DATA BUOY COOPERATION PANEL
TWENTIETH SESSION

Chennai, India, 18-22 October 2004

FINAL REPORT

JCOMM Meeting Report No. 33

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO

WORLD METEOROLOGICAL ORGANIZATION

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N O T E

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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-XX was opened in the Sagar Sangamam Conference Centre of the National Institute of Ocean Technology (NIOT), at 09.30 hours on Monday, 18 October 2004. In its inaugural session, Mr K Premkumar, Programme Director of the National Data Buoy Programme of NIOT and Vice-Chair of DBCP, extended a warm welcome to the participants on behalf of the NIOT. He recalled that the NIOT had first participated in the DBCP at its 14th Session, beginning a period of close interaction involving the exchange of practical issues relevant to the operation of a moored buoy programme. He also acknowledged the role of DBCP support in instituting an awareness campaign for mariners on the importance of floating platforms at sea and the crucial need to avoid vandalism. He explained that the NIOT is involved in many ocean related technological developments, and hence was a highly appropriate venue for the Scientific and Technical workshop. Moreover, participants would be very welcome to tour an exhibit of NIOT facilities and to interact with NIOT staff.. He then introduced the Director of the NIOT, Dr S Kathiroli.

1.1.2 Dr Kathiroli emphasized the importance of data buoys for the prediction of monsoons in a peninsular country like India, wherein the vast majority of the population is involved in agriculture. He also highlighted the importance of data buoy activities to India's active operational oceanography programme, and as a key contribution to the global forecasting effort in general . He concluded by wishing that all participants would share their expertise in constantly developing the utilization and impact of data buoy observations.

1.1.3 Commencing his inaugural address on behalf of the DBCP, Mr David Meldrum, Chair of the Panel, extended a warm welcome to all participants in the forthcoming workshop, particularly those from NIOT, National Institute of Oceanography (NIO), India Meteorological Department (IMD) and other Indian agencies. He extended the Panel's sincere thanks to Mr Premkumar and Dr Kathiroli for the excellent arrangements, and for the unstinting efforts that had been made by Mr Premkumar and his team to ensure the success of the meeting. Noting that India had built on its traditional expertise in oceanography and meteorology by establishing a substantial infrastructure to support these activities, notably the Department of Ocean Development (DOD), the Council for Scientific and Industrial Research (CSIR) and their respective institutes, he applauded the creation and nurturing of the NIOT. This institute, through its far-sighted approach to sustainable ocean utilisation and the expertise and commitment of its leadership and staff, had established itself at the forefront of ocean technology developments. In the particular area of data buoy technology, Mr Premkumar's team had established a world-class network of 20 moored data buoys in the Arabian Sea and Bay of Bengal, which had proved vital to the forecasting and other operational agencies, and were making a significant contribution to climate research in the region. In this regard, Mr Meldrum noted the Panel's appreciation of the prompt and efficient efforts by the first meeting of the CLIVAR/GOOS Indian Ocean Panel in establishing a framework for climate-related research in the region, and, with the co-operation of the CSIR, NIO and NOAA, in moving swiftly to a deployment of four moorings in the Indian Ocean. Noting that the Panel had itself been active in the region through the activities of one of its action groups, the International Buoy Programme for the Indian Ocean (IBPIO), Mr Meldrum briefly described the mission of the DBCP, and its wish to recruit more members to its regional action groups. Amongst other benefits, this would assist in the education of the marine communities as to the importance of ocean observations, and hopefully lead to a reduction in the vandalism of ocean moorings, an area which was of considerable concern in the region. Finally, Mr Meldrum wished all participants a pleasant and productive workshop session.

1.1.4 Mr Kenneth Jarrott, Chair of the Technical Workshop then welcomed attendees. He noted that the workshop provided a special opportunity to share experience and vision, to see individual contributions in an end-to-end perspective, and to learn from the innovations or trials of new technologies, practices and services. He introduced the themes and schedule of the workshop. While noting the valuable contributions from America and Europe, the special contributions of presenters from the Indian and Asian region were particularly recognized, as was the excellent presentation venue made available by the NIOT.

1.1.5 On behalf of the Executive Secretary IOC, Dr Patricio Bernal, and the Secretary-General of WMO, Mr Michel Jean-Paul Jarraud, the Secretariat representative also welcomed participants to the meeting and to India. In doing so, she offered the sincere appreciation of both Organizations, the co-sponsors of JCOMM and the DBCP, to NIOT for hosting the session in India. She also offered special thanks to the Vice-Chair from Asia for his considerable efforts in preparing for the session and in making the local arrangements so effective for participants. The Secretariat representative stressed the importance of the Panel and its work, both in directly supporting all the major programmes of WMO and IOC, and also as a key component of the integrated ocean observing system coordinated through the Observations Programme Area of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology, JCOMM. She also noted the current effort of the *ad hoc* Group on Earth Observation (GEO), which is engaged in an ongoing effort to establish an integrated, coordinated Global Earth Observation System of Systems (GEOSS). The Secretariat representative stressed that the activities of DBCP will play an essential role in the future scheme of GEOSS. She concluded by assuring participants of the full ongoing support of the Secretariat in their work, and wishing them a successful meeting and enjoyable stay in India.

1.1.6 The list of participants in 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 twentieth session of the DBCP itself was opened by the Panel Chair, Mr David Meldrum, at 14.30 hours on Tuesday, 19 October 2004, in the conference room of the NIOT. He welcomed participants again to the session and once more thanked the NIOT for hosting it and providing such a congenial environment and facilities.

1.2.2 From the morning session of Wednesday, 20 October, sessions were held in the conference room of the MGM Beach Resort.

1.2.3 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. The Secretariat introduced the documentation.

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, part of his time was spent on SOOP (28.5%). He reported that most of his time was spent on (i) missions, including preparation (14%), (ii) user assistance (9.6%), (iii) development of a buoy metadata collection scheme (6.5%), (iv) JCOMMOPS development, operations and maintenance (5.4%), and (v) cooperation with Service Argos regarding future Argos GTS data processing system (2.7%). The remaining time was related to many issues such as encouraging buoy operators to release their data onto the GTS, support to the Action Groups, monitoring of the DBCP quality control guidelines, information exchange, including provision of an article by K Premkumar in Port Technology International, production of statistics, etc.

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

- Paris, October 2003, GLOSS Group of Experts, making a presentation on JCOMMOPS
- Angra dos Reis, October 2003, DBCP-XIX and JTA-XXIII
- Paris, December 2003, EGOS Management Committee meeting
- Washington-DC and Florida, USA, January 2004, visit of the NOAA Office of Climate Observation (OCO), Ocean.US, Service Argos, inc., the Global Drifter Centre, and Technocean
- Brest, March 2004, Argo Steering Team meeting, for discussing the role of the Argo Information Centre which is part of JCOMMOPS
- Geneva, March 2004, JCOMM Management Committee meeting
- Toulouse, May 2004, OceanOPS04 conference
- Reykjavik, June 2004, EGOS Management Committee meeting
- Geneva, July 2004, IABP meeting

2.1.3 He then presented a status report on buoy programmes stressing that the deployments of drifters increased substantially during the last intersessional period as about 950 drifting buoys were reporting on GTS in August 2004 (752 in August 2003). 325 were reporting air pressure, and 865 SST. Also 191 moorings appeared in the DBCP status report for August 2004. These moorings include moored buoys in the high seas (e.g. TAO, NDBC, MSC, EGOS, NIOT), plus those for which information is made available to the Technical Coordinator.

2.1.4 The Panel was informed that 69 air pressure drifting buoys were operational in the Southern Ocean Buoy Programme (SOBP) in July 2004. In August 2004, Panel Members agreed to commit about 95 drifting buoys measuring air pressure in the region for the period September 2004 to August 2005.

2.1.5 Because of increased deployments which are consistent with the JCOMM-OCG phased-in implementation plan where the goal is to eventually operate a network of some 1250 drifting buoys, a large number of them being fitted with barometers, the DBCP implementation strategy is to be updated. More deployment opportunities will be needed and the latest technological developments should permit enhanced network management (e.g. extending buoy life-time through two-way communications, new transmission strategy, the storm buoy concept, etc.). This was discussed between the DBCP Chair, OCG Chair, and the Technical Coordinator, and will be discussed again by the Panel under agenda item 4.

2.1.6 JCOMMOPS work was mainly related to (i) operations and maintenance of the information system (servers, database, Geographic Information System), (ii) keeping the database up to date and consistent, (iii) development of new tools and services, and (iv) presentation of JCOMMOPS at several meetings, including OceanOPS04. See paragraph 8.5 for details. Also, following a request by the GOOS Steering Committee, a method for demonstrating the evolution of the flow of data volume over time was proposed.

2.1.7 Regarding information exchange, the DBCP web site is routinely managed by the Technical Coordinator, although new products and web pages tend now to be implemented via JCOMMOPS. No major changes were therefore made to the DBCP server in the last 12 months. Also, as it had not been used in the last few years, the technical internet forum was stopped and replaced by a DBCP News section at JCOMMOPS which will be driven by the Technical Coordinator. A few articles from Panel Members have already been included there. The SVPB design reference (DBCP TD No.4) and Argos GTS sub-system reference guide were updated according to latest evolutions. See paragraph 7.2 for details.

2.1.8 As discussed at the last Panel session, time was spent on coordinating development for a buoy metadata collection scheme. This was done in cooperation with the GDP, EGOS, and two manufacturers. A prototype scheme was presented to EGOS, the IABP, GDP, IBPIO, NPDBAP, and the ISABP. See paragraph 8.6.4 for details.

2.1.9 The Argos GTS sub-system was upgraded in September 2004 to implement miscellaneous user requirements, including TAO (salinity), and Argo. Also, as discussed at the previous Panel session, an improved filtering system was implemented to limit the number of duplicates distributed onto the GTS. BUFR compression is underway and planned for implementation in late 2004 or early 2005. CLS/Service Argos is also completely redesigning its data processing system, including the GTS components. The Technical Coordinator worked with CLS/Service Argos on the latter to make sure that the requirements of the DBCP are properly taken into account.

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, noting that the Panel's aims would not have been achieved without his efforts.

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:

- the European Group on Ocean Stations (EGOS) (verbal presentation by Mr Frank Grooters, representing the EGOS officers);
- the Global Drifter Programme (GDP) (verbal presentation by Dr Rick Lumpkin and Mr Craig Engler, GDP representatives);
- the International Arctic Buoy Programme (IABP) (verbal presentation by Ms Elizabeth Horton, on behalf of the IABP officers);
- the International Buoy Programme for the Indian Ocean (IBPIO) (verbal presentation by Mr Graeme Ball, representing the IBPIO);
- the International Programme for Antarctic Buoys (IPAB) (report only)
- the International South Atlantic Buoy Programme (ISABP) (verbal presentation by Mr Louis Vermaak, ISABP technical coordinator);
- the North Pacific Data Buoy Advisory Panel (verbal presentation by Mr Ron McLaren, representing the NPDBAP)
- 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.

2.2.2 Some comments and discussion followed the above presentations:

(i) The ISABP reported a new initiative being developed on earth observation, namely the establishment of the Global Earth Observation System of Systems (GEOSS), which would have an impact in Panel's activities. The group also acknowledged the existence of the Global Marine Assessment (GMA) and the IOC Advisory Board of Experts on the Law of the Sea (ABE-LOS). It was agreed by the Panel that it should remain fully informed of those activities.

(ii) Regarding the quality control of pressure data on the GTS, a number of QC products were accessible on various websites. It was requested that Technical Coordinator would draft a guideline, which will be placed on the ISABP website. The guideline will focus on assisting institutions on how to use QC tools.

2.2.3 The Panel noted a message from EGOS, applying to close as an action group of DBCP. The EUCOS-SURFMAR (Surface Marine programme of the Network of European Meteorological Services, EUMETNET, so called E-SURFMAR), applied to replace EGOS (see paragraph 3 for details), to which a formal handover of duties from EGOS would occur in the WMO Headquarters in Geneva, on January 18, 2005.

2.3 NATIONAL REPORTS

2.3.1 The Panel had received written and verbal reports on current and planned buoy programmes from Australia, Canada, Ecuador, France, India, Ireland, Japan, Malaysia, Netherlands, New Zealand, Republic of Korea, South Africa, Sweden and USA. As usual, these written reports, as well as others submitted to the Secretariat before 30 November 2004, would be published in the Panel's annual report.

2.4 ARGO STEERING TEAM AND ARGO INFORMATION CENTRE

2.4.1 The Panel noted with interest a report on Argo implementation. The Argo array was expected to reach 50% of its goal of 3,000 operating floats by the end of 2004. The growth of the Argo array was dependent on a) the number of floats successfully deployed and b) the extent to which those floats meet their design specification in terms of float life and quality of CTD data.

2.4.2 Dr Steve Piotrowicz noted that significant progress has been made this year on implementing the array in the southern hemisphere. Major deployments had occurred in the South Pacific through the use of a charter vessel, the R/V *Kaharoa* and a research cruise of the R/V *Mirai*. An upcoming cruise of the R/V *Tangaroa* will continue this effort extending south of 50°S. It is expected that the use of charter vessels in the Pacific (and possibly Indian Ocean) will continue into the middle of 2006.

2.4.3 Delayed-mode quality control procedures, particularly important for salinity observations, are being implemented in the less dynamic regions of the world's oceans while procedures are under development for the more dynamic ocean basins. Major challenges continue to be sustaining the support for implementation of the array and access to deployment platforms in more remote ocean regions.

2.4.4 The report raised the following issues relevant to DBCP:

(i) Argo needs to continue to build towards its target 3000 float global array and then maintain it for long enough to be a part of an integrated global observing system.

(ii) Effort needs to be continuously applied to the monitoring of float and sensor performance, and to the identification and solution of problems in collaboration with float and sensor manufacturers.

(iii) The real time data system needs to be continuously evaluated to meet the needs of an expanding and more diverse user community. This requires an effective dialogue with users.

(iv) The backlog of data requiring delayed-mode QC needs to be reduced.

(v) Argo needs to work with the research community to ensure that high quality ship-based CTD data are rapidly incorporated into climatologies. This requires a) knowledge of planned cruises and b) willingness of PIs to release data.

(vi) As the array nears completion, innovative strategies will be needed to fill holes in the global array. This will be particularly challenging in remote areas.

(vii) There will be increasing pressure to incorporate new sensors and capabilities in the Argo array, which will have implications for data formats, energy budgets and communication bandwidth.

(viii) Using Service Argos, Argo floats have to spend significant time (up to 12 hrs) at the surface in order to guarantee error free data transmission. This means that for many floats Argos costs are doubled because although all transmissions for any surfacing fall within a 24hr window, that window spans UTC midnight and so incurs double costs. The risk of this can be reduced by choosing the multi-satellite option. Argo would be helped greatly if Argos charged for transmissions within a sliding 24 hr window rather than for transmissions on a particular UTC day.

(ix) Experimental floats using Orbcomm and Iridium data communication and GPS positioning have shown promise in allowing higher resolution profiles, two-way communication and improved navigation. Any improved communications system needs to have the prospect of long-term availability and cost-effectiveness.

(x) Argo has yet to develop a stable funding mechanism to support its project infrastructure.

2.4.5 The Panel thanked Dr Piotrowicz for his report, and noted with concern that the continuity funding for Argo had yet to be identified in most participating countries.

Argo Information Centre

2.4.6 Mr Etienne Charpentier reported that the Argo management structure had been reviewed at the last Argo Steering Team meeting (Brest, 9-11 March 2004) where he represented the Panel and JCOMM. The Argo Science Team renamed itself as the Argo Steering Team (acronym AST unchanged). The new structure includes the Chair, a Project Office, and the Argo Information Centre which is part of JCOMMOPS. The Project Office (APO) includes its Director who reports to the AST, and the Technical Coordinator, who reports to the APO Director. The Technical Coordinator, however works in Toulouse at JCOMMOPS under the guidance of the JCOMMOPS Coordinator (who is employed by IOC of UNESCO on behalf of the Panel and the JCOMM Ship of Opportunity Programme) for matters concerning Argos's relationship to IOC and JCOMM, and specifically to the implementation of IOC resolution XX-6.

2.4.7 Mr Etienne Charpentier then presented the activities and latest developments of the Argo Information Centre in the last 12 months on behalf of Mathieu Belbéoch, the Argo Technical Coordinator. He presented the AIC web site and monitoring tools and products that had been developed at AIC to serve the Argo community, including (i) interactive maps and monthly status maps, (ii) operational lists of active floats, deployments, and trajectories, (iii) query forms to access information for individual floats, (iv) statistics, and (v) assistance to the Argo Data Management Team to follow developments with a global view over the individual components. The Argo Web site (http://argo.jcommops.org) had recently been re-designed and cosmetic layers improved. The AST website is targeting a larger audience, including scientists and the general public, while the AIC web site is focusing on implementation and operations.

2.4.8 Future developments include an upgrade of the float deployment notification web interface, addition of new monitoring statistics (e.g. life-time), and an upgrade of the Geographical Information System.

2.4.9 The Panel also stressed that it was important to maintain AIC funding beyond 2006 as the Argo Technical Coordinator's position was also necessary to maintain an appropriate level of support at JCOMMOPS.

2.4.10 The Panel thanked the Argo Technical Coordinator for these developments and agreed that the synergy at JCOMMOPS between the Argo TC and the DBCP/SOOP TC was indeed very efficient and in the best interest of all Argo, DBCP, and SOOP communities.

2.5 EVALUATION SUBGROUP

2.5.1 The Chair of the Evaluation Group, Ms Elizabeth Horton, reported the ongoing initiatives by the Meteorological Service of New Zealand, Météo-France, and Techocean to work on the pressure spike problem in the Southern Ocean.

2.5.2 For some unknown reason, none of the buoys programmed with the TEST data format developed by Météo-France reported spiked pressure data. The South African Weather Service reported a continuing spike problem, and plans were underway to carry on with the testing. The updated wind speed retrieval algorithm developed by Météo-France and installed in Metocean WOTAN drifters gave good results in both the Tropical Pacific and Atlantic regions. Although wind direction measured by drifters was less accurate than that of moored buoys, the data were acceptable for use in models, provided the drogues remain attached.

2.5.3 The Pacific Gyre Minimets (WOTAN) drifters deployed in front of Hurricane Francis had problems with the wind measurements. Only three were reporting good wind data after one week in the water, while others were reporting bad data on the GTS. The Panel reminded the members that buoy operators should monitor data quality to ensure that bad data were removed from the GTS as soon as possible.

2.5.4 Under new developments, Météo-France deployed two Metocean salinity drifters in the bay of Biscay in the summer of 2004. One failed immediately after deployment and was retrieved and sent back to Metocean for analysis. Two repaired salinity drifters will be deployed in the same place as soon as convenient.

2.5.5 In addition to adding a temperature sensor to one set of buoys, and a thermistor chain to another set for its next generation of storm monitoring buoys, Marlin Yug had a proposal for the development of a suite of new technologies, including a 'smart' buoy that could conserve battery power and a wave-monitoring drifter. The Marlin storm buoys performed well again this storm season. Both Metocean and Marlin drifters were run over by strong hurricanes, yet all sensors continued to provide good data.

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 Chair of the Evaluation Group.

3. NEW ACTION GROUPS

3.1 The Panel noted the application of E-SURFMAR to be an action group of DBCP, to replace EGOS (see paragraph 2.2.3), and its planned data buoy programme in the North Atlantic and adjacent seas.

3.2 To date, E-SURFMAR included 15 out of the 19 EUMETNET members – Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Norway,

Portugal, Spain, Sweden and United Kingdom. The Operating Principles of the Programme are described in *Annex V*.

3.3 The Panel considered the application and adopted E-SURFMAR as an action group of the DBCP following the disbandment of EGOS.

4. REVIEW OF THE DBCP IMPLEMENTATION STRATEGY

4.1 The Panel recalled that it had reviewed its Implementation Strategy at its previous session and agreed that this review process should continue at each annual meeting, in view of changes in the organizational environment surrounding ocean observations, as well as ongoing developments in requirements for buoy data and advances in buoy technology. In this context, it undertook a further review of the latest version of the strategy (See *Annex VI*).

4.2 In particular the Panel recognized that its aims and objectives continued to develop and that many of the issues that had dominated Panel activities in its early sessions had been superseded by other challenges, such as those posed by new organizational structures (for example JCOMM) and new observing systems (for example Argo). The Panel therefore agreed that it must work proactively to maintain its position as an authoritative and influential force in ocean observation, and that this aim should be incorporated within its Implementation Strategy.

4.3 Explicit changes were made within the document tabled at the meeting as follows;

- References to the activities of the UNFCCC and the GEOSS process;
- Support for ongoing technology development;
- The need for an improved deployment strategy;
- The role of the Panel within the JCOMM OCG.

4.4 A number of other issues were identified during the session, and will be included in a revised draft of the strategy, viz:

- The definition of a target buoy network and its implementation;
- A response to request from OOPC for buoy deployments in marginal ice zone, especially in Arctic;
- Involvement, through IABP and IPAB, in the mission of the International Polar Year.

4.5 Participants were requested to continue the review after the meeting, and to pass any additional suggestions for modifications to the Chair, Mr David Meldrum, by 30 November 2004 at the latest. The Panel agreed that, in view of its highly dynamic nature, the Implementation Strategy should continue to be published and made available only through the DBCP web site, as was the case at present. In addition, the Panel agreed that it should regularly review and update as necessary in the light of developments, its aims, objectives and terms of reference. It therefore requested the Secretariat to include a specific item to this effect on the agenda of future meetings.

4.6 As noted in paragraph 2.1.4 a Southern Ocean Buoy Programme (SOBP), supported largely by existing DBCP action groups, now forms part of the DBCP Implementation Strategy. For the period September 2004 to August 2005 the following contributions have been offered to the SOBP:

* For the period 9/2004 to 8/2005, 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. For the period 9/2003 to 8/2004 the GDP had defined the Southern Ocean deployment plan as the region 40S - 60S.

Country	Buoys purchased	Additional upgrades	Total
Australia	5	0	5
France	0	5	5
New Zealand	5	5	10
South Africa	0	30	30
USA*	45	0	45
Total	**55**	**40**	**95**

Black Sea Buoy Programme (BSBP)

4.7 The Panel was presented with a report by Dr Sergey Motyzhev (Ukraine) regarding the activities of Black Sea Buoy Programme (BSBP). The BSBP had been created in 1999 under the Black Sea GOOS project, by the following participating bodies;

- Italy: Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS)
- Russia: P.P.Shirshov Institute of Oceanology (RAS)
- Ukraine: Oceanology Centre/ Marine Hydrophysical Institute (NASU)
- USA: Naval Oceanographic Office (NAVOCEANO)

4.8 The BSBP had implemented pilot drifter experiments from 1999 to 2004 in accordance with the Black Sea GOOS Strategic Action and Implementation Plan (GOOS Report No. 133, IOC/INF-1176, 2003). Following the ARENA meeting in Sofia in June 2003 regarding a regional capacity building and networking programme to upgrade monitoring and forecasting activity in the Black Sea, the following institutes joined the BSBP;

- Bulgaria: Institute of Oceanology, National Institute of Meteorology and Hydrology
- Georgia: Tbilisi State University, State Department of Hydrometeorology
- Romania: National Institute for Marine Research and Development
- Russia: Federal Service for Hydrometeorological and Environmental Monitoring
- Turkey: Institute of Marine Sciences, Middle East Technical University
- Ukraine: Ukrainian Hydrometeorological Institute

It was also noted that any other country/body willing to participate was welcomed.

4.9 The Panel noted with concern that, in spite of the official creation of the BSBP and participation of the Black Sea countries, there was not yet a proper mechanism for programme coordination, nor a financial arrangement to deploy and support on a permanent basis a drifter array with the necessary spatial-temporal resolution.

4.10 Considering the growing interest in the region, not only for the Black Sea countries but also for EU and others, the Panel recommended that the BSBP should;

- find a way to promote at governmental level an agreement to develop support for BSBP;
- develop an appropriate programme in which the members could participate by sharing resources and benefits;
- seek sustainable cooperation and coordination in the field of operational oceanography around the Black Sea;
- liaise with the E-SURFMAR programme and its sub-projects regarding operational meteorology and oceanography, as well as seek possible paths for the future.

5. JCOMM ACTIVITIES RELEVANT TO THE DBCP

5.1 The Panel noted with interest a report on activities, either under or associated with JCOMM, which had taken place since DBCP-XIX and which were of direct interest to the Panel.

5.2. The following JCOMM-related meetings had taken place during the intersessional period:

(i) An international seminar to celebrate the 150th anniversary of the Brussels Maritime Conference of 1853, Brussels, 17-18 November 2003. The seminar provided a fitting tribute to what had been the first example of extended international cooperation in meteorology and oceanography;

(ii) The second JCOMM Workshop on Advances in Marine Climatology (CLIMAR-II), Brussels, November 2003. The following were recommendations of the workshop;

- A catalogue of metadata for moored and drifting buoys and other ocean data acquisition systems (ODAS; e.g. offshore platforms) should be filled in by members, with WMO coordination, as soon as possible, with information on both current and historical deployments.
- If possible, a given buoy should have a unique identifier. The re-use of identifiers (buoy numbers) for different buoys can cause erroneous application of metadata. If buoy numbers must be reused, the metadata should include sufficient features (e.g., timestamps) so that they can be correctly applied.
- Metadata, including information on homogeneity adjustments applied, should be clearly linked to data.

(iii) The Third session of the JCOMM Management Committee (MAN-III), Geneva, 17-20 March 2004. It discussed JCOMMOPS.

(iv) The major JCOMM marine products workshop (Ocean Ops 04), Toulouse, May 2004. The DBCP Technical Coordinator made a presentation at the workshop. The workshop had attracted a large number of both providers and users of operational ocean products, and resulted in important input for the further development of the JCOMM Electronic Products Bulletin as well as the implementation of the Marine Pollution Emergency Response Support System (MPERSS).

(v) The *ad hoc* Task Team on MPERSS, Toulouse, 17-18 May 2004. The Team agreed that the MPERSS had already been substantially implemented as far as meteorological components were concerned. A revised version of the MPERSS system plan was prepared. A dedicated web site for MPERSS has been developed: http://www.mperss.org.

(vi) The second session of the JCOMM Services Coordination Group (SCG-II), Toulouse, 19-21 May 2004. It decided to establish two Task Teams: (1) on JCOMM Ocean Product Development and (2) on Restructuring the JEB.

(vii) The first session of the JCOMM Expert Team on Marine Climatology, Gdynia, Poland, 7-10 July 2004. With regard to the collection of metadata for offshore platforms, the Team recognized that application of the metadata requirements was complicated by the fact that such platforms could be either fixed or mobile. As a compromise the Team generally agreed that, on a temporary basis, mobile offshore units should be subject to the Pub47 metadata requirements, whilst fixed platforms should be subject to ODAS metadata requirements.

5.3 In addition, substantive reports on JCOMM were made to the WMO EC and IOC EC respectively in May and June 2004.

5.4 The Panel recalled that the second session of JCOMM (JCOMM-II) would take place in Halifax, Canada, 19-28 September 2005. A formal invitation will be sent to the Ministers of Foreign Affairs of Members/Member States (copy to Permanent Representatives with WMO and IOC Action Addressees). A technical conference was planned to be held prior to JCOMM-II, in Halifax, 15-17 September 2005. The Panel encouraged its members to actively join the Technical conference.

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 1100 hours on 18 October to 1300 hours on 19 October, 2004. 20 papers were presented during the workshop representing a broad global effort under three themes:

- Research and Applications
- Operations
- Technical Developments and Visions

These themes covered the spectrum from the use of marine sensor data (the “WHY” of our endeavours), through to the developments and uses of sensor platforms and communications systems (the “HOW” and “WITH WHAT”).

6.2 The Panel expressed its appreciation to the Workshop Chair, Mr Ken Jarrott (Australia), for his 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 Chair, in electronic form (MS Office compatible format only), by 30 November 2004 at the latest. At the conclusion of the workshop, Mr Jarrott expressed special thanks to Dr Premkumar and his NIOT colleagues for their assistance in the organization and smooth running of the workshop.

6.3 The Panel further agreed that the 2005 workshop should focus again on applications of buoy data, with the same themes as those of the 2004.

6.4 The Panel noted with appreciation that Mr Jarrott would continue to act as the Workshop Chair for 2005, 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 VII*. As usual, the full reports of the data management centres will be published in the Panel’s annual report.

7.2 INFORMATION EXCHANGE

7.2.1 The Technical Coordinator reported on media used by the DBCP to exchange information among buoy operators and to advertise its activities. Media currently being used consist of the DBCP web site, internet news, mailing lists, DBCP publications, a brochure, and articles in magazines. However, basic and background information about the Panel and the Action Groups, as well as comprehensive information on issues of concern to the Panel, continues to be maintained on the DBCP website.

Website http://www.dbcp.noaa.gov/dbcp/

7.2.2 The website is hosted by NOAA/AOML, Silver Spring, Maryland. Specific pages of the DBCP web site were updated to reflect recent changes. However, no major changes were made to the web site, which as noted above includes comprehensive information about the Panel and its activities (e.g. Action Groups, GTS, WMO numbers, GTS bulletin headers, GTS benefits, GTS assistance, impact studies, safety issues, satellite communications, Argos message formats, list of DBCP publications, list of buoy manufacturers, vandalism leaflet, buoy monitoring statistics, etc.).

New products or tools are now preferably implemented onto the JCOMMOPS web site (see paragraph 8.5 for details).

News http://w4.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/news?prog=DBCP

7.2.3 As the DBCP Internet Technical forum was not being used, its maintenance and operations were stopped. Functions of the forum are more or less replaced with a News section operated at JCOMMOPS. The Panel requested establishment of a DBCP news section at its 19th session. The Technical Coordinator is operating it and implementing submitted news into the JCOMMOPS database. This makes DBCP news searchable via the JCOMMOPS search engine. Nine news items have been published so far, including plans for an extension of the tropical moored buoy array in the Indian Ocean, publication of information on vandalism by FAO, description of the SVP-BT bathythermograph drifter, information on E-SURFMAR, and a keynote by the former DBCP Chair, Graeme Brough.

7.2.4 Panel Members were invited to suggest news items for future publication and to submit them to the Technical Coordinator. They basically would consist of one page of text plus one image and an icon.

Mailing lists

7.2.5 The Panel is using four mailing lists for its activities:

- Quality control guidelines (quality information relay): Buoy-qc@vedur.is maintained and operated by Icelandic Meteorological Office;
- DBCP administrative mailing list: dbcp@jcommops.org maintained and operated by JCOMMOPS;
- Buoy operators: buoys@jcommops.org maintained and operated by JCOMMOPS;
- DBCP evaluation group: dbcpeval@jcommops.org maintained and operated by JCOMMOPS.

Publications

7.2.6 The DBCP recently published the following documents within its Technical Document series, both available on CD-Rom: the October 2003 DBCP workshop's proceedings (No. 24), and the DBCP annual report for 2003 (No. 25).

7.2.7 The WOCE Surface Velocity Programme Barometer Drifter Construction Manual (No. 4, revision 1.3, 12/2003) was slightly updated to include a table describing the differences between the new smaller design and the design described in the manual.

7.2.8 The Argos GTS sub-system reference guide (No. 2, revision 1.4, 09/2004) was updated to reflect recent improvements implemented within the Argos GTS sub-system (e.g. TAO salinity, Campbell binary format, Argo specific developments, etc.).

7.2.9 The following new publications should be published during the next intersessional period:

- DBCP-20 Workshop proceedings;
- DBCP annual report for 2004.

Brochure

7.2.10 The Technical Coordinator is working with the WMO secretariat in order to update the DBCP brochure and make it available in PDF format via the web.

Magazines

7.2.11 An article submitted by K Premkumar on “use of real-time moored buoy observations for port applications” was published in Port Technology International, March 2004.

8. TECHNICAL ISSUES

8.1. QUALITY CONTROL

8.1.1 The Technical Coordinator reported on Quality Control activities. The DBCP is using a number of tools and products provided by its members to monitor the quality of buoy data that are being exchanged, to investigate specific failures, and to suggest remedial action. They include:

(i) the semestrial report on the quality of marine surface observations and the quarterly report on drifting buoys in the North Atlantic produced by the UK Met Office as Lead Centre for the Monitoring of Marine Surface Data;

(ii) NCEP Quality Assessment Project web page which includes "manual surface marine QC flags" and "surface marine monthly statistics";

(iii) graphical tools provided by the Centre de Météorologie Marine of Météo France which permits time series (e.g. Obs.-FG) to be created for individual buoys and buoy monitoring statistics to be queried;

(iv) access to archived QC messages (product developed by MEDS);

(v) histograms and time series from JCOMMOPS web sites.

8.1.2 For buoy operators that may be reluctant to authorize GTS distribution of their data, the above tools are excellent incentives to encourage them to do so because they can (i) easily obtain information on how their buoys are performing, and (ii) have better chances to discover the cause of a problem.

Quality control guidelines

8.1.3 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-qc@vedur.is) which is maintained by the Icelandic Meteorological Service (IMO), or via the dedicated web page at JCOMMOPS (http://w4.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 do not have to know who the PGCs are. The system relies on a database of WMO numbers and associated PGCs maintained at JCOMMOPS by the Technical Coordinator, acting as a focal point.

8.1.4 The following PMOCs participated actively in the Guidelines during the last intersessional period:

Centre	Quality information messages	Buoy monitoring statistics	Mailing list service	Web pages and tools
BOM	X			
ECMWF		X		
IMO			X	
JCOMMOPS	X			X

MEDS	X	X		
Météo France	X	X		X
MSNZ	X			
NCEP		X		X
Met Office	X	X		

8.1.5 The Panel encouraged other centres to actively participate in the guidelines either for global data, regional data or specialized data.

8.1.6 160 status change proposals were made by PMOCs during the period 1 August 2003 to 31 July 2004. More use is now being made of the dedicated web page as opposed to the mailing list, which suffers from SPAM messages.

8.1.7 Discussions with the IMO regarding the SPAM messages issue led to the following proposal:

(i) Rename the mailing list to buoy-qir@vedur.is (i.e. “qir” for Quality Information Relay);

(ii) Replace automatic registration to the mailing list by manual registration via the Technical Coordinator or a designated person at the IMO;

(iii) Restrict posting of messages to authorized subscribers only

(iv) Implement a filter at the IMO so that only “legal” messages are accepted and issued to subscribers. “Legal” messages are those that comply with the QC guidelines standard as far as the first 4 characters of the subject line are concerned (e.g. 1ASK CHK 16565 AP). All other messages are to be rejected, so PMOCs are encouraged to make sure that the subject line is properly formatted before issuing any new message.

8.1.8 The Panel agreed with this proposal and asked the IMO to implement the solution as soon as possible.

8.1.9 Regarding the quality of buoy data, the Technical Coordinator reported that the quality remained stable and good when compared to previous years.

Air pressure

8.1.10 The evolution of mean RMS (Obs-FG) for drifting buoy air pressure data based on ECMWF buoy monitoring statistics was relatively stable at a level of about 1hPa during the period July 2002 to July 2004. 65.3% of the RMS (Obs-FG) values are now lower than 1 hPa; another 29.4% between 1 and 2 hPa; 3.4% between 2 and 3 hPa; and less than 2% above 3 hPa. This highlighted the actual quality of both first guess surface pressure field and the observational pressure data from drifting buoys. The percentage of gross errors (ECMWF) was usually less than 1%. The quality of SVPB air pressure data is similar to the global value.

SST

8.1.11 According to NCEP buoy monitoring statistics, RMS (Obs-FG) for SST data from drifting buoys became relatively stable at a level of about 0.65C. On the other hand, percentage of gross errors decreased from about 2% in January 2003 to less than 0.5% in July 2004.

Wind

8.1.12 According to ECMWF buoy monitoring statistics, RMS (Obs-FG) for wind speed data reached a level of about 2.3 m/s. About 88% of mean RMS (Obs-FG) are less than 3m/s, about 6.7% between 3 and 4 m/s, and about 5.4% were larger than 4 m/s. Since November 2003, the percentage of gross errors remained lower than 1%. A peak of about 2% was however observed in

July 2003. The Panel however expressed concern that only 36% of the RMS(Obs.-FG) were within 2 m/s in July 2004 while 49% were within that range in July 2003. It asked the DBCP evaluation group to look at this issue.

8.2. CODES

8.2.1 As reported at the previous DBCP session, GTS distribution of buoy data in BUFR code was implemented at the Argos Global Processing Centres in early July 2003. Since then buoy data were being distributed in both BUOY and BUFR code forms. Data users were becoming increasingly reliant on BUFR reports instead of BUOY reports for data assimilation as they contained more information than BUOY reports. BUOY code is now considered to be frozen, and will not be further updated.

8.2.2 GTS bulletin headers used for GTS distribution of buoy data in BUFR are listed on the DBCP web site at http://www.dbcp.noaa.gov/dbcp/1gbh.html. The version of the code tables indicated in the produced BUFR report is 11. No changes were made to BUFR template for buoy data, which is the template that was agreed upon by the CBS Expert Team on Data Representation and codes (ET/DRC). The Panel considered that the current template met user needs and agreed that no changes were necessary at this point.

Distribution of wave data in BUFR

8.2.3 The Panel had expressed concerns at its previous session that there was no specific template for wave spectra for *in situ* wave observations defined.

8.2.4 During the last intersessional period, the following people expressed interest in participating in a discussion that would seek the development of such a template: Bob Keeley, MEDS, Richard O'Boyle, UK Met Office, Scott Tomlinson, MEDS, and the Technical Coordinator. It was noted that the character code presently in use for in situ wave spectra data was WAVEOB. However, a BUFR Table D sequence (312053) was defined by the ET/DRC for satellite derived ocean wave spectra. Also, MEDS is presently using so called Format B for storing Non-Directional Spectral Wave Data in its archives.

8.2.5 The Panel agreed that there was a need to study the examples of WAVEOB, 312053 BUFR Table sequence, MEDS Format B, and possibly other formats. It suggested directions regarding ways in which such formats could be merged into a new BUFR Template for *in situ* wave spectra data. The Panel asked the Technical Coordinator to liaise with people listed above and with the ET/DRC in this regard and to report at the next Panel session. On the other hand, the Panel admitted that in order for such a process to be successful, appropriate input on requirements should be received by the user community. It therefore recommended that the user community would properly document its needs in terms of real-time data exchange and make such information available to the Panel.

8.3. ARGOS SYSTEM

Operations

8.3.1 The Panel noted with interest a presentation by CLS/Service Argos on the present status and future enhancements of the Argos system. From May 5th to October 25th 2003, the basic service included three satellites, NOAA-15, NOAA-16 and ADEOS-2 (MIDORI-2). ADEOS-2, launched on December 14th, was lost on October 25th 2003 due to a power-supply failure. ADEOS-2 was carrying an Argos two-way instrument. The next satellite with two-way capability is METOP-1 scheduled for the end of 2005. Since then, Argos systems were operated aboard 6 NOAA satellites until 6th June 2004, when NOAA-11 was decommissioned. Three of these were second generation systems (Argos 2) on board NOAA-15(K), NOAA-16(L), NOAA-17(M). The two satellites designated operational were NOAA-16 and NOAA-17. Thus, expanded receiver

bandwidth was available operationally and all Argos users were urged to take advantage of the improved performance possible by transmitting outside the Argos 1 band.

