a technical coordinator.	Chair	Secretariats	Secretariats/Ongoing
7	Review programme & establish working priorities of the technical coordinator.	Panel, Chair		Panel/at next session
8	**Organize DBCP user and technology workshop in March or April 2006, tentatively at ECMWF.**	**D. Meldrum, E. Horton, TC**	**Members, Secretariats**	**Panel/ASAP**
9	**Organize scientific & technical workshop at DBCP-XXII**	**Ken Jarrott Willian Scuba**	**Secretariats**	**Panel/Intersessional period**
10	Prepare annual report of the DBCP.	Chair Secretariats	TC	Executive councils of WMO & IOC/End of 2005
11	**Update & publish new versions of DBCP publications No. 3 (Argos guide). Produce new publications: 2005 Annual Report, Workshop Proceedings (CD-Rom and web only).**	**Service Argos (No. 3) Secretariats**	**TC (No. 3) Members**	**Panel/Mid-2006**
	Explore options for allowing Panel contributors to participate in a wider funding activity that might eventually translate to direct contribution to a JCOMMOPS trust fund.	Chair	JCOMM OCG Secretariat	Panel/ JCOMM 4-year intersessional period
12	**Work with the Secretariats to seek additional contributions from member countries, action groups, and/or manufacturers.**	**Chair**	**Members**	**Panel/Intersessional period**
13	Encouraged to seek any possibility of increase of their future contribution.	Members		Panel/Intersessional period
14	Send invoices to Participants	Secretariats		Panel/November 2005
15	Pay Panel Member`s contributions as soon as invoices are received.	Members		WMO Secretariat/upon invoice
16	**Provide papers presented at the Workshop via e-mail or CD-Rom to workshop Chair, Ken Jarrot, in electronic form (MS Office compatible format only) by 30 November 2005.**	**Authors, Workshop presentation**		**Ken Jarrott/30 November 2005**
17	**Publish workshop proceedings.**	**Secretariats**		**Panel/Mid-2006**
18	Submit national reports & Action Group reports in electronic form to the	Members		Panel/End-2005

No.	Task	Carried out by	Supported/assisted by	Reported to/Due date
	Secretariats	AG		
19	Forward national & AG reports in electronic form to the technical coordinator for inclusion in the JCOMMOPS server	Secretariats		TC/Jan. 2006
20	Prepare & distribute revised budget estimates for 2006-2007	Secretariats	Chair	Panel/End-2005
21	Identify necessary funding to allow for expansion of JCOMMOPS & AIC staffing & resources.	Secretariats Members	JCOMM/OCG	Panel/Intersessional period
22	Make commitments regarding instrument evaluation.	Interested Members States		Panel/Intersessional period
23	TC to inform chairman of his wish or otherwise to continue to work as TC/DBCP for the period 1 June 2007 to 31 May 2008.	TC		Chair/1 Oct. 2006
24	**Review future mission of the DBCP; analyse past goals, current strengths and weaknesses of the Panel, future aims and objectives, and strategy to achieve them. Possibly suggest new ToR for the Panel**	**Task team**	**Chair**	**Panel/Intersessional period**
25	Provide the Technical Coordinator with short articles for inclusion in JCOMMOPS News section of its web site.	Members	JCOMMOPS	Panel/Ongoing
26	**Suggest revisions of the brochure.**	**Members**	**TC**	**Panel/Intersessional period**
27	Check the DBCP list of National Focal Points for logistical facilities and report discrepancies, changes, or additions to the WMO Secretariat.	Members	WMO Secretariat	WMO Secretariat/Ongoing
28	**Make recommendations to JTA XXV, including (i) Service Argos to monitor data flow and delays through its LUTs, and improve timeliness for the Indian Ocean; (ii) CLS/Service Argos consider the feasibility of installing LUTs in Saint Helenas and Easter Island with a view to possibly including this activity within their development projects; and (iii) additional ADS charges due to use of multi satellite service should be reduced.**	**Chair**		**JTA, Panel/JTA-XXV**
29	**Consider making commitments to DBCP Trust Fund for deployment opportunities especially in the SH, including by air and by ship.**	**Members Chair**	**Secretariats**	**Panel/Intersessional period**
30	**Ensure that each national coordination mechanism for GEO/GEOSS is fully informed of and consistent with existing and planned activities of JCOMM. Panel to contribute to GEO/GEOSS process for Tsunami monitoring system, either through JCOMM or through national coordination of each member country, and to actively communicate with national coordination for GEO to fully inform on the Panel's activities and capabilities in this regard.**	**Members**		**Panel/On going**
31	**Finalize and clarify the presentation of the DBCP accounts. Frank Grooters to engage with the Secretariats in defining a more detailed, accurate, and verifiable accounting process, and to recruit additional Panel Members to a financial task team as required**	**Frank Grooters**	**Secretariats, Task team (to be recruited)**	**Panel/ASAP**
32	**Reduce tentatively TC`s accrued leave to a reasonable level**	TC		Panel/Intersessional period

