



WORLD METEOROLOGICAL ORGANIZATION

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INTERGOVERNMENTAL OCEANOGRAPHIC  
COMMISSION (OF UNESCO)

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**DATA BUOY CO-OPERATION PANEL**  
***TWENTY-SEVENTH SESSION***

Geneva, Switzerland  
26-30 September 2011

**FINAL REPORT**

JCOMM Meeting Report No. 86

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**DATA BUOY CO-OPERATION PANEL**  
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## NOTES

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#### WMO Regulation 42

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

#### WMO Regulation 43

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

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Note: The following information is provided in the accompanying CD-ROM:

- Full report by the Technical Coordinator;
- Reports by the Task Teams;
- National reports;
- Full reports by the Action Groups;
- Data Management Centre reports;
- The current status and development of satellite communications;
- GTS status report;
- DBCP Implementation Strategy;
- Other financial and administrative papers;
- DBCP Technical Document list, including available electronic versions.



*(DBCP-27 group photo, Geneva, 29 Sept. 2011)*

## EXECUTIVE SUMMARY

The twenty-seventh session of the Data Buoy Co-operation Panel (DBCP-27) was held in Geneva, Switzerland, from 26 to 30 September 2011, at the headquarters of the World Meteorological Organization (WMO).

A technical and scientific workshop was organized during the first day of the session. 17 presentations were delivered under the themes of operational practices and enhancements, technical development for marine observation systems, applications of collected data, and requirements for climate applications. Approximately 70 participants from 17 countries attended the meetings.

The Chairperson, vice-Chairpersons and the DBCP Technical Coordinator (TC), reported on their respective activities on behalf of the Panel during the last intersessional periods. The Panel welcomed the new Technical Coordinator, Ms Kelly Stroker (USA), who had been recruited by the Panel as of 29 August 2011 to replace Ms Hester Viola, who had decided not to continue with UNESCO as of July 2010. The Panel realized that because of the long period during which there was no Technical Coordinator to serve the Panel, the DBCP monitoring record, including status maps, products and buoy metadata, had not been maintained since September 2010 at JCOMMOPS<sup>1</sup> as required. The Panel agreed that the Technical Coordinator should consider resuming the related activities, and reconstruct the missing records and monitoring products as a matter of priority.

Reports were provided by the Executive Board, the DBCP Task Teams, the Action Groups and the Pilot Projects, and decisions were taken according to their recommendations.

The Panel reviewed the status of drifting and moored buoy programmes. The TC outlined the current status of the data buoy network, noting that the total number of buoys globally was relatively stable during the last year. The spread across the globe has been relatively consistent and even, although some gaps could be seen in the Gulf of Guinea, the East and West Equatorial Pacific Ocean, the North Pacific, and the East Indian Ocean, the Arabian Gulf, the Bay of Bengal, and parts of the Southern Ocean. The total number of operational drifting buoys has experienced a significant drop due to technical problems - now being addressed - and about half report Sea Level Pressure. There was a small decrease in the number of drifters reporting Sea Level Pressure compared to last year. Regarding the tropical moored buoy arrays, plans for 2012 are to maintain the TAO<sup>2</sup>/TRITON<sup>3</sup>, PIRATA<sup>4</sup>, arrays at the level of 72 (completed), and 18 units (completed) respectively, and the RAMA<sup>5</sup> implemented sites at the level of 30 units (65% complete, 3 new sites implemented in 2011).

The Panel noted with concern a larger number of drifter failures than in previous years. The Panel urged all manufacturers to review their procedures, and to return to previous levels of buoy reliability. The Panel issued a number of recommendations to address this issue. The Panel also noted with concern that recent studies had indicated that estimates of drogue loss events since the late 1990s had probably been underestimates. The Panel considered that the time was right for a detailed evaluation of the issues surrounding drogue loss and drogue loss detection, and welcomed an initiative by many of its members, including the entire drifter manufacturing community, to engage in an open discussion of the problem and to seek enduring solutions.

Noting the successful outcome of the second "DBCP In-Region Western Indian Ocean Capacity Building Workshop", held in Mauritius, May 2011, the Panel agreed to organize and

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1: JCOMM *in situ* Observations Programme Support Centre

2: Tropical Atmosphere Ocean Array

3: Triangle Trans-Ocean buoy network

4: Pilot Research Moored Array in the Tropical Atlantic

5: Indian Ocean Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction

convene a third workshop (in Kenya, in April 2011) and to commit resources from its Trust Fund to support this activity.

Considering the completion of the deployment phase of the Iridium Pilot Project (IPP), the Panel agreed that the IPP steering team should disband at DBCP-28, but that its chair, David Meldrum, in consultation with the TC and other experts, be tasked with completing the analysis, the publication of a final report, and the compilation of a best-practices guide for the use of Iridium in drifters. The Panel agreed that the Argos-3 Pilot Project provided a positive and constructive technology transfer, and that the Pilot Project could now come to an end. The Panel requested Luca Centurioni to summarize the conclusions of the Pilot Project with a view to publishing them as a DBCP Technical Document. The Panel recommended merging the Pilot Project for Wave Measurements from Drifters (PP-WMD) with the Pilot Project on Wave Measurement Evaluation and Testing (PP-WET). The Panel will continue to support the PP-WET in the next two years. The Panel agreed on Terms of Reference and membership for the Steering Group of the Pilot Project on High Resolution SST (PP-HRSST), and requested it to develop a workplan for the next three years and to report back to the next Panel session on its progress. The Panel reviewed recent developments regarding ocean carbon and alkalinity measurements and explored how such measurements could be developed by the Panel in cooperation with the IOCCP<sup>6</sup>. The Panel agreed to initiate a two-year pilot project with objectives to (i) quantify the impact of Sea Level Atmospheric Pressure (SLP) data from the existing SVPB<sup>7</sup> network on Numerical Weather Prediction (NWP); and (ii) provide a scientific/operational rationale for designing the temporal and spatial resolution, as well as the optimal geographical distribution of the SVPB array, taking into account all sources of data (e.g. moorings, ships).

The Panel reviewed its website, the monitoring tools provided by the JCOMM *in situ* Observations Programme Support Centre (JCOMMOPS), and the status of DBCP Technical Documents. In particular, the Panel approved for publication the new DBCP Technical Document No. 42 on Sea Surface Salinity Quality Control processes for potential use on Data Buoy observations.

The Panel discussed the proposal to develop a “Ship Logistics Coordinator’s” position within JCOMMOPS, noted that the position should help Panel members to identify opportunities for the deployment of drifters in remote ocean areas, and agreed to co-fund this activity together with other partners and funding sources so that a two-year pilot experiment could begin in 2012.

The Panel reviewed the status of buoy data timeliness, and was very pleased with the improvements in the Central Pacific and the Indian Ocean. It noted with interest the improvements further expected from the evolution of the ground receiving antenna network operated by CLS. Pending improvement of data timeliness in specified regions, the Panel agreed to set aside some funds from its Trust Fund for use by Panel members to deploy Iridium drifting buoys in the areas of the South Pacific Ocean and the South Atlantic Ocean where the average delays are greater than 120 minutes. It also urged CLS to consider establishing an antenna on Easter Island, so as to resolve data timeliness issues in the SE Pacific.

The Panel discussed the issue of vandalism on data buoys, noted the recommendations made by both the WMO Congress and IOC Assembly in this regard, and thanked Mr Ken Jarrott for finalizing the report on Vandalism (DBCP TD No. 41). The small working group established at the previous Session will continue to follow up the recommendations from the report as well as from the DBCP. Hardware improvements include special fasteners, buoys with cones, better transmitters and fish dispersion devices. The Panel recognized that there were essentially three items on which to focus: hardware improvements, education and regulations.

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6: International Ocean Carbon Coordination Project

7: Surface Velocity Programme (SVP) Barometer drifter



Following discussions at the previous DBCP Session, the JCOMM Management Committee, and the Ship Observations Team (SOT), the Panel proposed to revise its Terms of Reference so that Rigs and Platforms might also be included within DBCP activities.

The Panel reviewed the legacy recommendations from the JCOMM Pilot Project for the WMO Integrated Global Observing System (WIGOS), and agreed on a DBCP response to these recommendations. This will provide for the DBCP contribution to WIGOS Implementation during the period 2012-2015.

The Panel recognized the considerable importance of the developing Global Framework for Climate Services (GFCS) to WMO and UNESCO/IOC, and to their Members/Member States, as well as the potential role of JCOMM in climate services. It updated its implementation strategy accordingly. The Panel also updated its operating principles and approved them.

The Panel discussed DBCP Trust Fund contributions, future commitments and budget related matters. The Panel agreed on its budget for the next year with the clear understanding that any budgetary figures attributed should be regarded as upper limits. Because of increased DBCP activities, the Panel invited its members not currently contributing to the Trust Fund to discuss nationally whether a contribution could be made in the future. It also took the opportunity to invite contributing members to consider increasing their contributions.

The Panel re-elected Mr Al Wallace (Canada) as its Chairperson, Mr Johan Stander (South Africa) as Vice-chairperson for the Southern Hemisphere, Mr Jean Rolland (France) as Vice-chairperson for Europe, and Dr R Venkatesan (India) as the Vice-chairperson for Asia. The Panel agreed to organize its twenty-eighth session in Perth, Australia, provisionally from 24 to 28 September 2012.

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## GENERAL SUMMARY OF THE WORK OF THE DBCP-27 SESSION

### 1 OPENING AND WELCOME

1.1 The Chairperson of the Panel, Mr Al Wallace, opened the twenty-seventh session of the Data Buoy Co-operation Panel (DBCP) and its associated Scientific and Technical Workshop at 0900 hours on Monday, 26 September 2011, in Geneva, Switzerland.

1.2 On behalf of the Panel, Mr Wallace welcomed all participants to the session and to the workshop, and expressed his appreciation for the commitment of the Panel Members. He then thanked the WMO Secretariat for hosting the session and workshop, and providing excellent support for following up the Panel's activities during the intersessional period, and for Trust Fund management. The Chair also expressed appreciation to the manufacturers and other companies who had made a financial contribution in support of the organization of the session (see **Annex XVI** for the list).

1.3 On behalf of Mr Michel Jarraud, Secretary-General of the World Meteorological Organization (WMO), and Dr Wendy Watson-Wright, Executive Secretary of the Intergovernmental Oceanographic Commission (IOC), the Director of the Observation and Information Systems Department, Dr Wenjian Zhang, welcomed participants to the workshop and to the DBCP session. He recalled that met-ocean applications provided the means to prevent, mitigate, and adapt to the impacts of ocean phenomena, weather, and climate on the environment and human activities in coastal regions and beyond. While useful to realize socio-economical benefits, met-ocean applications relied heavily on *in situ* and satellite meteorological and oceanographic observations. The DBCP played a crucial role within the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) for providing the buoy observation component of that effort, including surface drifters, tropical moorings, and coastal meteorological and oceanographic buoys.

1.4 Dr Zhang explained that through the WMO Integrated Global Observing System (WIGOS), the WMO was making efforts to establish an integrated, comprehensive and coordinated observing system that satisfied in a cost-effective and sustained manner the evolving observing requirements of WMO Members. WMO was collaborating with partner organizations, such as the Intergovernmental Oceanographic Commission (IOC) of UNESCO<sup>8</sup>, towards harmonization of instrument practices and related standards, and interoperability between data systems. The WMO Sixteenth Congress (Geneva, Switzerland, May 2011) adopted Resolution 50 (Cg-XVI), and decided that WIGOS implementation activities would be undertaken during the next financial period as one of the major efforts of the Organization, with the goal that WIGOS should become operational from 2016 onwards. WIGOS, along with the emerging Global Framework for Climate Services (GFCS),, was increasing the demand for high quality, documented, and traceable observations of known uncertainty, including historical data. There was no doubt that the DBCP could contribute to such improvements concerning buoy observations, in particular through the further development and sustainability of the drifter, tropical moored buoy, and the ocean reference – OceanSITES<sup>9</sup> – networks.

1.5 Dr Zhang concluded by assuring the continued commitment of WMO and IOC to support and strengthen the work of DBCP through the Observations Programme Area (OPA) of JCOMM.

1.6 Mr Wallace thanked Dr Zhang for his kind remarks, and then introduced the co-chairs for the Scientific and Technical Workshop, Bill Burnett and Jean Rolland, to lead that session.

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8: United Nations Educational, Scientific and Cultural Organization

9: OCEAN Sustained Interdisciplinary Timeseries Environment observation System

## 2 SCIENTIFIC AND TECHNICAL WORKSHOP

2.1 Under this agenda item, the Panel briefly reviewed the results of the preceding scientific and technical workshop. The workshop had opened at 1000 on Monday, 26 October 2011 in the Obasi Room of the WMO Secretariat, Geneva, Switzerland, and ended on the same day at 1800 hours. The themes of the workshop covered technology developments, operational practices, applications of collected data, integration of *in-situ*/satellite observations and observing/data management practices (traceability to standards). 17 presentations were delivered to approximately 70 participants from 17 countries; each presentation covering one of the four themed areas given below:

2.1.1 The first theme covered Operational Practices and Enhancements. The following presentations were made:

- (1) Rick Lumpkin (USA) – The Global Drifter Program, coordinated through the Atlantic Oceanographic and Meteorological Laboratory (AOML) of NOAA<sup>10</sup>, described their re-evaluation of drogue presence and the cause of death within the global drifter array;
- (2) Shaun Dolk and Mayra Pazos (USA) – NOAA AOML also presented the results from their drifter comparison studies and showed how drifter manufacturers performed throughout the year, and that the DAC is also processing Iridium drifter data in delayed mode;
- (3) Sergey Motyzhev (MarlinYug) – Marine Hydrophysical Institute/Marlin-Yug reviewed their investigations from 2010-2011 on the drogued Iridium SVPB drifters that were deployed in 2010;
- (4) Luca Centurioni (USA) – Scripps Institution of Oceanography (SIO) described their new technical developments and observations obtained in Typhoon Fanapi in September 2010.

2.1.2 The second theme covered Technical Development for Marine Observation Systems. The following presentations were made:

- (5) Chun Lin Ning, Weidong Yu (China) – China's First Institute of Oceanography discussed the recovery of two air-sea interaction 'Bai Long' buoy systems from the RAMA array and the deployment of a new complete 'Bai Long' buoy system at 8S 100E;
- (6) David Murphy (Sea-Bird Electronics) – Sea-Bird Electronics described their inter-laboratory calibration traceability for temperature, conductivity, pressure and dissolved oxygen;
- (7) Andy Sybrandy (Pacific Gyre) – Pacific Gyre discussed the improvements made to the barometric pressure port on their drifters and new technology improvements made in 2010-2011;
- (8) Bill Woodward (CLS America) – CLS America briefed the Panel on their Argos real-time antenna upgrade project and how they will optimize regional collection of real-time Argos data;
- (9) Robert Lawson (USA) – Science Applications International Corporation (SAIC) described their next generation easy-to-deploy tsunami assessment buoy.

2.1.3 The third theme covered Applications of Collected Data. The following presentations were made:

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10: National Oceanic and Atmospheric Administration (USA)

- (10) Dong-Kyu Lee (USA) – Scripps Institution of Oceanography and Korea Hydrographic and Oceanographic Administration (KHOA) discussed their new wave measurement system using the Global Positioning System (GPS), and compared the data collected with a conventional wave measuring sensor;
- (11) Robert Jensen (USA) – The Pilot Project on Wave Evaluation and Testing (PP-WET) briefed the Panel on the preliminary results from new wave test farms in Canada and the US;
- (12) Giles Reverdin (France) - LOCEAN<sup>11</sup>, CNRS<sup>12</sup>/INSU<sup>13</sup> described an experiment made from salinity drifters in the subtropical North Atlantic and plans for the 2012 SPURS experiment;
- (13) Pedro Vélez-Belchí (Spain) – Instituto Español de Oceanografía discussed their plan for a Spanish contribution to the Global Drifter Program in the Western Mediterranean Sea (SOCIB<sup>14</sup>) using a new open infrastructure in the Balearic Islands;
- (14) Marie-Hélène Rio (France) – Collecte Localisation Satellites (CLS) described the use of wind stress and altimetric data to detect the anomalous loss of SVP drifter drogues. Further discussions in this regard are reported under item 9.7.

2.1.4 The fourth theme covered Requirements for Climate Applications. The following presentations were made:

- (15) Sid Thurston (USA) – NOAA's Climate Program Office (CPO) described their continuing efforts to develop Partnerships for New GEOSS applications (PANGEA);
- (16) Ignatius Rigor (USA) – The University of Washington's Applied Physics Laboratory (APL) updated the Panel on observed changes at the surface of the Arctic Ocean in 2011;
- (17) R Venkatesan (India) – India's National Institute of Ocean Technology (NIOT) briefed the Panel on the significance of met-ocean-subsurface Indian OMNI buoy measurements in the Bay of Bengal.

2.1.5 Considering the excellent work done by the AOML<sup>15</sup> with regards to “Re-evaluating Drogue Presence and Cause of Death for the Global Drifter Array” as presented during the DBCP Scientific and Technical Workshop (2011), the Panel requested AOML to consider further research with regards to the cause of buoy failures for the last 10 years (**action; AOML; DBCP-28**). The Panel also suggested that after the reanalysis of drogue loss probabilities, a breakdown be given with regard to the failing of buoys at deployment, drogue loss, and the number of days transmitting for each manufacturer during this period. Once this information has been compiled and assessed, the Panel requested that these findings be submitted to the DBCP Scientific and Technical workshop.

2.2 The Panel expressed its appreciation to the workshop co-chairpersons, Bill Burnett (USA) and Jean Rolland (France) for their excellent work in organizing and chairing the workshop. As in previous years, all 17 presentations will be published in a DBCP Technical Document series, on CD-ROM, and will also be available on the DBCP website. All authors were invited to submit their papers via e-mail or CD-ROM to the Workshop Chairperson, via electronic format (MS Office compatible format only), by 30 November 2011 (**action; S&T workshop authors; 30 November 2011**).

2.3 The Panel noted with appreciation that Dr Burnett would continue to act as the Workshop Co-chairperson for 2011. The Panel also welcomed the offer from Ross Hibbins

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11: Laboratoire d'Océanographie et du Climat (France)

12: Centre National de Recherche Scientifique (France)

13: Institut national des sciences de l'Univers (France)

14: Balearic Islands Coastal Observing System

15: NOAA Atlantic Oceanographic and Meteorological Laboratory (AOML)

(Australia) to act as Co-chairperson for the Workshop and assist with its organization from a regional perspective (**action; W. Burnett & Ross Hibbins; DBCP-28**).

### **3 OPENING OF THE SESSION**

#### **3.1 Adoption of the agenda**

3.1.1 Following the Workshop on 26 September 2011, and side meetings of the DBCP Task Teams, Pilot Projects, and some of the Action Groups on 27 September 2011, the Twenty-seventh Session of the Data Buoy Co-operation Panel (DBCP) was opened by the Panel Chairperson, Mr Al Wallace, at 0930 on Wednesday 28 September 2011, in the Obasi Room. The Chairperson welcomed participants to the session and once more thanked the WMO Secretariat for hosting it and providing excellent facilities.

3.1.2 The Panel adopted its agenda, as reproduced in *Annex I*.

#### **3.2 Working arrangements**

3.2.1 The Panel decided on its working hours and other arrangements for conducting the session, noting that meetings of the Task Teams, Pilot Project steering groups, and some of the Action Groups were organized on the second day of the Session (27 September 2011). The Joint Secretariat then introduced the documentation in accordance with the provisional agenda.

3.2.2 The list of participants to the session is reproduced in *Annex II*.

### **4 REPORTS BY THE CHAIRPERSON, VICE-CHAIRPERSONS, AND THE EXECUTIVE BOARD**

#### **4.1 Report by the Chairperson of the DBCP**

4.1.1 The DBCP Chairperson, Mr Al Wallace (Canada), reported on his activities during the last intersessional period.

4.1.2 Mr Wallace voiced his appreciation for the excellent support and work done by the Secretariat, particularly in light of the departure of the Technical Coordinator the previous year. During the year, the Chairperson undertook two missions specific to the work of the Panel.

4.1.3 The first was to the Fourth International Port Meteorological Officer Conference (PMO-IV), and support to Global Ocean Observations using Ship Logistics, held in Orlando, Florida in December 2010. He made a presentation on trends and feedback on ship deployments of drifting buoys, and also included highlights on the work of the Panel. He used the meeting as an opportunity to promote participation with the Panel and to highlight the need for additional ship deployments. The second mission was to attend the 4<sup>th</sup> Session of the JCOMM Observations Coordination Group held in Hobart, Australia in April 2011. At this meeting leads of all of the ocean observations groups discussed issues and challenges, considered how the needs of clients for observing essential ocean variables are being met, and sought out synergies for working collectively to achieve common outcomes.

4.1.4 The Panel supported the 2<sup>nd</sup> Western Indian Ocean Capacity Building Workshop in Mauritius in May. Sidney Thurston again demonstrated excellent leadership and exceptional organizational skills in developing the agenda, soliciting speakers, and arranging logistics.

4.1.5 On behalf of the Panel, the Chair provided input regarding moored and drifting buoys to the new WMO Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP).

4.1.6 The staffing process for the recruitment of the new Technical Coordinator (TC) took much longer than expected. The Panel had been without a TC for most of the intersessional period, and the Panel acknowledged the support by Mathieu Belbéoch in keeping JCOMMOPS functioning during this time. The new TC, Kelly Stroker, relocated in August and began her work on the 29<sup>th</sup>. The Chair noted that the Panel was very pleased to welcome Kelly and looked forward to working with her. The Chair expressed his thanks to Ms Boram Lee (IOC) for leading this process, and to Mr Etienne Charpentier (WMO) for his excellent advice, and to David Meldrum (past Chair) for his participation.

4.1.7 The Chair also acknowledged the excellent support provided by Boram Lee (former IOC Secretariat) during her tenure in that Secretariat. Dr Lee had accepted a post as a Scientific Officer at WMO. In the interim, David Meldrum, working under contract, was supporting the IOC Secretariat.