8.3.2 The real-time (bent pipe) data reception performance continued to improve with the addition of seven new regional stations during the last 18 months. They are in Antarctica (Chile, Meteo Chile), Athens (Greece, CLS), Fiji (Fiji, FMS), Punta Arenas (Chile), Riyadh (Saudi Arabia, CACST), Søndre Strømfjord (Greenland, DMI) and Tromsø (Norway, NMI). The receiving network now consists of 41 stations. Ongoing projects for 2004 include new antenna implementations in Indonesia, China, and Guam.

8.3.3 The global processing centres at Largo and Toulouse continued to operate without major problem with an operational reliability of 99.9%. The Internet was the primary communication link to receive and distribute data. Toulouse and Largo centres were fitted with a double Internet access link (2 Mbits + 2 Mbits) which improved the reliability of the communication facilities. Data availability significantly improved with 96% of the real-time data being available within 30 minutes and 75% of Argos data being retrieved in near-real-time. Data delivery for the store-and-forward mode was also significantly improved with 81% of the data now available within three hours.

System Enhancements

8.3.4 Regarding computers and software, most of the work had been dedicated to the Argos 2001 project phase 2 implementation. Argos 2001 step 2, namely the upgrade of value-added services such as Automatic Data Distribution, databank, platforms and sensor monitoring, was completed in the first quarter of 2004. Validations tests were still ongoing. These new capabilities are to be made available to users in January 2005. The Argos processing system is being redesigned, as per Argos 2001 phase 3. This redesign encompassed enhanced location procedures, the processing of multiplexed messages and the merging of all the current GTS data processing facilities. Special attention was being paid to ensure that the new processing system and the related database would accommodate observational data relayed by other satellite communication systems, such as Iridium.

8.3.5 As mentioned last year, initial operations of the Argos Downlink with prototype PMT showed very positive results, in particular in terms of data throughput increase. These would be particularly beneficial to the Argo program, to reduce the surface time of the floats from several hours to less than one hour, and to TAO-TRITON type moored buoys to increase the data throughput. Because of the loss of ADEOS-II (MIDORI-II), the two-way platform production had been halted. Work was now being directed to the development of a new PMT that would integrate the new high data rate capability to be available on METOP-1 in early 2006.

8.3.6 In order to enhance the timeliness of Argos data, especially in tropical areas, tentative cooperation with the Brazilian space agency, INPE, was still in progress. CNES/CLS was receiving raw data transmitted from INPE. The formalization procedure is still under INPE/MCT analysis and has not yet been finally resolved.

DBCP – GTS related requirements

8.3.7 Regarding the relay of data from satellite systems without GTS data processing capability, CLS/Service Argos had reported at the previous session that “all the tools needed to put this capability in place are ready” This would be done upon request, within a one-week timescale, provided that data to be sent to the GTS were already formatted in a proper WMO code form. For the time being no such need had been expressed.

8.3.8 Additionally, during the recent intersessional period, Service Argos Inc had developed the capability to acquire, decode, and convert to GTS messages/bulletins, data being relayed via Iridium from both Argo test floats and from innovative moored buoys (PICO) being developed at NOAA/PMEL.

8.3.9 Some GTS processing enhancements had also been implemented to address data buoy and ARGO float needs. These included addressing the Campbell AWS and the APEX type formats, accommodating TAO buoy salinity data, speeding up the data processing for ARGO floats, implementing data compression for BUFR and suppressing a source of duplicates.

8.3.10 The Panel thanked CLS/Service Argos for their ongoing efforts in relation to the GTS insertion of non-standard data, and urged further developments in this area, notably with regard to the GTS insertion of data reporting through other satellite systems.

8.3.11 CLS/Service Argos had also implemented the capability to FTP datasets processed by the GTS subsystem directly to a user. This facility is being used to transfer ARGO float locations, T/S profile data (including rejected ones), and float technological meta-data encoded in the Argos messages to the Coriolis ARGO GDAC. An extraction of the GTS data in ASCII format was developed for such a purpose. NetCDF coding is also envisioned.

8.4. NEW COMMUNICATION TECHNIQUES AND FACILITIES

8.4.1 Under this agenda item, the Panel reviewed an updated report on developments in satellite communication systems prepared by its Chair, Mr David Meldrum. During the intersessional period consolidation amongst the range of systems being planned or launched had continued, largely in response to financial pressures. However some signs of stability were starting to emerge, and the systems that remained offered a range of facilities that could well encompass all envisaged buoy and float applications in terms of data throughput capability, geographical coverage and the like.

8.4.2 In particular, the Panel recalled workshop presentations on the Iridium system that had outlined the potential of this system for real time interactive communications at high data rates, and a new approach to data acquisition, management and distribution. In this context, the Panel was pleased to note that one of the outcomes of an Iridium workshop organized by NOAA and ONR in May 2004 had been to establish an oceanographic community of Iridium users. The Panel also noted with approval a plan presented at the workshop to establish a reduced tariff and technical support for oceanographic and other non-profit users.

8.4.3 The Panel remained aware that the financial viability of some of the operational systems still caused concern in some quarters, and that no system currently offered the range of data dissemination and quality control services that were available to users of Argos. Nonetheless, the Panel recognized the potential benefits of the new systems, and urged users of these systems to make use of the new facilities being developed by CLS/Service Argos to allow formatting and GTS insertion of such data.

8.4.4 The Panel also recognized the benefits that might accrue to members through concerted action in negotiating favourable tariffs for the use of these systems, and urged members to bring to the attention of the Panel, through its Chair or Technical Coordinator, any actual or intended use of new systems in order that joint negotiations might be considered.

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. 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.

8.5 JCOMMOPS

8.5.1 The Technical Coordinator reported on the activities and development of the JCOMM *in situ* Observing Platform Support Centre (JCOMMOPS). He recalled that JCOMMOPS was established by JCOMM-I in June 2001, and was operated by the DBCP, SOOP and Argo. It should be noted therefore that the DBCP, SOOP, and Argo were providing all of the resources needed to run

JCOMMOPS. The centre basically provides support in an integrated way for implementation, and operations of the DBCP, SOOP, and Argo programmes.

8.5.2 During the last intersessional period, JCOMMOPS continued to build up and was currently considered as fully operational. Developments will however continue as products and services offered by JCOMMOPS to the community need to be constantly adjusted to changing needs.

8.5.3 JCOMMOPS development was being realized in coordination with the Argo Technical Coordinator, Mathieu Belbéoch. While Mr Belbéoch was concentrating on Argo aspects and monitoring tools, the database, web server, and GIS were shared, and general data processing and development aspects are being realized in an important synergy between the TC/DBCP&SOOP and the Argo TC.

8.5.4 During the period September 2003 to August 2004, JCOMMOPS was also assisted by the following students:

- Mathieu Lopes, software development, July to September 2003;
- Marianne Barrailh, software development, 3 years,half-time as of September 2003;
- Irène Bouguerra, graphic artist, July to September 2004.

8.5.5 The Panel was asked to note the following achievements during the intersessional period.

Operations and maintenance of the information system

For tasks below to be achieved properly, a good web information systems and database has to be (i) developed, (ii) operated, and (iii) maintained. So development, operations, and maintenance of such a system are routine tasks of JCOMMOPS staff. Some support is provided by CLS, for physical database administration, and computer network aspects. Tasks undertaken directly by JCOMMOPS staff include (i) monitoring and operating the two web servers, (ii) monitoring daily and weekly automatic batches (e.g. getting information from other places such as the Argos database, GDP deployment log, Météo France GTS files, etc.), (iii) monitoring and operating dynamic web pages and applications, (iv) executing routine monthly batches, (v) monitoring the Geographical Information System (GIS), (vi) database conceptual administration and monitoring, (vii) producing monthly products and maps, and (viii) managing and monitoring database consistency and content in order to keep the database reliable and up to date. It should be noted that routine operations to rigorously maintain a consistent database from a diversity of sources is of itself a hugely time consuming task requiring regular contacts with many operators within the marine community.

In May 2004 the web server disk crashed. The server was consequently down for 24 hours, and GIS (maps) products had to wait another 24 hours before being operational again. A better backup solution is now in place.

Developments

The Technical Coordinator explained that there will probably always be the need for developing new monitoring tools for the programme. In addition, existing tools need to be revamped and/or upgraded and/or re-written on a regular basis as computers, operating systems, and commercial software being used are upgraded or disappear from the market. It is therefore necessary to maintain computer development skills at JCOMMOPS although efforts are being made to reduce the percentage of time spent on software development to the minimum by using as many standard tools from the market as possible.

The following new developments were realized during the intersessional period:

- Dynamic web site: the JCOMMOPS web site was upgraded to a new dynamic version. In other words, some of the database content is directly available on-line (e.g. list of platforms, news, documents, etc. - see below).

- Maps: query page to easily access JCOMMOPS static maps (see examples in the Technical Coordinator's report in *Annex III*); statistics were added on the map legends. The following maps are now produced monthly for the DBCP (i) monthly status by country, (ii) monthly status for SST and air pressure, and (iii) monthly status for SST, air pressure, and wind.

- The deployment opportunities application was finalized thanks to student Mathieu Lopes. The goal of the application is to search for all available deployment opportunities stored in the database by simply entering a deployment lat/lon box and period. However, for practical reasons, the application has not yet been implemented.

- Buoy metadata collection scheme: a prototype web based system, funded by EGOS was developed. See paragraph 8.6.4 for details.

- Graphical design: Irène Bouguerra worked on a new graphical design for the web site and proposed a new JCOMMOPS logo more consistent with the JCOMM one.

- News section: a news section was established on the JCOMMOPS web site. See paragraph 7.2 for details.

- WMO numbers: as the WMO numbering system was becoming complicated, with a specific numbering scheme being introduced for Argo and OceanSites, and as there was a need to document it, a new dedicated web page providing detailed explanations about it was added to the web site: (http://www.jcommops.org/wmo_numbers.html).

Proposed new Terms of Reference for JCOMMOPS

8.5.6 It was recalled that the first meeting of the Ship Observations Team (SOT), Goa, India, 25 February – 2 March 2002, had established a task team on SOT coordination. Following this work, at its first session, La Jolla, 24-27 April 2002, the JCOMM Observations Coordination Group (OCG) suggested a number of services that might be offered for SOT coordination in the near future, using existing resources either at JCOMMOPS or at specific agencies in Member States (e.g. QC feedback for VOS, SOT web page, information on telecommunication systems, SOT logo). A range of other services was identified which needed additional resources (e.g. SOT brochure, VOS web site).

8.5.7 At the 2nd meeting of the JCOMM Ship Observations Team (SOT), London, 28 July – 1 August 2003, the report of the Task Team on SOT coordination was discussed. It related to the possible extension of the work of JCOMMOPS to support overall SOT coordination. SOT-I had recognized the need for a detailed development plan for SOT coordination before consideration could be given to estimating and identifying the resources needed for further JCOMMOPS development in support of the SOT. This plan would include a specification of requirements (in particular for VOS and ASAP under JCOMMOPS, together with the integration aspects), plus an implementation plan to achieve full operational status.

8.5.8 The Task Team agreed that all of the activities proposed in the report for JCOMMOPS to support SOT coordination were potentially of value to the work of the team, including in particular a web-based system, such as a web forum, for quickly implementing remedial action on identified problems in ship-based observations. Such a system could be similar to the existing QC guidelines implemented by the DBCP for buoy data. At the same time, the meeting recognized that a number of the activities, both one-off and ongoing, contained in the plan might most effectively be done in

national agencies, rather than on the basis of additional funding resources provided to JCOMMOPS. The meetings identified specific new activities and functions for JCOMMOPS which should be developed and implemented within the facility itself. These included adaptation of some of the monitoring tools already provided to the DBCP, SOOP for the VOS programme, and in particular (i) maps to show global distribution of VOS SHIP observations to help identify data sparse regions, (ii) metrics to quantify SHIP performance by parameters e.g. AP, SST etc, and (iii) performance indicators to show timeliness of the receipt of SHIP observations.

8.5.9 Based on the outcome from SOT-2, the issue was further discussed by OCG in early 2004, and new Terms of References for JCOMMOPS proposed (see *Annex VIII*).

8.5.10 The Panel, while realizing that the Technical Coordinator might have to spend a little more time on SOT issues than before, agreed with the proposed new terms of references provided that the level of support it received from its Technical Coordinator remained about the same as before. It recommended that the new proposed terms of references for JCOMMOPS should be presented for adoption at JCOMM-II next year.

8.5.11 The Panel also wished to express its entire satisfaction for the development and operations of JCOMMOPS and thanked JCOMMOPS staff. It also thanked Argo and the Argo Technical Coordinator, Mr Mathieu Belbéoch for its continuing support for JCOMMOPS activities through the development of the Argo Information Centre.

8.6 OTHER TECHNICAL ISSUES

8.6.1 Deployment opportunities

Increasing need for deployment opportunities

8.6.1.1 The Panel agreed to develop its implementation strategy in such a way that it is consistent with the JCOMM OCG phased-in implementation plan (see paragraph 4). In this context, it noted that the number of drifter deployments had increased substantially in the last 12 months and is likely to increase again during the next intersessional period. The plan calls for the deployment of about 1250 drifting buoys worldwide, whereas a network of about 1000 drifting buoys is already in place, compared with a figure of 700 drifting buoys reported at the previous session.

8.6.1.2 In order to succeed with the deployment of such a larger number of buoys, deployment opportunities must be readily available, both by ship and air. Air deployment opportunities offered from member states are limited while these that might be offered through other means are expensive. The Panel agreed that we were *de facto* increasingly depending upon ship deployment opportunities.

8.6.1.3 The Panel was also invited to consider establishing a voluntary contribution fund for the exploitation of deployment opportunities, especially in the Southern Hemisphere, and asked its Chair to pursue this issue during the intersessional period.

8.6.1.4 The Panel also noted the request by the Chair of OOPC to enlist support from the SOOP, VOS and ASAP Panels of the JCOMM SOT. The Panel agreed that it should indeed establish closer links with SOT members to that end.

Interactions with Argo

8.6.1.5 Argo will now place emphasis on deployments in the Southern Ocean. In this regard, at the 6th Argo Steering Team meeting, Brest, 9-11 March 2004, it was noted that the deployment of surface drifters might also present opportunities for float deployments (and vice-versa) and it was therefore suggested that steps should be taken to identify possibilities for ship sharing. Steps should be taken to integrate information on float and drifter deployment opportunities. The AST agreed that this could be realized via JCOMMOPS and the Argo Information Centre.

Information on deployment opportunities at JCOMMOPS

8.6.1.6 The Technical Coordinator recalled that JCOMMOPS was maintaining information on deployment opportunities on its web site (http://www.jcommops.org/depl_opport/depl_opport.html). Information is useful for supporting (i) existing programmes looking for deployment opportunities in ocean areas where they are not necessarily used to deploy instruments, (ii) new programmes, and (iii) other Panels such as the SOT and Argo looking for logistical opportunities.

8.6.1.7 The Panel agreed that the information needed to be maintained accurately and should be up to date. It invited its members to check the JCOMMOPS dedicated web page, look for possible errors and ask the Technical Coordinator to make appropriate changes if needed. Also, the Panel invited members that did not appear in the list, but who had deployment opportunities to offer, to contact the Technical Coordinator and provide relevant information to him.

8.6.2 GTS delays and Argos ground receiving stations

Regional network

8.6.2.1 The Panel praised the efforts by CLS/Service Argos to increase the number of receiving stations able to provide TIP data sets from the NOAA satellites. Seven new stations had joined the Argos network during the year, including Antarctica, Athens, Fiji, Punta Arenas, Ryadh, Søndre Strømfjord, and Tromsø. There are currently 41 stations delivering real time (TIP) data sets to the Argos Global data Processing Centres. Most of them process data from NOAA-16, NOAA-17, NOAA-15, NOAA-14 and NOAA-12, so throughput times for delivery of results are good. For the end of year 2004, Service Argos is planning to install or connect antennas located in Indonesia, China, and Guam. Efforts are still being made to eventually connect the Falkland LUT. A 64 kilobauds communication link exists with the UK Met Office headquarters. However, software has still to be written to FTP the TIP data through the local firewall. Despite recent connection of two stations relatively close to Falklands, namely Punta Arenas, and Chile Antarctic base, the Chair of the DBCP agreed to pursue the idea and will continue discussing it directly with the UK Met Office. The Chair was also able to report that tests were underway to connect another UK operated LUT, at the British Antarctic Survey base Rothera, to the Argos processing centres.

8.6.2.2 The Panel noticed substantial improvements in the availability of data collected through the regional network since 2003, the proportion of datasets received within one hour having increased from 20% to 70%. It thanked CLS/Service Argos for its efforts.

8.6.2.3 Mr Louis Vermaak reported that connection of the LUTs on Marion Island and Gough Island was potentially possible as internet links were available and about to be set up respectively. He informed the Panel that he would continue to pursue that goal.

Global network

8.6.2.4 The global network includes Wallops Island, Virginia and Gilmore Creek, Alaska. These stations deliver STIP telemetry from the satellites NOAA-11, NOAA-12, NOAA-14, NOAA-15, NOAA-16 and NOAA-17. However, only two orbits are delivered by NOAA/NESDIS for NOAA-12, which is the minimum requirement for the collection of the orbitography data required for the processing of the Argos location. The STIP telemetry from NOAA-11 – the only type of telemetry available for this satellite – is delivered by groups of three or four orbits. Since the end of 2003, it is the same situation holds for NOAA-14.

8.6.2.5 As discussed at previous DBCP sessions, reception and processing of STIP data were terminated at Lannion in 2000. The DBCP had demonstrated that this had adverse effects on the timeliness of the buoy data distributed on GTS, particularly due to the “blind” orbits. Prior to DBCP-XIX, NOAA/NESDIS had reviewed the DBCP and JTA participant concerns, coordinated similar requirements from other users and evaluated the cost/benefits of the Lannion, France, and Barrow,

Alaska sites. A consolidated requirement for POES “blind” orbit data was presented to NESDIS management for decision and was approved for implementation at the Barrow site. The Argos report to JTA XXIII indicated that NOAA/SOCC was taking steps to enhance the facilities at Barrow where the necessary equipment exists to download some of the “blind orbits.” However, a report at the OPSCOM 38 in June, 2004 indicated, that software upgrading would be necessary to enable simultaneous reception of HRPT and STIP data at Barrow. The earliest date when funding may be available for this upgrade is October 2006. In the meantime NOAA is interested in testing its equipment in place at Svalbard for risk reduction for the NPOESS mission. NOAA is considering downloading blind orbits for one or both of the operational satellites to accomplish this test. Testing may begin in early 2005. The Panel requested the Chair to present its concerns regarding these issues to the JTA.

Delays

8.6.2.6 As far as GTS distribution is concerned, the Technical Coordinator explained that the following delays must be added: (i) the period during which observations are stored onboard the buoy before actual data transmission to the satellite can take place, (ii) the satellite pass duration, as we have to wait for the end of the pass to transfer and process the data set, (iii) the time taken to transfer data sets to the global processing centres (orbital delays, if any, plus time to transfer the data from the receiving stations to the Argos global processing centres), (iv) the time taken to process the dataset by the global processing centres (typically less than 30 seconds), (v) the GTS data processing time at Service Argos, and (vi) GTS bulletins routing delays.

8.6.2.7 The loss of Lannion is compensated somewhat through (i) use of multi-satellite service, and (ii) wider extension of the Argos network of regional receiving stations.

8.6.2.8 Technically, the multi-satelite service permits reduction of the time a platform is “waiting” before a satellite is in view and the observations actually transmitted. Wider provision of the multi-satellite service is now becoming a JTA policy issue. As noted by EGOS at its last Management Committee meeting, charging 10% for the multi-satellite service is a deterrent for buoy operators to use that service, while the buoy community as a whole is already providing a substantial part of the Argos operations funding. This was also a concern of the IBPIO at its recent meeting in Chennai. The Panel therefore decided to submit a recommendation to the JTA that the multi-satellite service should eventually be provided free of charge to users.

8.6.2.9 CLS/Service Argos presented diagrams showing the impact of the extension of the Argos network of regional receiving stations on so-called Argos throughput times. These are calculated in terms of the time for the raw Argos data to reach end users. It was shown for example that for stored (STIP) datasets from NOAA-17, NOAA-16 and NOAA-15, 59% of the data are available within two hours, while 81% of the data are available within three hours (48% received within three hours for the two backup satellites NOAA-11 and NOAA-14). For the real-time (TIP) datasets delivered through the network of local receiving stations from NOAA-17, NOAA-16, NOAA-15, NOAA-14 and NOAA-12, 96% of the data are delivered within 30 minutes and 70% within 15 minutes. About three quarters of the Argos data are now available in near real time.

8.6.3 Vandalism

8.6.3.1 The Panel recalled that DBCP-XIX had discussed the ongoing problem of vandalism of ocean data buoys, had recognized the potential value of the leaflet prepared by the Technical Coordinator, and had requested him to review and update this as appropriate, and to make it available on the DBCP web site. The Panel noted with satisfaction that the leaflet was now available on the DBCP web site.

8.6.3.2 DBCP-XIX also requested the Secretariat to contact relevant international organizations, such as the International Hydrographic Organization (IHO), the International Maritime Organization (IMO), the Food and Agriculture Organization (FAO), as well as international fishery bodies such as the International Tuna Commission, on the issue of vandalism, in order to provide them with the

leaflet and to request them to distribute it widely among their member countries and institutions. The Panel noted that the Secretariat had contacted IHO, IMO, FAO. The Panel noted with appreciation that IHO had sent a circular letter to Member States of IHO together with the background information, asking them to bring the attention of their maritime agencies to this issue in order to inform the mariners and different professional associations of this problem.

8.6.3.3 The Panel noted with appreciation an offer by the FAO Secretariat that, if a sufficient number of hard copies of the leaflet were available, FAO could make the leaflet available to the FAO Committee on Fisheries (COFI) and all the FAO Regional Fishery Bodies, although FAO itself had very little direct contact with fishing vessel captains, crews, and ports. Unfortunately, because of the current budget constraint, hard copies of the leaflet have not been prepared yet.

8.6.3.4 The Panel noted with appreciation that the leaflet was put on the FAO's fishery section web site (http://www.fao.org/fi/default_all.asp) under "News". This page can also be reached from the front page of the FAO web site (http://www.fao.org) by selecting "Fishery ". Through the web page, the information leaflet can be downloaded. The web page is also linked to the DBCP web site. Although items under the "News" section on the FAO Fishery sector web site, including this vandalism issue, will disappear after a while, the FAO has made this information searchable by key words including "meteorology, ocean, data, drifter, drifting buoy, buoy, vandalism, moorings, weather, navigation, wind, currents, waves, observation, instrument, marine forecast", so that the information may continue to be found after this particular page is deleted from the News section. The Panel expressed its sincere appreciation to the FAO for their prompt and kind actions.

8.6.3.5 The Panel noted that the FAO had also suggested that the information on vandalism could be inserted on the UN Atlas and that an article be submitted to relevant journals such as "Fishing News International". The Panel requested the DBCP Chair to make arrangements to have an article prepared and submitted as appropriate.

8.6.3.6 The Panel recognised the importance of such advertisement and education, and agreed that actions preventing the vandalism should be retained and repeated. The Panel noted that it would be desirable if such information could be distributed through the media. In this regard, the Panel was informed of a situation when a buoy had been caught by fishermen in Sri Lanka. The Argo Technical Coordinator and a local oceanographer in Sri Lanka had coordinated the preparation of a news bulletin, which was made available on the Argo web site and subsequently given prominence by local media in Sri Lanka. The Panel was pleased to note that the publication of such information by the media was very helpful for educating marine users in the prevention of vandalism.

8.6.4 Buoy metadata collection scheme

8.6.4.1 The Panel had addressed the issue at its previous session and recognized that metadata are useful for the following applications:

(i) Global programme coordination, including for the Action Groups;

(ii) Observational programme monitoring and provision of accurate status information;

(iii) Instrument performance and evaluation;

(iv) Data assimilation and ocean field analysis;

(v) Ocean modelling;

(vi) Ocean modelling validation;

(vii) Climate forecasting;

(viii) Seasonal to decadal climate variability studies;

(ix) Numerical weather prediction;

(x) Satellite calibration;

(xi) Satellite validation.

8.6.4.2 The Technical Coordinator presented developments undertaken during the intersessional period on a buoy metadata collection scheme that would serve the requirements of the above applications. At the last DBCP session, the Technical Coordinator was asked to coordinate this and refine the proposal with the Global Drifter Programme and EGOS. The Panel had also agreed that dedicated web pages should be user-friendly for the manufacturers and should be designed in such a way as to limit the workload for them and for the GDP. The Technical Coordinator therefore visited the GDP and a buoy manufacturer in January 2004 in order to discuss the details. Specific procedures were agreed upon to make the GDP and the new proposed DBCP schemes compatible.

8.6.4.3 In parallel, discussions with EGOS led this DBCP Action Group, at its December 2003 Management Committee meeting, to decide to fund JCOMMOPS to develop such a scheme while agreeing that the scheme could be used globally by the DBCP. JCOMMOPS therefore started developments in early 2004. A database relational model was completed, and database tables implemented. Marianne Barrailh, a computer science engineering student, developed a demonstration prototype at JCOMMOPS. The prototype was presented to DBCP Action Groups, including the IABP, ISABP, IBPIO, and DBCP-PICES NPDBAP. It was also presented to the Panel at its current session. It is planned that developments should be finished by the end of 2004 (collection of metadata), and that by early 2005 or mid-2005 all collected metadata should be made freely available via FTP through dedicated XML files.

8.6.4.4 The Panel recorded its pleasure with these developments and thanked EGOS for its commitments in this regard.

8.6.4.5 The Technical Coordinator explained implications of the proposed web based scheme for buoy operators and manufacturers:

(i) Buoy operators would be required to ask the manufacturers to fill in information about batches of identical buoys that are ordered. This would be done through a dedicated web page (buoy type, size, telecommunication system, etc).

(ii) Buoy operators would be required to fill in (web page) information about every deployment they make (e.g. WMO number, deployment date and position, type of deployment, weather/sea conditions at deployment, etc).

(iii) Buoy operators would be required, if needed, to go back to the dedicated web page in order to change the status of their buoys in the database (e.g. indicate when the drogue is off, when the buoy fails and for what reason, etc).

8.6.4.6 The Technical Coordinator also explained that specific procedures will be put in place with the Global Drifter Centre in order to avoid duplication of efforts (i.e. on one hand GDP to maintain their metadata database as before for the buoys directly deployed by AOML and to submit the information to JCOMMOPS through specific files, and, on the other hand, GDP to receive specifications sheets from JCOMMOPS for Lagrangian drifters deployed by buoy operators other than AOML).

8.6.4.7 The scheme will permit the maintenance of a reliable, consistent, and comprehensive database. Collected metadata will be made available freely to end-users by FTP through XML files and eventually made available to the JCOMM ODAS Metadata Database (JOMDB) that China has

offered to operate. Also, thanks to the scheme, the GDP and DBCP Action Groups will be automatically notified of new deployments.

8.6.4.8 The Panel endorsed the proposal and recent developments and strongly recommended that the Action Groups, Panel members, buoy operators, and manufacturers comply with it as soon as it is implemented operationally. The Panel also agreed that notification by the manufacturers should be considered by them as a requirement and part of the services they provide to their customers.

8.6.5 *Metadata distribution in real-time*

8.6.5.1 It was recalled that at its seventh Session, Brest, France, 26 – 29 April 2004, following the request by OOPC, the Global Ocean Observing System Steering Committee (GSC-VII) requested JCOMM to develop and implement, through its OPA and sub-panels, a pilot project for the real-time transmission, through the GTS, of all metadata relevant to the observational data for SST and subsurface temperature profiles. A proposal was written by the Technical Coordinator with input from Panel Members and other JCOMM .parties.

8.6.5.2 The Technical Coordinator presented the proposal. He reported that the issue had a number of implications because the observational systems, data telecommunication systems, and data processing systems in place are various and not necessarily homogeneous. Moreover, platform operators in charge of such *in situ* marine observing systems often come from different communities with different perspectives and priorities. Implementation is achieved nationally although there is substantial room for international coordination and standardization. Fortunately, implementation of most of these systems is well coordinated through dedicated JCOMM sub-panels (e.g. SOT, DBCP, TIP) and other associated pilot projects (e.g. Argo). Each of these sub-panels defined or is defining its strategies regarding metadata in relatively independent ways. The Panel agreed that SST data from drifters (GDP) as well as profile data from equatorial moorings (TIP) represented a large component of the proposed system.

8.6.5.3 The proposal included a combination of (i) real-time distribution of a very limited subset of metadata along with the observations, and (ii) provision of an extensive set of metadata through dedicated JCOMM global data centre(s). In any case, it was proposed that there would need to be strong justification by users for any metadata to be included in real-time reports, and that this would have to be documented. The need for other metadata not necessarily included in the real-time reports should also be documented. To realize this, the proposal suggested the following:

(i) Categorization of metadata (e.g., 1=real-time, 2=operational/pulled, 3=delayed, 4=historical).

(ii) For metadata of category 1, selecting BUFR for real-time GTS distribution, the number of metadata fields appearing in category 1 should be restricted to a minimum.

(iii) Identification of a contact point for every one of the concerned data processing systems (i.e. Argos, NOAA processing for GOES, EUMETSAT, JMA, Argo GDACs, NOAA/AOML), the contact point to be willing to work closely with JCOMM in this regard.

(iv) Identification of contact points in every national centre that implemented a national solution for GTS distribution of their platform data (e.g. NOAA/NDBC, JMA, Met Office, Météo France).

(v) For metadata of category 2, establish one or more JCOMM centres dedicated to the routine distribution of metadata from *in situ* marine observational platforms to operational end users.

(vi) Organization of a workshop with a fairly broad community representation (platform operators, modellers, scientific users, data centres, communications specialists). The workshop would be 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.

(vii) Seek funding sources to implement the proposed solutions.

(viii) Implement and document the new system, and recommend that platform operators make sure that the required metadata are properly made available to the system.

8.6.5.4 The Panel agreed that the current buoy metadata collection scheme (see paragraph 8.6.4) which is being developed at JCOMMOPS was consistent with the proposal and agreed to offer assistance in building up the project if required. Also, as buoy data are now being distributed on the GTS in BUFR, distribution of metadata within BUFR reports was practicable provided that the number of required metadata fields to be included in BUFR reports remained limited.

8.6.5.5 The Panel endorsed the proposal described in paragraph 8.6.5.3. Regarding the proposed workshop, the Panel agreed to make a recommendation to JCOMM and take necessary measures for workshop preparation, such as establishing an *ad hoc* working group during the intersessional period.

8.6.6 *Others*

8.6.6.1 Under this agenda item, the Panel listened with considerable interest to a presentation by Dr S Piotrowicz on his personal view of the new technologies that would become available in ocean observation. Dr Piotrowicz then went on to describe recent large-scale collaborative ocean observation campaigns in the US, such as the AOSN-II programme in Monterey Bay, and the build-up to the NSF-funded ORION programme for the creation of an enduring observational infrastructure for ocean science. In a look to the future, ocean scientists were advised to pay heed to developments in smart micro-sensors. In Dr Piotrowicz's opinion, the vast majority of ocean users did not use the GTS, but relied on other sources of information, such as the Internet, even though these data might be unverifiable.

8.6.2 The Panel thanked Dr Piotrowicz for his remarks, and agreed to pay special attention to reaffirming its role in promoting the collection and wide dissemination of quality-controlled ocean data.

C. ADMINISTRATIVE COMPONENT

9. REPORTS

9.1 CHAIR AND VICE-CHAIRS

Chair

9.1.1. The Chair reported on his first year of chairmanship of the DBCP. His main activities during the year are summarized in the following paragraphs.

9.1.2 The main activity of the Chair during the intersessional period had been participation in the definition of a much simplified tariff structure for the use of Argos. This involved travel to Toulouse in the company of the JTA Chair to review and discuss a cost analysis and draft proposal tabled by CLS/Service Argos, and subsequent interaction with members of the JTA Working Group. At the request of CLS/Service Argos, a final session was held with Christian Ortega of CLS in early

October to refine some parameters of the proposal and to help ensure a smooth and equitable transition from the current scheme. This matter would be discussed in great detail at the JTA session following this meeting.

9.1.3 The Chair had been active in promoting the forwarding to Argos of TIP data from two UK-operated LUTs at high southern latitudes (Falklands Islands and Rothera). These stations would be extremely valuable in improving the timeliness of GTS data from the South Atlantic, Southern Ocean and South Pacific, much of these data are currently suffering delays of several hours because of the blind orbit problem. The operators of these stations (the Met Office and the British Antarctic Survey) were co-operating fully with this initiative, and tested datasets have just recently been sent from Rothera to the Argos ftp site in Toulouse.

9.1.4 With regard to satellite communications issues, the Chair participated in a NOAA/ONR-hosted workshop at the University of Washington regarding the use of Iridium for environmental data collection. Citing the successful precedents of the Argos JTA and the DBCP Technical Co-ordinator post, the Chair opened discussion on the formation of a not-for-profit Iridium reseller and technical support officer for environmental applications. This was well received by participants and will be the subject of further discussion.

9.1.5 The Chair, assisted by the Technical Coordinator, updated a number of DBCP documents for the current session, and he has of course penned a number of letters dealing with DBCP administrative matters, particularly in regard to the DBCP funding situation.

9.1.6 Finally, the Chair recorded his appreciation of the fine work accomplished by the three Vice-Chairs, the action groups, and the two secretariats during the year. He also expressed his thanks to the Technical Coordinator for his excellent performance.

Vice-Chairs

9.1.7 The Vice-Chair from North America, Ms Elizabeth Horton, worked on the following items during the intersessional period:

(i) Wrote a letter to the Chair of the Argo Science Team on behalf of the Technical Coordinator for the Argo Program. The question was whether or not the TC position should be moved to Scripps Oceanographic Institute because of the difficulties with the time differences between France and the U.S. The NAVC pointed out that the Naval Oceanographic Office has been working perfectly well for years with the DBCP TC who is co-located with the Argo Program TC. This co-location question was apparently also somewhat contentious, so the NAVC stated that in her opinion co-location provided economies with sharing of assets, and no doubt created synergies that wouldn't otherwise exist. The NAVC was happy to hear from the DBCP TC that all issues had been favourably sorted out at the Science Team meeting held in May in Brest.

(ii) Coordinated beta testing for BUFR code with the DBCP TC and the NAVOCEANO Argo Data Team member, who also handles real-time data received via GTS for the office. BUFR code is installed and operational at NAVOCEANO.

(iii) Assisted the National Data Buoy Center with the visit of the Vice-Chair for Asia, Mr K Premkumar of the National Institute of Ocean Technology in Chennai, India. The visit went well.

9.1.8 During the period, the activities of Mr K Premkumar, the Vice-Chair from Asia, focused on holding the 20th Session of DBCP. He expressed his happiness for having carried out the preparation and hosting the session in Chennai. He also assisted in making arrangements to host the annual sessions of IBPIO and NPDBAP in Chennai, prior to the 20th DBCP Session.

9.1.9 During the intersessional period, the Vice-Chair from Asia made efforts in inviting the neighbouring Asian countries like Malaysia, Thailand, Indonesia and Vietnam, who operate various types of buoy programme to participate in the DBCP session being held at NIOT Chennai, India.

9.1.10 The Vice-Chair from Asia also supported the Technical Coordinator in providing a write-up as to how moored buoys can support ports for navigation purposes by integrating buoy data with Vessel Traffic Management Systems. This paper is available now in the DBCP News.

9.1.11 During the period, the main DBCP-related activities of Mr Louis Vermaak, Vice-Chair for the Southern Hemisphere, included attendance at the International South Atlantic Buoy Programme (ISABP) meeting in Arraial do Cabo, Rio de Janeiro from 23 to 26 August 2004.

(i) During the meeting, Mr Louis Vermaak presented some outcomes from the DBCP 19th session as well as the DBCP activities in the intersessional period, which included individual countries' activities. An overview of the status of the global array of buoys was highlighted. The meeting was concerned about the lack of participation from other countries in South America, outside Argentina and Brazil.

(ii) The group raised the need to extend benefits for participating in the ISABP to other countries in addition to Brazil, Argentina, South Africa and the USA. It was suggested that a different strategy should be considered as a means of promoting the program.

(iii) It was suggested that the GOOS Africa and Regional Ocean Observing and Forecasting System for Africa (ROOFS) coordinators should be contacted so as to attract the attention of African countries towards ISABP.

(iv) Likewise the IOC/UNESCO GOOS office in Rio de Janeiro could do the same for South American countries, as well as investigating the possibility of getting extra support to hold ISABP meetings. The meeting was of the opinion that the Vice-Chair could play a greater role on this matter.

9.1.12 During the period, Mr Vermaak, as a member of the Evaluation Sub-group, was participating in the group activities and exchange of information on the performances of the drifters.

9.1.13 After the 19th session of the DBCP, Mr Vermaak contacted the OGP office and made a plea for their serious consideration to deploy more barometers drifters, especially in the Southern Hemisphere.

9.1.14. Mr Vermaak had been in regular contact with Navoceano to try and get the problem of the hardware on the LUT system at Gough Island addressed. Navoceano sent updated software for use on the LUTs. He is also busy with other parties to get independent communications on Gough and Marion Islands so that TIP data can be sent to Argos for processing. Telkom (SA) promised that 24 hour internet access will be established by the end of October 2004. The South African Weather Service will replace the hardware on Gough Island.

9.1.15. The Vice-Chair for the Southern Hemisphere also communicated with the Technical Coordinator on numerous occasions by e-mail regarding buoy matters, as well as from time to time with Panel members.

9.1.16 The Panel expressed its considerable appreciation to the Chair and Vice-Chairs 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 publication and distribution of the Annual Report for 2003 and the proceedings of the 2003 Technical Workshop; 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; with other IOC and WMO technical commissions and regional associations (or equivalent bodies) on relevant issues; and 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; support for the DBCP Action Groups as required.

9.2.2 The Panel noted that The WMO Executive Council, at its fifty-sixth session (Geneva, May 2004) noted continued expansion of the JCOMMOPS facility, with new support tools and services being offered to users. It expressed its considerable appreciation to those members who contributed financially to the operation of JCOMMOPS. Since the nineteenth session of the Panel, the IOC Executive Council had held its thirty-seventh session (Paris, 23 – 29 June 2004). The Executive Council considered the issue of International Polar Year (IPY) in relation to DBCP activities; as for the IPY 2007/2008 proposal (see http://www.ipy.org), the IOC EC agreed that IOC should contribute to the IPY through GOOS and its operational observing system components such as DBCP, Argo and GLOSS.

9.2.3 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.

9.2.4 The Panel was informed that that the WMO Executive Council, at its fifty-sixth session (Geneva, May 2004) reviewed the outcome of the Review of the WMO Programme Support Cost Arrangement carried out in accordance with the request of the Fourteenth World Meteorological Congress (Cg-XIV) (Geneva, May 2003) and approved the new programme support cost policy, and adopted Res. 9 (EC-LVI) - WMO Programme Support Cost Policy. As a consequence, the WMO support cost for the DBCP Trust Fund will increase to 7% of expenditure as from January 2005.

9.2.5 The Panel expressed its concern on the planned increase of the WMO support cost. The Panel requested its Chair to take actions either to reduce the support cost or to recover some of the support cost to be taken by the WMO administration.