Annex XVII

LIST OF ACRONYMS AND OTHER ABBREVIATIONS

ABE-LOS	The IOC Advisory Board of Experts on the Law of the Sea (IOC)
ADEOS	Advanced Earth Observing Satellite (Japan)
AIS	Argo Information Centre
AOML	Atlantic Oceanographic and Meteorological Laboratory (NOAA)
ARGO	Array for Real-time Geostrophic Oceanography programme
ASAP	Automated Shipboard Aerological Programme
BATHY	Bathythermograph report
BOM	Bureau of Meteorology (Australia)
BUFR	Binary Universal Form for Representation of Meteorological Data
	BUOY Report for Buoy Observations
CBS	Commission for Basic Systems (WMO)
CHMI	Czech Hydrometeorological Institute
CIMO	Commission for instruments and Methods of Observation (WMO)
CLIVAR	Climate Variability and Predictability (WCRP)
CLS	Collecte Localisation Satellites
CNES	Centre National d`ètudes spatiales (France)
COP	Conference of the Parties to the Framework Convention on Climate Change
DART	Deep-ocean Assessment and Reporting of Tsunamis
DBCP	Data Buoy Cooperation Panel (WMO-IOC)
DWD	Deutscher Wetterdienst
ECMWF	European Centre for Medium-Range Weather Forecasting
EGOS	European Group on Ocean Stations
ET	Expert Team
ET-ODRRGOS	CBS Expert Team on Observational Data Requirements and Redesign of the Global Observing System
FAO	Food and Agriculture Organization of the United Nations
FRGPC	French Argos Global Processing Centre
GAC	Global Area Coverage
GCOS	Global Climate Observing System
GDP	Global Drifter Programme
GEO	*ad hoc* Group on Earth Observation
GEOSS	Global Earth Observation System of Systems
GIS	Geographic Information System
GLOSS	Global Sea-Level Observing System
GMA	Global Marine Assessment
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
GTS	Global Telecommunication System (WMO)
HRPT	High Resolution Picture Transmission
IABP	International Arctic Buoy Programme
IBPIO	International Buoy Programme for the Indian Ocean
ICES	International Council for the Exploration of the Sea
IFREMER	Institut Francais de Recherche pour l`èxploitation de la Mer
IGOOS	Intergovernmental Committee for GOOS
IHO	International Hydrographic Organization
IMO	International Maritime Organization
IMO	Iceland Meteorological Office
INMET	Brazilian National Institute of Meteorology
INPE	Instituto National de Pesquisas Espaciais (Brazil)
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IODE	International Oceanographic Data and Information Exchange (IOC)
IRD	Institut francais de recherche scientifique pour le dévelpment en coopération (ex ORSTOM)
ISABP	International South Atlantic Buoy Programme
JCL	Joint Circular Letter

JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
JCOMMOPS	JCOMM Observing Platform Support Centre
JMA	Japan Meteorological Agency
JOMDB	JCOMM in situ ODAS Metadata Database
JTA	Argos Joint Tariff Agreement
LAC	Local Area Coverage
KNMI	Royal Netherlands Meteorological Institute
MEDS	Marine Environmental Data Service (Canada)
MSC	Meteorological Service of Canada
MSNZ	Meteorological Service of New Zealand
NCEP	US National Centers for Environmental Prediction
NDBC	National Data Buoy Center
NESDIS	NOAA Satellites and Information Service
NOAA	National Oceanographic and Atmospheric Administration (USA)
NPDBAP	North Pacific Data Buoy Advisory Panel
NPOESS	National Polar Orbiting Environmental Satellite (USA)
NWP	Numerical Weather Prediction
NWS	National Weather Service (NOAA)
OCG	JCOMM Observations Programme Area Coordination Group
ODAS	Ocean Data Acquisition Systems
ONR	Office of Naval Research (USA)
OOPC	Ocean Observation Panel for Climate (of GOOS, GCOS, WCRP)
OOSDP	Ocean Observing System Development Panel
OPSCOM	U.S. Argos Operations Committee
PIRATA	Pilot Research Moored Array in the Tropical Atlantic
PMEL	Pacific Marine Environmental Laboratory (USA)
PMO	Port Meteorological Officer
PMOCs	Principal Meteorological or Oceanographic Centres
PMT	Platform Messaging Transceiver
POES	Polar-orbiting Operational Environmental Satellite
QC	Quality Control
RMS	Root Mean Square
RNODC	Responsible National Oceanographic Data Centre
SAWS	South African Weather Service
SBSTA	Subsidiary Body for Scientific and Technological Advice (of the COP)
SCOR	Scientific Committee on Oceanic Research
SOBP	Southern Ocean Buoy Programme
SOC	Specialized Oceanographic Centre
SOOP	Ship-of-Opportunity Programme
SOOPIP	JCOMM Ship-of-Opportunity Programme Implementation Panel
SOT	Ship Observations Team (JCOMM)
SST	Sea Surface Temperature
STIP	Stored TIROS Information Processor
SUA	Argos System Use Agreement
SVP	Surface Velocity Programme Drifter
SVPB	Surface Velocity Programme Barometer Drifter
TAO	Tropical Atmosphere Ocean Array
TIP	TAO Implementation Panel
UKMO	United Kingdom Meteorological Office
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
URL	Universal Resource Locator
USGPC	US Argos Global Processing Center
VOS	Voluntary Observing Ship
VSOP-NA	VOS Special Observing Project-North Atlantic
WIOMAP	Western Indian Ocean Marine Applications Project
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment (WCRP)
XBT	Expendable Bathythermograph