## **4.2 Report by the vice-Chairpersons of the DBCP**

### **4.2.1 Report by the vice-Chairperson for Europe**

4.2.1.1 The DBCP vice-Chairperson for Europe, Mr Jean Rolland (France) reported on his activities during the last intersessional period. His activities had mainly been conducted through the Executive Board in providing guidance on actions and budget issues within the recommendations established at DBCP-26. He had taken a proactive role in developing links with the Group for High-Resolution Sea Surface Temperature (GHRSSST) and Iridium activities. About 80 drifters equipped to report SST with a resolution of 0.01K and accuracy of 0.05K to meet GHRSSST requirements had been deployed in the Atlantic and Indian Oceans. The data were reported in BUFR<sup>16</sup> code on to the Global Telecommunication System (GTS). However the probes needed to be calibrated, so the next step would consist of building drifters that were capable of having their SST probes pre-and post-calibrated. 30 drifters had been upgraded to Iridium with DBCP funds for use in the Indian Ocean, and 19 of them were deployed in Spring 2011. As decided at last DBCP session, a proposal had also been made to have five drifters upgraded to Iridium, to be deployed in the South Pacific.

### **4.2.2 Report by the vice-Chairperson for Asia**

4.2.2.1 The DBCP vice-Chairperson for Asia, Dr Venkatesan (India) reported on his activities during the last intersessional period. He provided up to date information regarding the successful re-establishment of the moored buoy network in India in January 2011 (16 units functional as of July 2011). In particular, next generation deep water moored buoy systems (with meteorological and 500m sub-surface data) had also been established in six locations in the Bay of Bengal and Andaman Sea.

4.2.2.2 India had also started its participation in the DBCP Pilot Project on Wave Measurement and Evaluation Test (PP-WET) with the deployment and testing of one wave rider buoy and contributions to best practices.

4.2.2.3 Dr Venkatesan also reported on the use of INMARSAT data telecommunications. The Panel concurred with Dr Venkatesan's suggestion to urge INMARSAT to provide special attention to buoy data reception (**action; INMARSAT; ongoing**).

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16: FM 94 BUFR GTS format: Binary Universal Form for Representation of meteorological data

4.2.2.4 The Panel concurred that vandalism of ocean data buoys had been, and still remained, a significant problem in many ocean areas (see agenda item 9.4). Further, in recent days, the piracy issue in the Arabian Sea had been affecting the servicing and deployment work in that area.

4.2.2.5 Dr Venkatesan also reported on major events of interest to the Panel that took place in the region, including in particular:

- (1) Regional Workshop on *Establishing a Co-operative Mechanism for Protection of Met-ocean Data and Tsunami Buoys in the Northern Indian Ocean Region*, NIOT, Chennai, India, 6 – 7 May 2011;
- (2) NOAA – National Data Buoy Center (NDBC) Training - Capacity Building on *Moored Buoy Data Management and Quality Control*, NDBC, Mississippi, USA, 18 – 29 April 2011;
- (3) *JCOMM Regional Marine Instrumentation Workshop for the Asia Pacific Region*, Tianjin, China, 11 - 13 July 2011;
- (4) 8th International Scientific Symposium, IOC of UNESCO Sub-Commission for the Western Pacific (WESTPAC), Busan, Republic of Korea, 28 – 31 March 2011.

4.2.2.6 Dr Venkatesan outlined future plans for the region, including the proposal for a 3-day regional workshop on best practices for instruments and methods of ocean observation in 2012, with the aim to build capacity for Asian developing countries (see details in Appendix A of DBCP-27 doc. 4, and the Panel's discussion under agenda item 6.4).

4.2.2.7 It was also reported that the Indian Ministry of Earth Sciences had developed a comprehensive programme for continuous observation of various ocean parameters including surface meteorological variables. This network, primarily designed for the development of operational oceanography, was also providing valuable data for use in real/near-real time by weather prediction/analysis centres and for the validation of satellite-derived products. Currently the Indian Government is in the process of finalizing a cohesive Indian Ocean Observation Programme under the national Five Year plan for the period 2012-17.

4.2.2.8 The full report of the Vice-Chair for Asia is provided in Appendix A of DBCP-27 doc. 4.

### **4.2.3 Report by the vice-Chairperson for the Southern Hemisphere**

4.2.3.1 The DBCP vice-Chairperson for the Southern Hemisphere, Mr Johan Stander (South Africa) reported on his activities during the last intersessional period. He explained that he had been in constant e-mail communication with various task teams and contributing in this regard throughout the period. During the meeting of the Executive Committee of the Argos Joint Tariff Agreement (Miami, USA, 27-29 April 2011), he had also visited the NOAA Atlantic Oceanographic and Meteorological Laboratory (USA), which operated the Global Drifter Centre (GDC), for a better understanding on what they do for the Panel and how this is done.

4.2.3.2 Mr Stander also attended the second DBCP in-region Capacity Building Workshops for the Western Indian Ocean (Mauritius, 2-6 May 2011) – see agenda item 6.4 for details – where he had put emphasis on training of researchers especially for East African countries. During this workshop, with the assistance of NOAA, Mr Stander had also committed to buoys for deployment by East African countries, as well as buoys for the “*adopt a drifter*” programme for the remainder of WMO Regional Association I (RA-I, Africa). He had started a process within the South African Weather Service (SAWS) for the signing of a Memorandum of Understanding (MOU) with the



Global Learning and Observations to Benefit the Environment (GLOBE<sup>17</sup>), to ensure that the South African Weather Service (SAWS) provided buoys to the RA-I for the purpose of learner education. All of this was being done under the auspices of and with full credit to DBCP.

4.2.3.3 Mr Stander reported that he was working closely with the SAWS Chief Executive Officer (CEO) to ensure that RA-I would get more involved in Marine Meteorology and/or Oceanography. Once RA-I had been elevated and all had been made aware of DBCP activities, Mr Stander would work closely with other Southern Hemisphere partners in expanding certain services such as "*adopt a drifter*" and/or learner/teacher programmes.

4.2.3.4 Within South Africa, Mr Stander had also expanded the services of DBCP to all other oceanography institutions/organisations and a national JCOMM committee had been formed to coordinate activities. All of these stakeholders had contributed towards the second DBCP in-region capacity building workshop for the Western Indian Ocean, mostly in the form of educators/presenters. The Panel had encouraged enhanced participation of the African countries in DBCP activities, including through partnerships with active Panel members.

### 4.3 Report by the Executive Board

4.3.1 The DBCP Chairperson, Mr Al Wallace (Canada), reported on the activities of the DBCP Executive Board during the last intersessional period. The Chair noted that the Executive Board had conducted most of the necessary Panel business electronically, and without difficulty, and he thanked his Vice-Chairs for their diligence, and the Secretariat for facilitating the decision making.

4.3.2 The Executive Board had implemented a change in the schedule for the 27<sup>th</sup> Meeting of the Panel in order to facilitate meetings of action groups, task teams and pilot project teams.

4.3.3 In line with the DBCP Operating Principles, and the guidelines for DBCP Trust Fund expenditures, the Executive Board had been consulted and had had to make a number of decisions on behalf of the Panel, regarding expenditures not originally planned or entirely covered as part of the budget that had been agreed by the Panel at its 26<sup>th</sup> Session. These included:

- (i) Agreement to commit up to USD7.0k from the DBCP Trust Fund to permit the upgrading of 7 drifters to HRSST-2 standard in support of the pilot project;
- (ii) Agreement to increase the funding for shipping cost to USD7.2k of Argos3 buoys in support of the pilot project;
- (iii) Agreement to fund David Meldrum's participation on behalf of the Panel at the annual GHRSSST meeting in Edinburgh, Scotland;
- (iv) Agreement to fund the DSA for the participation of Joaquin Tinanes at the Inter-Programme Expert Team on Data Representation and Codes (IPET-DRC), in Melbourne, Australia, September 2011;
- (v) Agreement to fund missions to Paris and Geneva for the new Technical Coordinator;
- (vi) Agreement to commit the USD20k presently under the "SOT<sup>18</sup> Travel" budget line to the "JCOMMOPS Data Devt" budget line.

4.3.4 The Executive Board had been consulted to approve publication of two DBCP Publications on behalf of the Panel:

- (i) DBCP TD No. 41, Ocean Data Buoy Vandalism, Incidence, Impact and Responses;
- (ii) Revision 1 (2011) of DBCP Technical Document (TD) No. 3, Guide to Data Collection and Location Services using Service Argos.

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17: <http://www.GLOBE.gov>

18: Ship Observations Team

4.3.5 The Executive Board had also been consulted regarding a proposal from the Secretary General of WMO suggesting that International Public Accounting Standards be adopted for the management of the DBCP Trust Fund, and that an external audit be conducted at WMO's cost.

## 5 REPORT BY THE TECHNICAL COORDINATOR

5.1 The Panel recalled that the Technical Coordinator's position had been vacant for eleven months during the last intersessional period, i.e. between 1 October 2010 and 28 August 2011. Ms Hester Viola's contract with the UNESCO had not been renewed following her decision not to pursue continuing employment for personal reasons. Ms Hester Viola's contract with UNESCO ran up until July 2010, after which point she was employed via a short-term contract with the World Meteorological Organization (WMO) until the end of September 2010.

5.2 The recruitment process as presented at DBCP-26, and discussed under agenda item 11.1, had continued during the last intersessional period until the recruitment of the new Technical Coordinator, Ms Kelly Stroker as of 29 August 2011 – i.e. only four weeks before the current DBCP Session. Ms Stroker is now based in Toulouse, France, at CLS, and employed by UNESCO through a renewable fixed-term post.

5.3 As of 29 August 2011, Ms Stroker had received some training and guidance from the WMO and IOC Secretariats, including from the former Technical Coordinators Mr David Meldrum (IOC), and Etienne Charpentier (WMO), and well as from the DBCP Chair, Al Wallace (Canada), and the JCOMMOPS Manager and Argo Technical Coordinator, Mr Mathieu Belbéoch. The rest of Ms Stroker's time had been spent essentially in getting familiar with routine TC tasks, and reading preparatory documentation for the current DBCP Session, which was also regarded as an opportunity to learn about DBCP activities and issues.

5.4 During her short period of employment, Ms Stroker had also travelled on mission to the following places:

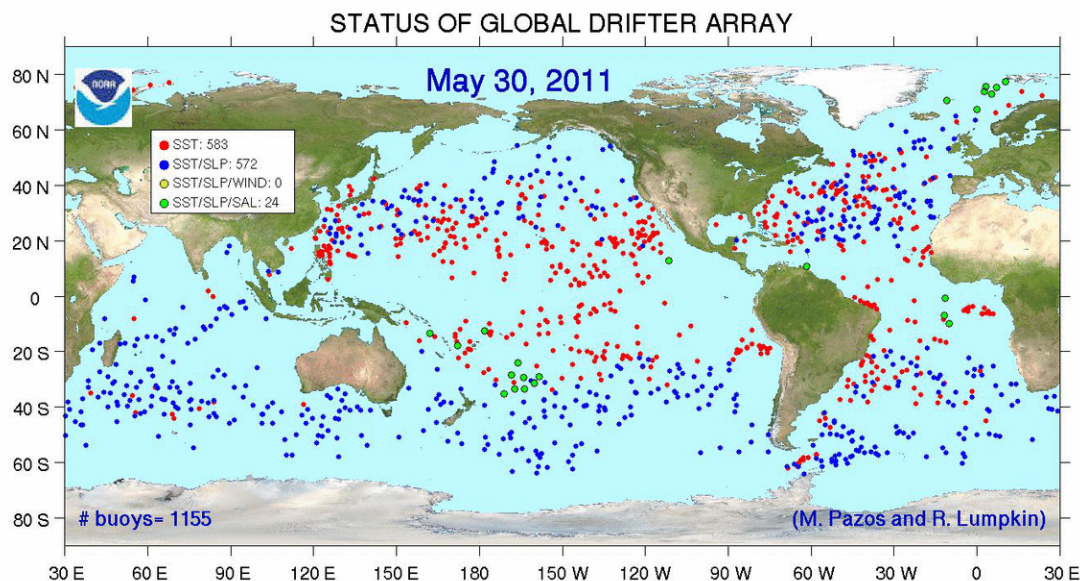
- (i) IOC Headquarters, Paris, France;
- (ii) WMO Secretariat Headquarters, Geneva, Switzerland (to participate in the Ninth JCOMM Management Committee meeting, 13-16 September 2011, as well as the present DBCP-27 Session).

5.5 The Panel realized that, because of the long period during which there had been no Technical Coordinator to serve the Panel, the DBCP monitoring record, including status maps and products, and buoy metadata had not been maintained since September 2010 at JCOMMOPS, as required. The Panel agreed that the Technical Coordinator should, as a matter of priority, consider resuming these related activities, and reconstruct the missing records and monitoring products (**action; TC/DBCP; asap**). This would also permit the Technical Coordinator to conduct her work properly using accurate and up to date information.

5.6 The Panel recalled the high priority activities it had agreed for the new Technical Coordinator – once recruited – at the previous Session (see section 5.11 of the DBCP-26 Final Report) and agreed that these remained valid. It therefore requested the Technical Coordinator to address these tasks during the next intersessional period as a matter of priority (**action; TC/DBCP; Sep. 2012**).

5.7 The TC outlined the current status of the data buoy network, noting that the total number of buoys globally had been stable during the last year. The spread across the globe had been relatively even, although some gaps could be seen in the Gulf of Guinea, the East and West

Equatorial Pacific Ocean, the North Pacific, and the East Indian Ocean, the Arabian Gulf, the Bay of Bengal, and parts of the Southern Ocean.



Map 1: Status of the Global Drifter Array for May 2011 (source, GDP).

5.8 The TC reported that amongst the drifting and moored buoys reporting on the GTS in BUOY (or BUFR) message format and archived at the Responsible National Oceanographic Data Centre for Drifting Buoys (RNODC/DB, ISDM<sup>19</sup>, Canada), the variables tabulated below had been measured in June 2011. The total number of operational drifting buoys had experienced a significant drop due to technical problems (currently being addressed), with about half of those reporting Sea Level Pressure. There had been a small decrease in the number of drifters reporting Sea Level Pressure compared to last year (572 in May 2011, 659 in May 2010 according to JCOMMOPS). Similarly the total number of buoys (drifters and moorings) reporting air pressure had decreased slightly in the last two years (figure 2).

Variable	Any	Air P	P Tend.	SST	Air T	Hum.	Wind	Waves	Sub/T
Drifting Buoys	1451	691	633	1327	25	1	1	0	1
Moorings	133	50	2	122	124	101	112	7	113

Table 1. Drifting and Moored buoys – variables being reported on the GTS (source ISDM)

19: Integrated Science Data Management

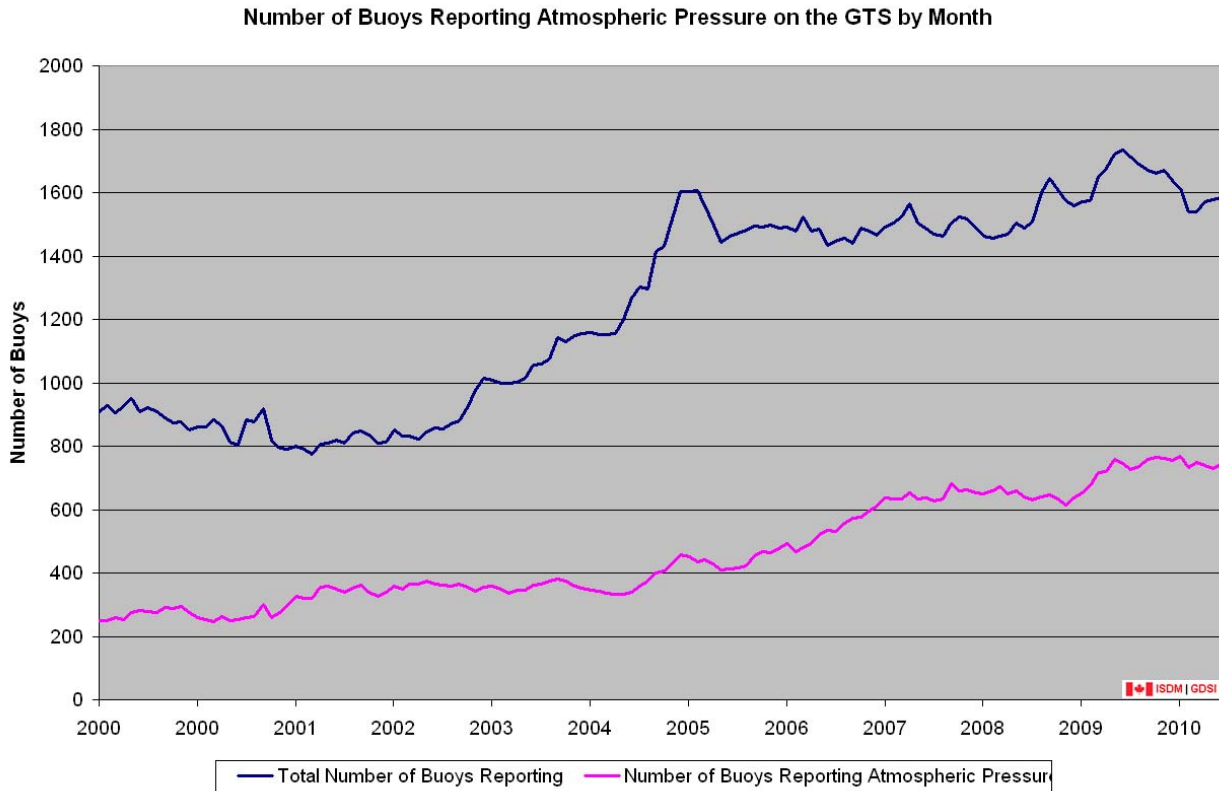


Figure 1: Number of buoys (moored and drifting) reporting air pressure on the GTS between 2000 and June 2011 (source ISDM)

5.9 The Panel noted with appreciation that 334 SVPBs had been deployed in the area South of 40S as part of the Southern Ocean Buoy Programme (SOBP) during the period August 2010 to July 2011, while the plans agreed upon at the previous session called only for 241 units. However, the number of operational units reporting from the area in July 2011 was only 152, a substantial decrease from previous years. This might be due to a shorter lifetime of the buoys deployed in this area. The Panel requested the Technical Coordinator to investigate the causes of this problem, to work with Panel members on possible solutions, and to report findings at the next Panel Session (**action; TC DBCP; DBCP-28**). The Panel agreed to commit 273 units for the period August 2011 to July 2012.

5.10 Noting the decrease of global drifters reporting air pressure, the Panel urged its members to make use of the barometer drifter upgrade scheme<sup>20</sup> by purchasing barometers for GDP-funded SVP drifters and negotiating their deployment positions with AOML (**action; Panel members; ongoing**).

5.11 The Panel warmly welcomed Ms Stroker and wished her a successful and fruitful time in her future work for the Panel. The Panel also thanked Mr Etienne Charpentier (WMO Secretariat), Mathieu Belbéoch (JCOMMOPS), and Mr David Meldrum (IOC) for providing training to Ms Stroker.

20: <http://www.jcommops.org/dbcp/platforms/barometer.html>

## 6 REPORTS BY THE TASK TEAMS

### 6.1 Task Team on Data Management (TT-DM)

6.1.1 Ms Mayra Pazos, Chairperson of the Task Team on Data Management (TT-DM), reported on the progress during the intersessional period. The Task Team had promoted discussion amongst its members, revised the recommendations proposed last year to assess actions taken, and had proposed new recommendations.

6.1.2 The meeting agreed on the following:

- (i) All old 5-digit WMO numbers should be converted to use the equivalent 7-digit WMO number<sup>21</sup> to refer to drifters in all metadata files (e.g. GDP deployment log, JCOMMOPS cross-reference lists, etc). The Panel requested GDP and JCOMMOPS to implement the required changes (**action; GDP & JCOMMOPS; DBCP-28**);
- (ii) The Technical Coordinator (TC) should continue to assist Pierre Blouch and Jon Turton in preparing a methodology to compare non-GTS buoy data with NWP/Ocean models, open to anyone via the web (Continuation of DBCP-25 Action 8.8.2). The Panel requested the TC to report any progress made with respect to related web tools by the next DBCP Session (**action; TC DBCP; DBCP-28**);
- (iii) The cross reference list of WMO ID vs. Transmitter ID provided by JCOMMOPS on the web<sup>22</sup> is very useful. However, the Panel noted with concern that due to the Technical Coordinator's position having been vacant, it was last updated on October 13, 2010. The Panel requested the Technical Coordinator to resume producing the list operationally (**action; TC DBCP; asap**);
- (iv) The Panel requested the Specialized Oceanography Centre for Drifting Buoys (SOC/DB, Météo France) and the RNODC/DB (ISDM) to monitor GTS bulletin headers used for GTS distribution of buoy data, reconcile the differences found, and publish the list on the JCOMMOBS website and Meteo-France QC tools (**action; Météo France & ISDM, JCOMMOPS; ongoing**);
- (v) The WMO Secretariat is invited to communicate to GTS data users that they will stop receiving BUOY<sup>23</sup> reports from drifters using 7-digit WMO numbers, as such reports will only be distributed in BUFR format (**action; WMO Secretariat; DBCP-28**);
- (vi) The Secretariat is requested to inform all GTS focal points that the BUFR subcategory for "missing value" is being changed from the currently used value of 255 to 25, to conform with WMO rules (**action; WMO Secretariat; DBCP-28**).

6.1.3 The Panel thanked Ms Pazos and members of the Task Team for their efforts. It was agreed that Ms Mayra Pazos would continue as chairperson of the Task Team for the intersessional period. The full report of the Task Team is provided in Appendix A of DBCP-27 doc. 6.1 as well as in the CD-ROM accompanying the DBCP Session final report.

6.1.4 The Panel agreed with the following recommendations from the Task Team:

- (i) The Panel recommended keeping the same WMO number for a mooring's position as long as moorings are maintained at that position. In case a mooring ceases to be maintained at a given position, the WMO number should not be re-used for another

21: see convention in DBCP-25 final report, paragraph 5.1.3, and DBCP-26 final report, paragraph 9.8.1.

22: [ftp://ftp.JCOMMOPS.org/JCOMMOPS/GTS/wmo/wmo\\_list.txt](ftp://ftp.JCOMMOPS.org/JCOMMOPS/GTS/wmo/wmo_list.txt)

23: FM 18 BUOY GTS format: Report of a buoy observation

location. 7-digit WMO numbers for drifters or for moorings should not be reallocated, until available numbers are exhausted, which is not expected to happen in the foreseeable future;

6.1.5 The Panel noted that there are now many portals for GTS insertion of buoy data and invited the Global Drifter Programme (GDP) Data Assembly Centre (DAC), the two data management centres for drifting buoys, and JCOMMOPS to monitor the situation. The Technical Coordinator was requested to coordinate this activity and report findings at the next Panel Session (**action; TC DBCP; DBCP-28**).