9.2.6 The Secretariat informed the Panel that the merger of the Capacity Building panels of JCOMM and GOOS was agreed in principle. For the follow-up, the terms of reference for the merged JCOMM-GOOS Capacity-Building Co-ordination Group were revised, and the JCOMM Task Team on Resources was being continued to support the merged Co-ordination Group. In the context of cooperation on Capacity Building, the joint IODE/GOOS/JCOMM Panel for Capacity Building organized a “Capacity Building Jamboree 2005”, to take place in two venues; Oostende, Belgium (25 April - 6 May 2005) and Bergen, Norway (2 – 6 May 2005). It expected to attract attendants mainly from Africa, but also from South and Central America. The Executive Council of IOC, at its thirty-seventh session, asked that the role of the JCOMM-GOOS Capacity-Building Panel be considered in the further development of the Strategy for Capacity Building.

9.2.7 The Panel also reviewed brief information on the IOC activities for a regular global assessment of the marine environment (GMA) and IOC Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), following a request by the ISABP. It was noted that the IOC Executive Council accepted that IOC should continue to play a leading role in the GMA initiative, but should pay special attention to the nature of the IOC commitments, modalities and means with respect to the GMA. The Panel was then informed that the information on IOC/ABE-LOS would be available from the Secretariat of ABE-LOS located in IOC.

Intergovernmental ad hoc Group on Earth Observation (GEO)

9.2.8 The Panel received with interest a brief note on the GEO process. The GEO that was established by first the Earth Observation Summit (EOS) aimed to develop a conceptual framework and implementation plan for building a comprehensive, coordinated and sustained Global Earth Observation System of Systems (GEOSS). GEO was charged with establishing a 10-year Implementation Plan for the creation of GEOSS, based on existing observing systems, in time for the third Earth Observation Summit, in February 2005.

9.2.9 The Panel expressed its appreciation for the efforts made by both IOC and WMO in the GEO process, particularly emphasizing the importance of the existing observation systems with their own mandates, such as WWW, GAW, GCOS, GOOS and JCOMM, as key components of GEOSS. The Panel then noted that, in the process of 10-Year Implementation planning of GEOSS, the field of ocean observation was acknowledged as one of the most challenging areas, needing intensive effort to fill the gap in earth observation. This initiative was considered as a critical opportunity to define firm resources for operational observations of the ocean, at the national and international levels, with support at a high political level.

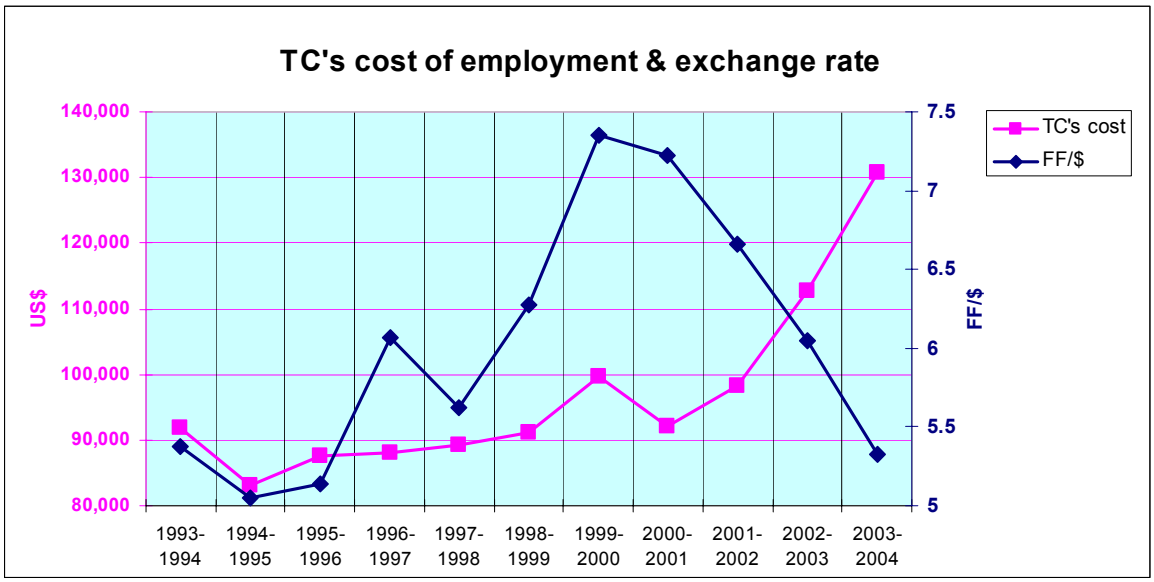
9.2.10 The Panel noted that the Executive Council of WMO (fifty-six session, June 2004), and IOC (thirty seventh session, June 2004) adopted Resolution 9 (EC-LVI) and Resolution EC-XXXVII, respectively, affirming their support for the concept of GEOSS and emphasizing that the existing observation systems should be clearly recognized in the GEOSS Implementation Plan as key components of Earth Observation. The Panel also noted, in particular, that WMO offered to host a future GEO Secretariat within WMO.

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, which would profoundly affect its activities in the near future.

10. FINANCIAL AND ADMINISTRATIVE MATTERS

10.1. FINANCIAL SITUATION

10.1.1 In February 2004, the IOC trust fund dedicated to the DBCP and used, inter alia, to support the cost of the Technical Coordinator's employment, had experienced a significant deficit problem due to the evolution of the exchange rate between the euro (or equivalent French francs) and the US dollar (see graphic below). Indeed, contributions to the trust fund were held in USD, whereas all expenses were incurred in euros.



10.1.2 To try and find a solution to that problem, the joint Secretariat made an appeal to Panel members to seek additional and/or new contributions. As a result, Australia, Canada, Iceland, Ireland, Netherlands, New Zealand, Norway, South Africa and USA made an additional contribution amounting to 25% of their original contribution (50% for Iceland). In addition, India intimated that they would try to start to contribute to the Trust Fund. New Zealand affirmed that their contribution would be doubled in future.

10.1.3 In the meantime, contributions already received for the period 1 June 2004 – 31 May 2005 were used to ensure that the Technical Coordinator could be paid until the end of May 2004. His contract was renewed at that time for only six months (up to 30 November 2004), pending the arrival in WMO Secretariat of new, additional and/or late contributions. The renewal of the employment contract of the Technical Coordinator for the remaining period 1 December 2004 – 31 May 2005 was under way at the date of the session.

10.1.4 This financial problem, together with an audit that took place within UNESCO at that period of time (first half-year 2004), led the Secretariat to make an in-depth review of the DBCP accounts held within IOC/UNESCO since the origin (1993). As a result of that review, some discrepancies between the accounts maintained by the Secretariat and the official UNESCO accounts were discovered, as follows:

(i) regarding the Technical Coordinator's missions, the official accounts are not always fully finalized when the administration provides the relevant figures to the IOC Secretariat for submission to the Panel session, every year in August/September. Some corrections are therefore to be made;

(ii) the cost to the Panel (in USD) of the contract established with CLS for the logistic support of JCOMMOPS depends on the fluctuation of the rate exchange between the USD and the € (or FF in the past), which was not reflected in the financial reports;

(iii) for some unknown reason, in 1996 and 1997, bank charges were levied on the DBCP account, of which the IOC Secretariat was unaware;

(iv) the figures provided at the previous DBCP session for the Technical Coordinator's salary during the period 2002-2003 were not the actual ones, for some unknown reason.

On that basis, the Secretariat computed a full set of revised past financial reports since 1994 (see Annex IX).

10.1.5 In addition, it was discovered that an accounting error had occurred in 1995, when UNESCO undertook a major change in its accounting system: the funds that were earmarked at that time as pertaining to the DBCP trust fund were erroneously attributed to the general IOC trust fund. As a result, USD 13,521.27 was no longer earmarked within the fund. The Secretariat noted that this money had been used for general IOC purposes, therefore indirectly benefiting the Panel activities.

10.1.6 The Panel expressed concern at this last piece of information. It highlighted that it indeed had always considered IOC and WMO, from the management of its funds standpoint, to be simply a bank, and that the accounting error should therefore be corrected. It requested its Chair to officially address the Executive Secretary IOC, with a view to requesting him to find ways to correct this erroneous attribution so that the fund would be available again for Panel’s direct activities.

10.1.7 Eventually, the Panel considered and approved the financial report submitted by IOC for the period 1June 2003 – 31 May 2004 (see Annex X).

10.1.8 The Panel considered the interim Statement of Account as at 31 August 2004 provided by WMO (see Annex XI). The Panel recalled that excessive publications costs had been overcome,

partly through the use of CD-ROM and web publications only, and partly through the mechanism of funding publication costs through the WMO regular budget. As agreed at DBCP-XIX, a transfer was made from the DBCP Trust Fund to the WMO regular budget to cover specific DBCP publication costs. The Panel approved the statement.

10.1.9 The Panel considered the provisional estimate of income and expenditure until 31 May 2005, which is reproduced in Annex XII. The Panel was pleased to note that the arrears from France for 2002-2003 were now being paid and that the JTA had agreed to pay additional contributions so that the costs associated with maintaining an independent JTA Chair might be fully covered by JTA. The Panel accepted the provisional estimate.

10.2. CONTRACTS

10.2.1 The contracts established by IOC/UNESCO for the employment (see paragraph 10.1.3) and logistic support for the position of the Technical Coordinator were considered and approved by the Panel.

10.2.2 Regarding the latter, the Secretariat explained the difficulties it had encountered in the past to have the contract endorsed by UNESCO administration, because the time at which it had to be signed did not comply with UNESCO regulations regarding contracts. An attempt was therefore under way to solve that problem through signing a kind of “standing agreement” or “Memorandum of Understanding” between IOC and CLS for the future logistic support of JCOMMOPS. The Panel requested the Secretariat to report on this topic at its next session.

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) Mr Charpentier would be requested to inform the Chair, 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 Mr Charpentier 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 Chair on 4 October 2004, to inform him of his intent to continue working as Technical Coordinator of the Panel for the period 1 June 2005 - 31 May 2006. The Panel therefore agreed to continue the employment of Mr Charpentier as its Technical Coordinator for the year 1 June 2005 to 31 May 2006. 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 reviewed the table of expenditures and income for 2002-2005 and the table of provisional contributions. The Panel agreed that the same publications policy as previous years (see paragraph 10.1.7) should be applied in 2005 and future years. It also recommended to JTA-XXIV to continue to fund the independent JTA Chair position through the JTA, using the DBCP trust funds as a relay mechanism (see paragraph 10.1.8). The estimated cost for the JTA is USD 15,000.

10.3.4 The Panel note with appreciation that India would commence its contribution (USD 3,000) as from 2005. The Panel sincerely welcome this new contribution and suggested that any possible actions should be taken to seek new contributors.

10.3.5 The Panel invited its Chair to request that IOC and WMO should contact member countries to seek additional contributors.

10.3.6 The Panel was informed that participants in E-SURFMAR, which will supersede EGOS as an Action Group in 2005, will not make national contributions direct to the DBCP. Instead, contributions will be channelled via E-SURFMAR. In this context the Panel noted with considerable appreciation the offer of the E-SURFMAR representative to increase his provisional contribution from Euro 37,000 to Euro 40,000. Membership of E-SURFMAR currently includes Belgium, Finland, Greece, Italy, Portugal and Sweden in addition to the former EGOS participants Denmark, France, Germany, Iceland, Ireland, the Netherlands, Norway, Spain and the United Kingdom. The Panel was also pleased to note that the proposed E-SURFMAR contribution exceeded that made by those EGOS countries that had until now contributed directly to the DBCP.

10.3.7 The Panel adopted a budget for 2005/06, which is given in Annex XIII. The scale of provisional contributions required to balance expenditures under this budget is given in Annex XIII, on the assumption that contributions will again be received from SOOP participants similar to those in the current year.

10.3.8 The Panel recalled that the delay of contributions in the past few years had made serious difficulties, especially in maintaining the employment of the Technical Coordinator. The Panel thus agreed that future contributions should be paid as soon as invoices are received.

10.3.9 Noting the importance of the services provided by the DBCP Technical Coordinator, the Panel again encouraged its members to seek any possibility of increasing their future contribution.

10.4 DRAFT IOC PROPOSAL

10.4.1 The Panel discussed a proposal tabled by IOC, wherein the DBCP funds relating to the employment of the Technical Coordinator might be managed more directly by the IOC Secretariat. The draft proposal by IOC is reproduced in Annex XIV.

10.4.2 After some discussion, during which a number of opinions were expressed, including the opinion from France that the IOC proposal should not be considered until assurances had been received from IOC that the discrepancy in the DBCP fund would be remedied (see Paragraph 10.1.5), the Panel finalized its position as follows;

(i) The Panel felt that the proposal from IOC was unacceptable in its present form in that it contained a number of serious assertions that needed to be checked, and that the Panel had been pressurized into making a decision in an unreasonably short time.

(ii) The Panel, however, recognized that the present system urgently needed to be improved and that an alternative should be proposed. To that end, it remained open to any proposal from IOC and/or WMO, as well as other organizations;

(iii) Representatives of some meteorological services expressed concern that they might face difficulties in paying invoices coming from other organization than WMO. Nonetheless it was felt that these difficulties were alone not sufficient reason to prevent progress on this matter.

10.4.3 The Panel concluded this agenda item by warmly thanking the IOC for its support of the Panel's activities and its Technical Coordinator, and for its assurance that this support would not be affected in any way by the outcome of discussion of the current proposal.

10.5 REVIEW OF THE DUTIES OF THE TECHNICAL COORDINATOR

10.5.1 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-of-Opportunity Programme. 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 Recalling the discussions under agenda item 2.2 relating to the use of the Argos system, the Panel agreed the need to include the multi-satellite service as part of the basic service in order to improve the quantity and timeliness of observations, particularly in data sparse regions. The Panel also noted with considerable concern the possible action by NOAA NESDIS to discontinue the DCS mission on NOAA-12 and NOAA-14, since data relayed through these satellites are of considerable value as part of the multi-satellite service. In particular, this move would run counter to efforts by other NOAA offices, such as OCO, to improve the situation in data sparse areas. The Panel therefore requested the Chair to seek support from the JTA to keep NOAA-12 and NOAA-14 in operation, and to include the multi-satellite service within the basic service under the Joint Tariff Agreement.

11.2 During the discussion of GTS delays in the Argos system (agenda item 8.6.2), the Panel was informed of the possibility of overcoming the ‘blind orbit’ problem by downloading stored Argos data at the Svalbard ground station being established for the NPOESS and METOP missions. The Chair was requested to seek support from the JTA to implement this service at the earliest opportunity in order to improve arrival times of stored data at the processing centres. This would greatly improve the situation in critical areas such as the S Atlantic, Southern Ocean and S Pacific, which are severely affected by the blind orbit problem and are poorly served by LUTs.

11.3 Under item 8.3 the Panel noted that some progress had been made with the request to process data from the Brazilian DCS within the Argos system. There was also the possibility of using Brazilian LUTs to obtain standard Argos data that would improve observational data coverage for the ISABP, amongst others (agenda item 2.2). The Panel therefore requested its Chair to recommend to the JTA to investigate the possibility of obtaining Argos data from these LUTs, as well as from the Brazilian DCS.

11.4 Under item 2.4 concerning Argo communication through Argos, it was reported that costs could be doubled simply through transmissions spanning UTC midnight. The Panel requested its Chair to recommend to the JTA that the new tariff structure be designed to circumvent this problem in the future.

11.5 Under agenda item 3 the Panel noted the intention of E-SURFMAR to include communication costs within its budget after 1 January 2006. This would include Argos processing costs currently the responsibility of individual ROCs. The Panel therefore requested the Chair to raise the issue at the forthcoming JTA session in order to include this possibility within the future Joint Tariff Agreement.

12. WORKPLAN

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

13. ELECTION OF THE CHAIR AND THE VICE-CHAIRS OF THE PANEL

13.1 The Panel re-elected Mr David Meldrum as its Chair, to serve until the end of the next Panel session. It also re-elected Mr K Premkumar as its Vice-Chair for Asia, Ms Elizabeth Horton as its Vice-Chair for North America, and Mr Louis Vermaak as its Vice-Chair for the Southern Hemisphere, for the same period.

14. DATE AND PLACE OF THE NEXT SESSION

14.1 The Panel recalled its agreement at DBCP-XIX that the session in 2005 would, in principle, be hosted by South Africa. It was therefore pleased to accept confirmation from the South African Weather Service to host DBCP-XXI in Cape Town, South Africa, subject as always to a similar agreement by JTA-XXV. Tentative dates for the session were agreed as 17-21 October 2005.

14.2 Bearing in mind its general policy to alternate, as much as possible, the annual meetings between hemispheres, the Panel also noted with appreciation the offer from the US National Data Buoy Center (NDBC) to host the 2006 session.

15. CLOSURE OF THE SESSION

15.1 In closing the session, the Chair, Mr David Meldrum, thanked all participants for their active and constructive input to what had been a very successful session. He particularly remarked that the support and active participation of Panel members was essential to the successful outcome of the meeting. On behalf of the new office-bearer and secretariat team, he also thanked members for their guidance and forbearance. Participants in turn offered their thanks to the new team for their professionalism and hard work during the session and throughout the intersessional period.

15.2 Speaking on behalf of all participants, the Chair once again expressed sincere thanks to Mr K Premkumar, his team from NIOT, and the staff of the MGM Beach Resort, for their outstanding support, 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 Mr Ron McLaren (Canada), the outgoing technical coordinator of North Pacific Data Buoy Advisory Panel, for his enthusiastic and dedicated service to the Panel and its activities over many years. In particular, the Panel applauded his efforts in establishing and improving the capacity of NPDBAP, as well as his long service at a national level.

15.4 The Panel also recorded its sincere appreciation for the work of Mr Derek Painting, who had been closely involved with the Panel since its inception, and who also announced his retirement from the Panel. Mr Painting had served as a Chair of the Panel during its early years, and had been instrumental in forging the Panel into an effective and influential force in ocean observation.

15.5 The Chair expressed his regret for the departure of Mr McLaren and Mr Painting, and on behalf of the Panel, wished that even in retirement they would continue to make their longstanding skill and experience available to the Panel.

15.6 The twentieth session of the Data Buoy Cooperation Panel closed at 1230 hours on Friday, 22 October 2004.

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

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3. NEW ACTION GROUPS

4. REVIEW OF THE DBCP IMPLEMENTATION STRATEGY

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8.2 CODES
8.3 ARGOS SYSTEM
8.4 NEW COMMUNICATION TECHNIQUES AND FACILITIES
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8.6 OTHER TECHNICAL ISSUES
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    8.6.2 GTS delays and Argos ground receiving stations
    8.6.3 Vandalism
    8.6.4 Buoy metadata collection scheme
    8.6.5 Metadata distribution in real-time
    8.6.6 Others

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9.2 SECRETARIATS

10. FINANCIAL AND ADMINISTRATIVE MATTERS

10.1 FINANCIAL SITUATION
10.2 CONTRACTS
10.3 FUTURE COMMITMENTS
10.4 DRAFT IOC PROPOSAL
10.5 REVIEW OF THE DUTIES OF THE TECHNICAL COORDINATOR

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11. RECOMMENDATIONS TO THE ARGOS JTA

12. WORKPLAN

13. ELECTION OF THE CHAIRMAN AND THE VICE-CHAIRMEN 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 2003 to 31 August 2004. 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). Details on time spent on TC DBCP tasks is given in table 1 below. From this table is can be seen that the more time consuming issues were:

- Missions & preparation
- User assistance
- Buoy metadata collection scheme (discussions, specifications & development)
- Future Argos GTS data processing system (new CLS project to eventually replace the Argos GTS sub-system and provide more flexibility)
- JCOMMOPS development (web site, new products, maps, statistics)
- JCOMMOPS information system operations & maintenance (database, web servers)

During the period, I also worked for SOOPIP part time (28.5%) and spent some time on Argo (3.1%) and JCOMM & JCOMMOPS issues (11.2%). Work spent on JCOMM was directly related to DBCP and SOOP activities. Work spent on Argo basically included training of the Argo Coordinator, supervision, team work to develop JCOMMOPS, miscellaneous support, and presenting JCOMM at the Argo Steering Team meeting to discuss future of Argo Information Centre and role within JCOMMOPS. 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 paragraphs describe in detail the various activities of the TC DBCP during the period. Paragraph 2 highlights recent DBCP activities. Paragraph 3 describes specific non regular tasks undertaken by the TC DBCP during the considered period while paragraph 4 describes regular tasks normally undertaken during any intersessional period.

Table 1: Time spent on tasks by the Technical Coordinator

Topic	days	%tot. TC	%tot. TC
JCOMM			
Mission (JCOMM), effective meeting time (GLOSS, MC, OceanOPS04)	7.5	2.9%	
Missions (JCOMM), travel time on working days	0.5	0.2%	
JCOMMOPS development (web site, dynamic pages, maps, statistics)	8.0	3.1%	
JCOMMOPS Information system operations & maintenance	6.0	2.3%	
Student supervision and training	2.0	0.8%	
Real time distribution of metadata	1.5	0.6%	
JCOMM/OCG (OCO OSMC)	1.0	0.4%	
Deployment opportunities	1.0	0.4%	
OceanOPS04 preparation	0.5	0.2%	
VOS Quality Information Relay web page	0.5	0.2%	
GLOSS map	0.5	0.2%	
Total JCOMM (%)			**11.2%**
SOOP (excluding travel time)	70.0	26.9%	
Missions (SOOP), effective meeting time (Brest workshop, BOM, SOT-2)	4.0	1.5%	
Missions (SOOP), travel time on working days	0.0	0.0%	
Total SOOP (%)			**28.5%**
Argo (coord. training, supervision, team work, misc. support)	4.0	1.5%	
Missions (Argo), effective meeting time (AST-6)	4.0	1.5%	
Missions (Argo), travel time on working days	0.0	0.0%	
Discussions with AST regarding future of AIC	2.0	0.8%	
Total Argo (%)			**3.1%**
DBCP Missions, effective meeting time	18.0	6.9%	
Missions (DBCP), travel time on working days	3.0	1.2%	
Missions, preparation (DBCP only)	15.0	5.8%	
TC Vacation, holidays	31.0	11.9%	
User assistance (e.g. GTS distrib, technical files, investigations)	25.0	9.6%	
Buoy metadata collection scheme	17.0	6.5%	
Future Argos GTS data processing (Argos 2001 project)	7.0	2.7%	
Miscellaneous DBCP	5.0	1.9%	
Action Groups	4.0	1.5%	
GTS (BUFR, bulletin headers)	3.5	1.3%	
Requests for GTS	3.0	1.2%	
GTS Sub-system evolutions (TAO, BUFR compr., Argo QC)	2.0	0.8%	
Monitoring, Quality Control Guideleines, SPAM issue	2.0	0.8%	
Misc. Administrative	2.0	0.8%	
GTS Sub-System monitoring	1.5	0.6%	
TC monthly report, stats., regular reports	1.5	0.6%	
Information exchange (publications, articles, JCOMMOPS news)	1.5	0.6%	
DBCP evaluation group (e.g. spikes, TEST fmt., storm buoy)	1.0	0.4%	
DBCP web server	1.0	0.4%	
TC Tools	1.0	0.4%	
Provide training on GTS sub-system to Argos user office	0.5	0.2%	
Cost estimate for WOMAP	0.5	0.2%	
Southern Hemisphere SVPBs	0.5	0.2%	
GTS delays	0.5	0.2%	
Vandalism	0.0	0.0%	
Total DBCP (%)			**56.5%**
Total (52 weeks)	**260.0**	**100.0%**	**99.2%**

2) DBCP highlights (As of August 2004)

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://w4.jcommops.org/cgi-bin/WebObjects/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 31 July 2004):

Table 2: Drifting Buoys and Moored Buoys in the high seas (including US and Canadian moorings) reporting on GTS in July 2004

Variable	Drifting Buoys	Moorings	Remark
Any variable	950	191	
AT	45	183	
P	325	126	
U	0	111	
SST	865	185	
Tend	303	113	
Waves	1	119	
Wind	32	172	
Sub/T	2	71	TAO, PIRATA, TRITON.

2.2) 19th DBCP session, Angra dos Reis, 20-24 October 2003.

19th DBCP session was held in Angra dos Reis, Brazil, 20-24 October 2003. DBCP Technical & scientific workshop was chaired by Eric Meindl and focused on research, applications and developments involving data buoys. Particularly, presentations were given on performance of Minimet and wind drifter (W. Scuba), on GDC data products (S. Cook), Argos 2-way (W. Woodward), smart buoy project (E. Horton on behalf of S. Motyzhev), evolution of SVP drifter design (P. Niiler), Iridium (D. Meldrum, B. Petolas), low power transmission on moorings (R. McLaren). Workshop proceedings will be published by the Panel on CD-Rom. Next year's workshop will be organized by Ken Jarrott, BOM.

DBCP Action Groups reported on their specific activities. National reports were presented. Elizabeth Horton also reported on the SVPB evaluation sub-group (air pressure spike issue on SVPBs).

DBCP implementation strategy was reviewed and commitments in the Southern Ocean discussed. About 91 barometer buoys are committed in the region for the period September 2003 to August 2004. Strategy was reviewed again after the Panel session in order to take into account new challenges, developments, and DBCP aims and objectives.

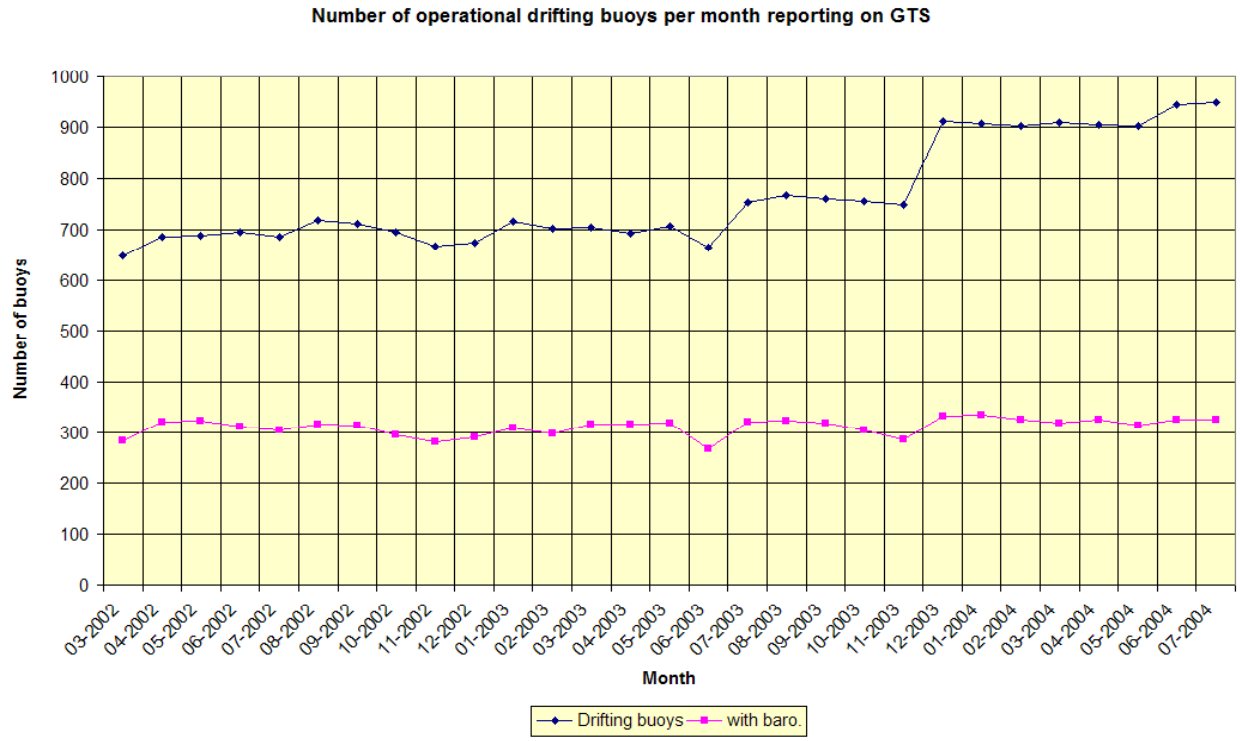
The panel elected the following officers:

- Chairman: Mr David Meldrum
- Vice-Chair, North-America: Ms Elizabeth Horton
- Vice-Chair, Southern Hemisphere: Mr Louis Vermaak
- Vice-Chair, Asia: Mr K. Premkumar

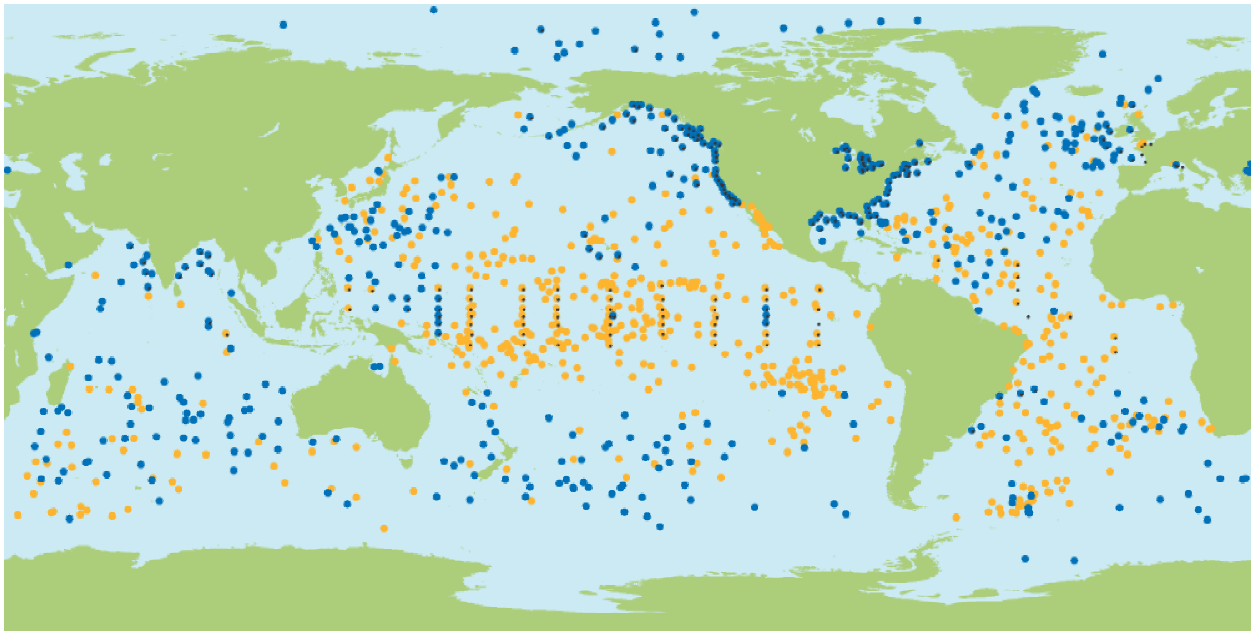
2.3) Global Implementation

The graph below shows the evolution of the number of operational drifting buoys reporting on GTS from March 2002 to July 2004, and those reporting also air pressure.
Deployments increased slowly from 650 in March 2002 to about 749 in November 2003. Then dramatic increase appeared in December 2003 with 913 operational drifting buoys, reaching a level of 950 in July 2004 (map 1). This is consistent with JCOMM/OCG phased-in implementation plan and target of 1250 drifting buoys (see map 2). It shows that steps were actually taken by Panel Members during the last intersessional period to follow the plan. However, at the same time, the number of drifting buoys reporting air pressure did not increase significantly. DBCP needs to refine its implementation strategy, agree on a realistic figure regarding the number of barometer drifting buoys to deploy yearly or to keep operational at any time, agree on the definition of the area where the barometers should be deployed (e.g. how to define extra-tropical regions), and propose a phased-in deployment plan for the barometer drifting buoys.

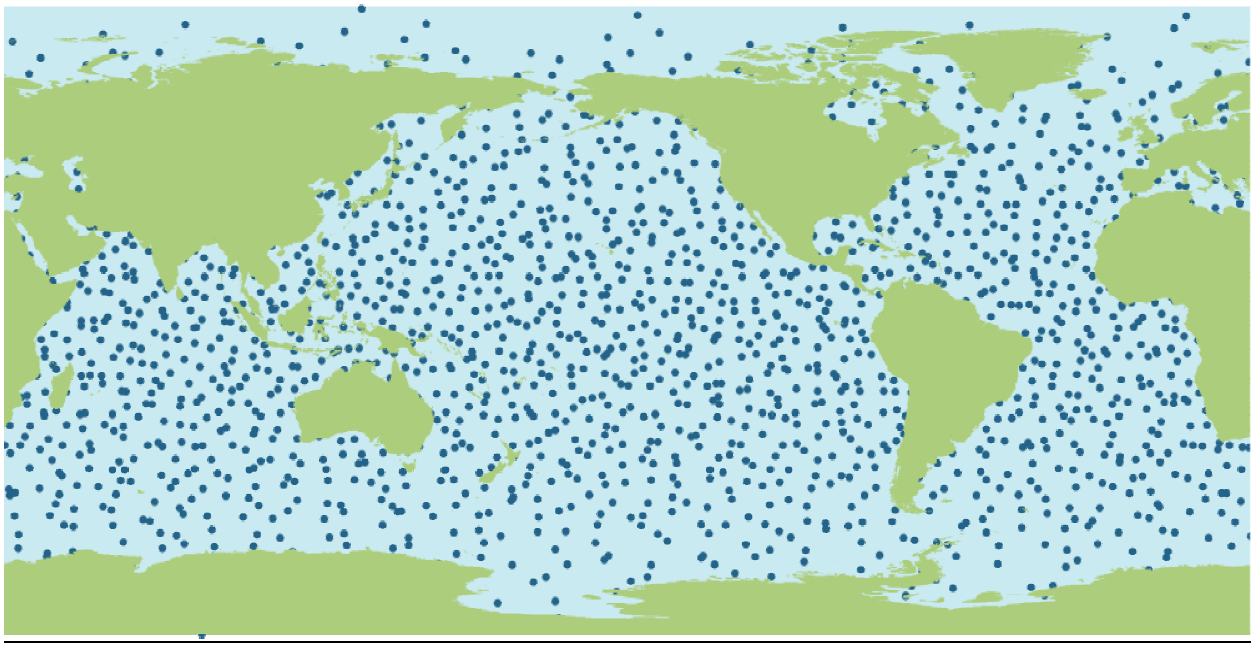
Graph 1 : Monthly evolution of the number of operational drifting buoys reporting on GTS from March 2003 to July 2004, and those reporting air pressure.



Map 1: Drifting and moored buoys reporting SST (orange dots) and air pressure (blue dots) in July 2004



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) References to GEOS process
(ii) References to JCOMM and participation of DBCP in OCG phased-in implementation plan.
(iii) New technological developments (e.g. storm buoy).

Although there is now a consensus regarding the estimated 1250 drifting buoys required worldwide, the number of required barometers (installed on drifting buoys) remains under discussion. Targeting the extra tropical regions only would require maintaining a network of about 700 barometer drifters. We presently have about 325 drifting buoys reporting air pressure on GTS from the world oceans. Additional commitments would therefore have to be made at a level of about 375 barometers. Considering that the cost of upgrading a standard SVP drifting with a barometer is about $1200, additional commitments would have to be in the order of about $450 000 to be shared amongst Panel Members.

In order to succeed with the deployment of such a larger number of buoys, deployment opportunities must be available, both by ship and air. As air deployments opportunities are not as readily available as before from Navoceano we are increasingly depending upon ship deployment opportunities or air deployment opportunities from other organizations or countries. Cost might eventually be involved and the Panel might have to discuss funding for this as well.

Sergey Mothyzev is still working in cooperation with Navoceano on the storm buoy concept. Initial tests showed good results. This concept permits to save electric power, to increase the buoy life time, and to obtain better data in weather conditions where they are particularly useful.

2.3.2) JCOMM

Time spent on integrated JCOMM issues was mainly related to JCOMMOPS development and operations, attending the 8th meeting of GLOSS Group of Experts, Paris, October 2003, representing JCOMM at the 6th Argo Steering Team meeting, Brest, March 2004, attending the JCOMM Management Committee meeting, Geneva, March 2004, assistance regarding organization of OceanOPS04 workshop in Toulouse, May 2004, attending the latter meeting, and make there a presentation on JCOMMOPS.

2.3.1.1) JCOMMOPS.

JCOMMOPS development is realized in coordination with the Argo Technical Coordinator, Mathieu Belbéoch. During the period September 2003 to August 2004, JCOMMOPS was also assisted by following students:

- Mathieu Lopes, software developments, July to September 2003
- Marianne Barrailh, software developments, 3 years, ½ time as of September 2003
- Irène Bouguerra, graphic artist, July – September 2004

The following was achieved during the considered period:

- Information system operations and maintenance with assistance from CLS, Service Argos. In May 2004, a crash disk occurred on the disk that hosted the web server. Server was consequently down for 24 hours. GIS (maps) products had to wait another 24H before being operational again. Better backup solution is now in place.
- Keeping JCOMMOPS database up to date (platform and programmes status, statistics, list of GTS observations, platform locations, etc.).
- Implement easy access to JCOMMOPS static maps; adding statistics on map legends.
- Deployment opportunities application finalized thanks to student Mathieu Lopes. However, for practical reasons, application has not been implemented yet.

- Development of a buoy metadata collection scheme, i.e. discussing issue with EGOS, GDC, and manufacturers, writing specifications, creating database relational model and tables, working with Marianne Barrailh on related software development.
- Upgrade dynamic web page applications (from WebObjects 4.5 to WebObjects 5.2); move applications to a new server; upgrade JCOMMOPS web site to a fully dynamic web site; start working on a new graphical design for the web site with Irène Bouguerra and change JCOMMOPS logo so that it is consistent with JCOMM logo.
- Suggest a method for demonstrating the volume flow of data over time for GOOS Steering Committee.
- Develop News section in JCOMMOPS web site. Seek articles from Panel Members for addition in the News section.
- New web page providing detailed explanations regarding WMO numbers (i.e. numbering system) and allocation process for WMO numbers.
- Make a presentation on JCOMMOPS at the OceanOPS04 meeting, Toulouse, May 2004; submit paper for workshop proceedings.

See DBCP session preparatory document dealing with JCOMMOPS for details.

2.3.2) 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.

A dedicated web application was developed but not implemented operationally because it appeared too complicated to use. Application will be simplified so that it can realistically serve operational purposes.

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

2.3.3) Southern Hemisphere barometers

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

69 drifting buoys were reporting air pressure from area South of 40S in July 2004.
Main players are:

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

Country	Buoys operational
Australia	7
France	2
Germany	2
New Zealand	2
South Africa	4
USA	52
Total	**69**

Proposed commitments for the period September 2003 to August 2004 are:

Country	Buoys purchased	Additional upgrades	Total
Australia	5	0	5
France	0	5	5
New Zealand	5	5	10
South Africa	0	30	30
USA*	45	0	45
Total	**55**	**40**	**95**

*: For the period 9/2004 to 8/2005, 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. For the period 9/2003 to 8/2004 the GDP had defined the Southern Ocean deployment plan as the region 40S - 60S.

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

2.3.5) DBCP Action Groups

2.3.5.1) EGOS

European Group on Ocean Stations (EGOS)

Area of interest: North Atlantic Ocean: EGOS area of interest covers the sea area from the European coastline out to 50 °W, between 30°and 65°N, including adjacent seas, such as the Baltic and Mediterranean Seas.
Chairman: Evelyn Murphy, Irish Met. Service
Technical Secretary: Ann Hageberg, Christian Michelsen Institute, Norway
Technical Coordinator: Pierre Blouch (deployment coordination and GTS matters), Meteo France
Web site: http://www.meteo.shom.fr/egos/
Status: Network of 54 drifting buoys in June 2004. In addition, 17 moorings are part of the EGOS programme.
Meetings: Twice a year (December and June).

At the last EGOS meeting in Reykjavik, transition from EGOS to EUMETNET SURFMAR Technical Advisory Group (TAG) was discussed. E-SURFMAR data buoy Manager will be appointed on the 1/1/2005 and joint EGOS to E-SURFMAR TAG handover meeting is planned tentatively in Geneva in January 2005 (to replace usual EGOS December meeting).

Pierre Blouch reported on the design study he had conducted for E-SURFMAR. In the study, it was proposed to maintain a network of about 200 drifting buoys, and 3 moorings at key positions to support NWP. However, funding for the proposed design (i.e. about 1800 K€) was not agreed upon and needs to be discussed by EUMETNET council, Vienna, 14-15 September 2004, with likely substancial reductions.

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: 37 IABP buoys were operational in the Arctic basin in June 2004.
Meetings: 14th IABP meeting was held in Geneva, 7-9 July 2004. Exact dates and place for the next IABP meeting are yet to be decided. Options are Washington-DC, in March or April 2005, Seattle, in May or June 2005, or Venice, in October 2005 in conjunction with IPAB.

ICEXAIR type buoys are the backbone of the IABP. However, annual WHITE TRIDENT air deployment exercise requires a minimum of 7 ICEXAIR buoys to be committed and deployed. This remains a challenge for the programme because of the higher cost of this type of buoy (about $22000/unit).

Participation of IABP in the International Polar Year (IPY, http://www.ipy.org) was discussed. This will be coordinated with IPAB which was also represented at the meeting by its Chairman, E. Zambianchi. The IABP Coordinator will prepare a draft letter of intent to be circulated to IABP Participants regarding IABP plans regarding IPY (IPAB already did the same for the Antarctic area).

New Ice Tethered Platform (ITP) concept that can potentially measure both surface and sub-surface variables was presented, and particularly the results from a dedicated workshop that was held recently at WHOI, USA. This should be an opportunity for IABP to eventually cooperate with Argo in the future.

2.3.5.3) ISABP

International South Atlantic Buoy Programme (ISABP)

Chairman: Alaor Moacyr Dall'Antonia Jr., MHS, Brazil
Vice-Chairman: Ariel Troisi, Argentina
Coordinator: Louis Vermaak, 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: 89 buoys reporting on GTS in July 2004.
Meetings: Last meeting was held in Rio de Janeiro, 23-27 august 2004.

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: 130 buoys were reporting from the Indian Ocean in July 2004. IBPIO maintains a network of about 100 drifting buoys in the Indian Ocean. The 12 NIOT moorings also provide valuable data as well as the two JAMSTEC TRITON buoys.
Meetings: Last meeting was held in Cape Town, 29-31 July 2002. IBPIO 7th meeting will be held in Chennai, 14-15 October 2004.

2.3.5.5) IPAB

WCRP International Programme for Antarctic Buoys (IPAB)

Chairman: Enrico Zambianchi, Istituto Universitario Navale, Italy
Coordinator: Peter Wadhams, SPRI, UK
Web site: http://www.antcrc.utas.edu.au/antcrc/buoys/buoys.html

Status: The IPAB was launched in 1995 for a period of 5 years, to coordinate drifter deployments in the Antarctic sea ice zone, to optimize buoy distribution and create a central data archive. It was resolved to continue the programme indefinitely, and as of September 2003, 15 agencies were participating in IPAB activities. In July 2004, 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: Venice, Italy, October 2005.

2.3.5.6) GDP

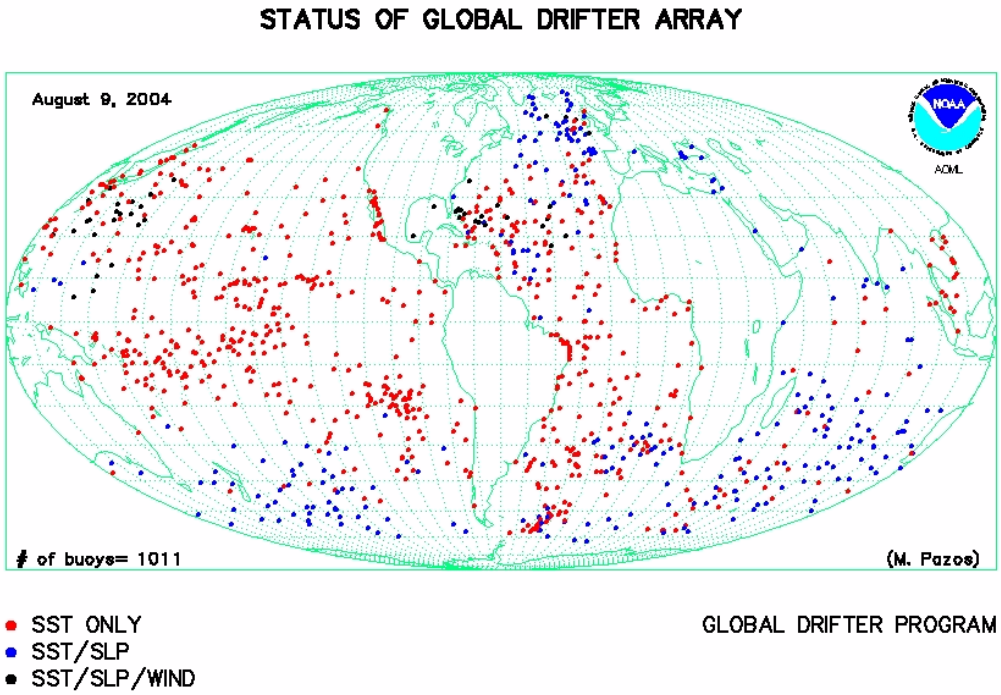
Global Drifter Programme (GDP)

Chairman: Pierre Poulain, OGS, Italy
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. Consistently with JCOMM/OCG phased-in implementation plan, drifter network increased substantially during the last intersessional period as we had 1011 drifters under the GDP in August 2004 versus 775 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.



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.

2.3.5.8) DBCP-PICES NPDBAP

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

Co-Chairmen: NE Pacific: Brian O'Donnell, MSC, Canada
NW Pacific: To be proposed by PICES
Coordinator: Ron McLaren, MSC, Canada
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 July 2004, 66 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-19 meeting in Angra Dos Reis, October 2003. Next meeting is planned in Chennai, 17 October 2004.

2.4) Information exchange

The technical coordinator achieved the following tasks regarding information exchange:

- Updating DBCP web site (http://www.dbcp.noaa.gov/dbcp/) to reflect current DBCP activities.
- Update JCOMMOPS web site (see paragraph 2.3.1.1) for details).
- Stop maintenance and operations of JCOMMOPS internet technical forum as it was not being used.
- Establish JCOMMOPS and DBCP News sections on JCOMMOPS web site and seek articles from Panel Members for addition in the section.
- 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.
- Provide input, if needed, for DBCP publications (DBCP annual report, SVPB design reference)
- Provide DBCP publications upon request
- Make suggestions regarding DBCP brochure update.

2.5) GTS

2.5.1) GTS codes

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

BUFR: BUFR was implemented operationally within Argos GTS sub-system in July 2003. Since then, no changes were made to BUFR template which is used for GTS distribution of buoy data. Developments for BUFR compression are underway as required by the DBCP at its 19th session. Implementation is planned at the end of 2004 or early 2005.

2.5.2) GTS bulletin headers

ICAO Location Indicator (CCCC) used in GTS bulletin headers to identify the source of the data was changed from LFPW to LFVW in June 2004 for all buoy data inserted on GTS from the French Argos Global Processing Centre of Toulouse.

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

2.5.3) 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.

2.5.4) Argos & Argos GTS sub-system

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

- Specifications, and development of BUFR compression within the GTS sub-system
- Specifications, development, testing, and implementation of TAO salinity computation algorithm with GTS sub-system
- Specifications, development, testing, and implementation of Campbell binary format (for IRD met. stations)
- Specifications, development, testing, and implementation of a better duplicate filtering system
- Specifications, development, testing, and implementation of concatenation of the last 40 bits of the preceeding Argos message (basically for Argo APEX 28-bit format)
- Specifications, development, testing, and implementation of smarter delayed distribution to reduce delays (for Argo, distribution achived when a sufficient number of profile points is available)
- Specifications, development, testing, and implementation of FTP distribution of Argos GTS sub-system data to Coriolis centre (Argo).

TC also participated in the activities of the team in charge at CLS of desiging the future Argos data processing system which will eventually replace both standard Argos data processing system and the GTS sub-system. See related preparatory document for details.

2.6) Quality Control

2.6.1) QC guidelines.

TC discussed with Icelandic Meteorological Office ways to find solutions to avoid having SPAM messages distributed onto the buoy-qc@vedur.is mailing list. It was proposed (i) to rename the mailing list to buoy-qir@vedur.is (QIR for Quality Information Relay which is really what the mailing list is doing), and (ii) to implement a filtering system as all buoy quality information messages that are distributed via the mailing list are supposed to have their subject line standardized.

2.6.2) Buoy monitoring statistics

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

2.7) 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.

2.8) Buoy deployment notification scheme

This is an issue where the Technical Coordinator spent substantial amount of time during the last intersessional period, involving the following:

- Discussion with DBCP Action Groups (EGOS, IABP, GDP)
- Discussion with manufacturers (Technocean, Marlin)
- Writing specifications
- Designing new system and working with Marianne Barrailh on software development
- Creating database relational model and tables
- Installing a prototype online

See specific preparatory document regarding this issue for details.

2.9) DBCP evaluation group.

A dedicated web page describing the DBCP evaluation group, membership and tasks, was established (http://www.dbcp.noaa.gov/dbcp/eval_group.html). Mailing list for the evaluation group is (dbcpeval@jcommops.org).

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

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

- **September 2003**

1. Problems with BUFR bulletins generated from Service Argos, Inc., Largo, USA
2. User friendly access to JCOMMOPS status maps
3. Finish reports by TC/DBCP for DBCP-19 session. Place submitted documents onto DBCP web site. Prepare presentations by TC/DBCP.
4. Observation counts on TAO array for Eric Meindl
5. Work with DBCP evaluation group on SVPB air pressure spike issue
6. Prepare meeting and discussion on metadata database (2-3 Oct. meeting in Toulouse)
7. Mathieu Lopes, student, finishes his training period at JCOMMOPS and deployment opportunities application
8. 22 September: Marianne Barrailh, student, begins a three-year part-time training period (basically 50%) at JCOMMOPS and work on JCOMMOPS software development.

- **October 2003**

1. 2-3 October: Visit of Anne Hageberg, CMR, and Enrique Alvarez Fanjul, Puertos del Estado, to write specifications for a metadata database.
2. 7-8 October: Mercator/Coriolis meeting at Météo France
3. 15 October, 8th meeting of GLOSS Group of Experts, Paris. Presentation on JCOMMOPS
4. 20-24 October, DBCP-19 session, Brazil
5. 27-29 October, JTA-23 session, Brazil
6. Follow up of truncated BUFR reports as received in Japan
7. Validation and installation of Argo QC within Argos GTS sub-system
8. SOOP semestrial survey for January-June 2003, import submitted files. Ask for missing files.
9. Work with DBCP evaluation group on SVPB air pressure spike/barometer port issue
10. Argo real-time QC implementation within the Argos GTS sub-system
11. Further discussions regarding buoy metadata

- **November 2003**

1. Problem of truncated BUFR reports fixed
2. Seek deployment opportunities from Argentina, Brazil
3. Update information on MSNZ, BOM, and IBPIO deployment opportunities
4. DBCP-M2-TEST format on DBCP web. GTS sub-system template created accordingly.
5. 6 November: visit of Vinciane Unger and André Peries of Météo France to discuss BATOS system and its possible upgrade to process ocean data, including XBTs.
6. Write specifications for small GTS sub-system evolutions: BUFR compression, battery voltage and sensor temperature in BUFR reports, GTSPP quality flags in BUFR reports, TAO salinity, APEX Argos message concatenation, duplicates and semi-duplicates, delayed Argo distribution, direct distribution of Argo float data to Coriolis, Campbell binary format.
7. Write specifications for buoy metadata deployment notification web pages (asked by EGOS) and ask CLS to evaluate cost of developments. CLS asked Steria. Steria evaluated cost at €24000. JCOMMOPS did its own evaluation at a level of 45 days.
8. Data buoy metadata database relational model circulated amongst DBCP Members
9. Address issue of SPAM messages on buoy-qc mailing list
10. SOOP semestrial survey, import data submitted by BSH, IRD (Nouméa), and complementary data from SEAS.
11. Spreadsheet from Bill Scuba on differences between previous SVPB design and the new one
12. GLOSS status map updated (Oct. 2003 status)

13. Initiating discussions with CLS regarding updating DBCP guide to Argos (DBCP Pub. No. 3)
14. Update "Operation and Achievements of the DBCP" document; update DBCP Powerpoint presentation.
15. Web page describing DBCP evaluation group and membership
16. Updated satcom. review by David Meldrum on DBCP and JCOMMOPS web.
17. Prepare report on DBCP activities for EGOS meeting

- **December 2003**

1. Paris, 2-3 December, EGOS Management Committee meeting. EGOS will be merged into E-SURFMAR of EUCOS as a data buoy advisory group during the 2004-2005 time frame. E-SURFMAR would apply to become DBCP Action Group at DBCP-21, Oct. 2005.
2. 17 December: Visit of Thierry Carval and Loic Petit de la Villeon, IFREMER/Coriolis
3. EGOS asked JCOMMOPS to develop metadata database and web collection system. EGOS offered €10000 to be transferred to DBCP trust fund for JCOMMOPS development.
4. Sorting out German WMO numbers, and AWI WMO numbers in particular
5. Check newly deployed buoys with DBCP-M2-TEST format. Recommend changes to Technical Files.
6. Investigate changing JCOMMOPS logo to make it more consistent with JCOMM logo
7. Update list of NFP for buoy programmes in JCOMMOPS database
8. Refine SOOP Indicators web application, add graphics and map
9. finalize SOOP semestrial survey Jan-June 2003
10. Wave maps for November 2003
11. Vacation, 22 December-2 January.

- **January 2004**

1. Identify pool of WMO numbers for AWI, Germany
2. Install WebObjects 5.2 on new server and test tools to upgrade from 4.5 applications to 5.2 version
3. Create required tables in JCOMMOPS database and develop prototype for web based buoy metadata purchase/deployment notification scheme
4. Barometer drifter upgrade issue
5. Washington-DC, 26-28 January, visit NOAA/OGP, NOAA/OAR, Ocean/US, and SAI.
6. Miami, 29-30 January, visit NOAA/AOML and Technocean

- **February 2004**

1. Barometer drifter upgrade issue
2. Provision of buoy metadata relational model to NDBC
3. Include GLOSS real-time stations in JCOMMOPS map
4. Scheme for allocating unique WMO numbers to OceanSites
5. Work on a tool to produce legends for JCOMMOPS maps that include statistical information of programme status. New maps now routinely produced (e.g. http://bouee.cls.fr/cgi-bin/WebObjects/MapSeek.woa/wa/directMapType?type=DBM_CNTRY)
6. Work with CLS in refining specifications for the new sensor data processing system that will eventually replace the Argos GTS sub-system (so called Argos 2001, phase 3 project)
7. Discuss future role of Argo Information Centre with AST and other actors.
8. Initiate discussion on BUFR template for wave data
9. Sondre Stromfjord LUT now connected to Argos system
10. BUFR decoder provided to NDBC
11. Suggest [JCOMMOPS] method for demonstrating the volume flow of data over time for GOOS Steering Committee.

12. Multisat suggested for buoys reporting in Tasman Sea region for filling in data time gap (added cost)
13. Seek article for Port Technology International. Article from Premkumar ready for April issue.
14. New version of SVPB design manual posted on DBCP web (differences between new reduced-size design and manual design listed in Appendix)

- **March 2004**

1. Macintosh (Mac OsX) ordered at JCOMMOPS for Mathieu Belbeoch and myself to (i) develop WebObjects tools, (and (ii) to test JCOMMOPS web products on Mac.
2. DBCP annual report for 2003 (comments to Boram Lee, IOC)
3. Provide Boram Lee with comments on Drifting Buoys for GEO draft report
4. Information on AX08 & AX18 SOOP lines needs to be loaded in JCOMMOPS database
5. QC Relay procedure using dedicated web page at JCOMMOPS put in place for VOS
6. Discuss Argo management structure with Argo Steering Team (exec). This can potentially impact Argo TC positions and JCOMMOPS
7. 8-11 March, Brest, attend 6th Argo Science Team meeting representing JCOMM
8. 16-17 March, Geneva, visit WMO and discuss OceanOPS04; attend JCOMM-MC meeting.
9. Finalize article from Premkumar for PTI.
10. Continue work with CLS on Argos 2001-phase 3 project
11. SOOP semestrial survey for 2003
12. Ask access to XBT data from Coriolis (MFS)
13. Ask access to XBT data from MEDS (NIO, India)
14. Possible switch from “LFPW” to “LFVW” for CCCC of GTS bulletin headers issued from FRGPC.
15. Plan switch of Argo float GTS bulletin headers from SOVXii to SOFXii for float data inserted on GTS from FRGPC (5 April planned).

- **April 2004**

1. 13, 15, 16 April: Vacation
2. Article from Premkumar published in April issue of Port Technology International
3. Start discussion on cooperation JCOMMOPS – Coriolis for data access
4. SOOP semestrial survey for 2003, first draft issued
5. Macintosh with OS/X operating system received & configured
6. 5 April: switch from SOVXii to SOFXii for GTS bulletin headers of float data inserted on GTS from FRGPC.
7. Continue work with CLS on Argos 2001-phase 3 project
8. Work on SOOP line responsibilities with Steve Cook; reconsider line end-points.
9. Discuss Office of Climate Observations (OCO) Observing System Monitoring Center (OSMC) with NDBC; JCOMMOPS to provide expertise in terms of required database relational model.
10. New dynamic JCOMMOPS web site deployed as prototype
11. Provide Service Argos, Inc. with BUFR decoding software and BUOY encoding software (for test purposes on Iridium data)
12. Buoy metadata collection mechanism (with Marianne Barrailh)
13. Discuss Mathieu Belebéoch’s position reclassification with UNESCO/IOC
14. Work out details of CLS/IOC contract for JCOMMOPS logistics and development
15. Continue work with CLS on Argos 2001-phase 3 project

- **May 2004**

1. 10-15 May 2004, OceanOPS04 meeting, Toulouse. Make a presentation on JCOMMOPS.
2. ICAO location indicator changed from LFPW to LFVW planned for 1/6/2004 for GTS bulletin headers originating from Service Argos, Toulouse. Make announcement.
3. Provide SOOPIP Chair with draft text to invite new participants to join the programme (e.g. Argentina, South Africa)
4. Technocean dummy drifter received at JCOMMOPS for display
5. Crash disk on 3/05/2004 at JCOMMOPS web server. Web site up & running 24 hours later, except for GIS map products which took another 24H to fix. Backup solution being investigated.
6. Investigate with JMA improvement of JMA deployment notification
7. NIB, Slovenia, looking for information on wave sampling
8. Investigate the issue, consult with key people, and start writing document "General scope for a pilot project to make available in real time metadata from in situ marine observing platforms providing SST and water temperature profiles"
9. Web page on WMO numbers updated on JCOMMOPS web site (http://www.jcommops.org/wmo_numbers.html)
10. A number of JCOMMOPS applications moved to new server
11. New developments with Argos GTS sub-system tested (Campbell binary format, TAO salinity)
12. Buoy metadata collection mechanism (with Marianne Barrailh)
13. End of May: GTS outage due to technical problems on both sides at Service Argos
14. Provide Service Argos user office of Toulouse with training on Argos GTS sub-system
15. Provide input on DBCP & SOOP for GODAE Implementation plan
16. DBCP-20 agenda reviewed with Boram Lee, IOC
17. Continue work with CLS on Argos 2001-phase 3 project

- **June 2004**

1. Continue working on general scope for a pilot project to make available in real time metadata from in situ marine observing platforms providing SST and water temperature profiles.
2. Obtain EGOS historical metadata from EGOS Technical Secretariat
3. 1 June; Implementation of "LFVW" GTS originating centre for GTS bulletins originating from Service Argos
4. Continue providing Service Argos user office of Toulouse with training on Argos GTS sub-system
5. Continue work with CLS on Argos 2001-phase 3 project (i.e. redesign of GTS sub-system)
6. Check DBCP-20 agenda and provide feedback to Boram Lee
7. Prepare dedicated web page for hosting DBCP-20 preparatory documents and provide link to it for DBCP-20 web site at NIO.
8. Discuss with Iceland issue of SPAM messages that appear on buoy-qc@vedur.is mailing list. List might be renamed to buoy-qir@vedur.is (i.e. Buoy Quality Information Relay) and filters applied.
9. Review and suggest new cost estimates of buoy networks for WIOMAP project document.
10. Establish contact with China regarding ODAS metadata database
11. Provide input on status of in-situ ocean observing systems for GODAE implementation plan
12. Prepare demonstration prototype of metadata collection scheme for presentation at EGOS meeting
13. New JCOMMOPS web site implemented. Site is now directly linked to JCOMMOPS database and web site content automatically updated according to changes in the database.

14. 29-30 June: EGOS Management Committee meeting, Reykjavik, Iceland

- **July 2004**

1. Student at JCOMMOPS working for 3 months on graphical design aspects of the web site
2. Submit paper to Yves Tourre on JCOMMOPS for publication in the OceanOPS04 proceedings
3. Prepare report and presentation for IABP meeting
4. 7-9 July: IABP meeting, Geneva
5. 12-30 July: Vacation

- **August 2004**

1. Buoy metadata collection mechanism (with Marianne Barrailh)
2. Continue providing Service Argos user office of Toulouse with training on Argos GTS sub-system
3. Continue work with CLS on Argos 2001-phase 3 project (i.e. redesign of GTS sub-system)
4. Prepare report and powerpoint presentation for Louis Vermaak to present at the 10th ISABP meeting, Rio, 23-27 August 2004.
5. DBCP-20 preparatory documents

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%

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 World Wide Web Internet 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://w4.jcommops.org/cgi-bin/WebObjects/MapSeek.woa/wa/directMapType?type=DBM_CNTRY
- Drifting and moored buoys in the high seas reporting SST and air pressure: http://w4.jcommops.org/cgi-bin/WebObjects/MapSeek.woa/wa/directMapType?type=DBM_SPW
- Drifting and moored buoys in the high seas reporting SST, air pressure, and wind: http://w4.jcommops.org/cgi-bin/WebObjects/MapSeek.woa/wa/directMapType?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 life time.

I Computed the graphs showing the distribution of life times 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://w4.jcommops.org/cgi-bin/WebObjects/WMOTelecom), 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:

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)

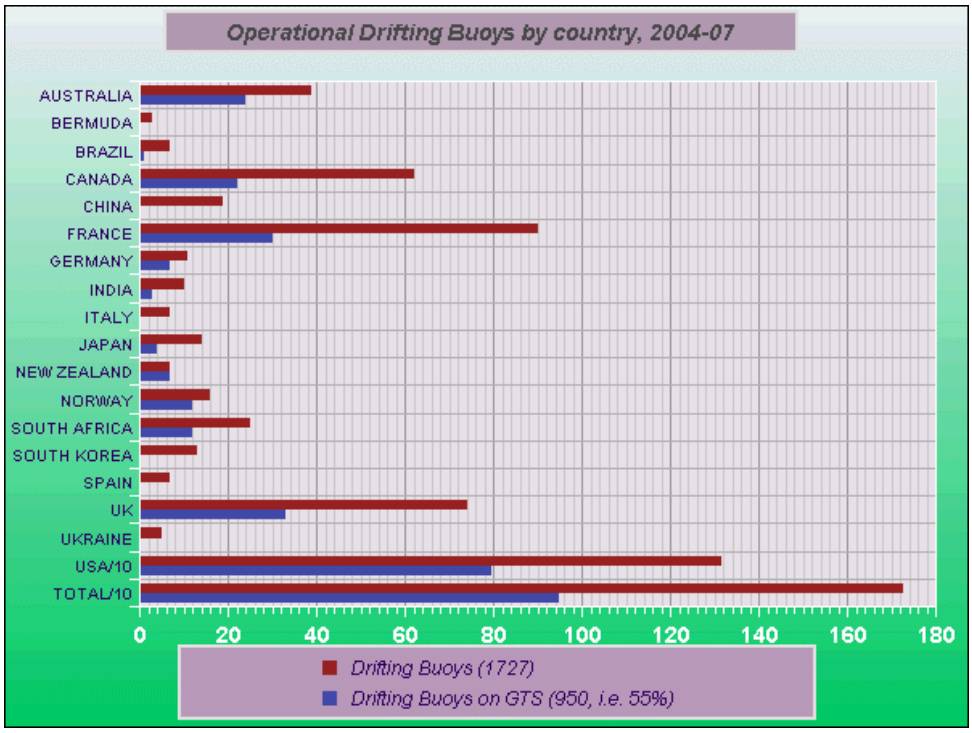
Bulletin header	Deployment area
SSVX01 CWHX	NorthWest Atlantic Ocean

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

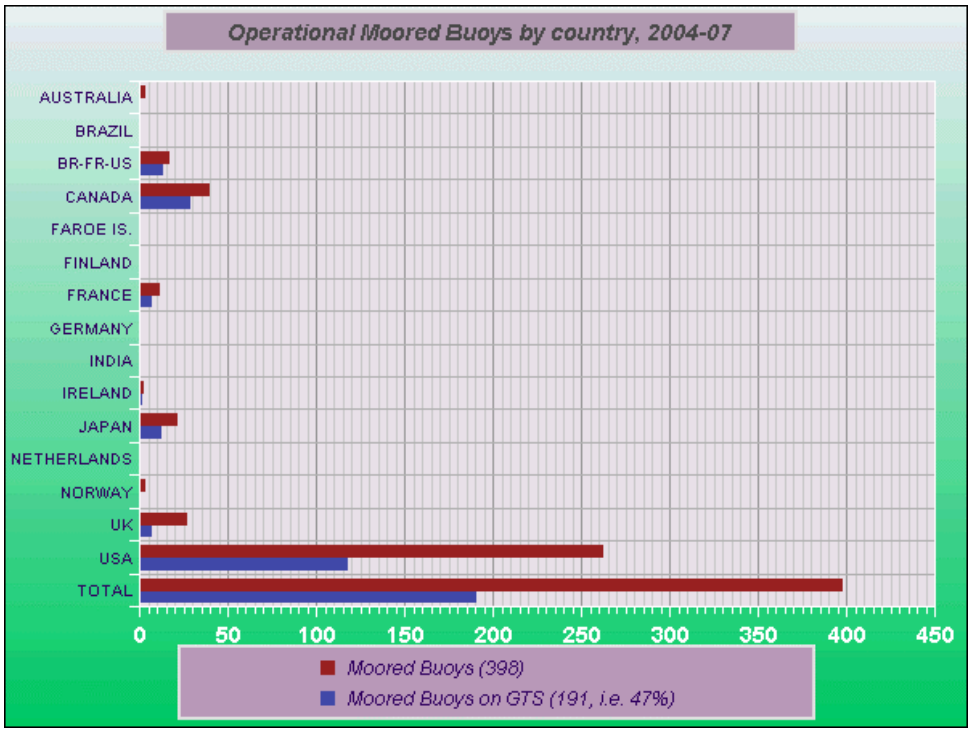
Bulletin header	Deployment area
SSVX01 BGSF	North Atlantic Ocean (EGOS)

Graphs

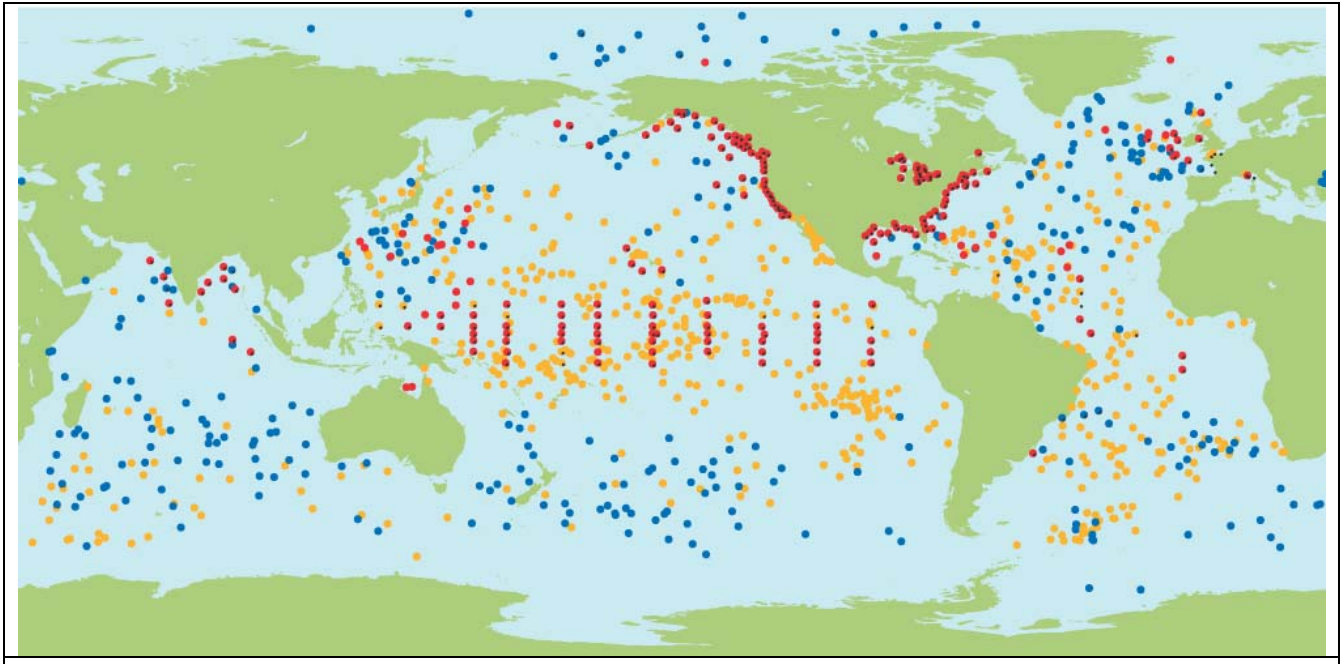
Graph-1: Drifting Buoys and those on GTS by country, July 2004:



Graph-2: Moored Buoys in the high seas (plus US and Canadian buoys and moorings reporting via Argos) and those on GTS by country, July 2004:



Map 1: **Drifting and Moored** buoys reporting SST, Air Pressure, or Wind on GTS in July 2004:

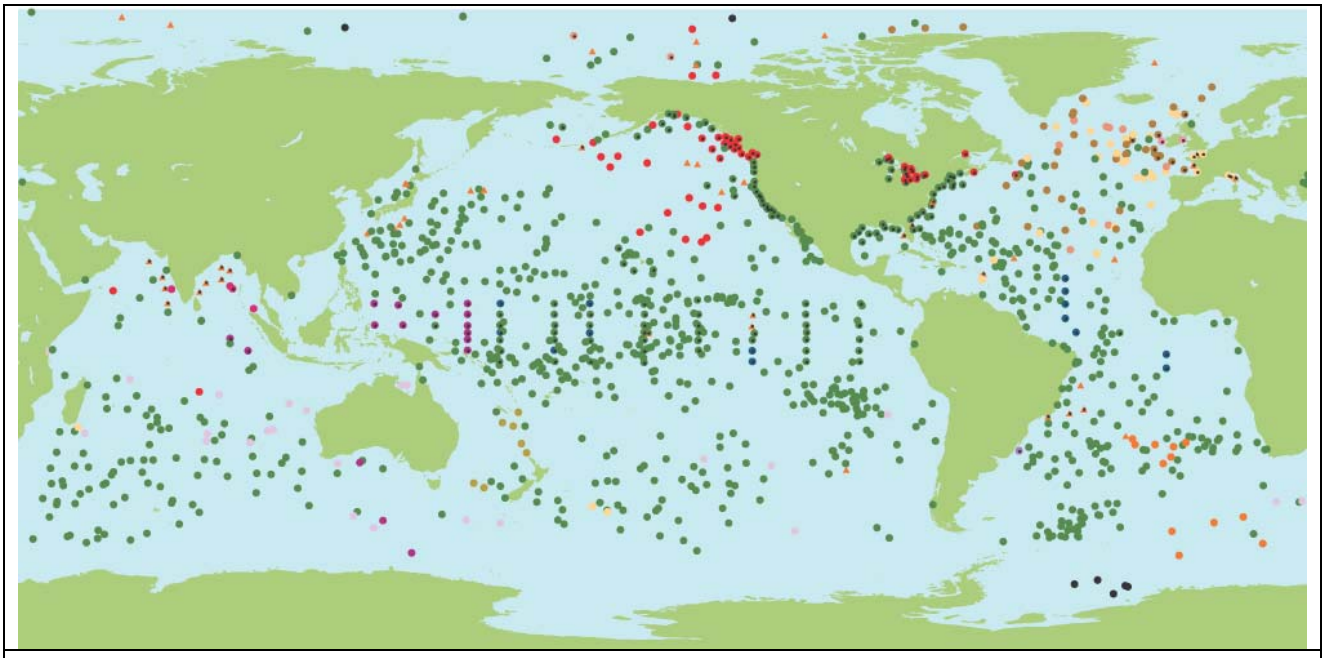


DBCP status (SST, P, Wind), July 2004 (data buoys reporting on GTS)

Air pressure
SST
Wind
Moorings

Note: Data received from GTS at JCOMMOPS via Météo-France

Map 2: Buoys reporting on GTS in July 2004 **by country**:



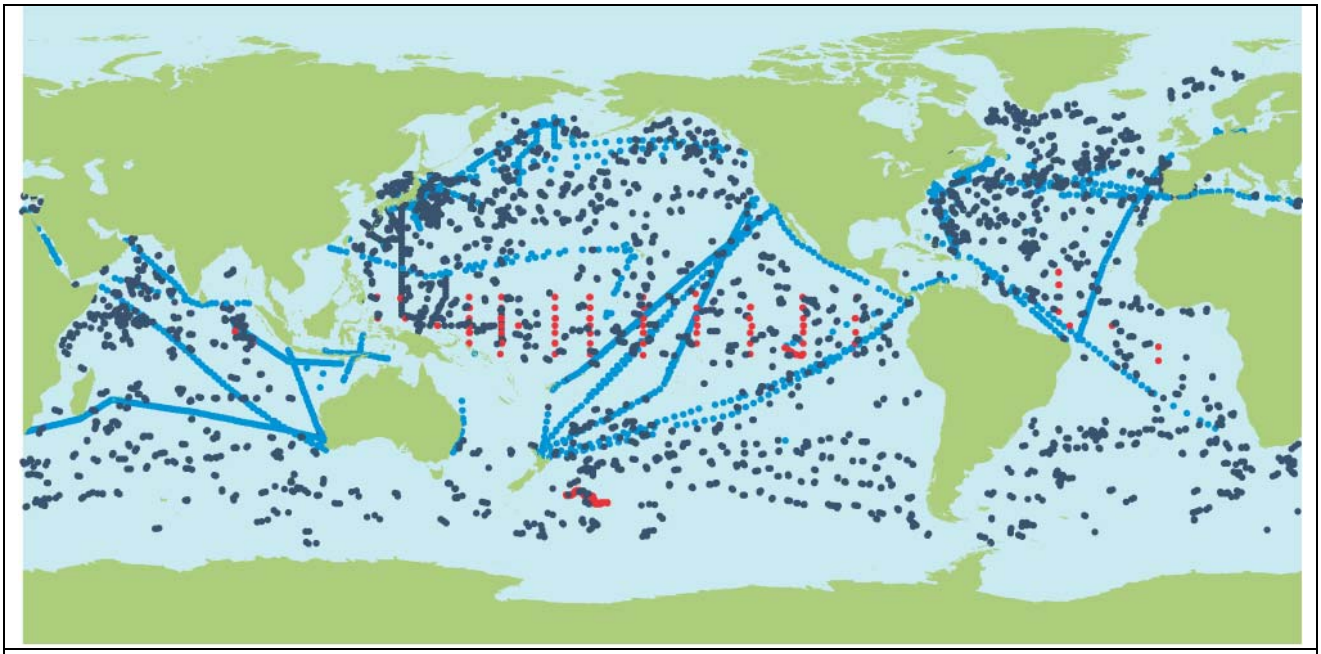
DBCP status by country, July 2004 (data buoys reporting on GTS)

Drifting buoys: 950 Moored buoys: 191

- AUSTRALIA (24)
- BRAZIL (1)
- BRAZIL/FRANCE/USA (14)
- CANADA (22, 29)
- FRANCE (30, 7)
- GERMANY (7)
- INDIA (3, 1)
- IRELAND (2)
- JAPAN (4, 13)
- NEW ZEALAND (7)
- NORWAY (12)
- SOUTH AFRICA (12)
- UNITED KINGDOM (33, 7)
- UNITED STATES (795, 118)
- MOORINGS
- UNKNOWN

Note: Data received from GTS at JCOMMOPS via Météo-France; number of drifting and moored buoys in brackets respectively

Map 3: Ocean platforms reporting **Sub-surface Temperature** on GTS in July 2004



Sub-surface temperature profiles, July 2004 (profile data distributed on GTS)

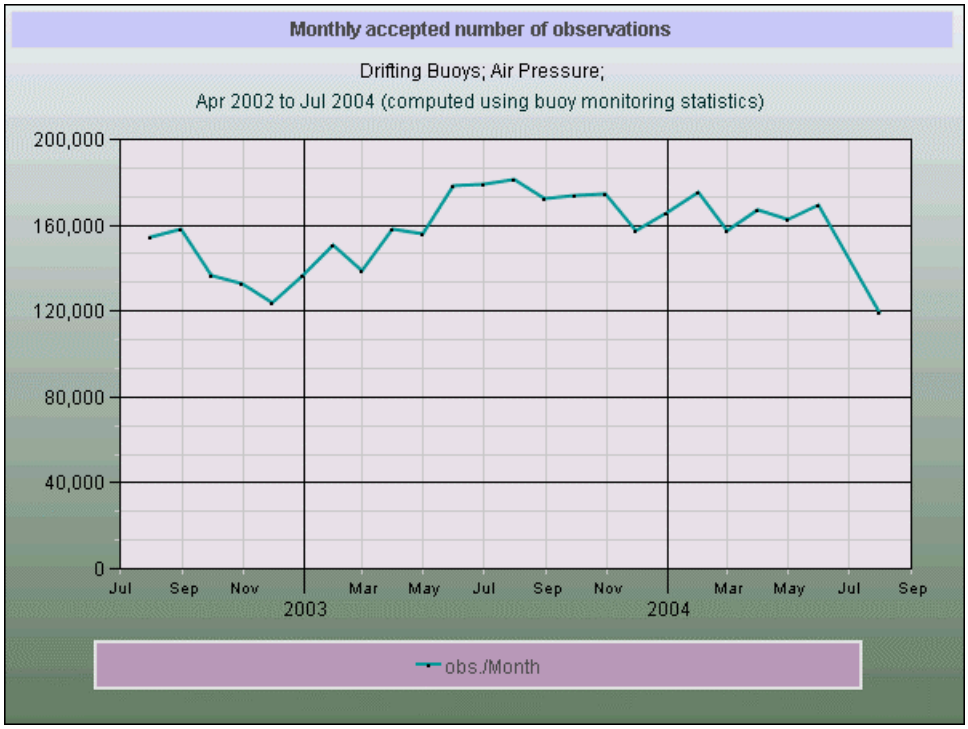
Total stations: 1284 Total profiles: 13436

- BATHY (mainly XBTs) (53, 1773)
- TESAC (mainly Argo floats) (1163, 3698)
- BUOY (drifting & moored buoys) (68, 7965)

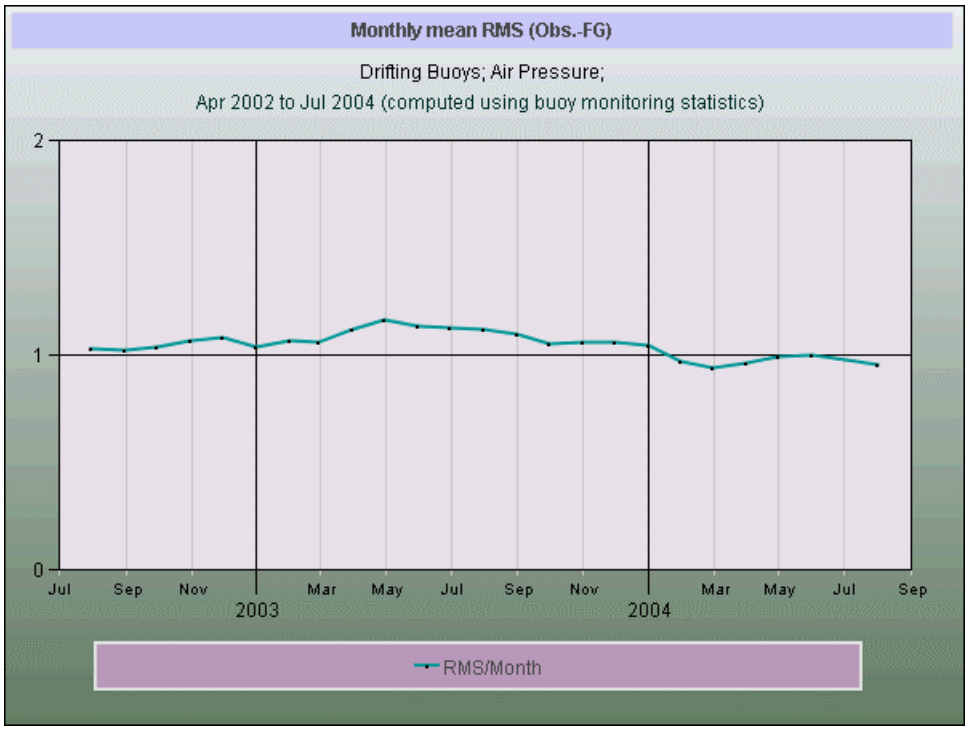
GTS data received at JCOMMOPS via Météo-France.