6.1.6 Following the presentation by Mayra Pazos, Jon Turton noted that the United Kingdom (UK) Met Office, as well as NDBC, were making data from rigs and platforms operated by the offshore oil and gas industry available on GTS. In the last year there had been significant changes, with many of the offshore platforms around the British Isles having being equipped with 3<sup>rd</sup> party Automatic Weather Station (AWS) systems. There was real concern that the data owners would not want their data to continue to be issued on the GTS, as once there they are effectively in the public domain. The Met Office's position is to encourage 3<sup>rd</sup> party data providers to permit their data to be made available on the GTS to allow its wider use, but if the data providers cannot be persuaded to agree, then the Met Office would have to withhold these data from the GTS. The Panel strongly encouraged that such data should be made available on the GTS where possible, whilst recognising the concerns and rights of the data originators not to make their data publicly available (see DBCP data policy promoting open and free data access policy in Appendix IX of the DBCP operating principles).

## **6.2 Task Team on Instrument Best Practices and Drifter Technology Development (TT-IBPD)**

6.2.1 Dr Bill Burnett (USA), Chairperson of the Task Team on Instrument Best Practices and Drifter Technology Development (TT-IBP), reported on the progress during the intersessional period. He reported that DBCP drifters did not perform as well as in the past, and work has been ongoing to identify and fix the problems. Mr Pierre Blouch (France) had highlighted the issues related to reliable drifters in December 2010, that had elicited a vigorous discussion within the Task Team.

6.2.2 All the air pressure measurements from Argos-2 SVPB drifters which had been deployed between April 2010 and late 2020 had been analyzed, and performance variations between the different manufacturers investigated. The Panel noted with concern that the number of buoys which completely failed during the period was unacceptable (34% on average), particularly for one manufacturer. The Panel urged all manufacturers to review their procedures, and resume reliable functioning of SVPBs (**action; manufacturers; asap**).

6.2.3 Based on the Task Team recommendations, the Panel recommended that its members insist on calibration certificates from instrument manufacturers. It further recommended and encouraged Panel members to start systems for record keeping for instrument calibration, replacement and validation that conform to International Organization for Standardization (ISO) recommended specifications (**action; Panel members; ongoing**).

6.2.4 In order to facilitate future studies on buoy performances, the Panel recommended to include buoy specifications, date of manufacture and barometer death date in the GDP metadata. The Panel requested the manufacturers to provide GDP (AOML) with dates of manufacture for all buoys built within the last 5 years (**action; manufacturers; ongoing**). The Panel also asked the National Meteorological Services (NMSs) to provide barometer/SLP data to the GDP (AOML) (**action; NMSs; ongoing**). Once the GDP has received the information from the manufacturers and the NMSs the GDP will incorporate date of manufacture and barometer death date into their metadata and make it available online (including creating additional columns in their metadata)

**(action; AOML; ongoing)**. The GDP (AOML) is required to provide drifter specifications on all drifters in their metadata. This manufacturing number/code is to be listed and used to reference buoy types, as well as any changes made to the buoy **(action; AOML; asap)**.

6.2.5 The Panel agreed that the best exercise to assess the performances of buoys remains with the AOML inter-comparisons, which are performed every year on batches of buoys from different manufacturers deployed in clusters. Buoys deployed in those experiments must be as new as possible.

6.2.6 The Task Team reviewed a draft Technical Document (DBCP TD No. 42) entitled “Sea Surface Salinity Quality Control Processes for Potential use on Data Buoy Observations” and approved the document for publication.

6.2.7 Dr Burnett reported on specific evaluations conducted by the Global Drifter Program / Data Assembly Center, the MetService of New Zealand, the UK Met Office, the Centre of Marine Meteorology of Météo-France, the National Institute of Ocean Technology of India, Environment Canada, the Ukrainian Marine Hydrophysical Institute and Marlin-Yug Ltd. Details are provided in the session document No. 6.2.

6.2.8 The Panel agreed that the manufacturers should play a strong role in the Task Team, and nominated Mr Andy Sybrandy (Pacific Gyre, USA) as co-Chair of the Task Team. The Panel agreed that the manufacturer representative’s co-Chair should be appointed on a rotating basis. The Panel also nominated Mr David Murphy (SeaBird, USA) to become a member of the Task Team.

6.2.9 The Panel noted that the current problematic situation was a result of a number of factors, including a specific problem related to drifters produced about two years ago. Solutions – including changes to drifter design – had been proposed in the mean time and their effectiveness would need to be monitored. However, the Panel acknowledged that it would take time to investigate the source of the problems because of the time between buoy manufacturing, deployment, recovery, and investigations.

6.2.10 The Panel agreed that it would be useful to define a minimum standard for the life-time of the buoys (as well as for barometers). For large batches of buoys not attaining the minimum standard, the manufacturers would be obliged to reimburse the cost of the difference with the standard. Manufacturers expressed willingness to collaborate in such a scheme once defined.

6.2.11 Regarding the drogue loss issue, the Panel established an in-session working group to make specific proposals. The outcome of those discussions, and the Panel’s recommendations in this regard, are provided in item 9.7.

### **6.3 Task Team on Moored Buoys (TT-MB)**

6.3.1 Mr Jon Turton, Chairperson of the Task Team on Moored Buoys reported on the progress during the intersessional period.

6.3.2 The Panel recalled that the initial priority for the Task Team had been to define the comprehensive metadata that needed to be collected for moored buoy systems (to be issued as version 1, as agreed at DBCP-26). The Panel noted with concern that, with the absence of a DBCP Technical Coordinator during the inter-sessional, period it has not been possible to progress the actions recommended at DBCP-26, although both the UK Met Office and Environment Canada have initiated production of metadata for their own buoy systems, with a view to their eventual submission to JCOMMOPS.

6.3.3 Mr Turton noted that individual moored buoy operators would be likely to compile their metadata in a format compatible with their asset management systems (tables, databases etc.) and that the need was for a standard format with which to upload the data to JCOMMOPS, who would then make the metadata available to users via the web and periodically forward it to the JCOMM ODAS<sup>24</sup> Metadata Service (ODASMS, China). There were a number of possible formats (BUFR, csv, tagged pairs, NetCDF, XML etc.) that could be used to provide the metadata to JCOMMOPS and the Task Team recommended the use of NetCDF for consistency with OceanSITES and tsunami buoys. This was endorsed by the Panel, who noted with appreciation that NDBC had offered to lead on developing the SIF (standard input format) for the moored buoy metadata NetCDF. The intention was that such metadata should start being submitted to JCOMMOPS within the coming inter-session period.

6.3.4 An ongoing action from DBCP-26 was to investigate certification processes and procedures for calibration. No progress had been made on this, but it was suggested to ask individual moored buoy operators to provide a summary of their pre-deployment checks and calibrations, compile the information and look for (and encourage) the best practices, and identify what additional calibration information should be added to the metadata records.

6.3.5 Mr Turton also noted that, as 7-figure WMO Identification Numbers (IDs) were now available for buoys, with far fewer moored buoys than drifters, the Task Team had recommended there was no need to re-issue WMO numbers for moored buoys, other than where a platform is moved but is still regarded as sampling the same region. This is consistent with the recommendation from TT-DM.

6.3.6 Mr Turton noted that from 2012 BUFR will be used for disseminating moored buoy data on the GTS. This could be done using either the defined templates (when agreed) or shorter self-describing messages using descriptors. In the first case there would be a standard (single) format, potentially with many unused sequences that would have to be padded out with 1s (i.e. many wasted bits). In the second case the messages would be more efficient to transmit, but would lead to more variability in the messages on the GTS. Possible approaches suggested were to have a basic template for common sequences, with optional descriptors for additional sequences that may or may not be used, and/or to use self-describing messages with an additional descriptor(s) to identify the template(s) of which it was a sub-set. The Panel asked the Task Team to consider the matter and to recommend by end 2011 the approach(es) to be put to the JCOMM Task Team on Table Driven Codes (**action; TT-MB; TC**).

6.3.7 The Panel noted the technical developments undertaken by Canada, India, the United Kingdom, and the USA for the buoy systems that they were deploying in the world oceans, as noted in the DBCP-27 preparatory document No. 6.3 at Appendix A, and discussed during both the Scientific and Technical Workshop and in the National Reports. It noted again the serious problem of vandalism on data buoys, discussed again under agenda item 9.4.

6.3.8 The meeting agreed on the following:

- (i) The Task Team and the Technical Coordinator are requested to follow up on actions related to the metadata issue that were agreed upon at DBCP-26, and discussed above, and to report at the next Panel Session (**action; TC DBCP; DBCP-28**).

6.3.9 The Panel thanked Mr Turton and members of the Task Team for their efforts. It was agreed that Mr Turton would continue as chairperson of the Task Team for the intersessional period. The full report of the Task Team is provided in Appendix A of DBCP-27 doc. 6.3 as well as in the CD-ROM accompanying the DBCP Session final report.

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24: Ocean Data Acquisition Systems



## 6.4 Task Team on Capacity-Building (TT-CB)

6.4.1 Dr Sid Thurston, Chairperson of the Task Team on Capacity Building reported on progress during the intersessional period. In particular, he provided comprehensive information on the preparation and outcome of the Second in-region Capacity Building workshop for countries of the Western Indian Ocean region, Balaclava, Mauritius, 2-6 May 2011.

6.4.2 After discussion, the Panel agreed on the following action items:

- (i) To convene the Third "DBCP In-Region Western Indian Ocean Capacity Building Workshop", April 2012, Mombasa, Kenya. The goals for the workshop are detailed in **Annex XV (action; TT-CB; Spring 2012)**;
- (ii) To coordinate workshop preparations with the DBCP, Kenya Meteorological Department, Kenya Marine & Fisheries Research Institute, the NOAA Office of Climate Observation (OCO), the African Monitoring of the Environment for Sustainable Development (AMESD), and the Agulhas-Somali Current Large Marine Ecosystem (ASCLME) (**action; Ali Mafimbo, Sid Thurston & Secretariat; Autumn 2011**);
- (iii) To continue to build the Observation Development Team (ODT) and Modelling Development Team (MDT) with Met/Ocean Institutes in the Western Indian Ocean Region (**action; TT-CB; DBCP-28**);
- (iv) To assemble a Team to explore recent advances in Information and Communication Technology (ICT) to help facilitate more effective DBCP TT-CB Outreach and Capacity Building Activities on a larger scale (**action; TT-CB; DBCP-28**);
- (v) To enhance coordination and co-operation between TT-CB and WMO Regional Associations (**action; TT-CB; DBCP-28**);
- (vi) To discuss preparations and funding impact for an additional "South Asia Capacity Building Workshop" in Chennai, India in November 2012 (**action; TT-CB & R. Venkatesan; DBCP-28**);
- (vii) To discuss preparations for an additional "NE Asia Capacity Building Workshop" in Jeju, South Korea in 2012 (**action; TT-CB; DBCP-28**);
- (viii) The Panel encouraged the TT-CB to investigate ways to add training material from all Capacity Building activities to the IOC/IODE<sup>25</sup> OceanTeacher<sup>26</sup> resource (**action; TT-CB; DBCP-28**).

6.4.3 The Panel thanked Dr Thurston and members of the Task Team for their efforts. The full report of the Task Team will be included in the CD-ROM that will be distributed with the Session final report.

## 7 REPORTS BY THE ACTION GROUPS

7.0.1 Under this agenda item, the Panel was presented with reports by its action groups. Summaries of the Action Groups reports are provided in **Annex IV**. The full reports of the Action Groups will be reproduced in the Panel's Annual Report.

25: International Oceanographic Data and Information Exchange (IOC)

26: <http://www.oceanteacher.org/>

## **7.1 Surface Marine programme of the Network of European Meteorological Services, EUMETNET (E-SURFMAR)**

7.1.1 The Chairperson of the Surface Marine programme of the Network of European Meteorological Services, EUMETNET (E-SURFMAR) Data Buoy Technical Advisory Group (DB-TAG), Jon Turton (United Kingdom) reported on the activities of E-SURFMAR during the last intersessional period. 89 drifting buoys were currently in operation (50 Iridium, 39 Argos) in the North Atlantic ocean, plus 4 E-SURFMAR supported moored buoys, and a further 45 moored buoys.

7.1.2 Plans for 2012 were to maintain a network of 100 drifting buoys (including 30 Iridium upgrades), and the 4 reference moored buoys in operation. E-SURFMAR would continue to be actively involved in the GHRSSST/DBCP Pilot Project to make SST measurements of 0.01°C precision from drifters. E-SURFMAR would also continue to deploy buoys in the Arctic Ocean through the IABP.

7.1.3 The Panel noted that at present only one EUCOS<sup>27</sup> buoy (Cabo Silleiro) was reporting directional wave spectra onto the GTS. Spectral data from buoy K5 were still experimental. Buoy Lion was reporting omni-directional spectra and buoy M6 was only reporting mean wave height and period. It was expected that a modified version of the system developed by the Met Office for buoy K5 would be also installed on the Lion buoy, with similar capability on buoy M6 in due course.

7.1.4 Mr Turton reported that half of the number of drifters operating were now using Iridium, with a consequent improvement in data timeliness. About 2,000 daily observations were inserted on to the GTS. The short-term target (70%) of the percentage of data received within 50 minutes was being reached. The long-term target<sup>28</sup> (90%) would be only reached if all the buoys moved to Iridium Short Burst Data (SBD).

7.1.5 The Panel noted with appreciation that a draft technical document on E-SURFMAR moored buoys was under review, with the plan to have it completed in May 2012.

## **7.2 Global Drifter Program (GDP)**

7.2.1 The Global Drifter Program (GDP) Chairperson, Dr Rick Lumpkin (USA), reported on the activities of the GDP during the last intersessional period. The Panel noted that for the most recent 365 days, the array had had an average size of 1248 drifters. This period had begun with the array at its maximum of 1375 drifters (see last year's DBCP report). The array size had fallen through the year, reaching 1145 on 28 March 2011. Its size on 26 September 2011 was 1020 drifters. The Panel had established a small in-session working group to address the issue.

7.2.2 Plans for 2012 were to:

- (i) increase the array size to the 1250 drifter level with operational buoy deployments, and consortium research buoy deployments of 200 units;
- (ii) re-evaluate drogue presence for historical data;
- (iii) begin incorporating salinity data into the data stream;
- (iv) continue participation in the Iridium and Argos3 pilot projects; and

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27: EUMETNET Composite Observing System

28: NOAA buoys upgraded with barometers by ESURFMAR are still reporting through Argos

- (v) conduct the AOML Data Buoy (ADB) study of SVPB drifters (i.e. compare and evaluate the packaging, activation, and sensor/drogue/transmitter performance of drifters from different manufacturers).

7.2.3 Regional deployment opportunities in 2011-2012 include the possible US Navy-led “African Partnership Station IV” programme in the western Indian and eastern Atlantic, the DART<sup>29</sup> servicing cruise, and the 2012 Argo charter of the *Kaharoa* in the South Pacific. As in previous years, cruises to service the global tropical moored array would be used opportunistically to seed drifters.

### 7.3 International Arctic Buoy Programme (IABP)

7.3.1 Dr Ignatius Rigor (USA) reported on the activities of the International Arctic Buoy Programme (IABP) during the last intersessional period, on behalf of its Chairperson, Ms Christine Best (Canada).

7.3.2 The Panel noted that a total of 72 buoys was operating in the IABP array on 19 July 2011 with an almost even split of Iridium and Argos for data transmission.

7.3.3 Plans for 2012 were to deploy a large variety of buoys ranging from SVPBs providing surface air pressure, buoys providing air pressure and air temperature, ice mass balance buoys, oceanographic profiling buoys measuring temperature and salinity to great depths and buoys that measure atmospheric air components such as ozone. Specific details on deployment plans and opportunities for 2012 were not known at the present time. As plans and opportunities for deployments become known, participants were encouraged to make them known to the IABP Coordinator Ignatius Rigor<sup>30</sup> (USA). Annually, in March or April, the current year plans were posted to the IABP website<sup>31</sup>. Participants were also encouraged to share their plans and opportunities with Jenny Hutchings<sup>32</sup> (USA) of the International Arctic Research Center (IARC), for posting on the Ice Plan web page<sup>33</sup> of the Arctic sea-ice measurement campaign coordination of the Climate and Cryosphere Project (CliC) Arctic Sea Ice working Group.

7.3.4 The Panel noted that it was challenging to sustain the IABP network due to (i) increasing areas of first-year ice and open water during the summer; and (ii) difficulties in deploying buoys in the Eurasian Arctic.

7.3.5 The Panel also noted with concern that some of the IABP data were not being distributed on the GTS (e.g. active Argos platforms in the IABP area north of 66N). The IABP Coordinator would contact the programme operators to promote data exchange and GTS distribution of the data in real-time (**action; I. Rigor; ongoing**).

7.3.6 The Panel also noted that some of the IABP buoys reporting through Iridium were not currently reporting their data on the GTS. Collaboration was underway with Joubeh, Scotia Weather, and Environment Canada for posting Iridium data on the GTS.

7.3.7 The Panel noted with appreciation the efforts to collect historical IPY data into IABP archives. These data could not be distributed on GTS at the present time.

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29: Deep-ocean Assessment and Reporting of Tsunami

30: Ignatius@apl.washington.edu

31: [http://iabp.apl.washington.edu/overview\\_deploymentplans.html](http://iabp.apl.washington.edu/overview_deploymentplans.html)

32: jenny@iarc.uaf.edu

33: <http://www.iceplan.org/>

## 7.4 International Buoy Programme for the Indian Ocean (IBPIO)

7.4.1 The Chairperson of the International Buoy Programme for the Indian Ocean (IBPIO), Mr Graeme Ball (Australia) reported on the activities of the International Buoy Programme for the Indian Ocean (IBPIO) during the last intersessional period.

7.4.2 The Panel noted that 152 drifters (126 with air pressure) were operational in the IBPIO area of interest during mid-2011, as well as 44 moored buoys (see item 7.9 below for the discussion about RAMA). India would maintain a network of 14 deep-sea buoys (Ocean Observation Systems, OOS), 6 in the Arabian Sea and 8 in the Bay of Bengal.

7.4.3 Plans for 2012 were to maintain a network of more than 150 drifters, and maintain the moored buoy arrays. About one third of the drifters deployed would be equipped to transmit through Iridium. Efforts were aimed at filling data gaps in the tropical regions, primarily during the Tropical Cyclone season. As in previous years, the GDP remained the biggest contributor to the IBPIO, with more than 100 planned drifter deployments. Some of the drifters are to be standard SVP (30 planned deployments) that only measure SST in addition to the surface current deduced from their movement.

7.4.4 Noting the gaps in ocean observations in the WIO, and with reference to the Nairobi Ministerial Declaration at the first African Ministerial Conference on Meteorology (AMCOMET) held in Nairobi, Kenya on 15 and 16 April 2010, the IBPIO requested WMO to request all African countries to provide their plans to the various Action Groups of the DBCP, with specific reference to buoy deployments in the Indian and Atlantic Ocean, and including all logistical arrangements (**action; WMO Secretariat; end 2011**)).

## 7.5 WCRP-SCAR International Programme for Antarctic Buoys (IPAB)

7.5.1 Dr Ignatius Rigor presented a report on the activities of the WCRP<sup>34</sup>-SCAR<sup>35</sup> International Programme for Antarctic Buoys (IPAB) during the last intersessional period, on behalf of Christian Haas (IPAB Coordinator, Canada). The Panel noted that the IPAB had not been very active during the previous two years. However, some buoy deployments had been made by South Africa, Australia, New Zealand, UK and USA.

7.5.2 Plans for 2012 were to deploy buoys in the Amundsen Sea and Ross Sea areas, capitalizing on IABP experience (e.g. using AXIB buoy technology, UpTempo, SVPB), from the ice breakers servicing McMurdo Station and field experiments in the area. The long range plan was to develop air deployment capabilities, build inter-agency support, and build international collaboration for the deployment of buoys in the Antarctic.

7.5.3 The Panel recalled its decision at the previous Session requesting Johan Stander (South Africa) and Graeme Ball (Australia) to review the IPAB operating principles and possibly make recommendations to IPAB for their updating. The Panel noted that such a proposal had been made to IPAB but noted with concern that this had had no effect. It therefore requested Dr Rigor to liaise with Mr Stander and approach IPAB with a view to have their operating principles updated according to the DBCP proposal (**action; I. Rigor; DBCP-28**).

7.5.4 The Panel recommended that the IPAB should be reinvigorated, and an IPAB meeting planned in the near future (**action; IPAB; DBCP-28**).

34: WCRP : World Climate Research Programme

35: SCAR : Scientific Committee on Antarctic Research

## 7.6 International South Atlantic Buoy Programme (ISABP)

7.6.1 The ISABP Coordinator, Ms Mayra Pazos (USA) reported on the activities of the International South Atlantic Buoy Programme (ISABP) during the last intersessional period on behalf of its Chairperson, Mr Ariel Troisi (Argentina).

7.6.2 The Panel noted that as of 25 July 2011, there were a total of 147 drifters in the South Atlantic region (78 SVP, 69 SVPB). Efforts to populate hard to reach areas (i.e. Gulf of Guinea and Angola Basin) continued during the intersessional period with help from IBPIO participants.

7.6.3 Plans for 2011 were to continue to (i) address observational gaps, especially in the Gulf of Guinea and Angola Basin; (ii) pursue recommendations to conduct studies and evaluate the impact of drifter pressure data and SST on the skills of numerical weather forecasting models for the region; and (iii) increase numbers of SVPBs in the region.

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

7.7.1 Mr Shaun Dolk (USA), Technical Coordinator of the NPDBAP, reported on the activities of the DBCP-PICES<sup>36</sup> North Pacific Data Buoy Advisory Panel during the last intersessional period.

7.7.2 The Panel noted that from 1 August 2010 to 31 July 2011 140 drifters had been deployed north of 30N in the Pacific Ocean. 59 of these drifters were equipped with barometers, while the remaining 81 drifters were basic SVP type units.

7.7.3 Plans for 2012 were to again reach 100 drifter deployments, of which at least 70 drifters should be barometer equipped. Both the GDP and Environment Canada would continue to utilize ships of opportunity for drifter deployments, whilst also looking for new possibilities within the Canadian and United States Coast Guards. Five drifters are to be deployed in the eastern part of the Bering Sea in October 2012.

7.7.4 Panel members were invited to inform the NPDBAP Coordinator about deployment opportunities in the Sea of Okhotsk (**action; Panel members; DBCP-28**).