Note: figures in bracket are number of platforms and number of profiles respectively

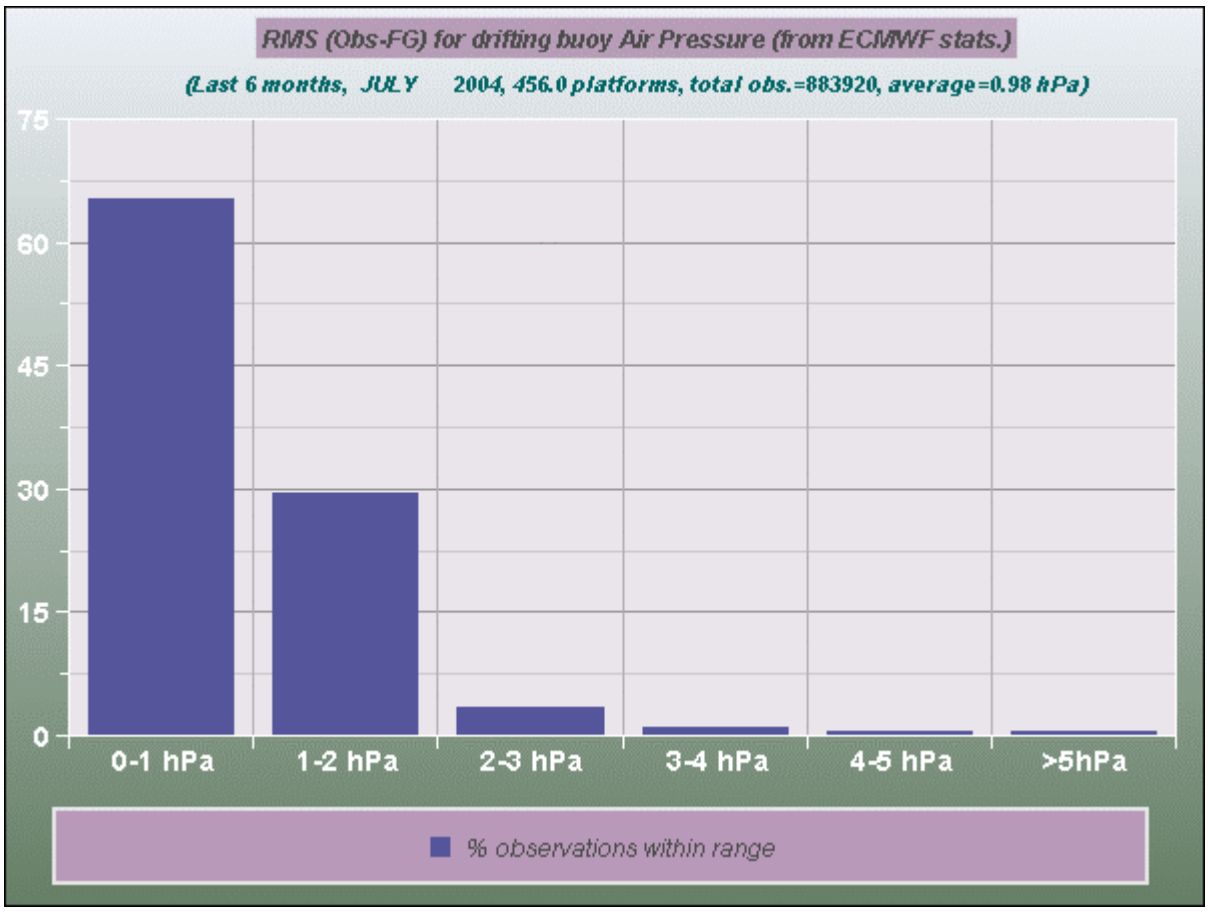
Graph 3: Evolution of number of air pressure observations distributed on GTS per month for the period April 2002-July 2004 (from ECMWF monitoring statistics)



Graph 4: Evolution of mean RMS (Obs.-First guess) per month for the period April 2002 to July 2004 for global GTS air pressure data (from ECMWF monitoring statistics)



Graph5: Histogram of distribution of RMS (Obs. - First Guess) for the period 03/2002 to 08/2003.



ANNEX IV

ACTION GROUP REPORT SUMMARIES

THE EUROPEAN GROUP ON OCEAN STATIONS (EGOS)

The EGOS MC had its winter meeting in Paris, December 2003, and its summer meeting in Reykjavik, June 2004. There was no change reported in the number of member countries, being Denmark, France, Iceland, Ireland, Germany, The Netherlands, Norway, Spain, Sweden and United Kingdom.

Pierre Blouch (Météo France) is the Technical Coordinator and ms. Anne Hageberg (Christian Michelson Research AS, Norway) represents the Technical Secretariat.

In summarizing the activities of EGOS, it was noted that:

- EGOS activities are to be transferred to the EUMETNET Surface Marine Programme E-SURFMAR by January 2005;
- As a collaborative action by the Spanish Meteorological Institude and Puertos del Estado, an array of 12 Spanish moored buoys were added to the EGOS data buoy system. The EGOS TC has been asked to find a solution to put the data of these buoys onto the GTS;
- The Technical Secretariat and the DBCP TC have worked together to define a system to store buoy meta data under JCOMMOPS. At its December meeting the EGOS MC agreed to support the development of a global meta data database and the related collection schemes. Work started early 2004 and it was hoped to finish the development by the end of 2004;
- The EGOS TC started several studies, among others on ARGOS' multi-satellite reception mode;
- Reporting tools and content for moored buoys were discussed;
- The lifetime of SVP-Bs, and in particular with their drogue still on at the end of the lifetime, was constantly monitored.

The number of drifters deployed had reached its maximum at the end of 2003 when 57 buoys were operational during an Observing System Experiment (OSE) under the EUMETNET Composite Observing System (EUCOS). This was and will be the highest number ever operational at one time under EGOS. The results of the OSE were used in the Design Study for E-SURFMAR.

At the reporting date of 22 August 2004, 55 operational drifters in the EGOS system were equally distributed over EGOS North (28) and EGOS South (27).

The average lifetime of the EGOS drifting buoys over the period 23 August 2003-22 August 2004 was 278 days for 53 buoys that ceased operation. This is 40 days lower than in the previous period. One major reason for the shorter lifetime was an early failure at or shortly after deployment.

The lifetime for SVP-B drifters ending without a drogue was 458 days, compared to 500 days during 2003. For SVP-Bs ending its life with the drogue still on the average lifetime was 196 days, 49 days more than in 2003.

A total of 27 moored buoys were under EGOS, of which 13 were reporting on the GTS.

Since this was the last report on EGOS activities because EGOS will be transferred to E-SURFMAR, Mr. Grooters, representing EGOS officers, thanked the DBCP and in particular the Technical Coordinator for the cooperation and assistance over the past years.

THE INTERNATIONAL ARCTIC BUOY PROGRAMME (IABP)

The 14th annual meeting of IABP was held at WMO headquarters, Geneva Switzland, on 7-9 July 2004. The participants strived to maintain at least 25 buoys spread evenly across the Arctic Ocean, reporting surface air pressure and temperature onto the GTS. Minimum data coverage occurred in April (24 byoys on GTS) and the maximum was in September (38 buoys on GTS)

Some participants highlights

- AWI (Alfred Wegener Institute) set up web site providing their information on IABP and IPAB activities and buoys.
- AARI (Arctic and Antarctic Research Institute) established arctic drifting station SP-33 in their central Arctic Basin in the summer of 2003
- JAMSTEC (Japan Marine Science and Technology Centre), in collaboration with MetOcean in development of an ice-drifting buoy system tethering an ARGO type subsystem CTD profiler.

Issues and opportunities included the following; Providing the 7 ICEX buoys required for the annual summer “White Trident” deployment via air drop from NAVO Hercules was struggle each year.

Challenges for the group

Agencies who deploy buoys on the ice should be encouraged to join IABP and release their data to GTS.

It should be ensured that the basic parameters are collected evenly across the basin, so that these requirements are not dropped as more sophisticated instruments are developed and deployed. It also should be ensured that forecast centers are made aware of IABP data to replenish funding lost as Research and Development gencies.

IABP hopes to make the best of the International Polar Year 2007-2008.

THE INTERNATIONAL BUOY PROGRAMME FOR THE INDIAN OCEAN (IBPIO)

The seventh Programme Meeting of the IBPIO was held at Chennai, India, preceding DBCP-20. The meeting was informed that in the period from 1 September 2003 – 31 August 2004, a total of 68 drifting buoys were deployed. This was lower than in previous years, however the ratio of pressure buoys compared to non-pressure buoys continued to increase. No buoys were deployed with wind measuring capabilities. In the same period, the number of active drifting buoys generally varied between 95 – 115, whilst the number of buoys measuring air pressure was mostly greater than 60. Combining the pressure observations from buoys with the sparse number of VOS observations significantly improved the MSLP coverage over the Indian Ocean, however the

combined density of MSLP observations over a large portion of the area still remains close to zero. Network density maps produced by JCOMMOPS and Météo France show the tropics remain sparsely populated with buoys.

The Programme Committee adopted two recommendations to DBCP:

- That IBPIO, through DBCP, is kept informed about GEOSS, and in particular about any likely involvement in the GEOSS 10 year Implementation Plan.
- That DBCP raise at JTA the need for Argos to provide all buoy operators with multi-satellite service, as part of the standard service, to increase the number of buoy observations.

Other outcomes from the Programme Meeting included:

- The Programme Committee welcomed and fully supported the metadata collection scheme developed and presented by the DBCP-TC.
- The number of planned drifting buoy deployments during the inter-sessional period is not firm, but will exceed 100 buoys.
- A challenge facing the IBPIO will be to meet the network requirements of other groups, e.g. IOC/CLIVAR/IOGOOS Indian Ocean Panel (IOP).

The Programme Committee reappointed Graeme Ball, Australia, as the Chairman and Pierre Blouch, France, as the Programme Coordinator for the next inter-sessional period.

The eighth Programme Meeting of the IBPIO will be held in Cape Town, South Africa in October 2005.

THE INTERNATIONAL PROGRAMME FOR ANTARCTIC BUOYS (IPAB)

Chairman: Enrico Zambianchi, Università di Napoli “Parthenope”, Italy

Coordinator: tbd, Alfred Wegener Institut fur Polar und Meeresforschung,

Last IPAB meeting: IPAB-IV in Bremerhaven, Germany, September 2003

Next planned IPAB meeting: IPAB-V in Venice, Italy, October 2005

The International Programme for Antarctic Buoys (IPAB) was launched in 1995 to establish, coordinate and maintain a network of drifting buoys in the Antarctic sea-ice zone in order to monitor and to support research on atmospheric and oceanic climate in the Antarctic sea-ice zone. The operational area of the Programme is south of 55 degrees South latitude, and includes that region of the Southern Ocean and Antarctic marginal seas within the maximum seasonal sea-ice extent.

The number of platforms contributing to the programme has been steadily increasing over the last four years; a large deployment coordination activity is planned for the International Polar Year, aimed at reaching the optimum sampling of autonomous platforms in the area of interest of the programme, for research and operational purposes.

THE INTERNATIONAL SOUTH ATLANTIC BUOY PROGRAMME (ISABP)

The intersession period September 2003 to August 2004 has been very successful. In the Tropical and Southern Atlantic Ocean the data coverage has been good, with some gaps still in the eastern part of the sub-Tropical ocean. In the period 265 drifters were deployed consisting of 209 SVP, 52 SVPB and 4 SVPBWD drifters. The main contributions to the deployments were GDC, Navoceano, South African Weather Service, Brazil and Argentina. 19% of the drifters deployed measured air pressure compared to the 37% in 2003.

The tenth ISABP meeting was held in Arraial do Cabo, Rio de Janeiro from 23 to 26 August 2004. The successful meeting was preceded by a Technical and Scientific workshop during which 12 papers were presented , attended by 32 participants. At the meeting hosted by INMET and DHN Ariel Troisi from Argentina was elected as chairman and Alaor Dall' Antonia from Brazil as vice-chairman. Louis Vermaak from South Africa was re-appointed as Programme Coordinator.

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, while GDP and South Africa will do some deployments off the West Coast of Africa to try and fill the gap. In the Southern Atlantic GDP, South Africa and Argentina will do all the deployments. South Africa will upgrade 30 SVP drifters, while GDP will provide an additional 15 SVPB drifters. In total 265 drifters are expected to be deployed which include 45 barometer drifters. The Programme Coordinator encouraged participants to make use of the upgrade offer from NOAA to try and increase the array of barometer drifters by 20%.

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

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

The Global Drifter Program (GDP) is a branch of the Global Ocean Observing System (GOOS) Center at NOAA's Atlantic Oceanographic and Meteorological Laboratory (AOML). The GDP objective is to maintain a global 5º by 5º array of ARGOS tracked Lagrangian surface drifting buoys to meet the need for an accurate and globally dense set of in-situ observations of sea surface temperature and mixed layer circulation. This data supports short-term (seasonal-to-interannual) climate predictions as well as climate research and monitoring.

Past Work

Tropical Oceans (20 S – 20 N)

During Sept. 2003-Aug. 2004 (hereafter "FY04"), 100 SVP drifters were deployed in the tropical Atlantic Ocean. Deployments were focused on data sparse regions such as the Gulf of Guinea and Angola Basin. A total of 169 drifters were deployed in the tropical Pacific. Research vessels and Voluntary Observing Ships conducted these deployments. In the Indian Ocean 18 drifters were deployed. Ten of these buoys were upgraded with barometers by Meteo-France and air deployed by the Naval Oceanographic Office.

Subtropical Oceans, Southern Hemisphere

During FY04, 55 buoys were deployed in the subtropical southern hemisphere. Deployments were made from research vessels and Voluntary Observing Ships. Five buoys in the

Pacific Ocean were upgraded with barometers. Six buoys in the Atlantic Ocean were upgraded with barometers.

Southern Ocean

During FY04, 92 drifting buoys were deployed in the Southern Ocean. A total of 74 buoys were upgraded with barometers by co-operative agencies. Research vessel and Voluntary Observing Ships conducted these deployments. There was an increase from the 58 barometer upgrades in 2003. Our appreciation to the many agencies and companies for their contributions to the Global Drifter Program

2005 Goals

- Deployment of 900 Drifters in the period between October 2003 and September 2004.
- Concentration of deployments on Southern Oceans and Data Sparse regions.
- Deployment of 50 SVP-B buoys in the North Pacific.
- Continue to work with Co-Operative Agencies to upgrade Buoys with Barometers.
- Increase in Atlantic Ocean deployments.
- Develop new products using the drifter data, including a high-resolution climatology of tropical currents and a quarterly update of the drifter array.

THE NORTH PACIFIC DATA BUOY ADVISORY PANEL (NPDBAP)

Summary of Activities for Sept. 2003 – Aug. 2004

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 second Annual Report as an official body of the DBCP.

During the period Sept 1, 2003 to August 31, 2004 an average of 66 drifting buoys reporting to the Marine Environmental Data Centre (MEDS) were active in the North Pacific Ocean (30.00N to 65.00N and 110.00E to 110.00W). A total of 268,547 messages were received during the period. As of August 2004, 68 buoys were reporting, 28 with barometric pressure. Please refer to the complete Annual Report for details, Tables and Figures showing the number of buoys in operation and the number of buoy messages received during the period. The tables and figures were compiled by MEDS and are also available on the NPDBAP web site which can be found at: http://npdbap.noaa.gov.

Meetings

October 11, 2003

A meeting of the Panel was scheduled during the PICES Twelfth Annual Meeting held October 10-18, 2003, at the Conference Hall of the Mayfield Hotel, Seoul, Korea. Unfortunately, insufficient Panel members attended to have a meeting. An information session was held instead to review the 2003 NPDBAP Annual Report. Ron McLaren presented the complete 2003 Annual Report to the Physical Oceanography and Climate Committee (POC) session.

October 21, 2003

A meeting was held during the DBCP 19 meeting in Angra dos Reis, October 21, 2003. Panel and DBCP representatives from Canada, United States, Korea, Japan and the WMO were in attendance.

October 17, 2004

The 2004 meeting of the NPDBAP was held on October 17, 2004 prior to DBCP 20 on Oct. 18-22 in Chennai, India. It was felt this would permit maximum attendance of active Panel members while minimizing travel costs to attend a meeting in a different location.

Election of officers

Mr. Al Wallace (Meteorological Service of Canada) was elected to the position of North American Co-chair and Mr. Craig Engler was elected as Technical Coordinator, due to the pending retirement of Mr. Ron McLaren.

Ron McLaren
Technical Coordinator - NPDBAP
Email: ron.mclaren@ec.gc.ca

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. At present, weak El Niño conditions prevail in the tropical Pacific. The array is maintained jointly by the U.S. (NOAA/PMEL) and JAPAN (JAMSTEC), with additional support from France (IRD). TAO/TRITON data return remains good, with an overall value for real-time data availability of 86% for the time period 1 October 2003 to 30 September 2004. Damage to moorings and sensors due to fishing activity continues to be of concern.

PIRATA (Pilot Research Moored Array in the Tropical Atlantic) is nearing the end of a 5-year (2001-2006) consolidation phase, during which time the array has been maintained jointly by the U.S. (NOAA/PMEL), France (IRD, Meteo France) and Brazil (INPE, DHN). The future of PIRATA will be the focus of discussions at PIRATA-10, to be held December 14-16, 2004, in Fortaleza, Brazil. Tropics of discussion will include the impact that PIRATA data have had on our understanding of tropical Atlantic variability, possible expansions within the PIRATA array, and resource allocations for continuation of the array. PIRATA real-time data return for the past year was 79%, an improvement over previous years, but still lower than that for TAO/TRITON. Loss of data due to vandalism is also of concern in PIRATA. Data from TAO/TRITON and PIRATA are also internally recorded, thus overall data return may increase after moorings are recovered.

Plans for the coming year include: expansion of sea surface salinity to all moorings in TAO/TRITON, insertion of TAO and PIRATA salinity data onto the GTS, and enhancement of 5 TAO/TRITON and 3 PIRATA moorings to full flux measurements. Management of the TAO portion of TAO/TRITON officially transferred from PMEL to NDBC in October 2004. A gradual transfer of responsibilities is planned through 2007. Current TAO staff at PMEL will continue to provide operational support for the array throughout the transition.

A draft strategy for the establishment of an Indian Ocean moored buoy array was presented at the First Session of CLIVAR/GOOS Indian Ocean Panel, held in February 2004 in Pune, India. The array will be maintained through international collaboration, with commitments from counties within and outside of the Indian Ocean region. Moorings at some locations have already been established, such as existing TRITON moorings at 1.5°S 90°E, 5°S 95°E and a subsurface ADCP mooring at 0° 90°E. The first deployment of 4 new moorings (3 ATLAS and 1 ADCP) is to be accomplished in October 2004 as a collaborative effort of the U.S (NOAA/PMEL) and India (NIO, NIOT, NCAOR).

Additional information, data, and metadata for TAO/TRITON and PIRATA are available at www.pmel.noaa.gov/tao.

ANNEX V

OPERATING PRINCIPLES OF E-SURFMAR in the context of the DBCP

(as submitted, by E-SURFMAR, 12 October 2004)

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, optimize and progressively integrate the European activities for surface observations over the sea. Fifteen EUMETNET members agreed to participate in the first four years of the programme (2003-2007).

According to a Memorandum of Understanding, signed in 2004 between the European Group on Ocean Stations (EGOS) and E-SURFMAR, it was agreed that, after 1st January 2005, E-SURFMAR will assume overall responsibility for the moored and drifting buoy networks managed by EGOS up to there. EGOS members will then transfer to an E-SURFMAR Data Buoy Technical Advisory Group.

E-SURFMAR aims are to

- . provide design principles for co-ordinating the future development of the surface marine observational structure for VOS, moored and drifting buoys in order to meet EUCOS requirements ;
- . develop appropriate funding mechanisms and provide suitable management to ensure that programme objectives are met in an efficient and timely manner ;
- . optimise surface-marine observations from VOS, moored and drifting buoys taking full account of EUCOS observational requirements in data-sensitive areas ;
- . maximize the efficiency of operating VOS, moored and drifting buoys for EUMETNET/EUCOS participants by reducing duplication and implementing requirements in the most cost-efficient manner ;
- . develop proposals for the future integration of the existing voluntary observing fleets and buoy networks operated by EUMETNET Member countries.

Operational area

The EUCOS area of interest is bounded by 90°N – 10°N ; 70°W – 40°E. However, climatological studies showed a higher sensitivity of air pressure measurements at the sea surface on Numerical Weather Predictions (NWP) over Europe when they are carried out in the north of 30°N. A higher density of observations will be searched there.

Variables

The atmospheric pressure at the sea surface (and its tendency) is the most important parameter for E-SURFMAR. It has a crucial importance for NWP and it cannot be provided by the satellite observing component.

Sea-surface temperature measurements are systematically performed on drifting and moored buoys. They contribute to calibrate satellite measurements for this parameter.

The measurements of wind (speed and direction) as well as waves (directional spectra) are strongly recommended on a few moored buoys in order to calibrate and validate satellite data.

Surface current is measured through the move of the drifting buoys which participate in the Global Drifter Programme of the DBCP (most of the E-SURFMAR drifting buoys).

Basic network density

To be consistent with the requirements stated by the World Weather Watch, E-SURFMAR attempts to provide a network of stations (buoys or ships) spaced at 225 km in average and reporting the basic variables (air pressure, sea surface temperature and air pressure tendency). However, due to budget considerations, this will be probably not possible before a long time.

Buoy providing and deployments

Although participants retain ownership of the moored buoys they operate in the frame of the programme – they are compensated for that -, drifting buoys are globally purchased. The buoys are delivered to a few deployment centers from which they are put aboard ships of opportunities. Ship's officers are instructed to deploy the buoys in suitable positions provided by the Data Buoy Manager.

Data acquisition and distribution

All buoys in the basic network are equipped with transmitters to enable hourly basic meteorological and oceanographic data to be transmitted in real-time. In general, data provided by drifting buoys are collected and located thanks to the Argos systems. Data provided by moored buoys are transmitted either through Meteosat Data Collection Platforms (DCP) or through Inmarsat-C. Data are then coded and reported onto the Global Telecommunication System of WMO in approved WMO formats.

Data acquisition, distribution and archiving

All basic meteorological and oceanographic data from drifting and moored buoys in the programme are sent onto the GTS. So, they are archived at various responsible oceanographic data centres including the Marine Environmental Data Service (Canada) for drifting buoys data and Meteo-France in the frame of E-SURFMAR.

Raw Argos data of the E-SURFMAR drifting buoys participating in the Global Drifter Programme are made available to the Global Drifter Centre in Miami. Raw Argos data of drifting buoys are also archived at Meteo-France for technical evaluations.

Duration

The E-SURFMAR programme operates for an initial four-year period with regular formal review by the EUMETNET Council leading to a decision on its continuation.

Funding arrangements

Financial contributions to the programme are shared among the participants according to the GNI of their respective country. For data buoys, the E-SURFMAR budget includes : the funding of a part time Data Buoy Manager ; the purchase of drifting buoys ; their communication costs after 1st January 2006 if possible ; compensations for the amortization and the maintenance of 4 moored buoys ; and the contribution from participants to the DBCP fund.

Meetings

The Data Buoy Technical Advisory Group meets at least once, every year. All the participants are eligible to attend at their own expense.

Websites

EUMETNET : http://www.eumetnet.eu.org/
EUCOS : http://www.eucos.net/ (restricted to participants only)
E-SURFMAR : http://surfmar.meteo.fr/ (should be opened before the end of 2004)

ANNEX VI

Revised version of the DBCP Implementation Strategy

FOREWORD

The Drifting Buoy Co-operation Panel (DBCP) was established in 1985, jointly by the World Meteorological Organization (WMO) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO, as a means of enhancing cooperation, coordination and information exchange among the operators and users of drifting buoys, meteorological and oceanographic, research and operational, with a view to improving both the quantity and quality of buoy data available on the Global Telecommunications System of WMO in support of major programme requirements of the two Organizations. The panel appointed a full-time technical coordinator in 1987, using funds provided voluntarily by panel member countries, and in 1992 its terms of reference were widened and its name changed to Data Buoy Co-operation Panel to reflect its work in co-ordinating all forms of ocean buoy deployments.

During the 15 years of its existence, the panel has achieved great success in achieving its initial objectives. At the same time, this period has also seen remarkable advances in both buoy and communications technology, as well greatly enhanced and expanded requirements for buoy data, in particular in support of global climate studies. Major global experiments such as TOGA and WOCE have clearly demonstrated the value of buoy data for this purpose, and at the same time established and refined the buoy networks needed to fulfill the scientific requirements. One of the major challenges now facing the panel and buoy operators is to convert the buoy networks established for these experiments into long-term operational programmes.

In recognition of these new developments and expanded requirements, and in the context also of the implementation plans and requirements of the Global Ocean Observing System (GOOS) and the Global Climate Observing System (GCOS), the panel agreed in 1997 on the need for a DBCP Implementation Strategy, which would provide an overall framework for the panel's work, and at the same time enable it and its members to react appropriately to future developments. A draft strategy document was prepared for the panel by Mr David Meldrum, reviewed and revised at the panel session in 1998, and is now published in this DBCP Technical Document. The strategy document will also be made available through the DBCP web server.

PREFACE TO 2nd EDITION, October 2001

It was always intended that the Implementation Plan should be a dynamic document that reflected the evolution of the DBCP's aims and aspirations within the rapidly changing environment of oceanography and marine meteorology. This edition takes particular note of the consensus that is developing regarding the requirements for marine observations in support of climate modelling and operational marine forecasting, as stated at the 1st International Conference of the Ocean Observing System for Climate (OceanObs 99, St Raphaël, October 1999)[1], and at the first session of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM-I, Akureyri, June 2001). [2]

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RECORD OF CHANGES

Version No	**Date**	**Change**
A	Oct 1997	First draft
1.0	Oct 1998	First release
2.0	Oct 2000	Revised and updated to take account of JCOMM and developments in satellite communications
2.1	Oct 2001	New references, graphics and textual changes
3.0	Oct 2002	New section 3.4, updated Annexes E and F
4.0	Oct 2003	Add para 8.13, update Annex F
5.0	Oct 2004	Updated paras 2.1, 3.5, 3.8, 4.1, 4.2 and 7

GLOBAL DRIFTING BUOY OBSERVATIONS - A DBCP IMPLEMENTATION STRATEGY

1. INTRODUCTION

Satellite-tracked drifting buoys have been used by oceanographers and meteorologists for two decades in support of both research and operational programmes. With the exception of the Global Weather Experiment FGGE, early deployments were largely uncoordinated at an international, or even national level. Co-operation between the meteorologists and the oceanographers was also practically non-existent, not only because of a lack of motivation stemming from different perceptions of the aims of drifter deployments, but also because no forum for dialogue existed. Some changes came about through the establishment of the Argos Joint Tariff Agreement (JTA), and its requirement for basic coordination of national plans, and through Argos User Conferences. However, it was not until the creation of the DBCP in response to WWW requirements for routine high quality observations from the world's oceans that positive steps were taken towards large-scale international cooperation in drifter deployment and data management.

Some time before the establishment of the DBCP, a European initiative (COST-43) was established involving the collaborative deployment of meteorological drifters in the north Atlantic, and this became in due course the first regional action group, EGOS, of the DBCP. The group retains complete autonomy in all its operational and administrative matters, but draws on the support of the DBCP through its technical coordinator, the WMO and IOC Secretariats, and its meetings. The freedom to determine its own affairs, yet benefit from association with an established and internationally recognized parent body, has been a keynote in the success and stability of EGOS, and it has become the model for subsequent drifter action groups such as IABP, IPAB, IBPIO, ISABP, TIP and the GDP.

All this has happened against a background of the fundamental global climate change that seems likely to result from increasing concentrations of greenhouse gases. Such is the universal appreciation of the consequences of climate change that climate issues have moved to the forefront of the international political agenda. GCOS and GOOS both owe their origins to this concern, and are responding directly to the needs, expressed in Agenda 21, by the IPCC, and in support of the FCCC, for ocean data to underpin the understanding and prediction of global climate and environmental change.

Much practical progress has been made in bringing together all sides of the oceanographic, meteorological and climate communities to define these observational requirements and the organisational structure that will assume responsibility for them, notably at the OceanObs 99[1] and JCOMM[2] planning meetings. This plan takes note of these requirements and defines the DBCP role in the new structure.

2. RATIONALE

Neither GCOS, GOOS, WWW, nor indeed the DBCP action groups, currently operate as funding bodies for observational networks. Therefore any DBCP implementation strategy must attempt to reconcile the needs and aspirations of the global programmes with those of the drifter programme operators and funders. Ultimately, it is an objective of the implementation strategy to assist in the unlocking of sustained national funding in support of the wider regional and global needs, at the same time recognizing that the aims of the programme operator remain paramount. In practice, with the advent of low-cost multi-function buoys (e.g. the WOCE/TOGA SVP-B barometer drifter, see Annex D), this is no longer the insurmountable problem that it once was.

2.1 The definition of requirements

The observational networks specified for the WWW[3] and the ocean observing system for climate (OOSC)[4] are detailed in Annex B. Taking SST as an example, the WWW seeks daily

observations over a 100 km grid with 0.5 C rms error; OOSC's needs are an order of magnitude coarser in space and time, but at a level of accuracy an order of magnitude higher. In essence this means that the density of any network deployed and maintained in support of weather forecasting (WWW) will be more than adequate for the perceived needs of climate monitoring (OOSC), provided that the accuracy and stability of the sensors can be improved. It should also be noted that OOSC calls for new sensors (e.g. for conductivity) that are not yet operational. In this context, the OOSC suggest that any practical, achievable implementation plan be broken down into a number of elements running over differing time scales, viz:

- the identification of elements that are part of existing operational systems;
- the identification of elements to be added now to constitute the initial observing system (either enhancements to existing operational systems or parts of existing research observing systems ready for conversion to operational status);
- the identification and specification of observations not now readily obtainable that are urgently required and should be added as enhancements to the initial system at the earliest feasible time;
- the identification of future research and development likely to be needed for further development of the system.

This analysis is used as a basis for the plan that follows. Although this strategy is restricted to drifting buoy applications, the Panel recognizes that moored buoys, sub-surface floats and profilers will also play a part in any future ocean observation network.

These basic requirements have been endorsed and further developed by other agencies, notably by GCOS and the UNFCCC[5], and fall within the remit of the Group on Earth Observation (GEO), established by the Earth Observation Summit in 2003. While the exact composition of the desired network has yet to be defined, a figure of 1250 drifters is achieving wide acceptance, and has been set as a target within the US OCO implementation plan.

3. ANALYSIS OF EXISTING DRIFTING BUOY NETWORKS

3.1 Existing networks - current status

In general, most current operational drifter networks fall within the scope of one or other of the existing DBCP action groups. Figure 1 indicates the areas of responsibility of each action group. The deployments are increasingly of SVP-B drifters which combine quantifiable current-following characteristics with reliable measurements of atmospheric pressure and SST. At present, in excess of 500 drifters report their data via the GTS (Figure 2); more than half of these report atmospheric pressure. Regular re-seeding is needed to maintain observational density in dynamic areas such as the south Atlantic. The action groups are the key to implementing and maintaining deployments in all ocean basins. Annex C gives an example of the operating principles for an action group.

3.2 Existing networks - enhancements needed for the basic WWW/OOSC system

Although the statistics for data availability collected by the various operational and archiving centres do not always fully agree, it is clear that the existing networks do not even approach the required observational density in a number of areas, viz:

- the tropical Indian Ocean (wind)
- the Arctic (P)
- the North Pacific Ocean (SST, P)

- the North Indian Ocean (P)
- the Southern Ocean south of 40 S (SST, P)

Figures 3 to 6 illustrate the problem through data availability indices for specific variables as a function of expressed WWW requirements.

Deployment and re-seeding strategies will be developed which optimize the expenditure of available resources, and which allow accurate and credible prediction of future resource requirements, and their relation to declared objectives.

3.3 New observations urgently required

Equatorial areas, where the atmospheric pressure signal is typically weak, would benefit from a greatly increased density of wind observations. Whereas the equatorial Pacific is adequately sampled by the moored TAO and TRITON arrays, and the PIRATA programme is addressing the sparsity of observations in the tropical Atlantic, the Indian Ocean is currently almost devoid of accurate *in situ* wind measurements, although plans are being drawn up for the establishment of a moored buoy array in the area.

3.4 The observational challenge posed by 4D assimilation schemes

Recent studies using models that allow assimilation of non-synoptic-hour data have demonstrated the positive impact of such data. In particular, the inclusion of hourly extra-tropical buoy data was found to significantly improve forecast quality, particularly in the southern hemisphere. Non-synoptic-hour data is not routinely reported by all buoys, nor is its insertion on the GTS by CLS/Service Argos currently supported. In both cases, little change would be needed to current practice to allow these additional data to be made available to forecasters.

3.5 Future research and development

In addition to the development and proving of an accurate and reliable wind sensor, OOSDP have stated a requirement for ocean surface salinity and rainfall measurements. Very few drifters currently possess this capability, and it will become an area for further research and development. *In situ* salinity measurements will be of great value in developing the sensors and algorithms for salinity determination by satellite.

The Panel will also support other technology developments, e.g. the use of adaptive sampling to increase the impact and cost effectiveness of data buoy observations.

3.6 Regional and national issues

It should not be forgotten that drifter deployments continue to be made, in support of both operational and research programmes, which do not fall within the sphere of influence of any of the DBCP action groups. Efforts will continue by the DBCP and the action groups to involve these buoy operators in the work of the Panel, and to ensure, where appropriate, that their buoy data are made available to the wider community, in near real time if possible.

3.7 Deployment opportunities

The deployment and re-seeding of a large network of data buoys poses a huge logistical problem. To date, deployments have largely been accomplished opportunistically using volunteer ships and aircraft. This system is showing increasing signs of strain, and the DBCP will actively pursue additional strategies, recognizing that the issue of funding associated logistical effort will have to be tackled.

3.8 Coordination issues

Within the above context, the action groups are best placed to identify the precise needs in their particular areas of responsibility, and to obtain the resources required. The Panel recognizes the autonomy of these groups and does not seek to impose any additional level of management or control.

There are areas, however, where the Panel is best placed to advise on overall methodology and policy; such areas include:

a) Co-ordination of deployments in areas not covered by the Action Groups or which involve several Action Groups.

Such areas presently include:

- The Southern Ocean
- The North Pacific Ocean, and particularly the NE Pacific Ocean
- The Mediterranean Sea
- The Black Sea

Unless there is a need to specifically establish DBCP Action Groups for those areas, it is proposed to include one or more of such buoy programmes directly within the DBCP implementation strategy and to discuss important co-ordination and implementation issues at Panel sessions where all DBCP Action Groups are normally represented. During intersessional periods, co-ordination can take place through direct exchange between buoy operators (e.g. email, DBCP internet forum), and through the Technical Co-ordinator as focal point. Specific mailing lists can be established for this purpose. Initially, it is proposed to consider the following buoy programmes as part of the DBCP implementation strategy:

- The Southern Ocean Buoy Programme (SOBP), which would tentatively deploy about 80 barometer drifters South of 40S yearly, excluding the Antarctic sea-ice zone.
- The Black Sea Buoy programme (BSBP).

In the event that such programmes eventually reach a sufficiently high level of co-ordination, and if the need is expressed by the buoy operators, it could be proposed to eventually establish new DBCP Action Groups.

b) Real-time data quality control,

c) Data management,

d) Other co-ordination issues such as the negotiation of bulk purchase rates for drifter hardware and communications costs.

The role of the Panel and its technical co-ordinator within the proposed new JCOMM structure is discussed in section 7.

4. DATA COLLECTION AND EXCHANGE

4.1 The status quo

With very few exceptions, drifting buoys use the Argos satellite system for location and data collection. Telemetry datasets stored on board the NOAA satellites that carry Argos are processed by Argos centres in France and the USA. Data are quality controlled and inserted on to the GTS for use by weather forecasters and climate modellers, and for archival by the responsible data centres, if authorised by the buoy operator. Data timeliness, vital for

weather forecasting, can be improved by using LUTs to access buoy data rebroadcast by the satellites in real time. The operators of the Argos system have been attentive to the need for faster data turnround times, and have taken steps to increase the amount of LUT data that are processed by the two main centres.