## 7.8 OCEAN Sustained Interdisciplinary Timeseries Environment observation System (OceanSITES)

7.8.1 Mr Bill Burnett (USA) reported on the activities of the OCEAN Sustained Interdisciplinary Timeseries Environment observation System (OceanSITES<sup>37</sup>) during the last intersessional period.

7.8.2 The Panel noted that in January, 2011 the 12th Annual Meeting of the Partnership for the Observation of the Global Oceans (POGO) had been hosted by the Korea Ocean Research and Development Institute (KORDI) in Seoul, South Korea, and that the meeting had expressed its support of OceanSITES in its final declaration and pledged financial support and donations.

7.8.3 Additional activities had taken place at the Data Management level. Previously, the Data Management Team had agreed on an update to the OceanSITES data format. This new data format was growing in acceptance and was being implemented by the current data providers. Data were flowing from most of the participants in the original OceanSITES Steering Team, and in some cases was starting to include biogeochemical data (e.g. for EuroSITES<sup>38</sup>).

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36: PICES: North Pacific Marine Science Organization ( <http://www.pices.int> )

37: <http://www.oceansites.org/>

38: European integrated network of open ocean multidisciplinary observatories

7.8.4 Mr Burnett reported that the project office activities for OceanSITES had suffered during the past year with the departure of Hester Viola. However, in August Kelly Stroker had been appointed so that functions in the project office might continue. One of the first focuses would be regarding the migration of the OceanSITES web pages from the Woods Hole Oceanographic Institution (WHOI) to JCOMMOPS, where Ms Stroker will maintain the sites. The Panel noted that Bob Weller and Uwe Send had held a face-to-face meeting with Kelly before her official start date in Denver to discuss several OceanSITES activities.

7.8.5 The OceanSITES Executive Committee had been set up to permit, amongst other activities, the formal adoption of new sites and a review of the current list of proposed new sites. The committee would also discuss some exciting new ideas to tackle the 'low-hanging fruit' in terms of network enhancements to fulfil a goal of OceanObs'09. One such idea is to deploy deep 'MicroCATs' miniature CTDs on all moorings. This relatively minimal cost would add great value to the network.

7.8.6 Outreach, collaborations, and interfacing with other communities had taken place in various ways. Dr Bob Weller had represented the US Ocean Observatories Initiative (OOI<sup>39</sup>), was a member of Ocean Observations Panel for Climate (OOPC), and had attended and networked at many international meetings. Uwe Send had represented OceanSITES in JCOMM panels such as the JCOMM Observations Coordination Group (OCG), in the Climate Variability and Predictability (CLIVAR) Global Synthesis and Observations Panel (GSOP), in the US and international Atlantic Meridional Overturning Circulation (AMOC) programme<sup>40</sup>, and at international meetings such as the International Union of Geodesy and Geophysics (IUGG).

7.8.7 A major OceanSITES meeting was now planned for 29 November – 2 December 2011, with both the Steering Team and the Data Management Team meeting back to back. Topics to address included steering possible broadening of OceanSITES, e.g. to include boundary current observations or coastal carbon/ocean acidification timeseries.

7.8.8 The Panel noted that JCOMM was developing a strategy and workplan for a new Marine Climate Data System (MCDS), and invited OceanSITES to play an active role in these developments with a view to having the OceanSITES Data System contribute to the MCDS (**action; OceanSITES; Nov. 2011**). The Panel noted that a workshop for the new MCDS was planned in Hamburg, Germany, 28 November – 2 December 2011.

## 7.9 Tropical Moored Buoys Implementation Panel (TIP)

7.9.1 Mr Paul Freitag (USA), Chair of the TIP, reported on the activities of the Tropical Moored Buoys Implementation Panel (TIP) during the last intersessional period.

7.9.2 The Panel noted that the daily average data return for the period 1 July 2010 until 30 June 2011 was 86% for TAO<sup>2</sup>/TRITON<sup>3</sup>, 86% for PIRATA<sup>4</sup> and 66% for RAMA<sup>5</sup>. Primary reasons for lower data return in RAMA were a higher incidence of vandalism coupled with longer mooring deployment periods. Intense fishing activity in some regions had led to high vandalism rates. The survival rate for ATLAS moorings in RAMA since the first deployments (2004) was 77%, compared to 90% for TAO (since 1980) and 91% for PIRATA (since 1997). Cancelled and delayed RAMA cruises had resulted in deployments much longer than the 12-month design lifetime of the moorings. Two moorings recovered in October 2010 had been deployed for 23 months. As of July 2011, 2 other sites had not been serviced for 22 months, with no cruise scheduled in the area due to security issues (see 5.6 below).

39: <http://www.oceanobservatories.org/>

40: <http://www.atlanticmoc.org/>

7.9.3 Plans for 2012 were to maintain the TAO/TRITON, PIRATA, arrays at the level of 72 (completed), and 18 units (completed) respectively, and the RAMA implemented sites at the level of 30 units (65% complete, 3 new sites implemented in 2011). New mooring systems had been designed by China (Bai-Long) and USA (TFlex). Both systems telemetered their data via Iridium. Methods to submit data from these systems onto the GTS had yet to be established.

7.9.4 The Panel noted that formal bilateral agreements had either been approved or were under development amongst agencies of the various partner countries in order to help complete and sustain the array, the most recent being a Memorandum of Agreement between the United Nations Development Programme (UNDP) and NOAA which had been signed in May 2011. The agreement covered technical support, research cooperation, technology development and data management for RAMA. The Indian Ocean Observing System (IndOOS) Forum had held its second meeting in Chennai, India, 29 July 2011, and had discussed how to enhance the coordination and integration by agencies planning cruises, and to formulate security measures in response to piracy threats and the commitment of resources to implement such measures.

7.9.5 The Panel again noted with concern the ongoing damage to buoys and theft of instrumentation, especially at sites near areas of intense fishing activity such as the far eastern and western equatorial Pacific, the Gulf of Guinea and the equatorial Indian Ocean. In response, the Panel noted that some TRITON sites which had been vandalized heavily were now deployed without meteorological sensors. Some ATLAS<sup>41</sup> moorings in RAMA had been modified to inhibit vandals from boarding the buoy. As a consequence of the modification the moorings also lacked meteorological sensors. These modified ATLAS moorings had not exhibited survivability rates significantly higher than moorings with standard towers and will be discontinued. See also agenda item 9.4 for further details on the vandalism issue.

7.9.6 In addition to vandalism, well-publicized piracy events had resulted in the suspension of RAMA implementation off Africa and in the Arabian Sea. Two sites previously implemented in the Lloyds of London defined Exclusion Zone along 67°E had not been serviced in the past year due to lack of security measures during a *Sagar Nidhi* cruise.

## **7.10 International Tsunameter Partnership (ITP)**

7.10.1 Mr Ross Hibbins (Australia) reported on the activities of the International Tsunameter Partnership (ITP) during the last intersessional period.

7.10.2 Draft Instrument standards had been developed by the ITP under the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG-IOTWS). These standards would be reviewed at the Seventh ITP meeting, Geneva, Switzerland, 1 October 2011.

7.10.3 Globally, there were currently 52 tsunameters operational, with 16 in the Indian Ocean. The ITP encouraged all data to be distributed via the GTS. The US was providing DART data on the OPeNDAP website and through an RSS feed. The ITP-initiated BUFR<sup>16</sup>/CREX<sup>42</sup> templates for GTS transmission of tsunameter sea level data were now in the operational WMO Manual on Codes since 15 Sep 2010 and had been adopted by two countries to date, Australia and India. Australia had been transmitting data in the BUFR code form for pre-operational trial since March 2009 and recently India had started coding their tsunameter data in BUFR/CREX format. The US were expected to be providing their data in the new BUFR/CREX code format soon, with global GTS dissemination by 2012.

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41: Autonomous Temperature Line Acquisition System

42: FM 95–XII CREX GTS format: Character form for the REpresentation and eXchange of Data

7.10.4 There were two modes by which tsunameter data was being exchanged in real-time, GTS and FTP. Australia, Chile, Russia, Thailand and the US tsunameters were reporting real-time data on the GTS. India was currently working towards approval to release their tsunameter data onto the GTS. Chile, Russia and the US have also made their tsunameter data available via FTP.

7.10.5 The amount of data being exchanged in delayed mode had not so far been determined. This was an agenda item for the 7<sup>th</sup> meeting of the ITP (ITP-7) in Geneva.

7.10.6 The Panel noted that data quality standards, quality control and fault detection were the responsibility of the national tsunameter operators. There was a need to qualify the tsunameter instruments to characterise data quality from tsunameters of differing manufacture: this also was an agenda item at the ITP-7 meeting in Geneva.

7.10.7 Future plans for 2012 and beyond aimed to increase the network globally to 83 units.

## **8 PILOT PROJECTS**

### **8.1 Drifter Iridium Pilot Project**

8.1.1 Mr David Meldrum (IOC Secretariat) reported on developments with the DBCP Iridium Pilot Project during the last intersessional period. The Iridium Pilot Project (IPP) had been initiated by the Panel in 2007 with the objective of deploying and evaluating up to 50 Iridium equipped SVPBs throughout the global oceans. In fact nearly 300 Iridium SVPBs had been deployed within the context of the IPP, largely as a result of the active participation and in-kind support of a number of meteorological agencies, notably E-SURFMAR, Météo France and the Australian Bureau of Meteorology (BOM). The Panel thanked these agencies for their involvement, which had done much to evaluate the performance of Iridium drifters and to ensure the success of the IPP.

8.1.2 The Panel noted with approval that residual IPP funds were to be used to help the GDP to target the central South Pacific with Iridium drifters, an area that continued to suffer from appreciable timeliness issues for data being transmitted by Argos. It thanked the GDP for its efforts in this regard, and also thanked Météo France with respect to further Iridium deployments already being made in the Indian Ocean.

8.1.3 The Panel noted that timeliness issues were to be further discussed under item 9.3, but agreed that Iridium drifters did apparently offer a number of advantages, not only in timeliness, but also with regard to eventual life-cycle costs. Lifetimes continued to improve, and manufacturers were urged to further investigate ways of increasing energy efficiency by implementing improved power management schemes and new low-power GPS receivers.

8.1.4 The Panel, in recognizing that the IPP had long outlived its initial two-year lifespan, agreed that it should formally be disbanded at the next session, but that a small number of legacy actions should be followed up by its chair, David Meldrum, aided by the TC and others as required. In particular, the Panel agreed to continue funding airtime for legacy Iridium Pilot Project drifters, and the purchase of units to be deployed in poor timeliness areas.

8.1.5 Some members of the Panel noted with concern that multiple agencies were now inserting Iridium data onto the GTS, in contrast to the situation that existed for Argos data, and that the potential for poor quality data to be distributed outwith the Panel's control now existed. This issue is further discussed under item 10.5.

8.1.6 The Panel closed this item by thanking the IPP, participating agencies and manufacturers for leading the way in establishing Pilot Projects as a key component of the Panel's activities, and for greatly assisting the rollout of Iridium technology in the data buoy community.



- 8.1.7 The meeting decided on the following action items:
- (i) The Panel agreed that the IPP steering team should disband at DBCP-28, but that its chair, David Meldrum, in consultation with the TC and other experts, be tasked with completing the analysis, the publication of a final report, and the compilation of a best-practices guide for the use of Iridium in drifters. (**action; David Meldrum & TC; DBCP-28**)
  - (ii) Buoy manufacturers were urged to continue seeking improvements in Iridium buoy energy efficiency through the implementation of improved power management schemes and the latest low-power GPS receivers. (**action; Buoy Manufacturers; ongoing**).
- 8.1.8 The full report of the Iridium Pilot Project is given in **Annex V**.

## **8.2 Pilot Project for the evaluation of Argos-3 technology**

### *Technology development and deployments*

- 8.2.1 Mr Michel Guigue (CLS) reported on the development and current status of the Argos-3 pilot project implementation. Details are provided in **Annex XI**.
- 8.2.2 The Panel noted with appreciation that two satellites carrying the Argos-3 payload were planned to be launched in 2012 (METOP-B<sup>43</sup> and SARAL<sup>44</sup>).
- 8.2.3 The Panel noted that the timeliness of reports collected through Argos-3 is similar to that for reports collected via Argos-2. Improvements in terms of timeliness were expected to be realized through the evolution of the Argos receiving station network.
- 8.2.4 The Panel agreed that the Argos-3 Pilot Project had provided a positive and constructive technology transfer, and that the Pilot Project could now come to an end. The Panel requested Luca Centurioni to summarize the conclusions of the Pilot Project with a view to their being published as a DBCP Technical Document (**action; L. Centurioni; end 2011**). CLS offered to assist buoy operators willing to use the Argos-3 technology if needed.

## **8.3 Pilot Project on Wave Measurement from Drifters (PP-WMD)**

- 8.3.1 Mr David Meldrum reported on the Pilot Project on Wave Measurement from Drifters (PP-WMD). Little tangible progress had been made with this project during the intersessional period owing to the pressure of other work on project participants. However the Panel noted that a number of relevant papers had recently appeared in the scientific literature, and that this work by other parties would better inform the PP-WMD as to how best to proceed with a practical implementation of wave-spectral measurements from drifters.
- 8.3.2 In this context, the Panel had noted with considerable interest a report by Dr Dong-Kyu Lee from Scripps at its Scientific and Technical Workshop. The paper described work with a simple GPS-based wave measurement sensor deployed in a moored buoy alongside a Datawell waverider in S Korea. The sensor was in due course to be deployed in a drifting buoy hull by Dr Luca Centurioni, also from Scripps. Initial results suggested that the sensor could be capable of yielding good quality 2-D wave spectral data, and the Panel welcomed a suggestion by Dr Val Swail of PP-WET to validate the sensor on or alongside one of their reference platforms. A

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43 METOP: Meteorological Operational satellites of the EUMETSAT Polar System (EPS)

44 SARAL: Satellite with ARGos and ALtika (SARAL) – France and India

subsequent step would be to characterise how the sensor's performance was modified by its incorporation within a drifter hull.

8.3.3 The Panel also agreed that, given the excellent progress that had been made by PP-WET and the potential new focus for PP-WMD work at Scripps, the chairmanship and membership of the PP-WMD should be reviewed, and it asked the DBCP Executive Board (EB) to decide whether indeed PP-WMD's activities should be subsumed within PP-WET.

8.3.4 The Panel thanked Mr Meldrum for his work as PP-WMD chair and, while noting his wish to step down from the post, urged him to continue to work with both waves pilot projects.

8.3.5 The meeting decided on the following action items:

- (i) PP-WMD chair and membership should be reviewed, and possible incorporation within PP-WET should be considered by the DBCP EB (**action; DBCP EB; asap**);
- (ii) The Scripps GPS sensor should be deployed within the PP-WET evaluation and inter-comparison exercise (**action; PP-WMD and PP-WET; asap**);
- (iii) Early consideration should be given to a protocol for characterizing the performance of the sensor when incorporated within a SVP drifter hull (**action; PP-WMD and PP-WET; mid-2012**).

#### **8.4 DBCP/ETWS Pilot Project on Wave measurement Evaluation and Test from moored buoys (PP-WET)**

8.4.1 Dr Val Swail (Canada) reported on the development and current status of the joint DBCP<sup>45</sup>-ETWS<sup>46</sup> Pilot Project on wave measurement evaluation and test from moored buoys. The full report is included as a presentation in the CD-ROM for the DBCP-27 meeting report.

8.4.2 Dr Swail reported on two very important initiatives during the year relating to wave measurement and evaluation. The first of these was a workshop hosted by the US Alliance for Coastal Technologies in St Petersburg, Florida, 22-24 February 2011, which sought to integrate US wave evaluation activities with the Pilot Project and proposed a US contribution. A presentation was made on the Pilot Project at the third International workshop on the Use of Historical Marine Climate Data (MARCDAT-III, Frascati, Italy, 2-6 May 2011). Also, the JCOMM Marine Instrumentation Workshop for the Asia Pacific Region was held in Tianjin, China, from 11-13 July 2011, hosted by the State Oceanic Administration (SOA) and the National Centre for Ocean Standards and Metrology (NCOSM) of China. The Tianjin workshop encouraged its participants to participate in the DBCP-ETWS Pilot Project on Wave measurement Evaluation and Test from moored buoys (PP-WET). The workshop also noted that the WMO-IOC Regional Marine Instrument Centre (RMIC) can play a role in the Pilot Project by (i) calibrating instruments, (ii) providing technical advice, (iii) do data analysis on behalf of the Pilot Project participants. The workshop supported the long-term need for instrument evaluations.

8.4.3 Dr Swail also noted that a special session on wave measurement and a side meeting had been organized as part of the 12th International Workshop on Wave Hindcasting and Forecasting (November 2011, Kona, Hawaii) to present preliminary results to the scientific community and further develop guidelines and participation in the Pilot Project (<http://www.waveworkshop.org>).

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45: DBCP: Data Buoy Cooperation Panel

46: ETWS: JCOMM Expert Team on Wind Waves and Storm Surges

8.4.4 The Panel expressed its appreciation to several national agencies (Canada, US, Korea, India, Norway, United Kingdom) and international programmes for their participation in the intercomparison projects including the European Centre for Medium Range Weather Forecasts, which had provided complementary evaluations against wave model output. In particular, the Panel welcomed the continued contribution from Canada in providing financial support for the Coastal Data Information Program (CDIP) at the Scripps Institution of Oceanography (SIO), in setting up the intercomparison methodology, web site and metadata criteria, and in carrying out individual intercomparisons. The Panel encouraged its member countries to participate in the intercomparison activities that were being led by this pilot project (**recommendation**).

8.4.5 The Panel noted that evaluation results continued to be routinely added to the intercomparison web site <http://www.jcomm.info/wet>, where data were updated in near real time. Additional intercomparisons would be added to the web site once the information had been retrieved from the data storage systems on the buoys.

8.4.6 The Panel recognized that the pilot project would contribute to JCOMM in developing standards and best practices, as well as to the relevant WIGOS exercise, and encouraged the co-chairs and Steering Committee (SC) members to continue to update these activities with the progress in the inter-comparison exercise (**recommendation**).

8.4.7 The Panel agreed that this pilot project was progressing well, and decided to retain its financial support from the trust fund for another year (see agenda items 11.6 and 12.4). The revised work plan for the project was presented to the Panel and is available at the pilot project website. The Panel thanked the PP-WET SC co-chairs, Dr Val Swail and Dr Robert Jensen, and SC members for their work and for the progress made.

8.4.8 The meeting made the following recommendations:

- (i) Continue to support the Pilot Project for the next year;
- (ii) Encourage the co-chairs and SC members to contribute the results of the intercomparison exercise to JCOMM and WIGOS in developing standards and best practices;
- (iii) Encourage its member countries to participate in the Pilot Project intercomparison activities.

8.4.9 The meeting decided on the following action items:

- (i) A meeting of the Steering Committee is to be organized in late 2011 (**action; PP-WET co-chairs & Secretariat; asap**);
- (ii) The Panel encouraged the existing RMICs with wave capability, and particularly the RMIC for RA-IV, to assist the Pilot Project and play a role in PP-WET activities (**action; RMIC RA-IV & II; ongoing**).

## 8.5 DBCP/GHRSSST Pilot Project for High Resolution SST (PP-HRSST)

8.5.1 Mr Pierre Blouch (France) and Mr David Meldrum (UK) reported on the Pilot Project for High Resolution SST (PP-HRSST). The PP-HRSST had been established at the previous DBCP session as the outcome of a dialogue between the Group on High Resolution Sea Surface Temperature (GHRSSST) and the DBCP, resulting in a proposal<sup>47</sup> for a joint PP. GHRSSST was concerned to improve the quality of SST retrievals from satellites, and relied heavily on drifter SST

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47: [http://www.jcomm.info/index.php?option=com\\_oe&task=viewDocumentRecord&docID=6044](http://www.jcomm.info/index.php?option=com_oe&task=viewDocumentRecord&docID=6044)

as a validation mechanism, by comparing selected drifter SST values with co-located satellite estimates, so-called 'matchups'. Despite the best efforts of GHRSSST, progress was severely hampered both by the resolution (0.1C) and by the accuracy (~0.2C) of the SST reported by drifters. As a result of the dialogue, a basic set of standards had been agreed for HRSST drifters, in the hope that they would eventually lead to a universal standard applicable to all new drifters. The aim of PP-HRSST was to evaluate and develop this standard through the deployment of pilot drifters conforming to the standard, in the expectation that such drifters would in due course demonstrably improve the quality of satellite SST retrievals.

8.5.2 Noting with approval the progress that had already been made by E-SURFMAR, Météo France, the UK Met Office and Metocean in implementing HRSST (120 deployments of HRSST-1 drifters made to date), the Panel was nonetheless concerned that little positive and practical response had been forthcoming from GHRSSST, despite active DBCP participation in its science meetings. It therefore urged the emerging PP-HRSST Steering Group (SG) to pursue GHRSSST in this regard as a matter of urgency (**action; Chair, PP-HRSST; DBCP-28**).

8.5.3 The Panel noted with approval the proactive work by Metocean in developing a new 'smart' demountable sensor which would allow the full accuracy and resolution requirements of GHRSSST to be met. First deployments of HRSST-2 drifters, incorporating this sensor through support from the Panel, were to be made by the UK Met Office within the next few months. In this context, the Panel also noted an offer from Mr David Murphy of SeaBird to make their precision temperature sensor available to the project at a reasonable cost.

8.5.4 The PP-HRSST Steering Group (SG) shall be tasked in particular to develop a workplan for the next three years and to report back to the next Panel session on its progress (**action; Chair PP-HRSST; DBCP-28**).

8.5.5 The Terms of Reference, draft workplan and initial membership of the PP-HRSST SG are attached as **Annex XVI**. The Panel requested the Executive Board to finalize the membership of the Pilot Project SG (**action; EB; asap**).

## 8.6 Ocean carbon and alkalinity measurements

8.6.1 Dr Maciej Telszewski (IOC Secretariat), Deputy Director of the International Ocean Carbon Coordination Project (IOCCP<sup>48</sup>), updated the Panel on the latest instrumentation developments for biogeochemical measurements on moorings, buoys and floats. He concentrated on oxygen, pH and pCO<sub>2</sub> sensors. Oxygen sensors, the most mature in terms of calibration, maintenance and data quality control procedures, were successfully used across many platform types. Sensors for pCO<sub>2</sub> measurements were commercially available for moored platforms but their application to drifting surface platforms was restricted due to the technical obstacles which still needed to be overcome. One exception was a drifting buoy with a pCO<sub>2</sub> sensor developed by JAMSTEC which adopted a spectrophotometric measurement principle. While the application of this instrument could advance our knowledge of marine biogeochemistry in regions currently lacking in data coverage, its measurement principle significantly influenced data accuracy.

8.6.2 Finally, Dr Telszewski pointed out that Ion Sensitive Field Effect Transistor (ISFET)-based pH sensors were now fully commercialized for all types of surface platforms. Successful high pressure (up to 2000 dBar) tests had been also performed using a redesigned ISFET package. This sensor would be further tested on Argo floats in late 2011, and could in principle be incorporated into drifting buoys, possibly through a DBCP Pilot Project. The Panel, in thanking Dr Telszewski for his presentation, recalled that it had an action, arising from OceanObs'09, to investigate adding biogeochemical sensors to data buoys, and asked its TC to work with Dr Telszewski to progress this action if possible (**action; TC, Dr Telszewski; DBCP-28**).

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48: <http://www.ioccp.org/>

8.6.3 The Panel further invited the IOCCP to work closely with the OceanSITES, particularly on harmonizing data management aspects, including metadata (**action; IOCCP; asap**).

## 8.7 Proposal for a Sea Level Atmospheric Pressure Pilot Project

8.7.1 Dr Luca Centurioni (USA) reported on a proposal to establish a new DBCP Pilot Project on the evaluation of the Impact of Sea Level Atmospheric Pressure (SLP) observations from drifters on Numerical Weather Prediction (NWP).

8.7.2 The Panel recalled that SVPB SLP measurements were widely recognized by meteorological agencies as a very important source of data for assimilation in Numerical Weather Prediction (NWP) models. The DBCP Implementation Strategy focused on deployments in the tropical regions and in maintaining an array of 300 SVPB drifters in the Southern Ocean south of 40°S. Even sparse SLP data from SVPB drifters were regarded as a valuable validation tool for NWP pressure fields. While the DBCP had been requested to fit the whole GDP array with barometers by 2012, the current funding level suggested that this target will be delayed. The current proposal was to engage several DBCP members in a pilot project which would have as objectives to (i) quantify the impact of SLP data from the existing SVPB network essentially on NWP; and (ii) provide a scientific/operational rationale for designing the temporal and spatial resolution, as well as the optimal geographical distribution of the SVPB array taking into account all sources of data (e.g. moorings, ships).

8.7.3 It was anticipated that addressing these two objectives would assist the GDP in planning the implementation, possible expansion and/or re-distribution of the SVPB array, and would provide CIMEC<sup>49</sup>, AOML and its international partners with guidelines for the technical developments of future SVPB platforms. The results of this project would also provide national policy makers and funding agencies with a solid background and a scientifically sound foundation to promote, support and eventually enhance the global SVPB array.

8.7.4 In thanking Dr Centurioni for his suggestion, the Panel stressed that an investigation was needed into what impact studies had already been conducted recently so as to avoid duplication of effort. The Panel then discussed the Terms of Reference and membership of the proposed steering team for the Pilot Project, as well as draft workplan and budget. These are detailed in **Annex XVII**. The proposed duration of this pilot project is one year (phase 1), with the option to extend it by one year (phase 2). Phase 1 of the pilot project will investigate the state of the art of Observing System Experiments (OSE) in determining the impact of SLP from the existing network. The European Centre for Medium-Range Weather Forecasts (ECMWF) has already run a two month long global OSE targeted at the North Atlantic and it is currently running a six month long OSE. It is proposed to leverage on the existing resources as far as possible.

8.7.5 The Panel also noted that the WMO Commission for Basic Systems (CBS) has proposed addressing this issue under the agenda item “What density of surface pressure observations over ocean is needed to complement high-density surface wind observations from satellites? Suggestions: (a) network density reduction OSE in N.Atlantic, (b) southern oceans Observing System Simulation Experiment (OSSE)” as part of the forthcoming fifth International Workshop on the Impact of Observations on NWP (Sedona, Arizona, USA, 22-25 May 2012).

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49 CIMEC: Cooperative Institute for Marine Ecosystems and Climate

## 9 ISSUES FOR THE PANEL

### 9.1 Information Exchange

#### 9.1.1 Websites

9.1.1.1 The Secretariat reported on website developments during the last intersessional period, and the Panel was reminded of the official address for the DBCP website<sup>50</sup>.

9.1.1.2 JCOMMOPS also normally maintained some JCOMM Observations Programme Area content on the JCOMM web site<sup>51</sup> for the DBCP and OceanSITES.

9.1.1.3 The Panel invited its members to review the content of the DBCP web page on best practices<sup>52</sup> and to provide feedback to the Technical Coordinator as appropriate (**action; Panel Members; DBCP-28**).

#### 9.1.2 News

9.1.2.1 Due to the vacant position of the Technical Coordinator, no DBCP related news article had been posted on the JCOMMOPS website during the last inter-sessional period.

#### 9.1.3 DBCP Technical Documents

9.1.3.1 The Secretariat reported on new or updated DBCP Technical Documents (TDs), and JCOMM Meeting and Technical Reports. The following ones, of interest to the DBCP, had been published during the last intersessional period:

- DBCP Technical Documents<sup>53</sup>:
  - DBCP TD No. 41 – Ocean Data Buoy Vandalism - Incidence, Impact and Responses (available via ftp<sup>54</sup>)
  - DBCP TD No. 40 – Annual report for 2010 (available via ftp<sup>55</sup>)
  - DBCP TD No. 39 – Presentations at the DBCP Scientific and Technical Workshop, Oban, United Kingdom, 27 September 2010 (available via ftp<sup>56</sup>)
  - DBCP TD No. 38 – Annual report for 2009 (available on CD-ROM and via ftp<sup>57</sup>)
  - DBCP TD No. 37 – Guide to buoy data quality control tests to perform in real-time by a GTS data processing centre (available via ftp<sup>58</sup>);
  - DBCP TD No. 3, Revision 1 – Guide to Data Collection and Location Services Using Argos (available via ftp<sup>59</sup>).
- JCOMM Meeting Reports<sup>60</sup>:
  - JCOMM MR No. 80 – Second Session of the JCOMM Expert Team on Wind Waves and Storm Surges (ETWS), Toronto, Canada, 18-22 May 2010 (available via ftp<sup>61</sup>)
  - JCOMM MR No. 79 – Twenty-sixth Session of the Data Buoy Co-operation Panel,

50: <http://www.jcommops.org/DBCP/> - the following alias can also be used: <http://dbcp.jcommops.org>

51: <http://www.jcomm.info>

52: <http://www.jcommops.org/dbcp/bestpractice.html>

53: [http://www.wmo.int/pages/prog/amp/mmop/dbcp\\_reports.html](http://www.wmo.int/pages/prog/amp/mmop/dbcp_reports.html)

54: <ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/dbcp/Dhcp41-Vandalism/DBCP41-Buoy-Vandalism-v1.20.pdf>

55: <ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/dbcp/Dhcp40-ANN-2010/index.html>

56: <ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/dbcp/Dhcp39-Workshop-2010/index.html>

57: <ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/dbcp/Dhcp38-ANN-2009/index.html>

58: <ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/dbcp/Dhcp37-QC/DBCP37-QC-Guide-v1.pdf>

59: <ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/dbcp/Dhcp3/DBCP3-Argos-Guide-REV1.pdf>

60: [http://www.wmo.int/pages/prog/amp/mmop/meeting\\_reports.html](http://www.wmo.int/pages/prog/amp/mmop/meeting_reports.html)

61: <ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-MR/JCOMM-MR-80-ETWS-III.zip>

Oban, United Kingdom, 27-30 September 2010 (available via ftp<sup>62</sup>)

- JCOMM Technical Reports<sup>63</sup>:
  - JCOMM TR No. 53 / WMO/TD No. 1564 - The WMO-IOC Network of Regional Marine Instrument Centres(RMICs) (available via ftp<sup>64</sup>)

9.1.3.2 The Panel recalled efforts to produce a new DBCP Technical Document on Sea Surface Salinity Quality Control processes for potential use with Data Buoy observations, and corresponding action items from the previous Session. The Panel noted with interest that the draft<sup>65</sup> had been finalized as new DBCP Technical Document No. 42, having been reviewed by the DBCP Task Team on Instrument Best Practices and Drifter Technology Development (TT-IBP), the DBCP Task Team on Data Management (TT-DM) and the Secretariat. The following changes were included:

- (i) Editorial changes were made to properly format it as a DBCP TD, including cover page;
- (ii) Links with DBCP TD No. 37 have been added for referring to real-time data quality control tests for salinity data;
- (iii) Section 5 dealing with user requirements has been updated to reflect latest requirements from the WMO Database;
- (iv) Details about Quality Control procedures used for the TAO Array, as well as by NOAA/NDBC (USA) and LOCEAN (France), have been added;
- (v) Acronyms have been expanded, and website references added;
- (vi) A list of acronyms has been added.

9.1.3.3 The Panel endorsed those changes, and requested the Secretariat to publish the document on the JCOMM website (**action; Secretariat; asap**).

#### **9.1.4 Information Products**

9.1.4.1 Due to the position of DBCP Technical Coordinator being vacant during most of the last intersessional period, no additional information products of interest to the Panel had been provided or updated through JCOMMOPS.

#### **9.1.5 Scanning and preservation of past DBCP reports**

9.1.5.1 The Panel noted that the 29 DBCP documents (13 early DBCP Session/Meeting Reports, 2 Additional Meeting reports, 13 DBCP Technical Documents) shipped to NOAA for imaging through the NOAA Climate Database Modernization Programme (CDMP) for preservation purposes, had not yet been processed due to budgetary constraints.

### **9.2 Deployment opportunities and strategies**

9.2.1 The Argo Technical Coordinator, Mr Mathieu Belbéoch (JCOMMOPS), reported on activities and developments in JCOMMOPS regarding deployment opportunities, and highlighted several items of interest to the Panel. In particular, the Panel noted that JCOMMOPS was working on the design of a relational database to handle cruise metadata available through in Global Ocean Observing System (GOOS) and JCOMM networks.

9.2.2 Mr Belbéoch reminded the Panel that JCOMMOPS had been providing information on deployment opportunities on an *ad-hoc* basis without any strong commitments and means. However, such activities were viewed as crucial to assist implementers in the maintenance of the

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62 : <ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-MR/JCOMM-MR-79-DBCP-XXVI.pdf>

63: [http://www.wmo.int/pages/prog/amp/mmop/jcomm\\_reports.html](http://www.wmo.int/pages/prog/amp/mmop/jcomm_reports.html)

64 : <ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-TR/J-TR-53-RMICs/J-TR-53-RMICs-REV1.pdf>

65: [http://www.jcomm.info/index.php?option=com\\_oe&task=viewDocumentRecord&docID=7567](http://www.jcomm.info/index.php?option=com_oe&task=viewDocumentRecord&docID=7567)

global arrays, and JCOMMOPS had explored a number of medium term solutions (communication, logistics coordination) and funding sources to develop and sustain such activity.

9.2.3 He then reported on the use of the new mailing list set up in 2011 to share deployment opportunities amongst the Argo, DBCP, SOT and OceanSITES communities, [ships@jcommops.org](mailto:ships@jcommops.org), and invited all DBCP/OceanSITES deployment and operation managers to subscribe to the list and to systematically post their deployment opportunities. (**action; Panel members; asap**).

9.2.4 The Panel noted with pleasure the success of the *Lady Amber* experiment in completing its third cruise<sup>66</sup> in the Indian Ocean, with the deployment of 60 floats for CSIRO<sup>67</sup> (Australia), and preparations for a Pacific Ocean cruise in 2012. However, the Panel noted that no drifters had been deployed during those cruises, but that two RAMA moorings (WMO Nos 14046, 14042) had been checked on the way. The Panel welcomed the JCOMMOPS experiment in using low cost 'green' platforms for instrument deployment. Panel members were invited to consider using the *Lady Amber* on a shared-cost basis for the deployment of drifters, e.g. in the Southern Hemisphere data sparse areas (**action; Panel members; ongoing**).

9.2.5 The Panel noted that JCOMMOPS had finalized its proposal to set up a position dedicated to those activities, namely a Ship Logistics Coordinator. The Panel agreed to fund this activity together, with support from other partners and funding sources, so that a two-year pilot experiment could begin in 2012 (the related decision on funding is discussed under agenda item 12). This decision took into account that the finalized Terms of Reference would directly answer to DBCP needs, that most of the necessary resources would be generated by other income (e.g. ship chartering - Argo 2011) and that the SOT had agreed to support the activity at its last session. The Panel invited its members to review the Terms of Reference of the JCOMMOPS Ship Logistics Coordinator position, provide feedback, and consider funding part of it as of 2012 (**action; Panel members; Nov. 2011**). Further details on the proposal are provided in DBCP-27 preparatory document No. 11.2.

9.2.6 The Panel recommended that JCOMMOPS continue its efforts in developing products and services targeted at deployment opportunities.

9.2.7 The Panel recalled that the WMO Publication No. 47 contained the list of Voluntary Observing Ships (VOS), with information on their routes, and could therefore be used to identify potential deployment opportunities.

9.2.8 The Panel agreed that co-operation with the IMO should be enhanced with a view to attracting further support from the maritime shipping industry for the deployment of drifters. Universities featuring maritime activities should also be approached. The Panel invited the TT-CB to consider inviting mariners and shipping companies to the DBCP Capacity Building workshops as a way of advertising ocean observation activities and seeking industry support (**action; TT-CB; DBCP-28**).

9.2.9 Using the VOS Scheme as a model, the Panel recommended its members to consider offering awards to ships which were actively contributing deployment opportunities, as a way to further encourage their participation as well as the participation of others.

### 9.3 GTS bulletin timeliness

9.3.1 Mr Bill Woodward (USA) presented an overview of the pattern of delays for the three months May to July 2011). The monthly maps had been produced in collaboration with

66: [http://w3.jcommops.org/FTPRoot/JCOMMOPS/Cruises/JCOMMOPS\\_ZR2335.kml](http://w3.jcommops.org/FTPRoot/JCOMMOPS/Cruises/JCOMMOPS_ZR2335.kml)

67 CSIRO : Commonwealth Scientific and Industrial Research Organisation (CSIRO)



JCOMMOPS and with Météo France. The delays were quite similar to those observed last year, with most of the data of drifting buoys now transmitted on the GTS within 120 minutes. Iridium buoys continued to provide the vast majority of the data within less than 60 minutes.

9.3.2 Mr Woodward then presented a summary of the ongoing and planned upgrades/improvements in the CLS real-time antenna network, organized by the three high priority DBCP regions of interest. Performance of the current and evolving/planned network was illustrated using maps generated by the CLS simulation tool that analyzed data delivery time performance in 5° x 5° squares around the globe. Argos data timeliness from the calculated CLS maps was quite consistent with the measured timeliness from the JCOMMOPS maps. Improvements made to the antenna network between March 2011 and July 2011 had resulted in calculated improvements in timeliness in the Eastern Equatorial Pacific of 20+ minutes, in portions of the Equatorial Atlantic of 20+ minutes, and in the South Atlantic of 30-40 minutes.

9.3.3 Considering the usefulness of this list, the Panel recommended that WMO/ID cross reference list on the web continues to be updated by the Technical Coordinator (**action; TC DBCP; asap**).

9.3.4 The Panel recommended the completion of the DBCP monthly maps, normally produced by JCOMMOPS, for the end of 2010 and the beginning of 2011 (**action; TC DBCP; asap**).

9.3.5 Pending the capability of Argos data timeliness to meet a target of less than 60 minutes globally, the Panel agreed to set aside resources from its Trust Fund for use by Panel members in deploying Iridium drifting buoys in the areas of the South Pacific Ocean and the South Atlantic Ocean where the average delays were greater than 120 minutes (**action; DBCP members; DBCP-28**). Decision to use these funds should be made by the Executive Board through formal requests submitted by Panel members to the Board.

9.3.6 The Panel recommended that the DBCP and CLS perform regular (every 6 months) assessments of the global data buoy timeliness by jointly comparing the JCOMMOPS Delay Maps and the Argos Data Mean Disposal Time Maps for that time period. It therefore requested the Technical Coordinator to work with Panel members, the Task Team on Data Management, and CLS, with a view to establishing such a monitoring scheme, and to report on preliminary results and the proposed scheme at the next Panel Session (**action; TC DBCP; DBCP-28**).

9.3.7 The Panel invited CLS to make their “*timeliness maps*” available publicly on a routine basis (**action; CLS; asap & ongoing**).

## 9.4 Vandalism

9.4.1 The Panel recalled discussions at previous DBCP Sessions about the issue of vandalism on data buoys. The Panel noted with appreciation the many developments in this regard.

### *DBCP report on vandalism*

9.4.2 The report on “Ocean Data Buoy Vandalism - Incidence, Impact and Responses” prepared by Ken Jarrott (Australia), had been published as DBCP Technical Document No. 41, and was available from the JCOMM web site<sup>68</sup>. The Panel thanked Mr Jarrott for this comprehensive, detailed, and useful report. The Panel in particular concurred with the nine recommendations from the report to build understanding of this problem, mitigate the impact on human communities, and promote public education to protect ocean observing networks and save

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68: [http://www.jcomm.info/index.php?option=com\\_oe&task=viewDocumentRecord&docID=7150](http://www.jcomm.info/index.php?option=com_oe&task=viewDocumentRecord&docID=7150)

human lives. These recommendations are reproduced in **Annex XIV**. The Panel agreed that the report could usefully be enhanced with statistics and information from other countries. The Panel requested the Secretariat to update the template for DBCP National Reports with a view to including a section for the reporting of vandalism incidents (**action; Secretariat; DBCP-28**).

#### *DBCP Working Group on Vandalism*

9.4.3 The Panel also recalled that at its previous Session it had established a small working group (with limited lifetime) on vandalism, comprised of Ross Hibbins (Australia), Shannon McArthur (USA), Mike McPhaden (USA), K Premkumar (India), R Venkatesan (India), and Robert Weller (USA). The working group would provide continuity of attention to this important issue, and would provide a focal point for follow-up action by the Panel. It would also be a channel for further information requests, following the release of the vandalism report.

9.4.4 The Panel noted that during the last intersessional period, the working group had established its charter (Appendix B of DBCP-27 doc. 9.4) with the primary objective of ensuring the continued attention within the DBCP, WMO and IOC to the subject of buoy vandalism and to the discovery, sharing and promotion of counter-vandalism best practices throughout the international buoy operator community. The objectives of the working group were:

- (i) to share lessons learned in counter vandalism efforts among buoy network operators;
- (ii) to facilitate a conversation among buoy operators on counter vandalism approaches; including technical, educational, operational, and enforcement approaches;
- (iii) to facilitate a conversation on the development of best practices to mature the various methodologies used to quantify the impacts of buoy vandalism; and
- (iv) to serve as a communication channel within the DBCP for further information requests on the subject of vandalism following the release of the WMO vandalism report.

9.4.5 The Working Group on Vandalism met on Monday, 26 September 2011 at the WMO in Geneva. Representatives from the United States, India, Korea and Spain discussed the recently delivered DBCP Vandalism Report sent to the IOC, WMO, UN General Assembly (UNGA) and regional fisheries management organizations. Within the report, nine (9) recommendations were made (see **Annex XIV**) in relation to the following topics:

- (i) Improving platform designs;
- (ii) Redesigning networks to promote avoidance;
- (iii) Improving networks with regard to their availability;
- (iv) Establishing redundancy within networks ;
- (v) Encouraging nations to recognize marine vandalism;
- (vi) Calling on Fisheries Management and Regulatory Bodies to develop strategies;
- (vii) Maintaining records and consistent methods to document vandalism;
- (viii) Encouraging states party to the Law of the Sea Convention to use this legal instrument to promote protection;
- (ix) Expanding international education and outreach.

9.4.6 Hardware improvements included special fasteners, buoys with cones, better transmitters and fish dispersion devices.

9.4.7 India had developed an educational outreach, which included posters with buoy location maps in eight regional languages, to educate fishermen about the impact of vandalism. Most did understand the importance of tsunami buoys and did not disturb them.

9.4.8 The Panel recognized that there were three items to focus on: hardware improvements, education and regulations. The Republic of Korea had approached this effort in two ways, by both improving buoy systems to reduce vandalism and by cooperation with other countries to identify areas of vandalism.

9.4.9 Finally, Dr Venkatesan accepted the position of Chair of the Working Group.

*WMO Resolution 25 (Cg-XVI) and IOC Assembly Resolution XXVII/6 on data buoy vandalism: Incidence, Impact and Responses*

9.4.10 The Panel further noted with appreciation that the WMO Congress, and IOC Assembly had adopted WMO Resolution 25 (Cg-XVI) and IOC Resolution XXVI/5 respectively (see Appendix A of DBCP-27 doc. 11.3). Both Resolutions were similar. The Resolutions in particular urged Members and invited relevant International and Intergovernmental Organizations to work with the Food and Agricultural Organization (FAO) and regional fisheries management organizations and bodies, especially those with the competence to manage highly migratory fisheries, to educate and encourage stakeholders to adopt binding measures to prevent and minimize vandalism and damage to ocean observing networks and data systems. The Panel agreed that it could assist the WMO Secretary General and the IOC Executive Secretary to:

- (i) promote collection of more consistent and systematic statistics on vandalism, to increase capture and exchange of damage records and performance measures for ocean observing networks, and to conduct comprehensive cost-benefit assessments and risk-value analyses taking into account life, health, social and economic impacts of vandalism and damage to ocean observing networks and data systems;
- (ii) encourage and assist, where appropriate, the development of specific regional efforts and solutions in addressing the vandalism of ocean data platforms.

9.4.11 Regarding item (i) above, the Panel requested the Technical Coordinator to collect statistics and information on actual vandalism occurrences, and maintain relevant information on the DBCP website (**action; TC DBCP; ongoing**). It requested the working group on vandalism to propose a methodology, and conduct comprehensive cost-benefit assessments and risk-value analyses, with a view to presenting its findings at the next Panel Session (**action; Vandalism WG; DBCP-28**).

9.4.12 Regarding item (ii) above, the Panel requested the Task Team on Capacity Building to ensure that data buoy vandalism aspects are being addressed as part of its activities (**action; TT-CB; ongoing**).

9.4.13 The Panel noted that the DBCP Report on Vandalism shall be presented to the United Nations General Assembly, with a view to promoting an integrated UN approach to address this critical issue.