An agreed share of the operating costs of the two centres (approx USD 5 million in 2000) is recovered under the terms of the Argos JTA, under which all non-commercial usage of the system (of which drifting buoy operators account for roughly 50%) is charged out to designated national representatives (ROCs) at an agreed and supposedly equitable rate. ROCs then pass on costs to individual operators as they see fit. The Argos costs associated with a drifter programme are nowadays generally comparable with the actual buoy procurement costs, following the development of inexpensive buoy hardware. The DBCP will negotiate actively to achieve the best possible terms for data buoy users.

The charges associated with real-time data distribution via the GTS are currently borne by national weather services; individual buoy operators in general have to pay additional costs, over and above the processing costs described above, for access to their own data held at the Argos centres.

4.2 Future developments

Many new mobile satellite services are at the planning or pre-operational stage (see Annex F), and these are attractive to buoy operators, both from the cost perspective and from the increased operational flexibility (e.g. two-way communication) that they potentially offer. Systems which feature a continuous global coverage (e.g. those intended to supplement the existing terrestrial cellphone networks) would in addition allow a return to truly synoptic reporting of observations.

However, most of these new systems will never reach full operational capability, nor will buoy operators ever achieve more than minority status. Systems such as Iridium and Orbcomm, which have in fact launched services, encountered severe financial difficulties before emerging into commercial viability. Potential users of any new systems therefore need to exercise considerable caution in selecting a replacement for Argos. Argos for their own part have responded with a development programme which should greatly increase the usefulness of their system for data buoy operations. In particular, they have established a protocol for the assimilation of data from third party communications providers into their own GTS processing chain.

The Panel will, in this context, act as a focus for the exchange of practical information on the performance of the various systems, and will be active in sponsoring evaluation trials of new equipment and systems as they become available. As with Argos, the Panel will seek to negotiate the best possible terms for data buoy users of these systems.

5. DATA MANAGEMENT

5.1 Quality control

Quality control procedures, jointly developed and implemented by the DBCP and the operators of the Argos system, currently ensure that surface observations are validated in real time before insertion on to the GTS. Sub-surface (e.g. from the TAO array) data are further controlled by NOAA/NOS. Several other bodies (ECMWF, national weather and oceanographic agencies, GDC, MEDS, ...) contribute to an active off-line assessment of data quality. A well-defined feedback mechanism ensures that any interventions arising from this off-line quality control (e.g. modifications to individual sensor transfer functions) are implemented into the real-time data processing chain in a co-ordinated and auditable fashion. The Panel will encourage the users of other satellite communications channels and observing systems to benefit from its experience in this regard, with a view to avoiding the

many quality pitfalls that beset the acceptance of early drifting buoy data by the operational community.

5.2 Data archiving

Drifter data inserted on the GTS are routinely archived by MEDS, the IOC RNODC for drifter data. The DAC archives all data from the GDP, and any other drifter data that are made available to it. The Panel and its action groups will actively encourage all buoy operators to forward their data to one or other of these responsible global archives.

5.3 Data access policy

At present, all of the archiving agencies and many of the operational and research bodies make provision for the release of drifter data to scientific and other customers. In particular, many data are available via the World-Wide Web (see Annex E), either in the form of trackplots or as datasets. In many cases, the policies relating to the release and use of these data are not immediately clear. The Panel is seeking clarification from these agencies, and from its action groups, with a view to developing a co-ordinated data access policy for drifter data within the letter and the spirit of the WMO data exchange policy defined in WMO Congress Resolution 40 (Cg-XII).

5.4 DBCP publicity

Many suggestions have been made over the years regarding ways of publicizing the DBCP and its activities. Most of these have in practice been superseded by the DBCP server on the World-Wide Web, and this web site is now the *de facto* entry point for current information about the DBCP and its action groups.

The Panel is taking steps to ensure that resources and information are available to allow this web site to be developed and updated as required.

6. RESOURCE REQUIREMENTS

6.1 Manpower

Most of the success of the Panel to date in implementing its objectives is entirely due to the efforts made on its behalf by its technical coordinator, and by the support afforded to him by the operators of the Argos system and other agencies. The Panel will build on this success by actively seeking adequate and secure resources to ensure the continued employment of its technical coordinator.

6.2 Hardware and telecommunications

A crude analysis of the current situation indicates that a minimum of 1600 SVP-B type drifters are currently needed in extra-tropical regions plus a minimum of 650 SVP type drifters (i.e. SST only) in tropical regions to bring existing networks up to the OOSDP requirements for SST and an acceptable fraction of WWW requirements for atmospheric pressure. This presently represents a hardware investment of USD 7.5 million.

Reseeding of networks to cover buoy mortality and dispersion will require a further annual hardware commitment of 2400 SVP-B and 1000 SVP drifters (USD 11 million at current cost levels), if present drifter lifetimes and trajectories are maintained.

The initial goal of the reseeding strategy is to tentatively maintain a homogeneous network of buoys with a 500*500 km resolution. Taking dispersion and reseeding into account, data from a fraction only of operating buoys would be required, i.e. about 2250 PTT-years. At present data telecommunication costs, this would represent USD 9 million. This is well above

present usage of the Argos system for drifting and moored buoys. Present rules negotiated in the context of the Argos Joint Tariff Agreement (JTA) permit usage of extra Argos capacity. There is therefore a potential to substantially decrease telecommunication costs.

In recognition of the economies of scale that will flow from global annual procurements of this size, the Panel and its action groups will seek negotiations with the drifter manufacturers and the communications service providers to establish economical prices that will then be available to individual buoy operators.

7. THE DBCP ROLE WITHIN JCOMM

In deciding an organisational structure for JCOMM, the JCOMM planning meetings have noted the Panel's success in resolving many operational and co-ordination issues regarding buoy data quality, data flow, deployment scheduling and so on, and have adopted a similar 'Observations Co-ordination Group' for the management of the JCOMM observational programme (See Annex G). Membership of this group includes the Chair and Technical Co-ordinator of the DBCP. In practical terms, the DBCP technical co-ordinator works alongside the co-ordinators of other observing systems to implement a common approach to deployment strategy, data management and quality control, and to ensure the most efficient use of deployment opportunities. In this regard, the Panel will actively encourage the operators of other observing and satellite data collection systems to make full use of the Panel's experience and expertise in these areas.

8. SUMMARY OF AIMS AND OBJECTIVES

8.1 *Deployment and re-seeding strategies, and associated funding mechanisms, will be developed which optimize the expenditure of available resources, and which allow accurate and credible prediction of future resource requirements, and their relation to declared objectives.*

8.2 *In the particular case of equatorial areas, where the atmospheric pressure signal is typically weak, the Panel will strive to increase the density of wind observations, to be provided by drifter networks where there are no moored arrays.*

8.3 *Further research and development will be undertaken on new sensors to observe variables such as salinity, rainfall, wind, heat flux, ocean colour and CO_2.*

8.4 *Efforts will continue by the DBCP and the action groups to involve other buoy operators in the work of the Panel, and to ensure, where appropriate, that their buoy data are made available to the wider community, in near real time if possible.*

8.5 *The Panel recognizes the autonomy of its action groups and does not seek to impose any additional level of management or control.*

8.6 *The Panel acts as a focus for the exchange of practical information on the performance of the various satellite communication systems, and will be active in sponsoring evaluation trials of new equipment and systems as they become available.*

8.7 *The Panel and its action groups will actively encourage all buoy operators to forward their data to one or other of the responsible global archives.*

8.8 *The Panel will seek clarification of their data release policy from all agencies that distribute drifter data, and from its action groups, with a view to suggesting co-ordinated data access guidelines for drifter data, compatible with the WMO policy defined in Resolution 40 (Cg-XII).*

8.9 *In recognition of the economies of scale that will flow from global annual procurements of the size indicated by the WWW and OOSC observing network requirements, the Panel and its action groups will develop negotiations with the drifter manufacturers and the communications service providers to establish prices that will then be available to individual buoy operators.*

8.10 *The Panel will seek adequate and secure resources to ensure the continued employment of its Technical Co-ordinator.*

8.11 *Within the context of the proposed JCOMM operational structure, the Panel will encourage the users of other satellite communications channels and observing systems to benefit from its experience in data management and co-ordination, with a view to their avoiding the many pitfalls that beset the acceptance of early drifting buoy data by the operational community.*

8.12 *The Panel will note the deliberations of the UN Convention on the Law of the Sea (UNCLOS) and the provisions of the Antarctic Treaty, as amended by the Madrid Protocol (1991), with regard to data buoy operations.*

8.13 *The Panel will regularly review its mission in the light of changing research and operational imperatives, and will update this document and its terms of reference as appropriate.*

9. REFERENCES

1. Smith, N (ed), 2000. OceanObs 99 Conference Statement, 28 pp. WMO, Geneva.

2. Guddal, J and Kohnke, D, 2001. Report by the Interim Co-presidents of the Commission, JCOMM-I, Doc 3, 14pp. WMO, Geneva.

3. World Weather Watch Fourth Long Term Plan, 1996-2005. WMO, Geneva.

4. Final Report of the OOSDP, 1995 - 'Scientific Design for the Common Module of the Global Ocean Observing System and the Global Climate Observing System: an Ocean Observing System for Climate'

5. The Second Report of the Adequacy of the Global Observing Systems for Climate in Support of the UNFCCC, 2003. GCOS-82, WMO/TD No 1143, WMO, Geneva.

FIGURES

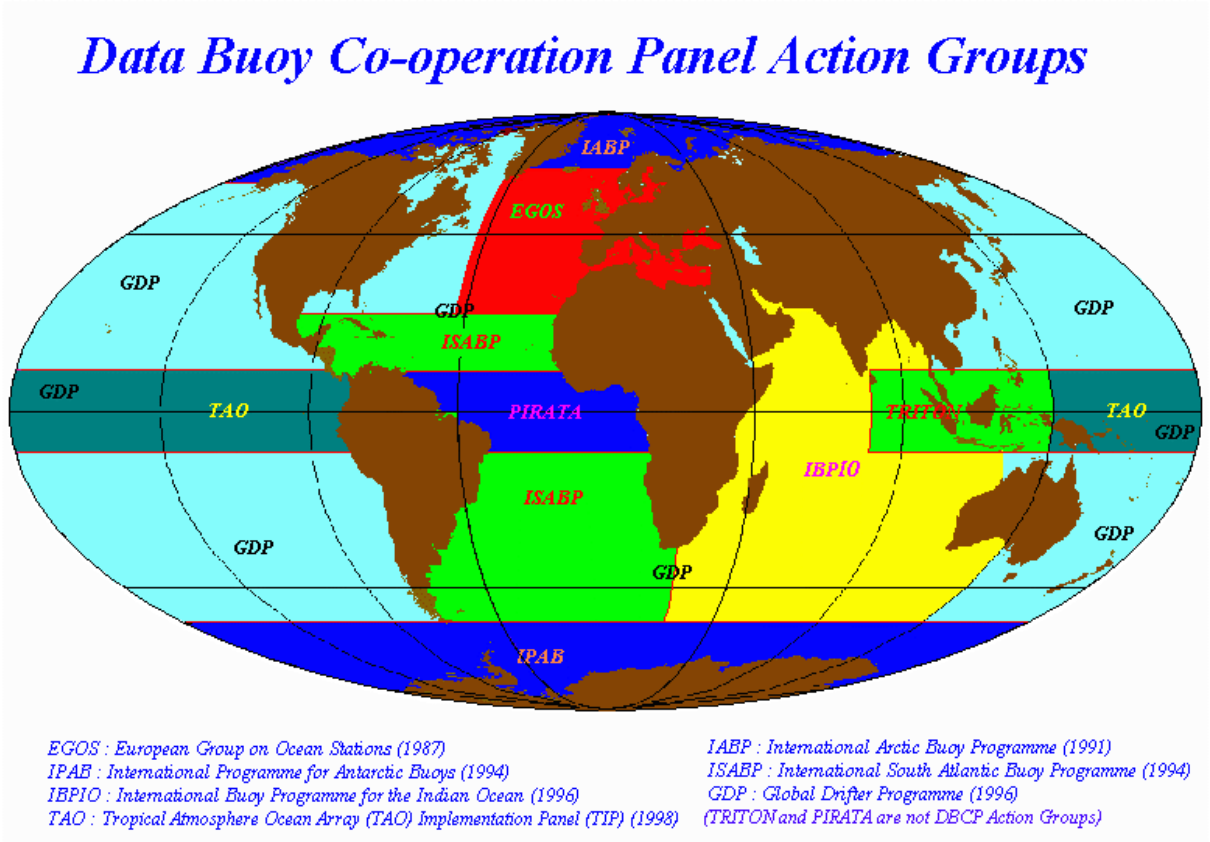

Figure 1. *DBCP action groups in 2001. Note that the TIP has been redefined as the Tropical moored buoy Implementation Panel following the adoption of the Triton and Pirata arrays.*

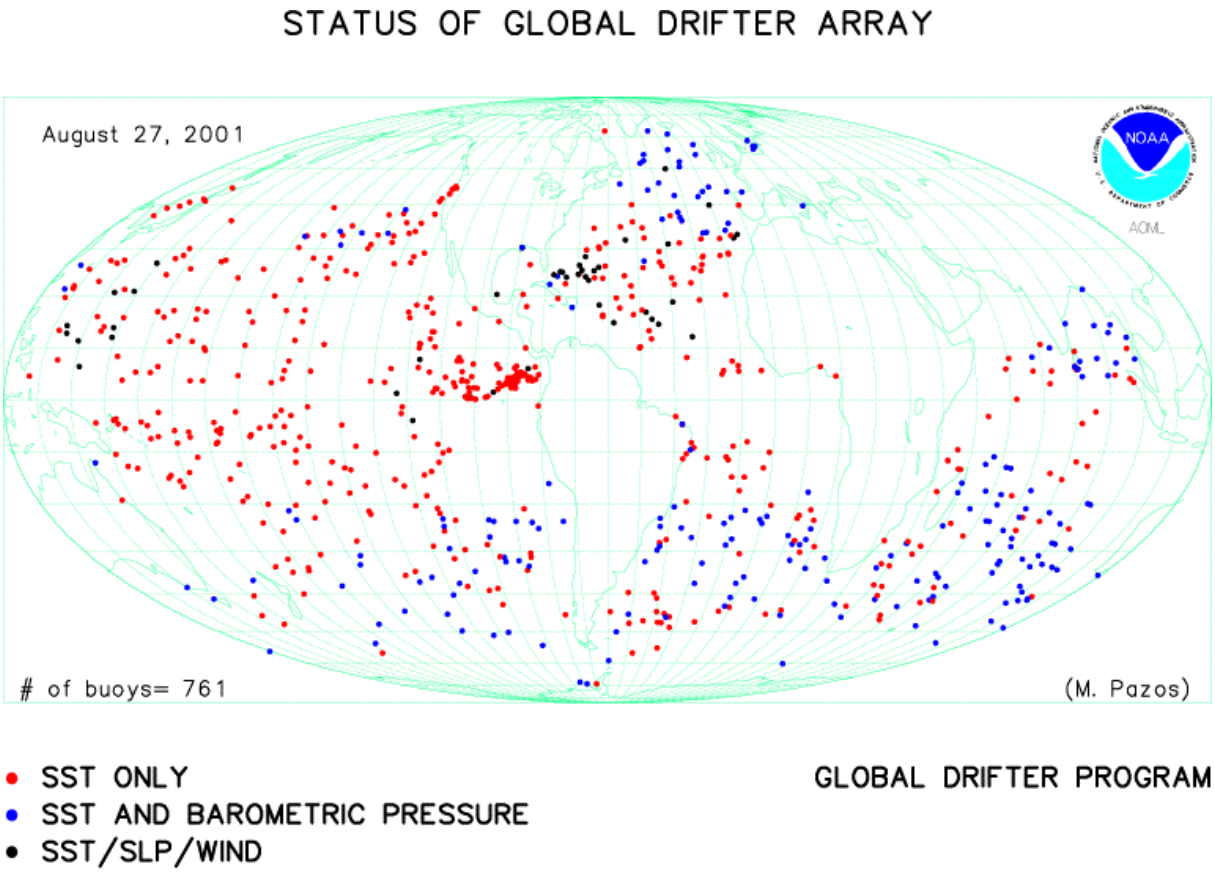

Figure 2. *The Global GTS drifter array in August 2001, by courtesy of the Global Drifter Center, NOAA-AOML.*

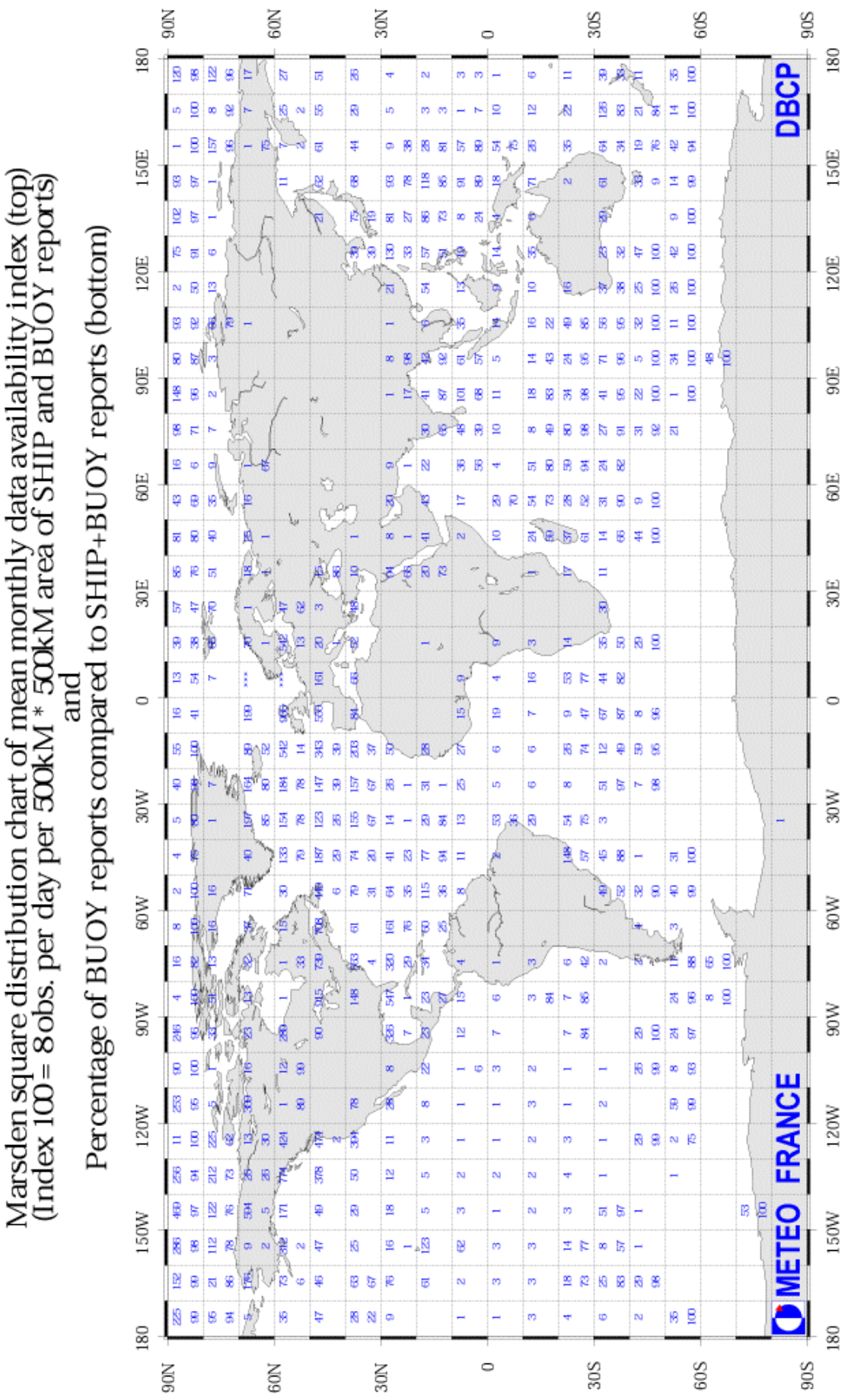

***Figure 3**. GTS data availability, September 2001 – Surface atmospheric pressure (by courtesy of Météo France).*

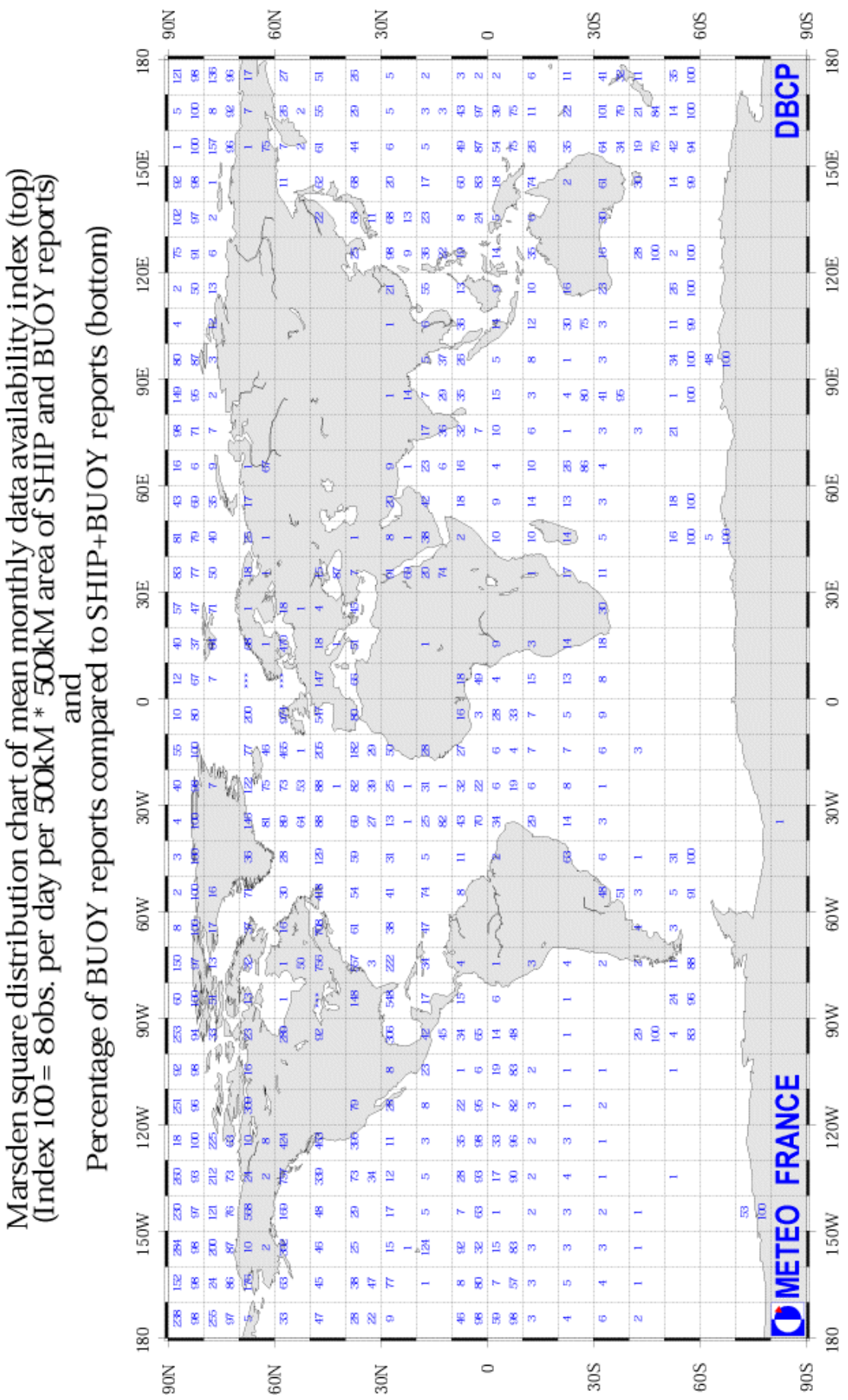

***Figure 4**. GTS data availability, September 2001 – air temperature (by courtesy of Météo France).*

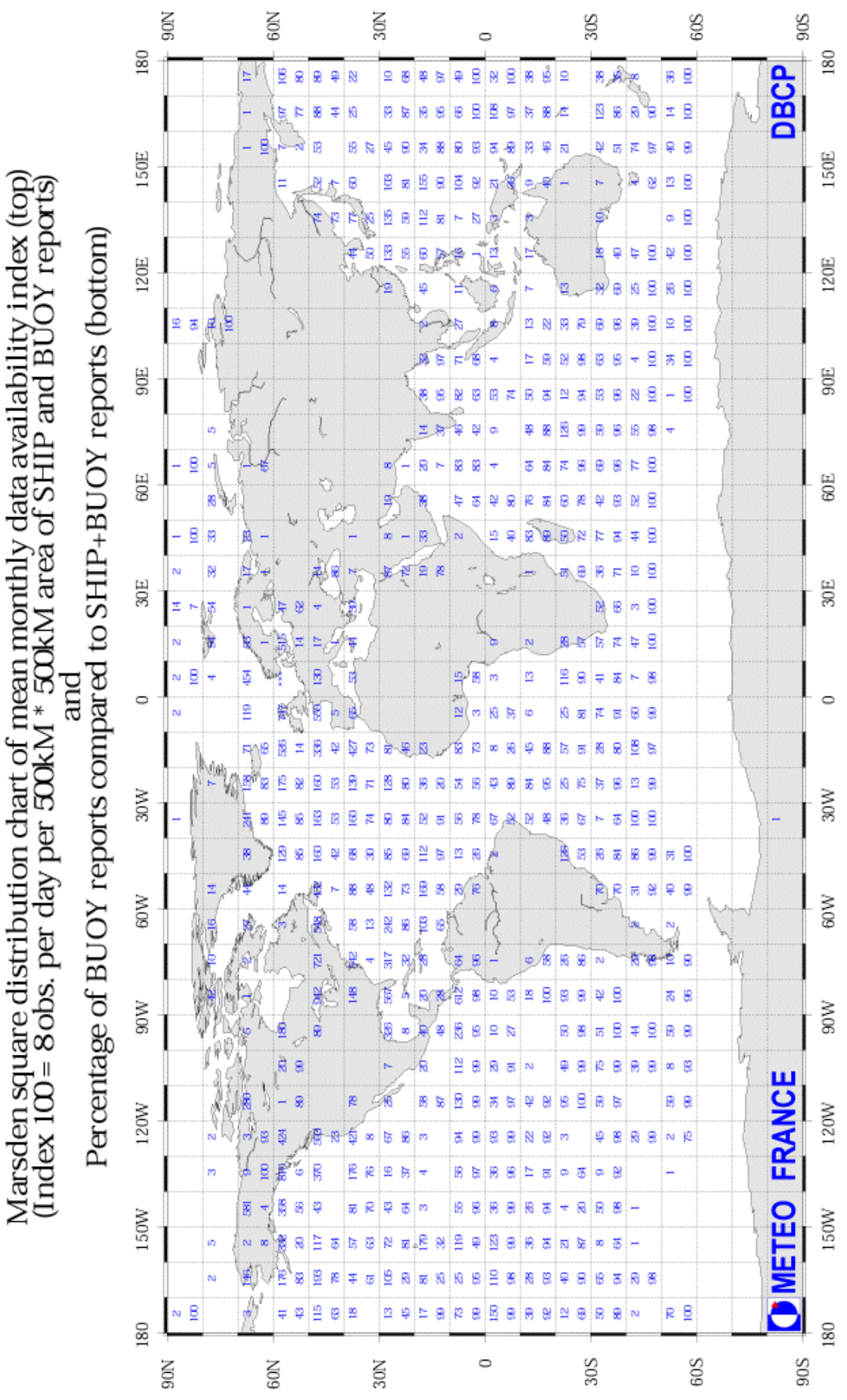

***Figure 5**. GTS data availability, September 2001 – Sea surface temperature (by courtesy of Météo France).*

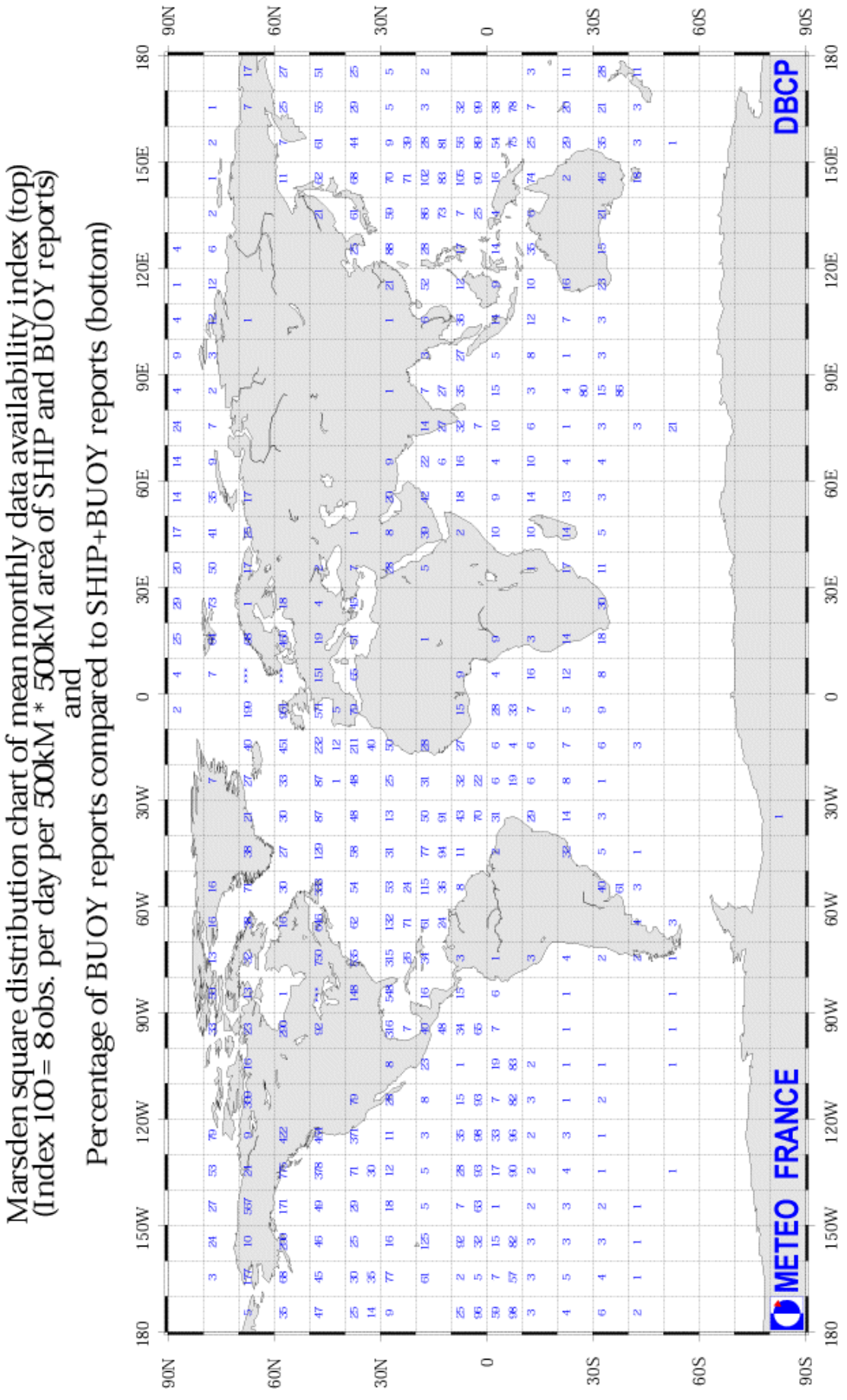

***Figure 6**. GTS data availability, September 2001 – Surface wind (by courtesy of Météo France).*

ANNEX A

Acronyms

CLIVAR Climate Variability and Predictability (WCRP)
CMM Centre de Météorologie Marine (Météo France)
DAC Data Assembly Center (of the WOCE Surface Velocity Programme)
DBCP Data Buoy Co-operation Panel
ECMWF European Centre for Medium-range Weather Forecasts
EGOS European Group on Ocean Stations
FGGE First Global GARP Experiment
FCCC Framework Convention on Climate Change
GARP Global Atmospheric Research Programme
GCOS Global Climate Observing System
GDC Global Drifter Center
GDP Global Drifter Programme
GOOS Global Ocean Observing System
GTS Global Telecommunication System
IABP International Arctic Buoy Programme
IBPIO International Buoy Programme in the Indian Ocean
IOC Intergovernmental Oceanographic Commission
IPAB International Programme for Antarctic Buoys
IPCC Intergovernmental Panel on Climate Change
ISABP International South Atlantic Buoy Programme
JCOMM Joint Commission for Oceanography and Marine Meteorology (WMO/IOC)
JTA Joint Tariff Agreement
LUT Local User Terminal
MEDS Marine Environmental Data Service
NOAA National Oceanographic and Atmospheric Administration
NOS National Ocean Service
OOPC Ocean Observation Panel for Climate
OOSC Ocean Observing System for Climate
OOSDP Ocean Observing System Development Panel
RNODC Responsible National Oceanographic Data Center
ROC Representative Organization of Country
SST Sea Surface Temperature
SVP Surface Velocity Programme
TAO Tropical Atmosphere Ocean Array
TC Technical Coordinator (of the DBCP)
TIP Tropical moored buoy Implementation Panel
TOGA Tropical Ocean Global Atmosphere
UNCLOS United Nations Convention on the Law of the Sea
WCRP World Climate Research Programme
WMO World Meteorological Organization
WOCE World Ocean Circulation Experiment
WWW World Weather Watch

ANNEX B

Observational requirements of WWW and GCOS/GOOS OOSC that could be addressed by drifting buoy networks

1. Ocean Observing System for Numerical Weather Prediction (World Weather Watch)

Variable	Spatial resolution	Temporal resolution	Accuracy
Atmospheric pressure	100 km	1 h	0.5 hPa
Wind	100 km	1 h	2 ms^{-1}
Air temperature	100 km	1 h	1 K
Integrated precipitation	100 km	3 h	0.1 mm
Sea surface temperature	100 km	1 day	0.5 K
Wave height	100 km	1 h	0.5 m

(from the WMO World Weather Watch Fourth Long Term Plan, 1996-2005)

2. Ocean Observing System for Climate (OOSC)

Variable	Spatial resolution	Temporal resolution	Accuracy
Sea surface temperature	500 km	1 week	0.1 K
Wind	250 km	1 month	0.5 ms^{-1}
Atmospheric pressure	250 km	1 day	1 hPa
Integrated precipitation	250 km	1 month	5 cm
Integrated heat flux	250 km	1 month	5 Wm^{-2}
Surface velocity	50 - 500 km	1 month	2 cms^{-1}
Sea ice velocity	250 km	1 month	2 cms^{-1}
CO_2, fluorescence	for ocean colour satellite calibration		

(adapted from the Final Report of the OOSDP, 1995 - 'Scientific Design for the Common Module of the Global Ocean Observing System and the Global Climate Observing System: an Ocean Observing System for Climate')

ANNEX C

Example operating principles of a DBCP action group

OPERATING PRINCIPLES OF THE ISABP

The ISABP strives to:

- Maintain a data network over the South Atlantic Ocean using *in situ* ocean platforms such as island weather stations, moored buoys and in particular drifting buoys;
- Establish and maintain data collection and data communication facilities, and ensure that the necessary quality control is undertaken according to DBCP guidelines;
- Distribute basic meteorological and oceanographic data from the network at operationally useful time-scales over the Global Telecommunication System;
- Arrange for the archival of data from the network and for the provision of archived data sets to programme participants;
- Liaise on technical aspects of buoy development and operational matters;
- Continually review the effectiveness of the programme in satisfying data requirements of the users.

Operational area:

The operational area is the Tropical and South Atlantic Ocean.

Variables:

Atmospheric pressure, sea-surface temperature and buoy location are reported. Additional variables such as air temperature, atmospheric pressure tendency, wind speed and direction, and surface and sub-surface oceanographic variables, especially waves, are viewed as highly
desirable.

Data archiving:

All basic meteorological and oceanographic data from drifting buoys in the programme are archived by the Marine Environmental Data Service (Canada), as the Intergovernmental Oceanographic Commission (IOC) responsible national oceanographic data centre for drifting buoys.

Other buoy data quality control and archival activities are relevant to the programme, in particular those of the Global Drifter Centre in Miami.

Basic network density:

To be consistent with the requirements stated by the World Weather Watch, we attempt to provide a network of the basic variables with data points spaced at approximately 250 km intervals over the operational area. As far as is practicable, sufficient platforms are deployed to achieve and maintain this density, taking into account other observing system components.

Buoy recovery and refurbishment:

Participants retain ownership of their buoys. While no specific plans for buoy recovery are made, agencies are encouraged to make arrangements, as appropriate, for the recovery, refurbishment and re-deployment of buoys which drift ashore or which, in other ways, no longer contribute to the goals of the programme.

Data acquisition and distribution:

All buoys in the basic network are equipped with transmitters to enable basic meteorological and oceanographic data to be transmitted in real-time (synoptic or asynoptic mode). As a preferred approach:

- Data are collected and located via the Argos systems;
- All basic meteorological and oceanographic data are coded in the approved WMO code form for buoys;
- Data collected through the Argos system are inserted by CLS/Service Argos into the Global Telecommunication System.
- Data collected by the participants through other means may also be inserted on the Global Telecommunications System;
- The programme seeks to establish and maintain, as necessary, Argos Local User Terminals (LUTs) covering the area.

Duration:

The programme will operate for an initial five-year period with formal review by the participants after three years leading to a decision on its continuation.

Funding arrangements:

The programme will be self-sustaining, supported by contributions in the form of equipment, services (such as communications, development, archiving or co-ordination) or monetary contribution. As necessary, suitable arrangements will be made for the administration of the monetary contribution by the participants.

Meetings:

An annual meeting of the participants will be held at a location to be determined by them. All the participants are eligible to attend at their own expense.

ANNEX D Specifications of the SVPB "barometer" drifter

1) Introduction

The SVPB drifter is basically a standard SVP drifter to which an air pressure port has been added (figure 1). Both standard SVP and SVPB drifters are proven and reliable designs and have been deployed at sea in large quantities for oceanographic research and operational meteorological programmes (e.g. WOCE, TOGA, WWW). SVPB is capable of accurately measuring sea surface currents (+/- 1 cm/s) in 10 M/S winds, sea surface temperature (+/- 0.1 C), and atmospheric pressure (+/- 1 hPa). Nominal lifetime is 18 month.

Design of the SVPB is regularly being upgraded to take advantage of new technologies and therefore to improve its overall reliability and lifetime. In latest design, the following changes have been proposed:

- Removal of sub-surface float.
- Reduction of drogue size (to keep a drag area ratio of 40).
- ABS plastic hull instead of fibreglass.
- Reduction of the tether diameter (to keep drag area ratio of 40).
- Three pressure sensors proposed instead of one: AIR (SB-2A), Vaisala (PTB 101C), Honeywell (still being designed, no ref. yet).
- Two designs proposed for the installation of the sea water switch.
- More latitude is left for the design of the barometer port provided that outside design is unchanged and certain requirements followed (e.g. submersible port, sufficient backing volume, water trap, desiccant …).
- New Argos message format.
- New instructions for installing the antenna.

A construction manual which does not mention above modifications has been produced and published by the DBCP (DBCP Technical document No. 4). Free copies can be obtained from the Technical Coordinator of the DBCP. A revised version of the manual is on the DBCP website.