*Regional Workshop on Establishing a Cooperative Mechanism for Protection of Met-Ocean Data and Tsunami Buoys in the Northern Indian Ocean Region*

9.4.14 The Panel also noted that the National Institute of Ocean Technology (NIOT) and the Bay of Bengal Programme Inter-Governmental Organization (BOBP-IGO) had jointly organized a “Regional Workshop on Establishing a Cooperative Mechanism for Protection of Met-Ocean Data and Tsunami Buoys in the Northern Indian Ocean Region” in Chennai, India from 6 to 7 May 2011. The workshop particularly made recommendations along the following lines:

- (i) Amendments to international law relating to platforms in the open ocean (specifically the UN Conventions on the Law of the Sea, UNCLOS) to recognize acts of ocean

- platform vandalism as an offence. Provisions such as those relating to piracy would afford a framework for protection of ocean data buoys in international waters;
- (ii) International/regional cooperation to declare a safe zone around buoys and to promulgate a protective ordinance, as is currently done in some countries for oil rigs; and
  - (iii) Development of cooperative measures to engage other agencies in the chain of education, interception or enforcement, including cross-border co-operation with countries which may have delegated custody of buoys deployed far from the host country.

## 9.5 Metadata

9.5.1 Mr Bill Burnett (USA) reported on various activities dealing with metadata that had occurred throughout the intersessional period. The Panel acknowledged that this report could not be delivered by the Technical Coordinator as the position had been vacant during most of the period. Mr Burnett reported that in terms of the JCOMMOPS drifter metadata database, inputs were taken from platform operators and telecommunications providers, either upon deployment or through regular (monthly) status reports from those responsible for buoy operations. The Panel thanked those buoy operators who report metadata in a timely fashion, and encouraged others to use similar methods as well.

9.5.2 The Panel recognized that one of the primary challenges facing the community was the fast and accurate assessment of the quality of data streaming from marine and oceanographic platforms. Operational data aggregation and assembly from distributed data sources was essential for the ability to adequately describe and predict the physical, chemical and biological state of the deep water and coastal ocean. These activities demanded trustworthy and consistent metadata for every observation distributed. Significant progress had been accomplished in previous years towards the definition of requirements both for metadata and relevant data flags for real-time quality control. The intent in the future was to report on the recommended quality control descriptions for parameters such as waves and currents, expand the work with additional parameters and evolving sensor systems, and develop guides for best practices to assure data quality.

9.5.3 The Panel noted that within the larger framework of Global Earth Observing System of Systems (GEOSS), the architecture for collecting and disseminating metadata had been defined. One of the more important elements within GEOSS involved participants following common standards and procedures with regard to the data collection and dissemination processes. For example, it was stated<sup>69</sup> that *for those observations and products contributed and shared, GEOSS implementation will facilitate their recording and storage in clearly defined formats, with metadata and quality indications to enable search, retrieval, and archiving as accessible data sets*. Common standards and procedures also had to be reflected in the metadata description. For instance, quality management standards applicable to instrument qualification and performance assessment had to be included as well. Implementing these standards would allow transformation of current ocean and coastal observations into operational activities and the use of common data quality standards and indicators would ease the integration of the observations into GEOSS.

9.5.4 Operators of Iridium drifters had continued to actively report metadata to each other and JCOMMOPS upon deployment, which was valuable and should continue beyond the life of the Iridium Pilot Project.

9.5.5 BUFR templates, and related metadata issues are discussed under item 11.2.

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69 The Global Earth Observation System of Systems(GEOSS) 10-Year Implementation Plan, 16 February 2005

9.5.6 The Panel noted with appreciation that the OceanSITES Data Management Team (DMT) had made significant progress during the year. Both the US National Data Buoy Center (NDBC) and France's IFREMER<sup>70</sup>/Coriolis were serving as Global Data Assembly Centres (GDACs), with responsibilities to provide a virtual or centralized access to data that are served to OceanSITES, check all files daily and synchronize catalogues. The OceanSITES DMT:

- (i) Completed and published the OceanSITES Users Manual 1.2 document – this document was serving as the critical basis for formatting all OceanSITES observations in an approved CF convention metadata format;
- (ii) Completed the synchronization software for all OceanSITES catalogues. NDBC and IFREMER were now successfully synchronizing OceanSITES observations on a daily basis. This was an enormous accomplishment which had taken five years to formally complete;
- (iii) Redesigned the GDAC FTP distribution and developed an OceanSITES Top Level Directory (<ftp://data.ndbc.noaa.gov/data/oceansites>);
- (iv) Implemented standard designated site codes and platform codes for each of the DACs;
- (v) Developed NetCDF Requirements for all data follows using the CF1.x standards and OceanSITES User Manual 1.2 requirements. Developed requirements for over 30 variables including standard names, unites, valid\_min, valid\_max, sensor names and serial numbers;
- (vi) Developed the NODC data archive convention to place the GDAC's best copy of the OceanSITES observations in the GDACs, with backup observations placed at NODC;
- (vii) Developed Google Ocean / OPeNDAP<sup>71</sup> / SensorML<sup>72</sup> interfaces for all OceanSITES observations. Utilized existing THREDDS Data Server at NDBC to deliver NetCDF files via OPeNDAP. Integrated OceanSITES artifacts by advanced user interfaces such as Google Ocean.

9.5.7 OceanSITES formats were now formally used, outside of the normal OceanSITES DMT, by NOAA's Water Level Stations, MyOcean *In Situ* Portal for Operational Oceanography, Emodnet Physics Portal, and (potentially) the Arctic Mooring Data Integration Project.

9.5.8 The Rigs and Platform metadata issued is discussed under item 11.2.

9.5.9 The Panel agreed on the following:

- (i) The Panel concurred with the JCOMMOPS recommendation that all drifting buoy operators make available to JCOMMOPS deployment information (preferably through a national website similar to that which AOML, NDBC and Canada were providing) for all buoys as well as continuing e-mail notifications as necessary (**action; Panel members; ongoing**);
- (ii) The Panel recognized that the operators of Iridium drifters have continued to actively report metadata to each other upon deployment. This was valuable. The Panel recommended that they continue to do so beyond the life of the Iridium Pilot Project (**action; Panel members; ongoing**);
- (iii) Panel members are encouraged to continue to test the new BUFR templates for drifting and moored buoy data, and inform the TT-TDC about any problems or confusion with the metadata (**action; Panel members; DBCP-28**);
- (iv) Panel members are encouraged to continue close co-operation with OceanSITES when considering future metadata content and standards. The Panel requested the

70 IFREMER: Research Institute for the Exploitation of the Sea (France)

71 OPeNDAP: Open-source Project for a Network Data Access Protocol

72 SensorML: OpenGIS® Sensor Model Language Encoding Standard

Task Team on Data Management and the Task Team on Moored Buoys to follow up on these aspects (**action; TT-MB & TT-DM; DBCP-28**);

- (v) Panel members are invited to review the categories defined by OceanSITES and to forward comments to the OceanSITES Data Management Team co-lead (Bill Burnett) (**action; Panel members; March 2012**).

## **9.6 Technological developments in support of user requirements**

9.6.1 The Panel briefly discussed the need to conduct technology developments in support of user requirements. The Panel recalled the following activities in which the DBCP is fully engaged:

- (i) Wave measurements, including moored buoy data evaluation and testing (PP-WET), and the development of wave measurements from drifters (PP-WMD) – see agenda items 8.3, and 8.4;
- (ii) Providing high resolution SST to address the requirements of the Group for High Resolution SST (GHRSSST) – see agenda item 8.5;
- (iii) New satellite data telecommunication systems as addressed through the Argos-3 and Iridium Pilot Projects – see agenda items 8.1, 8.2, 10.3, and 10.4;
- (iv) Efforts from the TT-IBP to improve reliability of drogoue and barometer sensors – see agenda item 6.2, 7.2.

9.6.2 The Panel requested the Task Teams and the Pilot Projects to continue efforts in this regard.

## **9.7 Other issues to be discussed, as proposed by the Task Teams**

9.7.1 The Panel had noted with concern a carefully researched paper, presented during its Scientific and Technical Workshop by Marie-Hélène Rio from CLS, that demonstrated, by comparing observed velocities with those that could have been expected from altimetric geostrophic hindcasts, that estimates of drogoue loss events since the late 1990s had probably been underestimates. This was of considerable concern to the Panel as drogoue presence was vital to oceanographic users of drifter data, and was also beneficial to the meteorological and climate community in terms of assisting prolonged drifter persistence in open ocean areas. Mme Rio's findings were consistent with similar analyses at the GDP: both also served to demonstrate additionally that drogoue performance had most probably deteriorated in the years following the adoption in the 1990s of the SVP platform as a common vehicle for oceanographic, meteorological and climate studies and operations.

9.7.2 The Panel considered that the time was right for a detailed evaluation of the issues surrounding drogoue loss and drogoue loss detection, and welcomed an initiative by many of its members, including the entire drifter manufacturing community, to engage in an open discussion of the problem and to seek enduring solutions.

9.7.3 An *ad hoc* group met on two occasions to debate the issues, and arrived at a number of conclusions:

- (i) That a drogoue loss problem did exist, and had existed for many years without adequate resolution;
- (ii) That the overall problem could be separated into three parts:
  - a. Drogoue loss *per se*;
  - b. Drogoue loss detection;

- c. Reanalysis of the historical record, particularly as it related to surface velocity climatologies;
- (iii) That traditional anecdotal-based drogue design changes should be superseded by an analytical approach as far as possible.

9.7.4 Whereas the group was unable to identify a detailed workplan during the session, it did nonetheless agree to work by e-mail to agree a structure and workplan by the end of October 2011 (**action; ad-hoc drogue task team; 31 Oct 2011**).

9.7.5 Initial actions that were agreed by the group were:

- (i) To establish a detailed chronology of drogue design changes, going back as far as possible (**action; L. Centurioni; DBCP-28**);
- (ii) To establish a detailed chronology of drogue loss events from the historical record, going back as far as possible (**action; R. Lumpkin; DBCP-28**);
- (iii) To cross-correlate these two chronologies in the hope of elucidating critical design changes (**action; L. Centurioni & R. Lumpkin; DBCP-28**);
- (iv) To reactivate dormant actions to deploy intensively instrumented drifters that would allow detailed characterisation of drogue performance and attendant stresses on its connection to the buoy hull (**action; L. Centurioni & A. Sybrandy; DBCP-28**).

9.7.6 The Panel applauded the group for the openness that it had brought to its deliberations, and asked that it move ahead to constitute itself as a working group within the existing TT-IBP, and to draw up detailed workplan (**action; IOC secretariat, chair TT-IBP; end 2011**).

9.7.7 The Panel also recognised that the group might reasonably expect DBCP financial support for those areas of its activities that could not be absorbed within existing budgets, and asked the DBCP Executive Board (EB) to earmark USD 25k from its following year's budget for group activities that might in due course be identified.

## 10 INFORMATION REPORTS

### 10.1 Argo

10.1.1 The Technical Coordinator, Mr Mathieu Belbéoch (JCOMMOPS), presented a report on Argo, on behalf of the Argo Steering Team (AST). The Panel noted that 3200 floats were operating worldwide, with 2900 units that were meeting the requirements of the original Argo plan (60°N/60°S, no marginal seas). Although Argo was still short of its target in the southern hemisphere, the core array had progressed from 85 to 90% since DBCP-26.

10.1.2 The Panel noted that the deployment rate was resuming after a challenging year. The challenge for Argo in 2011/2012 would be to address the 2009 deficit in deployments (300 units). Argo was using a scoring system to rate deployment plans according to the array density and float age, in order to encourage deployment managers to keep in mind the 3°x3° target.

10.1.3 The Panel noted that 90% of Argo profiles reached the GTS within 24 hours of collection and that efforts would have been made to maintain the current delay of ~48 hours with GDAC data distribution. Progress had been made to process the backlog of the profiles in delayed-mode.

10.1.4 Profiling float technology was still improving and new generations of instruments were gradually being rolled out. The use of two-way telecommunication systems and bio-optical-geochemical sensors were also being tested, and plans for “deep floats” were being initiated. Argo had had a strong showing at OceanObs’09, where the majority of the other white papers had referred to Argo and offered a variety of suggestions for Argo’s future. Analysis continued to be done on the effects of the pressure bias within elements of the Argo fleet, with the goal of recovering as much data as possible.

10.1.5 The Panel noted the work achieved so far on the Google Earth Argo products. Temperature and Salinity overlays (using the Scripps Argo based Atlas) had been tested and added to the Google Earth application, as well as a quality control feedback system. The Panel noted with appreciation that this service had been developed with the DBCP in mind. The Panel requested the Technical Coordinator to review the content and adapt the product to DBCP needs (**action; TC DBCP; DBCP-28**).

10.1.6 The Panel welcomed the idea of developing further the synergies between Argo and the DBCP regarding platform donor programmes and ship-time sharing.

## 10.2 Buoy data management centres

10.2.1 The Panel reviewed the report of the IOC International Oceanographic Data and Information Exchange (IODE) Responsible National Oceanographic Data Centre (RNODC) for drifting buoys (RNODC/DB), operated by the Integrated Science Data Management (ISDM, formerly MEDS) of Canada. Mr Joe Linguanti (Canada) presented the report.

10.2.2 The Panel then reviewed the report of the JCOMM Specialized Oceanographic Centre (SOC) for drifting buoys, operated by Météo-France, presented by Mr Jean Rolland.

10.2.3 The Panel thanked both centres for their reports. The full reports are provided in Appendices A and B and will be included in the CD-ROM that will be distributed with the Session final report.

10.2.4 As noted at the previous DBCP Session, the two respective IODE and JCOMM centres were completely separate but did provide similar functions. The Panel noted the discussions at the previous DBCP Session, and its request to the SOC/DB and the RNODC/DB to collaborate in possible integration. It noted with interest that an *ad hoc* Task Team comprised of Bill Burnett (USA, leader of the team), Bruce Bradshaw (ISDM, Canada, as RNODC/DB), Norio Baba (JODC, Japan, as IODE/RNODC), Joel Hoffman and Jean Rolland (Météo France as SOC/DB), Scott Woodruff (USA, ETMC Chair), and Sissy Iona (Greece, DMCG Chair), had been formed to address the integration issue.

10.2.5 The Twenty-first Session of the IOC Committee on IODE (IODE-XXI, Liège, Belgium, 23-26 March 2011) had approved the report by the JCOMM *ad hoc* Task Team and requested the team to draft a Recommendation for JCOMM-IV, including the ToRs of such centres, as well as background information. It requested the Chair of JCOMM DMCG to keep the Committee informed of progress with the integration of these centres. The report by the *ad hoc* Task Team is reproduced in Appendix C of DBCP-27- doc. No. 10.2.

10.2.6 A workshop was being planned in Hamburg, Germany from 28 November - 2 December 2011, with representatives from the *ad hoc* Task Team, the VOSCLim Real-Time Monitoring Centre (RTMC), Principal Investigators (PIs), DACs and GDACs, to discuss the vision for a future Marine Climate Data System (MCDS). This would include in particular the integration of the RNODC/DB and SOC/DB, the determination of the IT impacts for both Centres, and the development of a timeline for achieving Initial Operational Capability and Full Operational Capability.



### 10.3 Argos operations and developments

10.3.1 Mr Bill Woodward (CLS America) and Mr Michel Guigue (CLS France) presented reports on Argos operations and system improvements during 2010-2011. The Panel recalled that Argos was a global satellite-based location and data collection system dedicated to studying and protecting the planet's environment. CLS, as a unique operator of the Argos system on behalf of NOAA, CNES<sup>73</sup> and EUMETSAT<sup>74</sup>, continued to maintain and improve an operational service for all Argos users, especially for the meteorology and ocean community.

10.3.2 The Panel noted that Argos instruments are currently onboard five NOAA Polar Orbiting Environmental Satellites (POES) and one EUMETSAT spacecraft. Since January 2011, real-time Argos data were being transmitted from all of the NOAA satellites, but only in selected geographical zones from METOP-A due to technical problems. During the year EUMETSAT had extended the activation of the METOP-A HRPT<sup>75</sup> zone to cover much of the southern hemisphere.

10.3.3 There had been only three significant anomalies (two for NOAA-19 and one for METOP-A) since September 2010, with very few impacts for users. Two new satellites carrying Argos-3 instruments are to be launched in mid 2012: METOP-B (EUMETSAT) and SARAL (Indian Space Research Organization – ISRO).

10.3.4 The Panel further noted that in addition to the three existing northern hemisphere global antennas (Svalbard, Fairbanks and Wallops) that acquire globally recorded Argos telemetry transmitted by the satellites, a new antenna, McMurdo in Antarctica, acquiring one half orbit of telemetry from METOP-A, had been operational since June 2011.

10.3.5 The Panel noted with appreciation that the real-time Argos antennas network was still growing. 60 regional antennas were operational in July 2011, including 15 antennas compatible with METOP-A AHRPT<sup>76</sup> telemetry. Ongoing improvements to the real-time antenna network were focused on redundancy of locations and coverage extension. In January 2010 the Tromsø Antenna had been removed from the network (no impact on the network performance) and eight new real-time antennas had been added (Resolute Bay, Edmonton, Moscow, Gander, Muscat, Manas, Al Udeid and Halley).

10.3.6 Improving Argos data timeliness continued to be a high priority for CLS, and 55 stations now had a mean dataset availability of < 25 minutes). After improving the situation in the Indian Ocean last year, CLS was now focusing on the South Atlantic Ocean, with two new stations since January 2010 (Halley and McMurdo). Thanks to the Argos real-time station upgrade project, two future new antennas provided by CLS and CNES (Ascension Island and Cape Town) and two existing stations upgraded (Davis and Rothera) will be installed, all to be capable of acquiring data from NOAA, METOP and SARAL satellites.

10.3.7 The Panel acknowledged that the two Argos global processing centres in Toulouse and Largo had been operating nominally since January 2010 with a 99.5% average system availability. The disaster recovery architecture at CNES Toulouse had been completed in 2010. As was normal every year, several software improvements had been implemented in 2010 and 2011 in order to address user requirements. The principal application improvements had addressed the implementation of the new Argos location processing method, access to Argos data via the Web service, and new functionalities and better performances for the Argos web site.

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73 CNES: French Space Agency

74 European Organization for the Exploitation of Meteorological Satellites

75 HRPT: High Resolution Picture Transmissions

76 AHRPT: Advanced High Resolution Picture Transmission

10.3.8 The Panel noted with interest that the third generation Argos system, Argos-3, was fully functional on METOP-A, and had been so since early 2007. In the context of the Argos-3 DBCP pilot project, with four manufacturers involved, 57 Argos-3 drifters had been deployed globally to date to further test Argos-3 capabilities.

10.3.9 Mr Woodward concluded by noting that CLS was providing the GTS processing for all DBCP drifters and moored buoys in compliance with WMO and DBCP TT-DM recommendations. The CLS GTS processing system was monitored 24/7 in real-time, as well as the quality of the data and the entire Argos system performance.

#### **10.4 Iridium operations and developments**

10.4.1 Under this agenda item, Mr David Meldrum reviewed the current status and future plans for the Iridium 2-way satellite communications system, which was finding increasing favour within some parts of the data buoy community for reasons of data timeliness, ease of implementation and cost.

10.4.2 The 66-satellite constellation remained complete, although the number of in-orbit spares continued to decrease slowly as they were moved into service at the rate of about one per year. Nonetheless, the constellation was in a healthier state than had been predicted some years previously, and was expected to remain fully operational beyond the commencement of the rollout of the replacement constellation in 2015.

10.4.3 This new constellation, called Iridium NEXT, was fully funded and under detailed design by prime contractors Thales. It was promised to be fully backwards compatible with the current constellation, although some transitional difficulties could be expected. NEXT would additionally offer higher bandwidth services, and the possibility to embark third-party payloads.

10.4.4 Iridium was also engaged with many partners in the development of new products and services, and had seen the recent successful rollout of its 128 kbps broadband product, OpenPort. This was increasingly being used by shipping companies to provide broadband services to their vessels in preference to Inmarsat and other VSAT<sup>77</sup> services. Of particular interest to the environmental observation community was the proposed new modem chipset, which would offer the potential to build highly integrated and miniaturised sensor/communication packages.

10.4.5 The Panel also noted that for many users the costs of operating Iridium platforms was apparently much less than for Argos counterparts. However, Iridium did not offer an equivalent of the Argos service, which included a number of value-added functions, including conversion of raw data to physical units, both real-time and delayed mode Quality Control (QC), GTS formatting and insertion, archiving, and open access to all parts of this chain by the JCOMMOPS TCs. As a result, many operators had created their own 'back-office' services and took care of their own GTS insertion using their existing infrastructure.

10.4.6 Some members of the Panel recalled that a similar situation had existed in the mid 1980s during the rollout of Argos drifter programmes. Whereas much of the GTS insertion at that time had been undertaken by the two main Argos processing centres, many regional HRPT stations also generated GTS bulletins, often of poor quality. As a result, drifter observations as a whole attracted a negative reputation. This had led directly to the creation of the DBCP and the appointment of its first TC in 1987. The solution had been to persuade regional HRPT antenna operators to feed their near-real-time data to the Argos processing centres, where they received a consistent level of processing in terms of data conversion, QC, formatting and GTS insertion. Additionally, and most importantly, the DBCP TC had access to all nodes of the processing chain

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<sup>77</sup> VSAT: *Very Small Aperture Terminal*

and was able to initiate prompt action in the event of a problem being noted with a particular platform or processing module.

10.4.7 In order to circumvent possible similar issues with the uncoordinated GTS insertion of Iridium data from a wide range of platforms, including ships and floats, the Panel had its previous session considered a proposal from Mr David Meldrum to establish an Iridium '1-Stop Shop' (1SS) that would be modelled closely on the current arrangements for Argos. Additionally it might generate income for JCOMMOPS through revenue-sharing with the eventual 1SS service provider.

10.4.8 While the Panel recognised the considerable value that could accrue from such a service, it noted that a number of difficulties potentially impeded its acceptance. From an operator point of view, many agencies had already established their own Iridium infrastructure. The costs of this were generally 'invisible' to platform operator, whereas a 1SS would be visibly more expensive. Additionally, and critically, there had been no major crises so far with Iridium data circulating on the GTS, which meant that there was little incentive to change the present arrangements. Furthermore, the 1SS service provider would face a very difficult business case, in that there would be large up-front costs to build service, with no guarantee of market buy-in, and little margin from Iridium air-time sales.

10.4.9 The Panel felt that it would in consequence be necessary to attract significant community buy-in as a precondition to proceeding to an Invitation to Tender (ITT) for 1SS services, and it urged Mr David Meldrum and CLS to develop a short position paper to address this issue and seek community approval (**action; David Meldrum and CLS; asap**).

10.4.10 The Panel, in thanking Mr Meldrum and CLS for their efforts in this regard, also noted a kind offer by CLS to develop a draft business case, based on various funding scenarios, using their knowledge of the likely costs (**action; CLS; mid 2012**).

10.4.11 In conclusion, the Panel asked that Mr Meldrum and CLS report back to the next Panel session, at which point the Panel would decide whether or not to proceed to an open ITT for an Iridium 1SS (**action; David Meldrum & CLS; DBCP-28**).

10.4.12 The Panel also noted that a successful outcome might in due course lead to similar arrangements in support of environmental monitoring using other satellite communication systems, and noted a joint WMO-IOC-FAO initiative to establish a satellite telecommunications forum to address this and other issues. It noted with approval that this initiative would be led by Mr Meldrum, and asked Mr Meldrum to keep them fully informed and involved with this activity (**action; David Meldrum; ongoing**).

## **10.5 Additional reports, as required**

10.5.1 The Panel noted the proposal from the ITP to establish a pilot project, possibly on near-field tsunametry or sensor technology development (e.g. to be installed on multi-purpose ocean platforms). The Panel requested the ITP to submit a proposal to the Executive Board, and instructed the Executive Board to act on behalf of the Panel in this regard, and seek guidance from Panel members if necessary (**action; ITP; asap**).

## **11 ORGANIZATIONAL ISSUES**

### **11.1 Recruitment of the new Technical Coordinator**

11.1.1 The Panel recalled the discussion at the previous DBCP Session regarding the recruitment of the new Technical Coordinator of the DBCP following the resignation of Ms Hester Viola in 2010. The Panel reviewed the subsequent actions undertaken by the Chairperson, the

Executive Board and the Secretariats to evaluate the candidates for the position and select the current incumbent.

11.1.2 After review of applications by the evaluation committee (comprised of representatives of UNESCO, IOC, WMO, and the DBCP) in line with UNESCO guidelines, including interviews of five top candidates, and after the various bureaucratic steps had been completed, Ms Kelly Stroker (USA) was finally made a formal offer of appointment on 23 March 2011, accepted the post on 8 April, and effectively started working for the Panel on 29 August 2011.

11.1.3 The Panel expressed its appreciation to IOC for efforts it had made on the Panel's behalf. It also noted that securing sufficient funds at the DBCP Trust Funds, particularly these within the IOC (approximately USD 200,000 / year), is critical to secure this position at IOC, and urged all Panel Members to continue their budgetary contribution to the Trust Fund in a timely manner (**action; Panel; continuous**).

11.1.4 As a regular process, the Panel reviewed the current Terms of Reference (ToR) of the Technical Coordinator, and the arrangements for overall supervision, guidance, training, evaluation and promotion, both now and in the future. This is further considered under the DBCP Operating Principles, under agenda item 12.2.

## 11.2 JCOMM activities, including JCOMMOPS

11.2.1 Mr Edgard Cabrera (WMO Secretariat) and Ms Candyce Clark (USA) reported briefly on activities under or associated with JCOMM that had taken place since DBCP-26, and were of direct interest to the Panel. Several meetings had taken place during the intersessional period, involving JCOMM panels and Programmes, as well as other relevant bodies. Of primary interest to the Panel, the following events were noted:

- (i) Eighth session of the JCOMM Management Committee, Paris, France, 16-19 November 2010. The Management Committee reviewed progress since JCOMM-III, and defined a clear pathway for the next 12 months to achieve these results. Continuing efforts within the Observations Programme Area (OPA) to implement the initial ocean observing system specified by the Global Climate Observing System (GCOS) and endorsed by the OceanObs'09 were noted. A new cross-cutting Team on Satellite Data Requirements was established to incorporate the existing Programme Area satellite rapporteurs. The Management Committee concurred with the process proposed by the JCOMM Pilot Project for WIGOS for the adoption of a WMO/IOC Regional Marine Instrument Centre (see item 11.5). A procedure for regular web reporting of the Commission's capacity building activities, to better publicise the breadth and depth of its achievements in this vital area, will be developed.
- (ii) Fourth Session of the JCOMM Observations Coordination Group (OCG), Hobart, Australia, 18-20 April 2011. OCG recognized its role in coordinating observing networks within the post-OceanObs'09 Framework for Ocean Observations. The OCG agreed on its work plan and priorities. Key outcomes of the Session included:
  - a) OCG stressed the role of the observing networks in engaging in a dialogue with the requirements-setting process, providing information on feasibility. See agenda item 11.4 for the Panel's discussion in this regard.
  - b) OCG asked relevant teams to continue providing feedback to GHRSSST on feasibility and cost of improved SST measurements from their platforms (SOT: radiometers on ships, underway SST; Argo, DBCP, OceanSITES: temperature profiles in upper 2 m). See agenda item 8.5 for the Panel's discussion in this regard.

- c) OCG agreed to take some action to improve linked understanding of satellite and *in situ* observing and coordination needs.
- d) OCG recognized a clear role for itself in advancing the feedback loop on requirements by feeding back information on cost and feasibility, and in engaging in pilot projects, exploring feasibility/cost and impact, where sponsorship could be identified.
- e) OCG chair and the secretariat would work with each observing network to clarify their overall system goal metric(s) and any metrics of network efficiency, intensity of yearly effort, data timeliness and quality that should be reported for high-level systems overviews.
- f) OCG recommended continued efforts on sensor development for Argo, surface drifters, moorings (focus on ocean carbon system).
- g) OCG recommended to maintain a dialogue between the DBCP and other interested teams in OCG regarding the tender process for telecommunications.
- h) OCG endorsed the legacy recommendations of the JCOMM Pilot Project for WIGOS and invited OPA panels and associated programmes to address them as appropriate. OPA panels and associated programmes were invited to compile and document their instrument practices and make recommendations whether they should be promoted through specific guides, JCOMM TRs, or WMO & IOC Publications. See agenda item 11.5 for the Panel's discussion in this regard.
- i) On the ship coordinator proposal from JCOMMOPS, the OCG was generally supportive of the idea as a pilot, but encouraged further refinement in the terms of reference with the panels, to increase possibility for success. OCG members emphasized that the coordinator has first priority to serve the individual networks, before working on cross-platform actions, but that they believed integration would bring benefits. OCG encouraged all panels to consider working through JCOMMOPS for technical coordination. See the JCOMMOPS section below for the Panel's discussion in this regard.
- j) Second DBCP Africa/Western Indian Ocean Capacity Building Workshop, Mauritius, 2-7 May 2011. See agenda item 6.4 for the Panel's discussion in this regard.

#### *Rigs and Platform metadata*

11.2.2 The Panel recalled its recommendation at its previous Session that the DBCP eventually take over full responsibility for all types of Rigs and Platforms reporting meteorological and/or oceanographic measurements, and for all related aspects. The proposal had been discussed at the eight Session of the JCOMM Management Committee meeting (Paris, France, 16-19 November 2010) and agreed upon. It had been further accepted by the Ship Observations Team at its sixth Session (Hobart, Australia, April 2011). This recommendation would lead in particular to the DBCP proposing formats and procedures for managing rigs and platforms metadata. To reflect these decisions, the Panel agreed with the changes proposed in **Annex IX** for its Terms of Reference, and those of the Technical Coordinator. It requested the Secretariat to make that sure these were submitted to JCOMM-IV for endorsement (**action; Secretariat; end 2011**).

11.2.3 The Panel agreed that the TT-MB shall primarily be responsible for addressing the Rigs and Platforms issues, and coordinate its efforts with the SOT Task Team on Metadata for WMO Pub 47, and with the SOT Task Team on Instrument Standards.

## Codes

11.2.4 The Panel recalled that the WMO Commission for Basic Systems (CBS) had decided that migration to table driven codes shall be completed by the end of 2012. The Panel noted that the *BUFR Template for buoy data, including directional and non directional wave data*<sup>78</sup> was still undergoing validation.

11.2.5 Due to the TC position being vacant during most of the last intersessional period, and to the JCOMM Task Team on Table Driven Codes (TT-TDC) focusing on the XBT and VOS templates, there had been no progress regarding proposals to be made for updating the BUFR template for buoy data to take into account requirements for (i) Instrument/Platform metadata required in real-time, and (ii) Wave observations – e.g. wave property data, directional (or partial directional) and non-directional spectral wave data (by frequency, and wave number).

11.2.6 BUFR templates for XBTs, drifting buoys, VOS and buoys had been last updated by the JCOMM Task Team on Table Driven Codes (TT-TDC) in 2010. A new version of the BUFR Master Table for Oceanographic Data (Master Table 10) had been updated and brought into conformance with the present WMO and IOC rules. Testing continued on the BUFR templates – and inconsistencies had been found within the templates, including:

- (i) For VOS, element 0-01-044 should cover the actual ship's heading in degrees. The value (the direction towards which the bow of the ship points) is needed to calculate the true wind on a moving ship. The ship's heading is not *per se* the same as the ship's course over ground (element 0-01-012). Unfortunately, confusion exists in the reporting of both values.
- (ii) In the BUFR code manual and in the "marine template sequences" document, visibility (0-20-001) and the height of base of the cloud (0-20-013) appear to be physical values expressed in metres. However in the VOS template, these elements refer to tables formerly used in FM13: tables 4377 and 1600, respectively.

11.2.7 Other issues had been discovered, and the TT-TDC would conduct an extensive review of the BUFR templates in 2011 to resolve these issues.

11.2.8 The Panel also recalled that after the migration to Table Driven Codes, the moored buoys currently reporting on GTS in FM-13 SHIP format<sup>79</sup> would have to use an updated BUFR Template for buoy data or a new BUFR Template for Moored Buoy data, yet to be developed. These changes should include requirements expressed by the DBCP Task Team on Moored Buoys, as well as those of the OceanSITES. The Panel recommended to develop specific templates for specific platform types (e.g. using different templates for drifting buoys, wave buoys, and moored buoys).

11.2.9 The Panel requested the Technical Coordinator to work on these issues in close coordination with the chair of the JCOMM Task Team on Table Driven Codes (TT-TDC), Mr Bill Burnett (USA), the Chair of the DBCP Task Team on Moored Buoys, Mr Jon Turton (UK), the Chair of the JCOMM Expert Team on Wind Waves and Storm Surges (ETWS), Mr Val Swail (Canada), Panel Members as appropriate, and OceanSITES Science Team Co-chair, Dr Uwe Send (USA) (**action; TC; DBCP-28**).

11.2.10 The Panel recommended the development of a new BUFR Template for profiling and sub-surface and surface wave gliders, and requested the Task Team on Data Management (TT-DM) to work on this during the next intersessional period, and to liaise with the JCOMM Task Team

78: [http://www.wmo.int/pages/prog/www/WMOCodes/Ref\\_Templates/BUOY\\_wave.doc](http://www.wmo.int/pages/prog/www/WMOCodes/Ref_Templates/BUOY_wave.doc)

79 : FM-13 SHIP GTS format: Report of surface observation from a sea station

on Table Driven Codes (TT-TDC), with a view to circulating a draft version at DBCP-28 (**action; TT-DM; DBCP-28**).

11.2.11 The Panel invited its members to participate actively in the JCOMM Task Team on Table Driven Codes and to work more closely on the testing and use of BUFR templates for marine platforms (**action; Panel members; DBCP-28**).

*Integration of data management centres*

11.2.12 See item 10.2.

*Regional Marine Instrument Centres*

11.2.13 See item 11.5 for details, as well as outcome of the JCOMM Marine Instrumentation workshop for the Asia Pacific Region (Tianjin, China, 11-13 July 2011) in JCOMM MR No. 87<sup>80</sup>.

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

11.2.14 Mr Mathieu Belbéoch presented an update on the JCOMMOPS activities and challenges. The Panel took note of the progress in the development of the centre and on the fact that, already in a transition period, JCOMMOPS had been impacted by the lack of a DBCP Technical Coordinator for a full year.

11.2.15 The Panel noted that, following a request from the OCG, JCOMMOPS was preparing a "strategy paper" to clarify a number of items including budget, deliverables, performance and scenarios for its expansion with detailed and budgeted proposals. The paper would be circulated to the OCG, including the DBCP chair, targeting a final version for JCOMM-IV. This document would also be important in the renewal of the MoU with UNESCO (and its WMO partner) for the hosting of a Programme Office in France, according to the IOC guidelines on decentralized offices, and initiated by the IOC secretariat in 2011.

11.2.16 Following the arrival of the new DBCP Technical Coordinator (TC), the team would now compile a complete catalogue of products and services (web based, bulletins, statistics, etc.) that would be the core specifications for the production phase in 2012, and that would form the basis for JCOMMOPS performance evaluation and expansion. JCOMMOPS offered three levels of service, corresponding to the needs and means of the panels involved:

*Advanced* (e.g. for DBCP or Argo);

*Core* (for SOT and OceanSITES and potentially gliders), and

*Basic* for emerging programmes (e.g. Bio or coastal Argo, GO-SHIP, etc.).

Mr Belbéoch mentioned that the expansion of DBCP activities with recently adopted Action Groups (e.g. the ITP) would require additional resources for JCOMMOPS.

11.2.17 Mr Belbéoch presented the finalized proposal for a new *Ship Logistics Coordinator* at JCOMMOPS, and invited the Panel to actively consider participating in the funding for such a position given that (i) DBCP specific needs were now reflected in the terms of reference for the position, (ii) 75% of the position was already funded via an SOT agreed contribution, and income generated by JCOMMOPS services, and that (iii) the CLS CEO had accepted to run a pilot experiment with the setting up of a limited duration contract in 2012 dedicated to this activity. The Panel agreed to support the 2012 pilot experiment.

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80: [http://www.jcomm.info/index.php?option=com\\_oe&task=viewDocumentRecord&docID=7696](http://www.jcomm.info/index.php?option=com_oe&task=viewDocumentRecord&docID=7696)

11.2.18 Mr Belbéoch presented the proposed JCOMMOPS budget for 2011 and 2012. The Panel encouraged the SOT and OceanSITES to increase and sustain their contributions in order for these programmes to be properly supported. The TC mentioned that, after ten years of a fixed yearly budget for software/hardware, an increase would now be needed to take account of present costs. As budgeted at the DBCP-26, and at SOT-VI, the increment for Geographical Information System (GIS) licences (\$30k) was being met from the DBCP/SOT trust fund.

11.2.19 Finally, Mr Belbéoch thanked CLS for their faultless support of JCOMMOPS development, including their support for the new telecommunication systems being used by the global observing arrays.

11.2.20 The Panel noted the optimism of JCOMMOPS in serving the JCOMM/GOOS mission: with a team now nearly complete, successful experiments undertaken and the foundations of the infrastructure strengthened, a decade of enhanced integrated services was in sight.

11.2.21 Ms Kelly Stroker, the newly appointed DBCP Technical Coordinator, thanked the Panel for giving her this opportunity to work with the DBCP and OceanSITES. She was excited to be in the position and thanked everyone for their time and understanding as she mastered the tasks related to the post. She realized that there had been a long gap in support from the TC and was optimistic for a quick transition.

11.2.22 In concluding this agenda item, the Panel thanked Mr Belbéoch for his report and proactive actions to further develop JCOMMOPS during a difficult transitional period, and for promoting positive synergies between the different components of the global ocean observing system. The Panel also thanked him for welcoming and supporting the arrival of the new DBCP technical coordinator, and wished the JCOMMOPS team a fruitful future of cooperation.

### 11.3 Report on decisions of WMO and IOC governing bodies

#### 11.3.1 *Twenty-Sixth Session of the IOC General Assembly*

11.3.1.1 The IOC Secretariat representative reported on the outcome of the Twenty-Sixth session of the IOC General Assembly (Paris, France, 22 June – 5 July 2011)<sup>81</sup>. In particular, the Panel noted the following decisions of the IOC General Assembly and urged its members to take them into account when developing their activities in support of the Panel (**action; Panel members; ongoing**):

- (i) Recognition of the problem of vandalism on data buoys, and adoption of Resolution XXVI-6 - Data Buoy Vandalism: Incidence, Impact and Responses.
- (ii) The need to free up and streamline the timely exchange of data, to identify gaps in the existing observation, processing and dissemination networks, and to undertake routine performance assessments regarding Early Warning and Mitigation Systems for Tsunamis and Other Sea-Level-Related Hazards. The Assembly adopted Resolution XXVI-7 - Global Coordination of Early Warning and Mitigation Systems for Tsunamis and Other Sea-Level-Related Hazards.
- (iii) Strengthening and Streamlining GOOS through Resolution XXVI-8. This will effectively replace the Intergovernmental Committee for GOOS (I-GOOS), the GOOS Scientific Steering Committee and subsidiary bodies by a single GOOS Steering Committee from 1 January 2012.
- (iv) Through Resolution XXVI-9 – Designation of IOC-WMO Regional Marine Instrument Centres, the Assembly approved the designation process for IOC-WMO Regional Marine Instrument Centres (RMICs), and established two RMICs in Tianjin, China, and Mississippi, USA.

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81: [http://www.jcomm.info/index.php?option=com\\_oe&task=viewEventRecord&eventID=523](http://www.jcomm.info/index.php?option=com_oe&task=viewEventRecord&eventID=523)



### 11.3.2 Sixteenth WMO Congress

11.3.2.1 The WMO Secretariat representative reported on the outcome of the sixteenth Session of the WMO Congress (Cg-XVI, Geneva, Switzerland, 16 May - 3 June 2011)<sup>82</sup>. In particular, the Panel noted the following decisions and urged its members to take them into account when developing their activities in support of the Panel (**action; Panel members; ongoing**):

- (i) Support to ongoing JCOMM priority activities. See agenda item 11.2 for the Panel's discussion in this regard.
- (ii) The need to address the requirements of the Global Framework for Climate Services (GFCS).
- (iii) The need to develop Capacities of Members through the JCOMM Partnership for New GEOS Applications Concept (PANGEA). See agenda item 6.4 for the Panel's discussion in this regard.
- (iv) Implementation of WIGOS during the next financial period (2012-2015). See agenda item 11.5 for the Panel's discussion in this regard.
- (v) The need to develop the new Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP), taking into account the Vision for the GOS in 2025, WIGOS and GFCS, to guide Members in the implementation of their national observational programmes. See agenda item 11.4 for the Panel's discussion in this regard.
- (vi) The development of WMO Polar Activities, including the development of the Global Cryosphere Watch (GCW), the establishment of the new Antarctic Observing Network (AntON), and the new Global Integrated Polar Prediction System (GIPPS), as well as the support to the International Polar Decade (IPD) Initiative.
- (vii) Support to the establishment of an international forum of users of satellite data telecommunication systems. This issue is further discussed under agenda item 11.5 (WIGOS).
- (viii) Concerns expressed about data buoy vandalism, and adoption of Resolution 25 (Cg-XVI). See agenda item 9.4 for the Panel's discussion in this regard.

11.3.2.2 The Panel agreed that it should continue to be involved in Capacity Building activities, including through the regular organization of PANGEA workshops, while noting that the success of such workshops was heavily dependent on voluntary contributions from developed countries through the WMO Voluntary Cooperation Programme (VCP).

11.3.2.3 The Panel noted the Cg-XVI request to the WMO Secretary-General to facilitate a systematic survey of marine meteorological and oceanographic observations. This would assess the strength and weaknesses of Member countries and thus allow interested Members to provide targeted assistance to those in need. The Panel agreed that JCOMMOPS could contribute to this exercise and requested the Technical Coordinator to investigate how this could be realized with a view to making a proposal at the next Panel Session (**action; TC DBCP; DBCP-28**).

11.3.2.4 The Panel agreed that it should continue to contribute to the development of WIGOS by providing assistance, as required, on (i) instrument standards and practices issues, (ii) data and instrument/platform metadata exchange, and (iii) quality management issues.

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82: [http://www.wmo.int/pages/mediacentre/press\\_releases/pr\\_920\\_en.html](http://www.wmo.int/pages/mediacentre/press_releases/pr_920_en.html)

## 11.4 User requirements

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

11.4.1.1 Mr David Meldrum (IOC Secretariat) provided a report on behalf of the Ocean Observation Panel for Climate (OOPC). The Ocean Observations Panel for Climate (OOPC) was a scientific expert advisory group, charged with making recommendations for a sustained global ocean observing system for climate in support of the goals of its sponsors, the Global Climate Observing System (GCOS), the Global Ocean Observing System (GOOS), and the World Climate Research Programme (WCRP). It also reported to JCOMM on requirements, given that JCOMM groups including the Data Buoy Cooperation Panel (DBCP) coordinated a number of the *in situ* networks of the global module of GOOS and the ocean component of GCOS. The OOPC thanked the members of the DBCP and those contributing to DBCP networks as implementers. The global ocean observing system, though incomplete in important respects, was providing essential information to users.

11.4.1.2 The OOPC had written its latest recommendations on ocean observations for climate in the GCOS 2010 Implementation Plan<sup>83</sup>. These reflected a mild evolution of previous recommendations, expanding the number of Essential Climate Variables for the ocean and emphasizing integration. Of note for the DBCP were the following requested actions:

- (i) [Action O5] Complete and maintain a globally-distributed network of 30-40 surface moorings as part of the OceanSITES Reference Mooring Network.
- (ii) [Action O7] Continue the provision of best possible SST fields based on a continuous coverage-mix of polar orbiting IR and geostationary IR measurements, combined with passive microwave coverage, and appropriate linkage with the comprehensive *in situ* networks noted in O8.
- (iii) [Action O8] Sustain global coverage of the drifting buoy array (total array of 1250 drifting buoys equipped with ocean temperature sensors), obtain global coverage of atmospheric pressure sensors on the drifting buoys, and obtain improved ocean temperature from an enhanced VOS effort.
- (iv) [Action O11] Implement a programme to observe sea-surface salinity to include Argo profiling floats, surface drifting buoys, Ship-Of-Opportunity Programme (SOOP) ships, tropical moorings, reference moorings, and research ships. Performance indicator: data availability at International Data Centres.
- (v) [Action O16] Implement a wave measurement component as part of the Surface Reference Mooring Network.
- (vi) [Action O17] Establish an international group to assemble surface drifting buoy motion data, ship drift current estimates, current estimates based on wind stress and surface topography fields; prepare an integrated analysis of the surface current field.
- (vii) [Action O18] Plan, establish and sustain systematic *in situ* observations from sea-ice buoys, visual surveys (SOOP and Aircraft), and ULS in the Arctic and Antarctic.
- (viii) [Action O27] Complete implementation of the current Tropical Moored Buoy, a total network of about 120 moorings.
- (ix) [Action O29] Work with research programmes to develop autonomous capability for biogeochemical and ecological variables, for deployment on OceanSITES and in other pilot project reference sites.
- (x) [Action O32] Develop and implement comprehensive ocean data management procedures, building on the experience of the JCOMM Pilot Project for WIGOS.
- (xi) [Action O33] Undertake a project to develop an international standard for ocean metadata.