2) Surface current measurement

For measuring surface velocity, standard SVP buoys have been designed to be good Lagrangian drifters (buoys which follow the water motion well) and very specific requirements of drogue and surface float design have been developed (large holey sock drogue, spherical floats and thin wire tethers...). Laboratory and at sea tests have been conducted to guarantee the reliability of SVP drifter measurements.

The slip (i.e. the motion of the centre of the drogue relative to the moving water parcel) has been minimized. Many phenomena can induce slip; the main ones are wind stress, surface gravity wave effects and vertical shear of currents. Therefore tests have been conducted on various shapes of floats and drogues (NOAA data report 1990). These tests show that the most efficient shapes are small, spherically-symmetric surface and subsurface floats, thin-wire tethers and a large semi-rigid drogue. The drogues which have high drag coefficient and stable water following characteristics are the TRISTAR (Niiler, *et al*., 1987) and the Holey Sock (Nath, *et al*., 1979). The drag area ratio is the drag coefficient of the drogue times the frontal area divided by the sum of the products of the drag coefficient and the largest projected frontal areas of floats and tethers. A drag area ratio for the drifter greater than 40 will give the instrument the capability to make current measurements accurate to within 2 cm/s. Using a correction formula, a wind correction will then improve this accuracy to 1 cm/s if the wind is known within 4 m/s.

3) Drogue detector (Submersion switch)

A drogue detector is necessary for ascertaining if the drogue is still attached. A drifter without a drogue is of little value for surface velocity measurements. Since the surface float goes under the water more often when the drogue is attached, one principle is to install a submersion detector (switch) on the surface float and to analyze the time series in order to deduce if the drogue is still attached.

4) Sea Surface Temperature measurement

The SVPB drifter is also equipped with a sea surface temperature sensor that is designed to make measurements accurate to 0.1 Celsius. Experience gained with the standard SVP drifter has been used. To obtain this accuracy, tests show that one must install the temperature sensor outside the hull of the drifter float. Also, calibrations of a number of thermistors while connected to the electronics circuitry in a test tank in various ranges of temperatures must be done. Only these kind of tests and calibrations can provide accurate coefficients to be used to convert raw data (resistance) into physical values (Celsius) within +/- 0.1 Celsius. The lifetime of the sensor will exceed that of the transmitter.

5) Atmospheric Pressure Measurement

The air pressure port has been designed to withstand frequent immersion with no loss of accuracy. The port is elevated to some height above the float itself to avoid Venturi effects caused by airflow over the curved float surface. The total surface of the mast is lower than 10% of the total frontal area so that wind stress does not induce a substantial slip effect compared to the one induced through the hull itself. The design is based on a port used on moored buoys by the United Kingdom Meteorological Office, which has had extensive field tests in the wind tunnel. Internal baffling is provided against submergence surges and sufficient back up volume of air assures that water does not enter the barometer duct.

The barometer port design is based on the following rationale:

(i) Field observations indicate that the surface float of the SVP Lagrangian drifter is pulled under the water to a depth of 1-2 m at the crests of wind waves, therefore an overpressure of 200 hPa can be expected on the barometer. Data from the submergence switch on drifters in WOCE Heavy Weather Drifter Test (Sybrandy and Niiler, 1991) indicate that they spend about 20-30% of the time under the water in winds in excess of 15 m/s. Upon resurfacing, the port has to clear from sea-water quickly and completely. Flaps and valves to close a port will fail or become encrusted. An inverted port, with sufficient backup volume of air which can be compressed upon submergence so the water is kept out of the barometer air duct was incorporated in the design.

(ii) A long air pressure duct to the barometer can collect condensation in the extreme changes of moisture and temperature which occur in synoptic weather systems. This problem was solved by placing the barometer very close to and above the air intake. Specially configured barometers were made for this application for GDC by several manufacturers.

(iii) In a wind stream, the surface float produces a lowering of air pressure due to the Bernouilli effect. In 10 m/s wind, this effect produces less than 0.1 hPa pressure lowering at a distance of one radius of a sphere. The barometer port air intake is placed on a mast 24 cm above the top of the sphere. A second Bernouilli effect is produced by the airflow around the mast. This problem has been studied extensively, and a tabular windshield, with air intake holes inside an inserted, second sleeve is adopted (Osmund and Painting, 1984).

(iv) The sampling and averaging scheme for the air pressure has to be sensitive to when the port is under the water. Tests have run at sea under 15 m/s wind conditions off San Diego, Ca. (WOCE/TOGA Lagrangian Drifter with barometer port, May 91, Sybrandy and Niiler) where pressure was sampled at 2Hz inside the surface float. A laboratory standard

barometer of identical construction was used to obtain data at identical rates about 3 meters above sea level in a semi-enclosed laboratory on a ship. No significant wind effects, or delay times, were observed on the barometer port response on the surface float in the water.

The sensor itself is an AIR SB-1A model. It is a ceramic diaphragm capacitance sensor equipped with a built-in temperature compensating circuit. AIR sensors have been carefully tested for WOCE and finally proved reliable (Payne *et al,* IMET). Accuracy is +/- 1 hPa with a stability of +/- 1 hPa over a one-year period. Sensor output is digital in tenths of hPa.

Data are sampled at 1 Hz, and averaged over a 160 seconds period. A dedicated despiking algorithm was designed to remove from the average these air pressure measurements made while the barometer port is submerged.

The latest average of every hour is stored on-board. The last 12 hourly measurements are memorized on-board and transmitted through Argos using multiplexing techniques. It is expected that the full series of 24 hourly measurements will be recovered every day. Hence the latest available air pressure and tendency measurements (real time) as well as the synoptic air pressure measurements can be distributed on GTS (deferred-time).

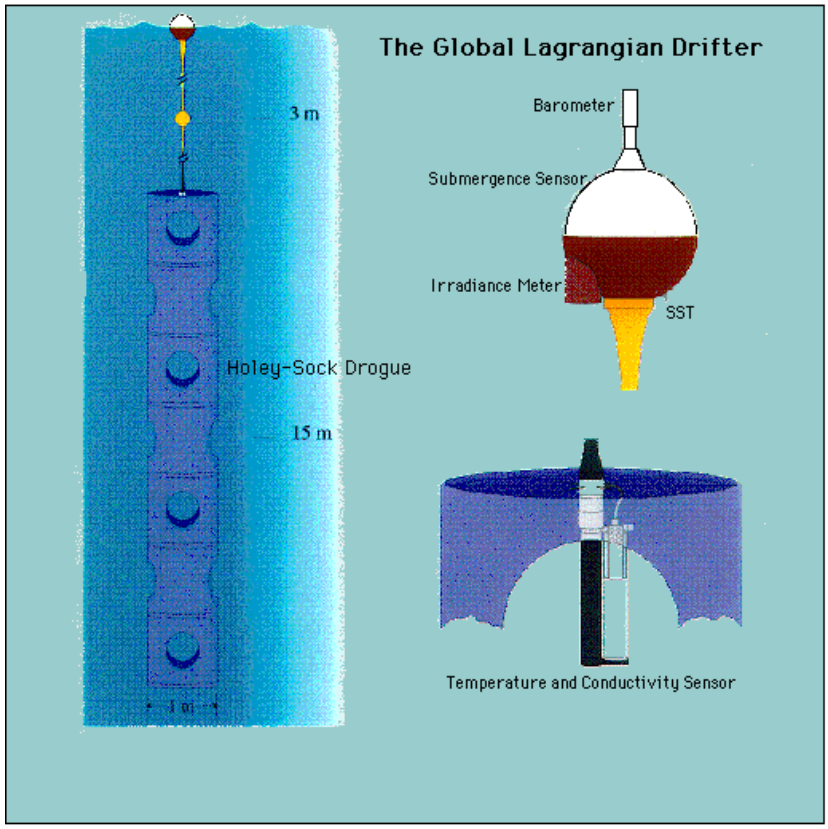

Diagram displaying the low-cost Global Lagrangian Drifter on the left hand side, and schematics of the sensor attachments (barometer, submergence, SST, irradiance and SEACAT), on the right hand side. Most drifters are also equipped with drogue sensors that indicate drogue loss. Buoys without drogues do not depict ocean currents accurately, because the drifter becomes susceptible to wave and wind action. Drifters transmit sensor data to satellites that determine the buoy's position and relay the data to Argos ground stations. Service Argos provides raw drifter data to the DAC where the data is processed and distributed.

Figure 1: The Minimet drifter. The SVPB drifter does not have the irradiance meter nor sub-surface temperature and conductivity sensor. The standard SVP drifter does not have the barometer as well. Latest designs omit the subsurface float.

ANNEX E

Contact information and World-Wide Web addresses

The Data Buoy Co-operation Panel
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DBCP home page	http://www.dbcp.noaa.gov/
WMO home page	http://www.wmo.ch/
GCOS home page	http://www.wmo.ch/web/gcos/gcoshome.html
GOOS home page	http://ioc.unesco.org/goos/
OOSDP Final Report	http://ocean.tamu.edu/oosdp/FinalRept/
EGOS home page	http://www.meteo.shom.fr/egos/
IABP home page	http://iabp.apl.washington.edu/
IPAB home page	http://www.antcrc.utas.edu.au/antcrc/buoys/buoys.html
ISABP home page	http://www.dbcp.noaa.gov/dbcp/isabp/index.html
IBPIO home page	http://www.meteo.shom.fr/ibpio/
GDC home page	http://www.aoml.noaa.gov/phod/dac/gdc.html
MEDS home page	http://www.meds-sdmm.dfo-mpo.gc.ca/
NPDBAP home page	http://npdbap.noaa.gov/
TIP home page	

ANNEX F

DEVELOPMENTS IN SATELLITE COMMUNICATIONS – update October 2003

1. INTRODUCTION

Mobile satellite systems (MSS) may be classified according to orbit altitude as follows:

- GEO - geostationary earth orbit, approx altitude: 35 000 km
- MEO - mid-altitude earth orbit, approx altitude: 10 000 km
- LEO - low earth orbit, approx altitude: <1 000 km

LEOs can be further sub-divided into Big LEO and Little LEO categories. Big LEOs will offer voice, fax, telex, paging and data capability, whereas little LEOs will offer data capability only, either on a real-time direct readout ('bent pipe') basis, or as a store-and-forward service.

Since the satellite footprint decreases in size as the orbit gets lower, LEO and MEO systems require larger constellations than GEO satellites in order to achieve global coverage and avoid data delays. Less energy is, however, generally required for LEO and MEO satellite communication because of the shorter average distance between transmitter and satellite. Some systems implement several high-gain antennas to generate ‘spot beams’ and so reduce the requirement of the mobile to have a complex antenna and/or high output power. A key feature of several MSS currently under development will be their inter-operability with existing public switched telephone and cellular networks, using a dual-mode handset, for example.

Because of the commercial forces which are driving the implementation of the new systems, many will primarily focus on land masses and centres of population, and will not offer truly global or polar coverage. These systems will not in general be acceptable for global ocean monitoring. Furthermore, while the technical capabilities for the new MSS do currently exist, delays are inevitable due to problems with spectrum allocation, licensing (in each country where the service will be offered), company financing, and availability of launch vehicles and ground stations.

It is unlikely that all of the planned systems will overcome all of these hurdles. Indeed, major financial difficulties have hit a number of systems, with Starsys having been cancelled, Iridium having collapsed (and been relaunched), and both Orbcomm and New ICO having been in and out of Chapter 11 bankruptcy protection in the US. Mergers are becoming increasingly common, as market reality forces system planners to cut their losses and pool resources: CCI, Teledesic, Ellipso and New ICO have all recently signed buy-out or collaboration agreements with cellphone entrepreneur Craig McCaw.

From a technical point of view, some systems do offer significantly enhanced capabilities compared to existing methods. Potential advantages include two-way communication, more timely observations, and greater data rates and volumes. Some systems may also prove to be considerably less expensive than existing channels, although this is as yet unclear. However, dangers will exist for data buoy users of most MSS, in that they will generally be small minority users of the system, with consequent lack of influence in regard to pricing. The arrangements for data distribution are also unlikely to be tailored towards data buoy applications, in particular those that require data insertion on the GTS.

2. DESCRIPTION OF CANDIDATE SATELLITE SYSTEMS

The following paragraphs describe the salient features of those systems that might have a data buoy application. In many cases systems are at an early planning stage, and reliable technical information on which to base an evaluation is unavailable. This section is summarised in tabular form in the Annex of the document.

2.1 Little LEOs

2.1.1 Argos

Argos has been used by the oceanographic community for more than two decades, and is a dependable, true polar, operational data collection and platform location system. Traditionally, communication is one-way only, at 400 baud, with practicable data rates of the order of 1 kbyte per day. Transmissions by the mobile in this mode are unacknowledged by the system and therefore have to incorporate some form of redundancy if data transfer is to be assured. The system enjoys a particularly clean part of the spectrum (401.65 MHz), with minimal interference from other users. Until now, Argos has flown as an attached payload on the NOAA 'TIROS' weather satellites, but the recent launch on board the Japanese ADEOS-II vehicle and projected launches on board the European METOPS platforms mark an important diversification of service provision.

Enhancements to the Argos on board equipment ('Argos-2') include increased receiver bandwidth and sensitivity, with a highly significant move to two-way communication ('downlink messaging') now being piloted aboard ADEOS-II, launched in December 2002. Next generation Argos equipment ('Argos 3') will fly from 2004 onwards, and will offer order of magnitude increases in data rates, as well as two-way communications. The system is one of the few that offers true global coverage, and currently has no commercial requirement to recover the cost of the launch or space segment equipment.

The first of the Argos-2 satellites, NOAA-K (NOAA-15) was launched in May 1998, and has been followed in September 2000 by NOAA-L (NOAA-16), and by NOAA-M (NOAA17) in June 2002. New direct readout stations continue to be commissioned bringing the current total to more than 30. Additions during the year have included Hatoyama (Japan, NASDA), Oslo (Norway, NMI), Las Palmas (Canaries Island, CLS), Singapore (Singapore, SMM) and Santiago (Chile, Meteo Chile). This continues the programme of improving data timeliness by exploiting use of Argos in 'bent-pipe' mode. Further enhancements to the on board equipment (Argos-3), to the ground processing centres and software, including new on-line facilities for users, are at the planning stage.

2.1.2 Orbcomm

This company was awarded the first FCC Little-LEO licence in late 1994. Satellites consist of discs about one metre in diameter prior to deployment of solar panels and antenna. Two satellites were launched into polar orbit during 1995, using a Pegasus rocket piggy-backed on to a Lockheed L-1011 aircraft. After a prolonged period of launcher problems, 35 satellites are now in orbit, making up the complete constellation – although Orbcomm have been awarded a licence for an expansion to a 48 satellite constellation. Of these satellites, 30 are currently operational. The A, B, C and D planes are at 45° inclination and therefore have poor coverage at high latitudes: only two satellites, in the F and G planes (70°), offer a near-polar service, and these have proved to be unreliable. No further launches have been announced.

The system offers both bent-pipe and store-and-forward two-way messaging capabilities, operating in the VHF (138-148 MHz) band. User terminals are known as 'Subscriber Communicators' (SCs). Although there have been significant problems with interference close to urban areas, this is not expected to impact offshore operations, and trials of the

system have been encouraging. Operational experience of the system is growing rapidly, although it remains difficult to obtain detailed technical information from Orbcomm.

The message structure currently consists of packets transmitted at 2400 bps (scheduled to rise to 4800 bps), and coverage is now global and near-continuous between the polar circles. Messages are acknowledged by the system when correctly received and delivered to a user-nominated mailbox. The platform position is determined, if required, using propagation delay data and doppler shift, or by an on-board GPS receiver. Position accuracy without GPS is similar to that offered by Argos, i.e. km-scale.

The limitations on the store-and-forward mode messages (known as globalgrams) have become apparent, with SC originated messages limited to 229 bytes and SC terminated messages limited to 182 bytes. Each SC can theoretically have a maximum of 16 globalgrams stored on each satellite. Currently, satellites will not accept or process globalgrams when in view of a ground ('gateway') station. As messages have to be designated as globalgrams or bent-pipe by the SC at the moment of origination, this presently limits the flexibility of the system to adapt to different coverage situations. Work-arounds do, however, exist, and it is expected that the next generation of SCs will be able to adapt more readily to changes in satellite communications mode.

Authorised transceiver manufacturers include Panasonic, Elisra (Stellar) and Quake. Elisra were the first to offer a transceiver with a fully integrated GPS engine, although Panasonic now also have one available. Quake sell a fully integrated unit which features a built-in antenna as well as GPS. Prices of most units are falling, with models now available for around $500.

The ground segment has continued to expand, and there are now active stations in Italy, Morocco, Argentina, Brazil, Curacao, Japan, Malaysia and Korea in addition to the four in the US. However the Japanese station is not available for international registrations. Further potential sites have been identified in Russia, Ukraine, Philippines, Botswana, Australia and Oman. 16 international service distribution partners have been licensed. Non-US customers have faced considerable difficulties because of the absence of ground stations, lack of spectrum licensing and the presence of other in-band users. However the situation is improving. Currently subscription costs within Europe are on a fixed cost per unit with two bands of usage (above and below 4kbytes per month with a typical monthly rate for the higher band being $70). A fully metered billing system based on users' actual data throughput was to be implemented in July 2000 but was postponed, officially due to technical problems. If this billing system is implemented with the planned charges ($6/kbyte) then it will result in a massive increase in airtime costs for any user with data rates over 0.5 kbytes/day. Metered billing is apparently implemented outside Europe.

Orbcomm has suffered financial difficulties, and filed for 'Chapter 11' bankruptcy protection in September 2000. The parent company, Orbital Sciences Corporation, has now put together a new consortium to run Orbcomm. The outstanding debts are believed to stem largely from the system rollout phase, with net running costs being of much smaller concern. Industry opinion in Orbcomm continues to grow, largely because of the commitment of many third-party equipment and system manufacturers to the success of the system, and evidence of increasing service take-up by a diverse range of customers.

2.1.3 Starsys

This system was to have been broadly similar to Orbcomm, except that it offered bent pipe mode only, thus limiting its usefulness to coastal areas. Further work on the system, in which the operators of the Argos system were closely involved, was suspended some years ago. The FCC licence was returned in late 1997 and the system is now no more than one of the first memorials to the many failures in the business.

2.1.4 Iris/LLMS

This European-led system appears to be similar to Argos, using two polar-orbiting satellites with store-and-forward capability. However, terminals are alerted by the satellite downlink signal, and two-way communications and message acknowledgement are supported. Location is by doppler and ranging, and message lengths of up to a few kilobytes are permitted. Some provision is planned for terminal-terminal communication within the satellite footprint. A single satellite was in orbit for system tests, but nothing further has been heard, and the parent company's website (www.saitrh.com) no longer makes any mention of the system.

2.1.5 Vitasat/Gemnet

This was a 36 + 2 satellite constellation proposed by CTA Commercial systems. Their experimental satellite was the failed Vitasat launch in 1995. CTA is reported to have been taken over by Orbital Science Corporation, the parent organisation of Orbcomm, and the 36-satellite Gemnet component has been cancelled. However, the volunteer VITA organisation still exists and currently has one satellite in orbit, with plans to rent bandwidth on two other existing satellites, HealthSat-2 and UoSat-12. This proposal received FCC clearance in December 2000, and the company have now brought HealthSat-2 on line. The main mission is to offer low-cost messaging services to developing countries.

2.1.6 Faisat

The Final Analysis company have planned this 32 (+ 6 spare) satellite constellation to provide data messaging services, principally aimed at small messages (~ 100 bytes), but with support for larger messages as well. It will operate in both bent-pipe and store-and-forward modes. The first satellite launch, on the Russian Cosmos vehicle, was scheduled for early 2000, but nothing has been reported. Further launches were to have occurred roughly twice a year. The system received FCC authorisation in April 1998. A test satellite (also part of the Vitasat system) was launched in 1997.

2.1.7 Leo One

This US-designed system consists of a planned 48 satellite constellation offering store-and-forward two-way messaging at up to 9600 bps. An FCC license was granted in February 1998, and a spectrum sharing agreement signed with the operators of the Russian maritime satellite system, TSYKADA. Commercial operation was expected to start in 2003, although no details are known regarding the launch schedule. Orbit inclination was to have been 50°, giving useful coverage up to latitudes of about 65°. No further details have been reported and the website no longer exists.

2.1.8 Gonets

Two GONETS LEO messaging systems have been proposed by the former Soviet Union, using both UHF and L/S-band communications channels. Both will offer true global coverage from high inclination 1400 km orbits. One system, GONETS-D already has 8 satellites in orbit with a further 36 planned. No operational experience has been reported to date.

2.1.9 Other Systems

Six E-Sat satellites are planned. Launches were to have started in 2001, but nothing has so far been announced. The system is aimed principally at the US utility industry for remote metering. The Italian based Temisat is another planned system which is intended to offer global coverage. Little further has been heard of the European SAFIR store-and-forward messaging system, which has two satellites in orbit, but has yet to relaunch a service after major technical problems with its first satellite.

2.2 Big and Broadband LEOs

2.2.1 Iridium

Iridium filed for Chapter 11 bankruptcy protection in August 1999, and underwent financial restructuring. Financial difficulties continued and the system ceased operation in April 2000. At that time, Iridium had its complete constellation of 66 satellites plus spares in orbit, and offered a true global service through a network of ground stations backed up by inter-satellite links. The system has since been rescued from planned de-orbiting and resurrected by the US Department of Defense. A commercial service has also been relaunched. Most Iridium phones are data capable and will interface with a standard modem. Throughput is about 2400bps. The component parts of some phones are now being repackaged as stand-alone modems. A short message service (1900 bytes max per message) was introduced in late 2002, as well as a dropout-tolerant direct Internet connection at up to 10kbps. This service (Short Burst Data) is still being evaluated by the community. Of particular interest to data buoy operators in the early days of Iridium was the Motorola L-band transceiver module, which was designed to be easily integrated with sensor electronics via a standard serial interface. This product has now reappeared as the Motorola 9522 modem. Discussions are underway regarding the implementation of a 'soft-SIM' user identification facility as a way of minimizing the costs of system membership for occasional users such as Argo floats, which might only place a call once every 10 days.

Iridium continues to add to its constellation, with five new satellites launched in February 2002, and operational experience with the data service is starting to grow. However it is likely that its future survival will depend heavily on continuing support from defence interests.

2.2.2 Teledesic

This 'Internet in the Sky' system planned a 288 (originally 840) LEO constellation to carry global broadband services such as video conferencing, the Internet, etc. It recently merged with Celestri, another proposed broadband LEO system. Since then there has been some doubt over the actual makeup of the combined constellation. Teledesic has suffered because of the financial difficulties of Iridium, as Motorola, one of Teledesic's primary investors and head of the industrial partnership developing the system, transferred engineering effort and funding to prop up Iridium. Teledesic has received FCC licensing for operations in the USA, and recently joined forces with Craig McCaw's New ICO. The constellation plan has been further trimmed to 30 MEOs, and the company announced in October 2002 that it was suspending its satellite construction work.

2.2.3 Globalstar

Globalstar was Iridium's main competitor in the mobile satellite telephony market. After a bad start in September 1998 when 12 satellites were lost in a single launch failure, Globalstar now has its complete 48 satellite constellation in space, and commenced a limited commercial service in the US in October 1999. Service has since been expanding to other regions and was available in the UK in mid 2000. Globalstar differs significantly from Iridium in that for a call to be made the user must be in the same satellite footprint as a gateway station. There is no inter-satellite relay capability as in Iridium. This means that coverage will not be truly global, especially in the short term as far fewer gateways have been built than originally planned. Although Globalstar was currently in a much stronger financial position than any of its competitors, only 55,000 subscribers had been signed by late 2001 and the company laid off half of its work force in August 2001. Globalstar subsequently filed for Chapter 11 bankruptcy protection in February 2002.

Data services at 9600 bps are planned to be commercially available sometime in the future. As with Iridium this is likely to be very dependent on the initial success of the basic voice service. Globalstar also has a second generation system planned, said to involve 64 LEO

satellites and 4 GEO satellites. Little else is known about the planned enhancements of this system.

2.2.4 Other Systems

Other planned big LEOs include Ecco (by the owners of Orbcomm), Ellipso (a hybrid elliptical LEO/MEO system, now merged with Teledesic and New ICO), LEO SAT Courier (a German led system which was originally a much smaller little LEO system), Signal and SkyBridge. Most of these systems seem to be on indefinite hold.

2.3 MEOs

2.3.1 New ICO

New ICO (formerly ICO Global Communications) is the third of the three main players in the global satellite telephony market. However it also has suffered severe financial difficulties and filed for Chapter 11 bankruptcy protection in August 1999, just two weeks after Iridium. The system, formerly known as Inmarsat-P but now fully autonomous, will use a constellation of 12 MEO satellites backed by a 12-station ground segment to provide a truly global voice, fax, data and messaging service. The aim is to complement and be inter-operable with existing digital cellular telephone networks. Prior to filing for bankruptcy protection, the first launch was planned for late 1999 with commercial service roll out scheduled for the third quarter of 2000. The company emerged from Chapter 11 protection in May 2000, and the first satellite was launched in June 2001, with service scheduled to start in 2003. However, ICO appear not to have launched any more satellites since 2001 and there is still no definite date for service rollout.

When the complete constellation is in service two satellites will always be visible from any point on the earth's surface. The space segment is being built by Boeing Satellite Systems. Data rate will be 9600 bps. Many large manufacturers are engaged in developing dual mode ICO/cellphone handsets. An ICO ‘engine’, is to be defined for the benefit of third-party equipment manufacturers (OEMs).

New ICO have joined forces with Teledesic (both owned by ICO-Teledesic Global), with major revisions to the scope of both systems. In particular New ICO is now putting a far greater emphasis on data services, rather than voice services which are now widely recognised as holding smaller potential.

2.3.2 West and East

Little is known about these systems, designed by Matra Marconi Space, except that a combination of MEO and GEO satellites were planned, with multimedia-like services scheduled to begin in Europe via West in 2003. A follow-on vehicle supporting a fully fledged ATM switch is planned for 2004. The Matra Marconi website makes no mention of these systems and they are probably on indefinite hold.

2.4 GEOS

2.4.1 Inmarsat D+

This is an extension of the Inmarsat D service using the new (spot-beam) Inmarsat Phase 3 satellites and small, low-power user terminals. The system was initially designed as a global pager or data broadcast service, with the return path from the mobile used only as an acknowledgement. D+ permits greater flexibility, but the uplink packets are still limited to 128 bits. The first ground station has been implemented in the Netherlands by the existing Inmarsat service provider (Station 12), but useful technical information has been difficult to

obtain. The only remaining manufacturer of D+ transceiver seems to be Skywave. The Skywave unit includes an integral antenna and is specifically designed for low power applications.

The service may prove particularly attractive to national meteorological services as protocols already exist with Inmarsat service providers for the free transmission of observational data to meteorological centres for quality control and insertion on to the GTS. Inmarsat, given its assured multinational backing and established infrastructure, is also extremely unlikely to disappear.

2.4.2 ODL

Oceanographic DataLink (ODL) was a US Office of Naval Research sponsored demonstrator system that uses Intelsat C-band transponders to communicate with small oceanographic packages at rates of up to 10 kbps. New signal processing techniques allow such transponders to be used in low energy applications. Both antenna and transceiver size are small (the complete package is expected to be video cassette size), and data costs are expected to be low. Successful bench trials were completed, and the results of field evaluations awaited with interest, but no information has been forthcoming. The parent company (Viasat) website no longer mentions the project.

2.4.3 Inmarsat Mini-M, Thuraya, ACes, AMSC, etc

These advanced GEOs offer voice-band communications using compact handsets or laptops by implementing high gain steerable spot beams to achieve sufficient link margin. Data services may available using a modem connection on the handset. Coverage is generally regional and not advertised for oceanic areas.

3. ACKNOWLEDGEMENTS

The assistance of Richard Winterburn of MES Communications Ltd in the preparation of this report is gratefully acknowledged.

4. REFERENCES

1. Hanlon, J (1996). Emerging LEOs telemetry options for use in scientific data buoys - a marine instrument manufacturer's perspective. In: *Proceedings of the DBCP Technical Workshop, Henley on Thames, October 1996*. DBCP Technical Document No 10, WMO, Geneva.

2. Hoang, N (1999). Data relay systems for drifting buoys utilizing low-earth orbit satellites. In: *Proceedings of the DBCP Technical Workshop, Hawk's Cay, October 1998*. DBCP Technical Document No 14, WMO, Geneva.

5. USEFUL WEB SITES

5.1 General information

Little LEO status, launch dates *http://www.ee.surrey.ac.uk/SSC/SSHP/const_list.html*
Constellation overview
http://www.ee.surrey.ac.uk/Personal/L.Wood/constellations/
The Satellite Encyclopaedia *http://www.tbs-satellite.com/tse/online/*
General satellite news/gossip *http://www.hearsat.org/*
Satellite news *http://www.spacedaily.com/*

General space news	*http://www.space.com/spacenews/*

5.2 Specific operators

Argos	*http://www.cls.fr/* *http://www.argosinc.com/*
Ellipso	*http://www.ellipso.com/*
E-SAT	*http://www.dbsindustries.com/*
Final Analysis	*http://www.finalanalysis.com/*
Globalstar	*http://www.globalstar.com/*
GOES	*http://www.goes.noaa.gov/*
Inmarsat	*http://www.inmarsat.org/*
Iridium	*http://www.iridium.com/*
LEO One	*http://www.leoone.com/*
LEO SAT Courier	*http://www.satcon-de.com/*
METEOSAT	*http://www.esoc.esa.de/external/mso/meteosat.html*
New ICO	*http://www.ico.com/*
Orbcomm	*http://www.orbcomm.com/*
Ocean DataLink (ODL)	*http://www.viasat.com/*
SAFIR	*http://www.fuchs-gruppe.com/ohb-system/*
Skybridge	*http://www.skybridgesatellite.com*
Teledesic	*http://www.teledesic.com/*
Thuraya	*http://www.thuraya.com/*
VITA	*http://www.vita.org/*
West	*http://www.matra-marconi-space.com/*

Overview of mobile satellite systems with possible data buoy applications - update 2003

System	Status*	Date (if known)	Orbit type	Buoy position	Message type	Terminal size	Power (W)	Comments
ARGOS	Operational		Little LEO	Doppler Shift	data: 32 bytes	Handheld	1	Various enhancements, incl 2-way messaging, are scheduled
ECCO (CCI Global)	On hold		LEO	GPS Required	voice/data	Handheld	TBD	12 equatorial satellites planned by 2003. Status questionable – merged with ICO-Teledesic Global
ELLIPSO	Licensed On hold		Big LEO	GPS required	voice/data	Handheld	TBD	17 satellites in highly elliptical orbits, serving major land masses. Status questionable – merged with ICO-Teledesic Global
EYESAT	Experimental		Little LEO	GPS Required	data: 60 bytes	Handheld	5	1 satellite 1995, principally for radio amateurs
E-SAT	Licensed On hold		Little LEO	GPS Required	data: TBD	TBD		6 satellites for utility metering (aimed at Continental US only initially)
FAISAT	Licensed On hold	Service 2002+	Little LEO	GPS Required	data: 128 bytes	Handheld	10	38 satellites 2000+ Test satellite launched 1997
GEMNET	Cancelled (pre-op)		Little LEO	GPS Required	data: no maximum	Laptop	10	1st satellite 1995 - launch failure 36 satellites by ???
Globalstar	Operational	1999	Big LEO	GPS Required	voice/data: no maximum	Handheld	1	48 satellites + spares (constellation complete) Limited coverage due to lack of ground stations. Financial difficulties.
GOES, Meteosat, GMS	Operational		GEO	GPS required	data: various options	Laptop	10	4 satellites; directional antenna desirable NOAA / ESA / Japanese met satellites.
GONETS-D	Pre-operational		Little LEO	GPS/ Glonass	Data	Handheld	TBD	8 satellites in orbit, 36 more planned
GONETS-R	Planned On hold?		Little LEO	GPS/ Glonass	Data	Handheld	TBD	48 satellites planned
INMARSAT-C	Operational		GEO	GPS required	data: no maximum	5.5 kg	15	Steered antenna not required

INMARSAT-D+	Operational		GEO	GPS required	data: 128bytes uplink, 8 bytes downlink	Handheld	1	Global pager using existing Inmarsat-3 satellites Note very oriented to downlink
INMARSAT-Mini-M	Operational		GEO	GPS required	voice/data: no maximum	Laptop	1	Mobile phone using regional spot-beams
ICO (New ICO)	Licensed On hold?	Service 2003	MEO	GPS required	voice/data: no maximum	Handheld	1	Global voice and packet data services. Recently merged with Teledesic to form ICO Teledesic Global. 12 satellites planned, only one launched so far.
Iridium	Revived	Service resumed 2001	Big LEO	GPS preferred	voice/data: no maximum	Handheld	1	72 satellites in orbit
IRIS/LLMS	Experimental On hold		Little LEO	Doppler + Ranging	data: up to few kbytes	Handheld	1	1 satellite in orbit. Belgian messaging system part of an ESA research prog.
LEO One	Licensed On hold	Service mid 2003	Little LEO	GPS Required	data: uplink 9600bps, downlink 2400bps	Handheld	Max 7	48 satellite constellation, store and forward + 8 spares. No polar sats
LEO SAT Courier	Planned On hold?	Service 2003+	Big LEO	GPS required	Data / voice	Handheld	1-5	72 satellites
OCEAN-NET	Experimental		GEO	Moored	no maximum	Large		uses moored buoys + Intelsat
Ocean DataLink (ODL)	Experimental On hold?		GEO	GPS	no maximum	Handheld	TBD	uses Intelsat
Odyssey	Cancelled (pre-op)		MEO	GPS required	voice/data: no maximum	Handheld	1	12 satellites were planned
Orbcomm	Operational	1998	Little LEO	Doppler or GPS	data: no maximum	Handheld	5	35 satellites in orbit, 30 operational, expansion to 48 sats licensed
SAFIR	Pre-operational On hold		Little LEO	Doppler or GPS	data: no maximum	Laptop	5	2 satellites in orbit
Signal	Planned On hold?		Big LEO		voice/data			48 satellites planned

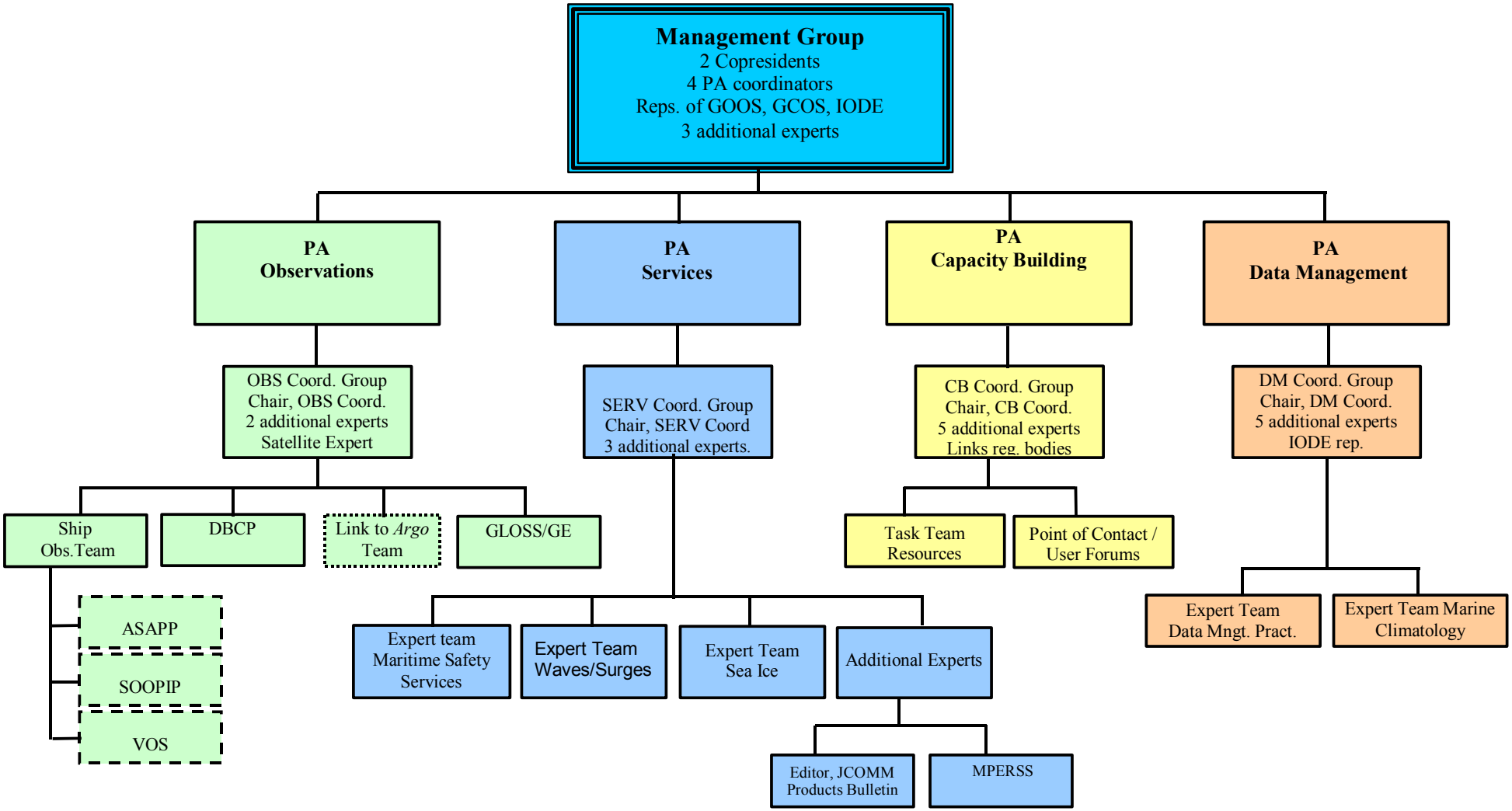
SkyBridge	Licensed On hold	Service 2002+	Big LEO	GPS Required	Broadband	Larger than handheld		80 satellites planned, recycling GEO spectrum allocations
Starsys	Cancelled (pre-op)		Little LEO	Doppler + Ranging	data: 27 bytes multiple msgs	Handheld	2	12 satellites 1998+ 24 satellites 2000+
Teledesic	Licensed On hold	Service Late 2004	Big LEO	GPS required	Broadband			288 LEOs planned, now reduced to 30 MEOs FCC licence granted, merged with new ICO
Temisat	Experimental		Little LEO		Data			7 satellites planned for environmental data relay. 1 satellite launched 1993.
Thuraya	Operational		GEO	Integral GPS	Voice/data	Handheld		1 multiple spot beam satellite in orbit (over Middle East), 1 planned
Vitasat	Pre-operational		Little LEO	GPS Required	Data			2 satellites in orbit, 2 more planned
WEST	Planned On hold	Service 2003+	MEO	GPS Required	Broadband			9 satellites planned

* Status of systems is categorized according to seven groups:

Planned: Little is known about the system except a name, notional type, and services to be offered. Mostly not licensed, although some may be.
Licensed: System has been licensed by a national or international regulatory agency (in most cases the FCC), but no satellites have been launched.
Experimental: System has one or more satellites in orbit for experimental purposes (not usually part of the final constellation). Includes new systems planning to use existing satellites.
Pre-operational: System is in process of launching, or has launched, its constellation but is not yet offering full services. Some limited evaluation service may be available.
Operational: System has full or nearly full constellation in place and is offering readily available service to external users (not necessarily commercial).
Cancelled: System has been cancelled, either before satellites launched (pre-op) or after (post-op).
On hold: No progress reported or scheduled.

ANNEX G

JCOMM STRUCTURE



TERMS OF REFERENCE AND GENERAL MEMBERSHIP OF THE OBSERVATIONS COORDINATION GROUP AND SHIP, DATA BUOY AND SEA LEVEL OBSERVATIONS TEAMS

1. Observations Coordination Group

Terms of Reference

1. Keep under review and advise on the effectiveness, coordination and operation of the observations work program, including performance measured against scientific requirements, delivery of raw data, measurement standards, logistics and resources.
2. Provide advice to JCOMM and to Observation Teams on possible solutions for newly identified requirements, consulting as appropriate with relevant scientific groups and CBS.
3. Taking into account the continuing development of satellite observations and their capabilities, review **in situ** data requirements and recommend changes as appropriate.
4. Coordinate the development of standardized, high quality observing practices and instrumentation and prepare recommendations for JCOMM.
5. Examine trade-offs and use of new and improved techniques/developments against requirements and available resources.
6. Liaise with and input to CBS activities regarding the consolidated requirements database and operational satellites.

General Membership

PA/Observations coordinator (chair)
Chairman Ship Observations Team
Chairman DBCP
Chairman GLOSS Group of Experts
Chairman Argo Science Team
Chairman TAO Implementation Panel
Technical coordinator DBCP/SOOP
Rapporteurs as required
Satellite expert
One other expert

2. Ship Observations Team

Terms of Reference

Generic

1. Review and analyse requirements for ship-based observational data expressed by the WWW, WCP, WCRP, GOOS, GCOS and in support of marine services, and coordinate actions to implement and maintain the networks to satisfy these requirements;
2. Review marine telecommunications facilities and procedures for observational data collection, as well as technology and techniques for data processing and transmission, and propose actions as necessary for improvements and enhanced application;
3. Coordinate PMO/ship greeting operations globally, propose actions to enhance PMO standards and operations, and contribute as required to PMO training;
4. Review, maintain and update as necessary technical guidance material relating to ship observations and PMOs;
5. Liaise and coordinate as necessary with other JCOMM Programme Areas and expert teams, in particular those relating to maritime safety services, marine climatology and ocean data management; in addition, liaise and coordinate with CBS, WCRP, GOOS and GCOS regarding the contribution of ship based observations to their respective programmes;
6. Establish, as necessary, *ad hoc* task teams to address specific issues such as: accuracy of hardware and software used on board ship; data quality control procedures for shipboard instrumentation; specifications for modifications to data transmission codes and general data formats;
7. Participate in planning activities of appropriate observing system experiments and major international research programmes as the specialist group on ship based observations;

SOOP Implementation Panel

1. Review, recommend on and, as necessary, coordinate the implementation of specialized shipboard instrumentation and observing practices;
2. Coordinate the exchange of technical information on equipment and expendable development, functionality, reliability and accuracy;
3. Ensure the distribution of available programme resources to ships to meet the agreed sampling strategy in the most efficient way;
4. Ensure the transmission of low resolution data in real time from participating ships; ensure that delayed more high resolution data are checked and distributed in a timely manner to data processing centres;
5. Maintain, through the SOOP Coordinator, appropriate inventories, monitoring reports and analyses, and information exchange facilities;
6. Provide general guidance to the coordinator in his support for the SOOP;

ASAP Panel

1. Coordinate the overall implementation of the ASAP, including recommending routes and monitoring the overall performance of the programme, both operationally and in respect of the quality of the ASAP system data processing;
2. As may be required by some members, arrange for and use funds and contributions in kind needed for the procurement, implementation and operation of ASAP systems and for the promotion and expansion of the programme;
3. Carry out other activities as agreed upon by participating members to implement and operate ASAP and to promote and expand the programme internationally;
4. Prepare annually a report on the status of ASAP operations, data availability and data quality;

VOS panel

1. Review, recommend on and coordinate the implementation of new and improved specialized shipboard instrumentation, siting and observing practices;
2. Support the development and maintenance of the VOSClim Project;
3. Develop and implement activities to enhance ship recruitment, including promotional brochures, training videos, etc.

General Membership

Chairman selected by JCOMM
Operators of VOS, SOOP and ASAP
Representatives of monitoring centres, data management centres and bodies
Representatives of Inmarsat and other communications satellite systems
Representatives of manufacturers as appropriate
Representatives of science advisory bodies and users as appropriate

3. Data Buoy Observations Team

Terms of Reference

Existing Terms of Reference for DBCP, TIP and Action Groups

General Membership

Open, existing DBCP members, Action Groups, TIP

4. Sea Level Observations Team

GLOSS Group of Experts

Terms of Reference

Existing terms of reference as determined by the IOC Executive Council

General Membership

Existing GLOSS GE and GLOSS Scientific Subgroup

ANNEX VII

SUMMARY OF REPORTS BY DATA MANAGEMENT CENTRES

Responsible National Oceanographic Data Centre (RNODC) for Drifting Buoys

During the last intersessional period, MEDS had archived an average of 365, 000 BUOY reports per month (18% more than last year) from an average of 983 buoys per months. About 12 observations per day per buoy were received in average. Most buoys are reporting SST and about 40% air pressure. MEDS continues to redistribute the data upon request, on a regular basis and via the web. Last year, MEDS received 65 requests for drifting buoy data, an increase of 38% over last year. Size of MEDS archive is increasing rapidly. It contains about 30 million records for the period 1978 to 2003.

At DBCP-18, MEDS agreed to participate in the DBCP QC guidelines to monitor the quality of location data distributed on the GTS. Since October 2002, statistics on the number of erroneous positions are sent on the buoy-qc mailing list on a monthly basis. These include a link to SVG maps in three projections to visualize the data.

The MEDS received a significant number of duplicate and semi-duplicate buoy messages distributed over the GTS and had enhanced its duplicate software to deal more effectively with this issue. Modifications included combining messages that had the same header information, such as buoy ID, observation date/time, position etc. The new system has been in place since July 2004 and removes approximately 10% of the total messages on a monthly basis. This has helped to make the data much cleaner and easier to understand and use in products and analysis.

MEDS flagging strategy was looked at during the review of the processing system and it was decided that the current practice should stop. A new system is being developed to look at both the observation date/time and position date/time separately when flagging. The speed analysis of the track (position date/time, latitude and longitude) will be improved, taking into account the QC flags sent with the data such as QL, quality of location and QA, the class of buoy location. Measurements (SST, atmospheric pressure and air temperature) will also be looked at as a time series by observation date/time, with considerations of where the buoy is being taken into account. The new system will use both automated checks and visual inspection. Some of the software to accomplish this is completed but there is still more to do and reprocessing of the archives will be required. MEDS expects to have the new flagging system completed for spring of 2005 at which time the task of reprocessing the entire drifting buoy archive will commence.

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 has also received three annual updates since then to include data up to December 2003. MEDS has been working on updating the system that handles the SVP data. The position and temperature archive has been recreated to include more observational data than just surface temperatures. A new archive is being built to store the raw data and an issue concerning reusing buoy ID's has been dealt with. Since the MEDS DBCP report was submitted in September, the new SVP system has been completed and is fully functional and updated with all data received from AOML. The MEDS web site has also been updated to provide access to the data.

Drifting buoy data is now being reported on the GTS in both BUOY and BUFR format. MEDS has established a connection to the Canadian Meteorological Center (CMC) to receive the BUFR messages via FTP and have been successful in splitting out the BUFR messages into single messages. MEDS is currently looking into software that will read and write BUFR code and have come across some issues such as finding a format of all the BUFR code tables that is easy to use and update. A request for help was sent out on acquiring the BUFR tables in an ascii version that could be easily used and updated. Some options for Tables B and D have been offered but so far no easy solution has been suggested for using the individual Code Tables. MEDS intends to have BUFR software, which will replace the existing BUOY decoder, put into production by the end of 2004.

An animation of buoy tracks in the NPDBAP area was added to the MEDS web site. The animation displays buoy tracks for the previous 12 months with each tail representing 30 days of data and is updated every month.

Specialized Oceanograhic Centre (SOC) for drifting buoys

The SOC for Drifting Buoys has been run continuously during year 2003-2004. 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-qc@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 and each LUT (when several are used for transmitting the data of a buoy). Monthly statistics are sent to the buoy-qc@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 (ftp://ftp.shom.fr/meteo/daim), including the following information;

- 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 time evolution of waveob reports and sensors
- mapping position plot charts and Marsden square distribution, produced for bathy, tesac, ship, buoy and trackob (each month)
- Marsden square distribution charts of mean monthly data availability and percentage of buoy reports compared to ship + buoy reports for wind, pressure, air temperature, sea surface temperature (each month)

Different issues have been raised and/or examined and dealt with during this year between SOC and other relevant teams, however not exclusively linked to drifting buoys: switch in bulletin headers between LFPW & LFVW, duplicate filtering aspects, evolution to BUFR.

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 centres (such as Mercator, French component of the GODAE).

ANNEX VIII

Proposed new Terms Of References for JCOMMOPS

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

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

(i) Act as a focal point for implementation and operation of relevant observing platforms and provide assistance to platform operators for free and unrestricted exchange of data by, for example, 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; for example, on instrumentation, on instrument evaluation, and on data quality.

ANNEX IX

Financial report by IOC
for the year 1 June 1993 to 31 May 1994

(all amounts in US $ unless otherwise specified)

BALANCE (from previous years)		**0**
FUNDS TRANSFERRED FROM WMO (relevant to the period)		
	104 500	**119 500**
	10 000	
	5 000	
	FF 75000	
TOTAL RECEIPTS		**119 500**
		FF 75000
EXPENDITURES		
Technical Co-ordinator's employment:		**91 915**
Salary:	54 771	
Allowances:	19 039	
Relocation (yearly provision):	18 105	
Technical Co-ordinator's missions:		**7 102**
Athens (18-29 October 1993):	2 375	
Paris (6-8 December 1993):	813	
Buenos-Aires (11-18 December 1993) *[funded by CLS]*		
USA (14-20 May 1994)	3 914	
Contract with CLS/Service Argos		**FF 75000**
	in US $:	
TOTAL EXPENDITURES		**99 017**
		FF 75000
BALANCE (at 1 June 1994)		**20 483**

Financial report by IOC
for the year 1 June 1994 to 31 May 1995

(all amounts in US $ unless otherwise specified)

BALANCE (from previous years)		**20 483**
FUNDS TRANSFERRED FROM WMO (relevant to the period)		
	90 000	**105 000**
	15 000	
	FF 77 000	
TOTAL RECEIPTS		**125 483** **FF 77000**
EXPENDITURES		
Technical Co-ordinator's employment:		**83 111**
Salary:	62 575	
Allowances:	17 276	
Relocation (yearly provision):	3 260	
Technical Co-ordinator's missions:		**23 754**
Copenhagen/Kiel/Hamburg/Helsinki (14-24 June 1994):	4 186	
Buenos Aires/Wellington/Melbourne/Hobart (3-13 October 1994):	7 765	
La Jolla (1-9 November 1994):	1 272	
Silver Spring (4-12 February 1995):	2 807	
Bergen (27-28 February 1995):	2 460	
Reading (27-29 March 1995) *[funded by COSNA]*		
Landover (4-6 April 1995):	2 840	
New Orleans (9-11 May 1995):	2 424	
Contract with CLS/Service Argos		**FF 77 000**
	in US $:	
TOTAL EXPENDITURES		**106 865** **FF 77000**
BALANCE (at 1 June 1995)		**18 618**

Financial report by IOC (rev)
for the year 1 June 1995 to 31 May 1996

(all amounts in US $ unless otherwise specified)

BALANCE (from previous years)		**18 618**
FUNDS TRANSFERRED FROM WMO (relevant to the period)		
	105 000	**121 057**
	16 057	**FF 79 000**
TOTAL RECEIPTS		**139 675** **FF 79 000**
EXPENDITURES		
Technical Co-ordinator's employment:		**87 517**
Salary:		
Allowances:		
Relocation (yearly provision):		
Technical Co-ordinator's missions:		**17 469**
Bergen (7-8 June 1995):	1 793	
Kiel (27-28 June 1995):	2 317	
Cambridge (21-22 September 1995):	1 462	
Pretoria (16-26 October 1995):	3 317	
Copenhagen (15-17 January 1996):	1 335	
New Orleans/Washington (19-26 January 1996):	2 786	
Goa (10-16 February 1996):	2 359	
Geneva (1-3 May 1996):	1 307	
Bonas (14-17 May 1996):	490	
Adjustment (travel claim paid 24/08/95)	304	
Contract with CLS/Service Argos		**FF 79 000**
	in US $:	**16 057**
TOTAL EXPENDITURES		**121 043** **FF 79 000**
BALANCE (at 1 June 1996)		**18 632**

Financial report by IOC (rev)
for the year 1 June 1996 to 31 May 1997

(all amounts in US $ unless otherwise specified)

BALANCE (from previous years)		**18 632**
FUNDS TRANSFERRED FROM WMO (relevant to the period)		
	105 000	**120 564**
	15 564	**FF 80 000**
TOTAL RECEIPTS		**139 197** **FF 80 000**
EXPENDITURES		
Technical Co-ordinator's employment:		**88 166**
Salary:		
Allowances:		
Relocation (yearly provision):		
Technical Co-ordinator's missions:		**10 680**
Bracknell (4-7 June 1996)	603	
Cambridge, UK (1-3 August)	1 386	
La Réunion (21-25 September 1996)	1 966	
Henley-on-Thames (21-30 October 1996)	2 320	
USA: Stennis Space Center, MS; Miami, FL; Woods Hole, MA; Silver Spring, MD (3-12 February 1997)	4 405	
Miscellaneous (bank carges)		**225**
Contract with CLS/Service Argos		**FF 80 000**
	in US $:	**12 882**
TOTAL EXPENDITURES		**111 953** **FF 80 000**
BALANCE (at 1 June 1997)		**27 244**

Financial report by IOC (rev)
for the year 1 June 1997 to 31 May 1998

(all amounts in US $ unless otherwise specified)

BALANCE (from previous years)		**27 244**
FUNDS TRANSFERRED FROM WMO (relevant to the period)		
	105 000	**120 000**
	15 000	
TOTAL RECEIPTS		**147 244**
EXPENDITURES		
Technical Co-ordinator's employment:		**89 142**
Salary:		
Allowances:		
Relocation (yearly provision):		
Technical Co-ordinator's missions:		**12 397**
Saint-Petersburg (3-5 June 1997)	2 434	
Perth & Melbourne (21-25 July 1997)	3 334	
La Réunion (13-22 October 1997)	2 935	
Reading (4-5 November 1997)	1 083	
Paris (2-3 December 1997)	920	
Naples (11-13 May 1998)	1 692	
Miscellaneous (bank charges)		**185**
Contract with CLS/Service Argos		**FF 80 000**
	in US $:	**13 201**
TOTAL EXPENDITURES		**114 926**
		FF 80 000
BALANCE (at 1 June 1998)		**32 318**

Financial report by IOC (rev)
for the year 1 June 1998 to 31 May 1999

(all amounts in US $ unless otherwise specified)

BALANCE (from previous years)		**32 318**
FUNDS TRANSFERRED FROM WMO (relevant to the period)	104 865	**118 067**
	13 201	**FF 80 000**
TOTAL RECEIPTS		**150 385** **FF 80 000**
EXPENDITURES		
Technical Co-ordinator's employment:		**91 242**
Salary:		
Allowances:		
Relocation (yearly provision):		
Technical Co-ordinator's missions:		**22 237**
La Jolla (22-26 June 1998)	2 778	
Seattle (29 July - 4 August 1998)	3 007	
Geneva (5-6 October 1998)	1 752	
Marathon/Nouméa (12-30 October 1998)	9 187	
Paris (30 November 1998)	681	
Geneva (8-9 December 1998)	1 167	
Piran/Trieste (10-14 January 1999)	792	
Brest (26-28 May 1999)	2 874	
Contract with CLS/Service Argos		**FF 80 000**
	in US $:	**12 811**
TOTAL EXPENDITURES		**126 290** **FF 80 000**
BALANCE (at 1 June 1999)		**24 095**

Financial report by IOC (rev)
for the year 1 June 1999 to 31 May 2000

(all amounts in US $ unless otherwise specified)

BALANCE (from previous years)			**24 095**
FUNDS TRANSFERRED FROM WMO (relevant to the period)			
	(28.04.1999)	118 000	**130 282**
	(16.12.1999)	12 282	**FF 80,000**
	TOTAL RECEIPTS		**154 377** **FF 80,000**
EXPENDITURES			
Technical Co-ordinator's employment:			**99 789**
	Salary:		
	Allowances:		
	Relocation (yearly provision):		
Technical Co-ordinator's missions:			**19 526**
	Bremerhaven (1-4 June 1999) *[accounted for last year]*		
	Oban (12-15 June 1999)	2 982	
	Saint Petersburg (18-23 July 1999)		
	Saint Raphael (18-21 October 1999)	1 155	
	Wellington/Melbourne (23 October - 6 November	3 868	
	Geneva (28-30 November 1999)	1 312	
	Paris (5-9 December 1999)	965	
	Washington (9-19 February 2000) *[partly WMO/CBS]*	1 988	
	Southampton (6-9 March 2000)	1 435	
	San Diego (24March - 2 April 2000)	2 051	
	Geneva/Tokyo (9-15April 2000)	3 770	
Contract with CLS/Service Argos			**FF 80,000**
		in US$	**11 272**
	TOTAL EXPENDITURES		**130 587** **FF 80,000**
BALANCE (at 1 June 2000)			**23 790**

Financial report by IOC (rev)
for the year 1 June 2000 to 31 May 2001

(all amounts in US $ unless otherwise specified)

BALANCE (from previous years)			**23 790**
FUNDS TRANSFERRED FROM WMO (relevant to the period)			
	(15.04.2000)	118 000	**128 292**
	(01.12.2000)	10 292	**FF 80,000**
	TOTAL RECEIPTS		**152 082** **FF 80,000**
EXPENDITURES			
Technical Co-ordinator's employment:			**92 182**
	Salary:	64 915	
	Allowances:	22 501	
	Relocation (yearly provision):	4 766	
Technical Co-ordinator's missions:			**16 119**
	Paris (13-16 June 2000)	842	
	Geneva (19-21 June 2000)	1 074	
	Paris (10-11 July 2000)	698	
	Brest (4 October 2000) [*paid for by IOC RP*]		
	Victoria/Washington DC (16 October - 3 November 2000)	4 327	
	Bergen/Tröndheim (11-12 December 2000)	1 308	
	Geneva (5-7 February 2001)	1 297	
	Southampton (1-2 March 2001)	1 037	
	Sidney (20-22 March 2001)	1 725	
	Geneva (9-10 May 2001)	1 074	
	Yokohama/Tokyo (30 May - 5 June 2001)	2 736	
Contract with CLS/Service Argos			**FF 80,000**
		in US$:	**11 199**
	TOTAL EXPENDITURES		**119 501** **FF 80,000**
BALANCE (at 1 June 2001)			**32 581**

Financial report by IOC (rev)
for the year 1 June 2001 to 31 May 2002

(all amounts in US $ unless otherwise specified)

BALANCE (from previous years)			**32 581**
FUNDS TRANSFERRED FROM WMO (relevant to the period)			
	(05.04.2001)	118 000	**126 259**
	(15.10.2001)	8 259	**FF 59,000**
	TOTAL RECEIPTS		**158 840** **FF 59,000**
EXPENDITURES			
Technical Co-ordinator's employment:			**98 160**
	Salary:	?	
	Allowances:	?	
	Relocation (yearly provision):	?	
Technical Co-ordinator's missions:			**14 822**
	Akureyri (20-24 June 2001)	1 692	
	Paris (27-30 June 2001)	897	
	Hyderabad (24-28 July 2001)	2 118	
	Perth (15 October - 2 November)	2 964	
	Brest (18-20 November 2001)	934	
	Geneva (27 January - 1 February 2002)	1 625	
	Goa (23 February - 4 March 2002)	1 838	
	La Jolla (20-28 April 2002)	2 753	
Contract with CLS/Service Argos			**€ 12,200**
		in US $:	**12 008**
	TOTAL EXPENDITURES		**124 990** **€ 12,200**
BALANCE (at 1 June 2002)			**33 850**

Financial report by IOC (rev)
for the year 1 June 2002 to 31 May 2003

(all amounts in US $ unless otherwise specified)

BALANCE (from previous years)		**33 850**
FUNDS TRANSFERRED FROM WMO (relevant to the period)		
(28.05.2002)	118 000	**118 000**
TOTAL RECEIPTS		**151 850**
EXPENDITURES		
Technical Co-ordinator's employment:		**112 788**
Salary:	?	
Allowances:	?	
Relocation (yearly provision):	?	
Technical Co-ordinator's missions:		**16 953**
Victoria/Ottawa (5-12 June 2002)	2 920	
Cape Town (29 July-2 August 2002)	3 326	
Martinique (14-23 October)	2 526	
Geneva (3-4 December 2002)	910	
Brest (28-29 January 2003)	1 207	
Melbourne/Paris (3-14 March 2003)	4 566	
Madrid (27-28 May 2003)	1 499	
Contract with CLS/Service Argos		**12 200 €**
	in US $:	**13 910**
TOTAL EXPENDITURES		**143 652**
BALANCE (at 1 June 2003)		**8 198**

ANNEX X

Financial report by IOC
for the year 1 June 2003 to 31 May 2004

(all amounts in US $ unless otherwise specified)

Theoretical BALANCE (from previous years)			**8,198**
FUNDS TRANSFERRED FROM WMO (relevant to the period and more)			
	(26.05.2003)	126,000	**252,000**
	(March 2004)	126,000	
	TOTAL RECEIPTS		**260,198**
EXPENDITURES			
Technical Co-ordinator's employment:			**130,670**
	Salary:	?	
	Allowances:	?	
	Relocation (yearly provision):	?	
Technical Co-ordinator's missions:			**16,698**
	Tromso (4-5 June 2003)	3,462	
	London (30 July-1 August 2003)	2,680	
	Paris (15 October 2003)	650	
	Angra Dos Reis (20-29 October 2003)	2,343	
	Paris (2-3 December 2003)	1,154	
	Washington-DC/Miami/Cape Coral (26-30 January 2004)	3,394	
	Brest (8-11 March 2004)	1,941	
	Geneva (16-17 March 2004)	1,075	
	Toulouse (10-15 May 2004) *[no cost]*	0	
Contract with CLS/Service Argos			**12,200 €**
		in US $:	**14,668**
	TOTAL EXPENDITURES		**162,037**
			12,200 €
Theoretical BALANCE (at 1 June 2004)			**98,162**
	"lost" in 1995	**13,521.27**	
BALANCE as per UNESCO accounts (at 1 June 2004)			**84,641**

ANNEX XI

World Meteorological Organization

Data Buoy Co-operation Panel

Interim Statement of Account as at 31 August 2004

	US$	US$
Balance from 2003		125,361
Contributions Paid for Current Biennium		103,385
Total Funds Available		228,746
Obligations Incurred		
Consultants	9,991	
Travel	4,718	
Bank charges	122	
Transfer to Marine Programe	12,000	
Contribution to JCOMMOPS Data Devt	6,527	
Payment to IOC/ Logistic Support	126,000	
Support Cost	1,594	
		160,952
Balance of Fund		US $ 67,794
Represented by.		
Cash at Bank		71,598
Exchange Adjustments		(3,804)
		US $ 67,794

CONTRIBUTIONS RECEIVED

Australia	16,875
Canada	12,500
CLS Service ARGOS	10,000
France	12,033
Germany	5,000
Greece	2,200
Iceland	2,250
Ireland	1,517
Japan	10,000
Netherlands	1,970
New Zealand	2,395
Norway	395
South Africa	3,750
USA	22,500
TOTAL	103,385

Revised version, prepared on 7 Sept 2004

ANNEX XII

PROVISIONAL ESTIMATE OF INCOME AND EXPENDITURE
UNTIL 31 MAY 2005

Income	**USD**
Balance of fund from interim account	67,794
Additional contribution (Arrears from France 2002-2003)	24,630
Additional contribution (from JTA for JTA chair's travels in 2004)	7,000

Expenditure (excluding WMO support cost)	
Travel (JTA chair, etc.)	5,000
Technical Coordinator (employment and travel)	78,000
Arrear payment for the CLS logistics support (euro 12,200)	15,024

EXPENDITURES AND INCOME FOR 2002-2005 (USD)

	Actual 2002 and 2003 (2 years)	Estimated 2004 (1 year)	Estimated 2005 (1 year)
Expenditures			
Payment to IOC for Technical Coordinator's (TCs) employment	200,000	100,000+ 67,000	147,500
Payment to IOC for TC's Travel	34,000	16,000+11,000	16,000
Payment to IOC for CLS logistic support	10,000	(10,000 +15,024)	15,024 (=euro 12,200)
Travels except for TC including JTA chair	24,037	(10,000)	
JTA activities including JTA chair salary			15,000
JTA chairman's salary	18,433	9,991	
UN Atlas	4,102		
Publications	1,363		2,500**
JCOMMOPS development	5,000	6,527	3,473
Refund to WMO		12,000	
Contingencies			316
sub-total	296,982	257,542	199,813
WMO support cost	1% (2,970)*	1% (2,575)*	7% (13,986)*
TOTAL	299,952	260,117	213,800

* to be confirmed
** additional 3,500 required is expected to be recovered from the WMO support cost

Income achieved/required to balance expenditures

Contributions	326,752	(200,960+24,630*+7,000**)	216,511
Carry forward from previous biennium	-1,984	24,816	-2,711
Carry over to next biennium (year)	24,816	(-2,711)	
TOTAL	299,952	(260,117)	213,800

*: arrear contribution from France for 2002-2003 (euro 20,000, ca USD 24,630)
** supplementary contribution from JTA for JTA chiar travels in 2004

ANNEX XIII

DRAFT TABLE OF PROVISIONAL CONTRIBUTIONS

DBCP

	2003-2004	2004-2005	2005-2006
AUSTRALIA	12,500	13,500+3,375	13,500
CANADA	10,000	10,000+2,500	12,500
FRANCE	12,315(€10,000)	12,033(€ 10,000)	E-SURFMAR
GREECE	2,200	2,200	E-SURFMAR
ICELAND	1,500	1,500+750	E-SURFMAR
INDIA			3,000
IRELAND	1,290 (Euro 1,000)	1,517 (Euro1,000+250)	E-SURFMAR
JAPAN	5,000	5,000	5,000
NETHERLANDS	1,575	1,575+395	E-SURFMAR
NEW ZEALAND	1,114	1,000+1,000	2,000
NORWAY	1,575	1,575+395	E-SURFMAR
SOUTH AFRICA	3,000	3,000+750	3,750
UNITED KINGDOM	19,000	16,000	E-SURFMAR
USA	68,000	70,000+20,000	90,000
E-SURFMAR			49,261*
			(Euro 40,000)
JTA (for JTA chair support)	10,000	17,000	15,000
TOTAL	**149,069**	**(185,065)**	**(194,011)**

* to be confirmed

SOOPIP

	2003-2004		**2004-2005**		**2005-2006**	
Germany	5,000		5,000		5,000	
Japan	5,000		5,000		5,000	
USA	10,000		10,000+2,500		12,500	
TOTAL	**20,000**		**22,500**		**22,500**	

TOTAL INCOME FROM CONTRIBUTIONS

	2003-2004		**2004-2005**		**2004-2005**	
Total	169,069		207,565		216,511	

ANNEX XIV

Draft Proposal from IOC

Subject: DBCP's Technical Coordinator

Contents:

Dear JCOMM DBCP Panel Members,

DBCP's technical coordinator, based in Toulouse France plays a vital role in support of the DBCP panel. Given this vital role a more transparent and efficient system is required to support him and the DBCP program as a whole. The current arrangement suffers from lack of transparency leading to inefficiencies and potential financial and legal irregularities. Furthermore, the current system does not conform to recently enacted IOC financial oversight requirements. The DBCP panel and its work is now under the general oversight of J-COMM, the WMO – IOC Joint Commission of Oceanography and Marine Meteorology.

The current system:

The coordinator is hired as a regular employee of IOC ("fixed term contract", financed through extra-budgetary resources). Financial support for this employee and their activities is provided via a tortuous route with numerous inefficiencies. DBCP member contributions are sent to WMO where various DBCP related costs are paid for and overhead is taken out. WMO then sends money on to IOC to cover the salary of the DBCP coordinator. IOC is no longer able to hire an employee based on extramural funds without direct agreements with the bodies providing the funding. The current system cannot be maintained beyond 2004.

Suggested solutions:

If the coordinator is to remain an employee of IOC, then members of DBCP must make financial contributions sufficient to support this specific cost directly to the IOC Special Account ("trust fund") earmarked for JCOMM-DBCP. Contributions sufficient to cover one year of salary support will have to be made at least 3 months in advance of the termination of the previous year's support period or the contract will not be renewed. IOC will require that 5% of the contributions are held aside to cover unpredictable costs, such as currency fluctuations, and will guarantee that the remaining 95% of the contributions are directly provided to the DBCP coordinator for salary and related expenses as suggested by DBCP.

From the IOC perspective, and now under the general oversight of J-COMM, this suggested strategy is far superior to the old mechanism both by virtue of its clear line of financial and legal responsibility. Over the past five years IOC has been able to put professional systems in place to monitor the Special Account, and expenditures in that account receive official certification from the Bureau of the Controller of UNESCO once a year. However, should the DBCP panel feel that the solution is not ideal, we are happy to consider any alternative mechanisms that the panel may wish to suggest. The point of contact at the IOC for further discussions on this proposal is Keith Alverson (k.alverson@unesco.org).

We look forward to working with you to find an amenable solution to facilitate the continued excellent work of the DBCP.

Annex XV

DBCP IMPLEMENTATION & TECHNICAL WORKPLAN FOR THE 20th YEAR

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	Update & publish new versions of DBCP publications No. 3 (Argos guide) & 4 (SVPB design reference). Produce new publications: 2004 Annual Report, Workshop Proceedings (CD-Rom and web only).	TC Secretariats	Service Argos (No. 3) SIO (No. 4) Members	Panel/Mid-2005
8	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
9	Monitor the operation of the Argos GTS processing sub-system & arrange for modifications as necessary.	TC	CLS	Panel & users/Ongoing
10	Keep up-to-date with the latest buoy technical developments.	Operational services Chair, vice-Chairs TC	Members	Panel/Ongoing
11	Coordinate operations of DBCP QC guidelines.	TC	Members Operational services	Panel/Ongoing
12	Follow up & possibly assist in implementing requirements expressed by the buoy users within the Argos system.	CLS	TC	Panel, meeting on JTA/Ongoing
13	Support, as required, existing DBCP action groups (E-SURFMAR, IABP, IPAB, ISABP, IBPIO, GDP, TIP, DBCP-PICES NPDBAP), and provide assistance on request to other internationally coordinated buoy programme developments.	TC Secretariats	Chair	Panel/Ongoing
14	IBPIO to coordinate with IOP implementing strategy for the Indian Ocean Observing System as far as data buoys are concerned.	IBPIO	Chair TC Secretariats	Panel/Ongoing

15	Organize scientific & technical workshop at DBCP-XXI	Ken Jarrott Willian Scuba	Secretariats	Panel/Intersessional period
16	Monitor & evaluate quality of pressure & wind data from SVPB & SVPBW drifters. Investigate the higher RMS values that were noticed for wind data in the recent months.	Evaluation Group		Panel/Intersessional period
17	Encourage other centres to act as PMOC	Members	TC	Panel/Ongoing
18	Document calibration procedures	Members		Panel/Ongoing
19	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
20	Produce table of national commitments in the Southern Ocean (by next Panel's session).	TC	Members	Panel/Intersessional period
21	Continue development of buoy metadata collection scheme.	JCOMMOPS	Buoy operators, manufacturers	EGOS/E-SURFMAR, Pane/Early 2005l
22	Relevant panel members to routinely (e.g. monthly) provide the Technical Coordinator with the list of moored buoys they operate and which are reporting in SHIP 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
23	Enhance buoy safety through improved design (refer recommendations) and keep the Panel informed about related changes.	Manufacturers	Members	Panel/Ongoing
24	Analysis on a possible relationship between drogue lifetime and manufacturer; the study to include physical location of drogue failure.	GDC		Panel/Intersessional period
25	Buoy operators to 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
26	Investigate flagging of GTS data in BUFR reports.	TC	CBS ET/DRC	Panel/Intersessional period
27	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 2004.	Chair	Members	Panel/30 November 2004
28	IMO to implement new buoy-qir@vedur.is mailing list and filtering system.	Iceland	TC	Panel/ASAP
29	TC to continue investigating with appropriate experts and ET/DRC establishment of a BUFR template for wave data.	TC	Members CBS ET/DRC	Panel/Intersessional period
30	Wave data users to provide input on requirements to DBCP.	Members (wave data users)		TC/Intersessional period
31	Technical Coordinator to draft guidelines to be placed on ISABP web site regarding the use of quality control tools made available by Panel Members, NWP centres, and JCOMMOPS.	TC	Members	ISABP/Next ISABP meeting
32	Panel Members to attend the technical conference, Halifax, 15-17 September 2005, that will be held prior to JCOMM-2, 19-28 September 2005.	Members	Secretariats	Panel/Sept. 2005

33	Interested Panel Members to 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.	Members	TC	Panel/Ongoing
34	Users of other satellite telecommunication systems to use, if necessary, facilities offered by CLS, Service Argos, for GTS distribution of already formatted reports.	Members	Service Argos	Panel/Ongoing
35	Panel members to inform the Technical Coordinator of use of other satellite data telecommunication systems than Argos.	Members		Panel/Ongoing
36	Continue development of JCOMMOPS.	DBCP & Argo TCs	Members Secretariats CLS	Panel/Ongoing
37	Closer links to be established with SOT members so that support on deployment opportunities can be obtained from the SOOP and VOS Panels of SOT.	Chair	TC	Panel/SOT meeting March 2005
38	Louis Vermaak to continue pursuing the goal of eventually connecting Marion Island and Gough Island LUTs to the Argos network.	Louis Vermaak		Pane/Intersessional periodl
39	Panel Members, buoy operators, and manufacturers to comply with buoy metadata collection scheme as soon as it is implemented at JCOMMOPS.	Buoy operators Manufacturers	TC	Panel/Ongoing
40	Secretariats to recommend that JCOMM takes necessary steps for preparation of a workshop and establishment of *ad hoc* working group regarding the proposal for real time distribution of metadata for SST and profile data.	Secretariats	TC, Members	Panel/ASAP
41	Secretariats to continue actions preventing vandalism.	Secretariats		Panel/Ongoing
42	Chair to insert information on vandalism into UN Atlas and submit article to relevant journals such as “Fishing News International.	Chair		Panel/Mid-2005

ANNEX XV

DBCP ADMINISTRATIVE WORKPLAN FOR THE 20th YEAR

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	Prepare annual report of the DBCP.	Chair Secretariats	TC	Executive councils of WMO & IOC/End of 2004
9	Ukraine to act regarding BSBP as suggested by the Panel (para 4.10).	Ukraine	E-SURFMAR Chair Members	Panel/Intersessional period
10	Make every effort to recruit new contributors to the trust fund. Secretariats to write to Member countries to seek additional contributions.	Chair	Members	Panel/Intersessional period
11	Panel members encouraged to seek any possibility of increase of their future contribution.	Members		Panel/Intersessional period
12	Panel members to pays their contributions as soon as invoices are received.	Members		WMO Secretariat/upon invoice
13	Authors of presentations at the workshop to provide their papers via e-mail or CD-Rom to workshop Chair, Ken Jarrot, in electronic form (MS Office compatible format only) by 30 November 2004.	Authors, Workshop presentation		Ken Jarrott/30 November 2004
14	Publish workshop proceedings (mid 2005).	Secretariats		Panel/Mid-2005
15	Submit national reports & Action Group reports in electronic form to the Secretariats	Members AG		Panel/End-2004
16	Secretariats to forward national & AG reports in electronic form to the technical coordinator for inclusion in the JCOMMOPS server	Secretariats		TC/Jan. 2005
17	Prepare & distribute revised budget estimates for 2005-2006	Secretariats	Chair	Panel/End-2004
18	Secretariats & members to identify necessary funding to allow for expansion of JCOMMOPS & AIC staffing & resources.	Secretariats Members	JCOMM/OCG	Panel/Intersessional period

19	Interested Member states to make commitments regarding instrument evaluation.	Members		Panel/Intersessional period
20	TC to inform chairman of his wish or otherwise to continue to work as TC/DBCP for the period 1 June 2006 to 31 May 2007.	TC		Chair/1 Oct. 2005
21	Review DBCP aims, objectives, and ToR. Secretariats to include an agenda item to this effect on agenda of future meetings.	Secretariats	Chair	Panel/31 May 2005
22	Panel Members to provide the Technical Coordinator with short articles for inclusion in JCOMMOPS News section of its web site.	Members	JCOMMOPS	Panel/Ongoing
23	PDF version of the DBCP brochure on DBCP web site. Panel Members to suggest revisions of the brochure.	Members	TC	Panel/Intersessional period
24	Panel Members to check the DBCP list of National Focal Points for logistical facilities and report discrepancies, changes, or additions to the WMO Secretariat. List to be possibly integrated as a JCOMM list.	Members	WMO Secretariat	WMO Secretariat/Ongoing
25	Chair to take possible actions either to reduce WMO support cost to be taken by the WMO administration or to recover some of it.	Chair	Secretariats	Panel/Intersessional period
26	Chair to officially address the Executive Sercretary IOC, with a view to request him to find ways of reimbursing the Panel of its loss.	Chair	IOC Secretariat	Panel/Intersessional period
27	Secretariats to report at next Panel session regarding MOU between IOC and CLS for the future logistic support of JCOMMOPS.	Secretariats	IOC, CLS	Panel/Next Panel session
28	Secretariats to make serious and well documented proposals from WMO and/or IOC, as well as other organizations, regarding management of DBCP trust fund and employment of the Technical Coordinator.	Secretariats	Chair, TC	Panel/Intersessional period
29	Make recommendations to JTA XXIV, including (i) multi-sat service provided as part of the basic service, (ii) keeping NOAA-12 and NOAA-14 in operation, (iii) implementation of Svalbard as Argos ground station receiving station for global data as soon as possible, (iv) investigating possibility of connecting Brazilian LUTs to the Argos network of regional ground receiving stations as well as receiving the Brazilian DCS, (v) new tariff structure to be proposed in order to circumvent problem of Argos cost increase due to transmissions through spanning UTC midnight, (vi) including possibility within the future JTA of having E-SURFMAR joining JTA negotiations for related Argos costs of its individual countries, and (vii) continue funding independent chairman position through the JTA, using the DBCP trust fund as a relay mechanism.	Chair		JTA, Panel/JTA-XXIV
30	DBCP brochure to be placed on DBCP web site in PDF format.	TC	Secretariats	Panel/Intersessional period
31	Present new proposed ToR for JCOMMOPS for adoption at JCOMM-2.	Secretariats		Panel & JCOMM/JCOMM-2 meeting, Sept. 2005
32	Chair to pursue the idea of establishing a trust fund for deployment opportunities especially in the SH, including by air and by ship.	Chair	Secretariats	Panel/Intersessional period

ANNEX XVI

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	Instituit 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