83: Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC (2010 update), GCOS-138, GOOS-184, <http://www.wmo.int/pages/prog/gcos/Publications/gcos-138.pdf>

- (xii) [Action O37] Develop enhanced and more cost-effective telecommunication capabilities, including two-way communications for dynamic control of systems, instruments and sensors.
- (xiii) [Action O41] Promote and facilitate research and development (new improved technologies in particular), in support of the global ocean observing system for climate.

11.4.1.3 At its 14th session (19-22 January 2010, NOAA/AOML, Miami FL, USA), the OOPC commended the high level of effort in the XBT and Argo communities in examining error budgets for ocean temperature profiles. It decided that in 2011 it would devote its meeting to a workshop on a Deep Ocean Observing Strategy, but that in 2012 it would revisit Ocean Thermal observation requirements. The planned workshop would try to reconcile ocean heat content, sea level, and energy imbalances, and would have a focus on the error budget and sampling requirements.

11.4.1.4 The Panel took note of the points from the OOPC above, and addressed them with specific recommendations and actions during the agenda items focused on each Panel.

#### **11.4.2 WMO Rolling Review of Requirements update**

11.4.2.1 The Panel discussed the WMO Rolling Review of Requirements (RRR) and how non-climate requirements might be addressed. In particular, taking into account the respective Statements of Guidance, the Panel reviewed variables of interest to JCOMM that were not adequately measured *in situ* at present, or variables which are not properly being addressed within the existing JCOMM OPA workplan through the climate requirements, for the following application areas:

- (i) Seasonal to Inter-annual Forecasts,
- (ii) Ocean Applications,
- (iii) Global Numerical Weather Prediction,
- (iv) High Resolution Numerical Weather Prediction,
- (v) Synoptic Meteorology.

11.4.2.2 The Panel agreed that the DBCP could respond to those requirements for the following variables and in the following way:

- (i) Continue to evaluate the quality of wave observations, and the development of cost-effective wave observations from drifters through the PP-WET and PP-WMD Pilot Projects;
- (ii) Invite Panel members to make precipitation measurements from moored buoys, including coastal moorings, tropical moorings, and OceanSITES;
- (iii) Urge Panel members to install barometers on all newly deployed drifters;
- (iv) Encourage the completion of the RAMA array of tropical moored buoys in the Indian Ocean.

11.4.2.3 The Panel noted that good progress had been made in developing the new version of the Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP), responding to the Vision of the GOS in 2025, WIGOS needs, and GFCS requirements, with excellent engagement from some application areas. The CBS Expert Team on the Evolution of Global Observing Systems (ET-EGOS) would ensure that all application areas with requirements for observations engaged fully with the process of contributing to and reviewing drafts of the new EGOS-IP before next ET-EGOS meeting in 2012, in order to ensure that actions related to filling key gaps in observations for their areas were adequately captured. The ET-EGOS had adopted an action plan so that the new EGOS-IP could be submitted to CBS-XV (2012) for consideration and to EC-LXV (2013) for approval. The EGOS-IP would be a key document in providing Members with clear and focused guidelines and recommended actions in order to stimulate cost-effective

evolution of the observing systems to address in an integrated way the requirements of WMO programmes and co-sponsored programmes

11.4.2.4 The Panel noted with appreciation that the DBCP Chair, Mr Al Wallace (Canada) had reviewed the first draft version of the EGOS-IP, provided comments, and suggested changes. The Panel noted the key gaps, and actions proposed by JCOMM to better address the requirements of Ocean Applications (see Appendix A of DBCP-27 doc. 11.4). The Panel agreed that these should be included in the next version of the draft EGOS-IP.

## 11.5 WMO Integrated Global Observing Systems (WIGOS)

11.5.1 The Secretariat reported on recent developments with regard to the WMO Integrated Global Observing System (WIGOS), in particular decisions of the WMO Sixteenth Congress with regard to WIGOS Implementation during the next financial period (2012-2015), referring to Resolution 50 (Cg-XVI) – Implementation of WIGOS.

11.5.2 Cg-XVI reaffirmed its support for JCOMM's project-oriented approach to address specific, defined, and time-bound activities, such as the JCOMM Pilot Project for WIGOS that had been successfully completed in 2011. WMO Congress had appreciated the excellent cooperation developed between CIMO and JCOMM in the development of the JCOMM Pilot Project for WIGOS through the participation of CIMO in the Joint WMO-IOC Steering Group for the IOC Ocean Data Portal (ODP) and the JCOMM Pilot Project for WIGOS. This effort had resulted in the proposal for the establishment of a network of WMO-IOC Regional Marine Instrument Centres (RMICs), agreed through Recommendation 1 (JCOMM-III). Congress had adopted Resolution 9 – Designation of Regional Marine Instrument Centres.

11.5.3 The Panel discussed the role of the DBCP with regard to the integration of marine meteorological and other appropriate oceanographic observations into WIGOS. In particular, the Panel reviewed the outcome and legacy recommendations<sup>84</sup> of the JCOMM Pilot Project for WIGOS and the role that the DBCP should play in this framework and the WIGOS Implementation Phase (2012-2015). The Panel agreed with the following:

- (i) Referring to legacy recommendation 2, the Panel noted that the work of the consultant (see DBCP-26 final report paragraph 11.5.3, and **Annex XIII**), Mr David Meldrum, to review WMO and IOC Publications regarding instrument practices related to buoy measurements had not started yet due to the change of position of Mr Meldrum and his recent recruitment by the IOC on a temporary basis. The Panel noted with appreciation that the “*Sea Surface Salinity Quality Control Processes for Potential Use on Data Buoy Observations*” had been reviewed and endorsed by the Task Teams on Instrument Best Practices and Drifter Technology Development, and on Data Management respectively, and published as DBCP Technical Document No. 42.
- (ii) Referring to legacy recommendation 3, the Panel recalled the discussion under agenda item 9.5, and invited its members to make sure that instrument/platform metadata related to buoy observations were properly collected and made available through the appropriate channels, paying particular attention to SST and Sea Surface Salinity (SSS) data (**action; Panel members; ongoing**).
- (iii) Referring to legacy recommendation 4, the Panel agreed to contribute to the development of JCOMM guidelines for marine instrument intercomparisons through the Pilot Project on Wave Measurement Evaluation and Testing (PP-WET), and the Task Team on Instrument Best Practices and Drifter Technology Development (TT-IBP), and

84 : See JCOMM Technical Report No. 48 (Project Report, JCOMM Pilot Project for WIGOS) for the list of Legacy Recommendations, and rationale – [http://www.jcomm.info/index.php?option=com\\_oe&task=viewDocumentRecord&docID=6698](http://www.jcomm.info/index.php?option=com_oe&task=viewDocumentRecord&docID=6698)

liaise with the JCOMM Observations Coordination Group (OCG) as appropriate (**action; TT-IBP; DBCP-28**);

- (iv) Referring to legacy recommendation 5, the Panel noted that through WMO Resolution 9 (Cg-XVI), and IOC Resolution XXVI-9, both WMO and IOC endorsed the process for the adoption of WMO-IOC Regional Marine Instrument Centres (RMICs) as documented in JCOMM Technical Report No. 53. They had also decided to establish RMICs for the WMO Regional Association IV and the Asia Pacific Region at the NOAA National Data Buoy Centre (NDBC, Bay St Louis, USA) and the SOA National Centre for Ocean Standards and Metrology (NCOSM, Tianjin, China) respectively. Both WMO and IOC recognized that the RMICs would help in improving adherence and traceability of ocean observations and associated metadata to a high standard for instruments and methods of observation on a regional basis. The Panel concurred that the network of RMICs would bring substantial benefits to Panel members, in particular for assuring traceability of buoy measurements to international standards, and recommended that RMICs be established in all regions. It further recommended that RMIC certificates be delivered officially to USA and China during JCOMM-IV (**action; Secretariat; JCOMM-IV**). The Panel also noted the successful outcome of the JCOMM Marine Instrumentation workshop for the Asia Pacific Region (Tianjin, China, 11-13 July 2011) organized and hosted by the NCOSM (see JCOMM MR No. 87<sup>80</sup>). The Panel noted with appreciation the plan to establish an RMIC in Morocco, including organization of a marine metrology workshop in 2012. The Panel thanked USA, China, and Morocco for their contributions in this regard, and encouraged DBCP members from these respective regions to use the RMIC facilities as appropriate, and participate in future workshops (**action; Members; ongoing**). The Panel noted with appreciation efforts by India to develop calibration facilities in its region of interest and to collaborate with the RMIC for the Asia Pacific Region in this regard.
- (v) Referring to legacy recommendation 6, the Panel invited the buoy manufacturers to participate in the HMEI (**action; manufacturers; asap**);
- (vi) Referring to legacy recommendation 9, the Panel invited its members to make sure that discovery metadata about buoy observational data-sets were properly compiled and made available through the Ocean Data Portal (ODP) and the WMO Information System (WIS) using the required ISO-19115 profiles (**action; Panel members; ongoing**).
- (vii) Referring to legacy recommendation 11, the Panel invited its members to comply with the WMO Quality Management Framework (QMF) and quality management principles (**action; Panel members; ongoing**);
- (viii) Referring to legacy recommendation 12, the Panel noted that Cg-XVI supported establishment of an International Forum of Users of Satellite Data Telecommunication Systems (Forum) covering a wide user base, and to address remote data communication requirements - including tariff negotiations as needed - for automatic environment observing systems coordinated through WMO and partner organizations such as IOC and FAO. Cg-XVI had requested the WMO Secretariat to approach the partner organizations, and coordinate with the Argos Joint Tariff Agreement (JTA) with a view to establishing such a Forum during the next intersessional period. Cg-XVI emphasized that such a forum should not only consider tariff negotiations but should take a very broad view of available technologies, options and prices as well as cooperative mechanisms through the Data Collection Platform (DCP) services of meteorological satellites.

In particular, there was concern during Cg-XVI that data from many Antarctic stations funded by research agencies were not available in real-time and, therefore, were not available to NWP systems. Cg-XVI noted that the high communication cost involved in using Iridium satellites was also a limiting factor. Cg-XVI requested the Executive Council, and the Secretary-General, in collaboration with the Commission for Basic Systems (CBS) and the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) to investigate possible ways to reduce such costs through an international forum of users of satellite data telecommunication systems. It was also recognized that the WMO Information System (WIS) would provide a suitable environment for collection and dissemination of data from research observing stations.

It should be noted that, once established the forum shall report to the executive bodies of the co-sponsor Organizations through mechanisms defined by each Organization. Regarding the WMO side of the governance, it was proposed to place the forum under the responsibility of the CBS who shall also coordinate closely on related issues with JCOMM. The forum would report to the WMO Executive Council through the CBS.

Draft Terms of Reference for the forum were proposed by the 12<sup>th</sup> Session of the CBS Management Group (CBS-MG-XII, Geneva, Switzerland, 13-16 July 2011). CBS-MG-XII requested the Secretariat to approach the partner Organizations (i.e. IOC, FAO) with a view to refining the draft terms of reference (see Appendix B of DBCP-27 doc. 11.5).

CBS-MG-XII reviewed and endorsed a proposed workplan leading in principle to the formal adoption of the forum in 2013 (Appendix C of DBCP-27 doc. 11.5). To realize this, the Secretariats of the co-sponsor Organizations would work together to set up an organizing committee, refine the draft terms of reference for the forum, and organize an *ad hoc* workshop in late 2012.

The Panel invited the satellite data telecommunication system operators used for the collection of buoy observations to participate in the international forum of users of satellite data telecommunication systems for environmental use once established (**action; satcom operators; DBCP-28**).

The Panel agreed to commit ad hoc resources from its Trust Fund in support of the forum's establishment and related workshops in 2012 and 2013.

- (ix) Referring to legacy recommendation 14, the Panel recalled the discussion under agenda item 6.4, and agreed to continue developing its Capacity Building activities as mean of realizing the JCOMM PANGAEA concept;

11.5.4 Mr Jon Turton (United Kingdom) informed the Panel that, as part of the FP7 funded Euro-Argo SIDERI (Strengthening the International Dimension of the Euro-Argo Research Infrastructure) project, there was a work package (to be led by the UK Met Office) to examine how Argo (and Euro-Argo) should interface with the WIGOS, particularly in terms of satisfying the recommendations from the JCOMM Pilot Project for WIGOS. The SIDERI project was due to start in early 2012, with a report on the work due in two years time (Sept 2013). This would involve the Met Office working closely with the WIGOS Project Office over the coming year or so.

## 11.6 Financial reports

11.6.1 The DBCP Financial Advisor, Mr Frank Grooters (the Netherlands) reported on the status of the DBCP accounts being managed by the joint Secretariat on behalf of the Panel. The Meeting noted with satisfaction the positive and secure cash balance of funds totaling USD 505,326 as of 31 December 2010, as shown in Appendix E, Table 1 of DBCP-27 Doc. 11.6.

11.6.2 As discussed and decided at the 23<sup>rd</sup> Session, new budget items such as Capacity Building, Collaborative Arrangement and New Technical Evaluation were introduced. In 2010, USD 47,867 (**Annex VIII**, Table 2) was charged to the Capacity Building line item, in particular for the DBCP CB Workshop (Cape Town, April 2010). Also USD 35,548 was charged to the New Technical Evaluation line item for the DBCP/Iridium Project for upgrade, activation and airtime.

11.6.3 The IOC Interim Statement for the period 1 January – 31 July 2011 is provided in **Annex VI**. It shows a positive balance of USD 124,087 as of 31 July 2011. During this period, no contribution was received yet from NOAA for the IOC accounts for DBCP.

11.6.4 The WMO Interim Statement for the period 1 January – 31 July 2011 is shown in **Annex VI**. It shows a positive balance of USD 505,366. USD 19,498 corresponding to expenditures for the DBCP Workshop in Mauritius was charged to the Capacity Building line item.

11.6.5 The IOC Interim Statement and the WMO Interim Statement are included in the Interim Statement of Accounts for the DBCP/SOOP Trust Fund, as given in **Annex VIII**. It should be noted that, in order to compare the current expenditure level with the budget, this Interim Statement shows the actual expenditure with the budgeted amounts as decided at DBCP-26.

11.6.6 The Summary of the Interim Accounts for 2011 of the DBCP/SOT Trust Fund, with no detailed budget lines, is given in **Annex VIII**, Table 1. The Panel noted the JTA budget managed within the DBCP Trust Fund (**Annex VIII**, Table 3), including the CLS contribution made on behalf of the JTA, and the expenditures for the JTA chairman, the JTA Executive Committee, and the Secretariat, and acknowledged that it did not impact the DBCP budget.

11.6.7 The Panel noted with appreciation the provisional table of contributions for 2012 as detailed in **Annex VII**. The Panel thanked contributing Panel members for their commitments.

11.6.8 The Panel recalled that expenditures from the DBCP/SOOP Trust Fund were largely in Euros. Recognizing that the exchange rate between the US dollar and the Euro is affecting more and more the DBCP budget in a negative way, the Panel urged the Members once more to consider contributing to the DBCP/SOOP Trust Fund in Euros (**recommendation**). The Panel noted with appreciation that several Panel Members had already been paying their contribution in Euros in the last two years.

11.6.9 The Panel urged its members to pay their contributions in a timely fashion (**recommendation**).

11.6.10 In view of the increase in DBCP activities, especially in Capacity Building and pilot projects, and considering the need to secure the position of the Technical Coordinator, the Panel invited its members not contributing to the Trust Fund to discuss nationally whether a contribution could be made in the future (**recommendation**). The Panel also invited members already contributing to the Trust Fund to investigate nationally whether their contribution could be increased (**recommendation**).

11.6.11 The Panel approved its budget for 2012 (maximal expenditures) as detailed in **Annex VIII**, Table 2. The Executive Board, authorized by the Panel, and taking into account the decisions and recommendations made at the twenty-seventh session of the DBCP, will set a plan for the 2012 actual expenditures. The Executive Board will liaise with Mr Frank Grooters for updating the interim financial report with the most accurate and actual information (**action; DBCP-EB; 31 Jan. 2012**).

11.6.12. The Panel requested the joint Secretariats and Mr Grooters to work together to distribute the final statement for the year 2011 to the Panel members as soon as the IOC and

WMO Final Statement of Accounts for the year 2011 are finalized (**action; Secretariat & F. Grooters; 1 Mar. 2012**).

11.6.13 The Panel again nominated Frank Grooters to act as its financial advisor according to the DBCP operating principles, and thanked Panel thanked Mr Grooters most warmly for his comprehensive financial report, and the Secretariat for providing timely and valuable financial information to Mr Grooters.

11.6.14 The Panel also noted that it would be required to demonstrate that it had sufficient funds at its disposal within the DBCP Trust Fund at the IOC to fully cover the annual employment and benefit costs of the new Technical Coordinator. It requested the WMO Secretariat, on request from the IOC and EB approval, to facilitate the transfer of sufficient funds from the DBCP Trust Fund at the WMO to the DBCP Trust Fund at the IOC if needed to permit covering all related expenses from the IOC (**action; WMO Secretariat; DBCP-28**).

## **12 REPORT AND RECOMMENDATIONS FROM THE EXECUTIVE BOARD SESSION**

### **12.0 Report from the Executive Board Session**

12.0.1 The DBCP Executive Board (EB) convened during the evening of 28 September 2011 to discuss a number of issues that had arisen during the plenary session and to make recommendations to the Panel for its consideration. The full report of the EB is attached as **Annex V**.

12.0.2 The Panel concurred with the Executive Board recommendations as detailed in **Annex V**, including on the proposed expenditures and budget for the next intersessional period, and agreed on the following:

- (i) Executive board Membership shall be unchanged, except that Mr Andy Sybrandy (Pacific Gyre, USA) was nominated to represent the manufacturers in the DBCP Executive Board as *ex officio* member;
- (ii) The new format of the DBCP Session (i.e. workshop on first day, side meetings on second day, main session the remaining of the week) had been very effective (good participation, stimulated discussion, savings on travel and DSA for many participants, etc.) and shall be continued, while leaving open the possibility to have specific side events during the week-end preceding the Session and adjusting the timing to permit longer discussions for some groups;
- (iii) Johan Stander was requested to prepare a standard template for the reporting of the vice-Chairs to Panel Session (**action; J. Stander; DBCP-28**);
- (iv) The Panel noted that the current yearly contributions to the DBCP Trust fund do not balance the regular yearly expenditures for supporting the Panel's activities. While there was a surplus in the Trust Fund to cover this yearly deficit for some time, the Panel agreed that it should target a balanced yearly budget, and seek new contributions to the Trust fund in order to preserve the core activities of the DBCP, including the Technical Coordinator's position, support to technology developments and Pilot Projects, and Capacity Building activities. The Panel therefore requested the Secretariat to write to a number of countries not currently contributing to the DBCP Trust Fund (e.g. Brazil, China, Republic of Korea, Japan, etc.) and seek their contribution (**action; Secretariat; DBCP-28**).



## 12.1 DBCP implementation strategy

12.1.1 As had become the custom at previous sessions, the Panel did not enter into discussion of its Implementation Strategy, but noted that the document was continuously updated by Chair and Secretariats, essentially to take into account the outcome and recommendations from the WMO Sixteenth Congress (Geneva, Switzerland, 16 May – 3 June 2011), and the IOC Twenty-Sixth Assembly (Paris, France, 22 June – 6 July 2011), and in particular the need to support the implementation of the Global Cryosphere Watch (GCW). The Chair asked the Panel to review the document at [http://www.jcommops.org/doc/DBCP/DBCP\\_Impl\\_Strategy.pdf](http://www.jcommops.org/doc/DBCP/DBCP_Impl_Strategy.pdf) and to forward any comments to the Chairperson by the end of November 2011 (**action; Members; Nov. 2011**). The Panel also requested the Technical Coordinator to provide an updated map for figure 2 in the document (**action; TC DBCP; Nov. 2011**).

## 12.2 DBCP Operating Principles

12.2.1 The Panel reviewed its operating principles and approved them. The new operating principles are attached as **Annex III**.

12.2.2 The Panel recalled the dynamic nature of the document and invited its members to provide the Chairperson with comments by the end of the year (**action; members; 31 Dec. 2011**).

## 12.3 Review of action items from the previous DBCP Session

12.3.1 The Secretariat presented the action plan from the twenty-sixth DBCP Session (Oban, UK, September 2010). The tables presented focused on actions and recommendations that were still underway. The plan also included some outstanding actions from previous Panel sessions. All key items had been discussed during the session. Completed actions were not included in the tables presented.

## 12.4 Workplans and priorities for the Panel and the Technical Coordinator

12.4.1 As in previous years, the Panel reviewed and updated the overall work plan for itself and the Technical Coordinator for the coming intersessional period. These work plans are given in **Annex XIII**. Noting that the Technical Coordinator's position had been partly vacant during most of the last intersessional period, the Panel invited the Chair, in liaison with the Executive Board and the Secretariat, to revise the list of prioritized tasks for the Technical Coordinator as agreed at the previous Session, and discuss execution details with Ms Kelly Stroker (**action; Chair; asap**). The Panel requested the Technical Coordinator to then undertake the tasks as proposed by the Chair and to report at the next Panel Session (**action; K. Stroker; asap**).

12.4.2 During the overall session, the Panel discussed and agreed on its priorities for the next intersessional period. These are reflected in the DBCP budget (**Annex VIII**) as well as in its workplan.

## 13 NATIONAL REPORTS

13.1 The National Reports Session was chaired by Mr Graeme Ball (Australia). The Panel received written reports on current and planned buoy programmes from Australia, Brazil, Canada, China, France, Germany, India, Ireland, Italy, Japan, New Zealand, Republic of Korea, South Africa, the United Kingdom, and the United States of America. As usual, these written reports, as well as others submitted to the Secretariat before 31 December 2011, would be published in the Panel's Annual Report (**action; Secretariat; Early-2012**). Oral presentations were made during the Session on national activities by the following countries: Australia, Brazil, Canada, China, India,

Italy, New Zealand, United Kingdom, and the USA. In addition, South Africa reported on Storm Surges activities.

13.2 The Panel invited its members who had not submitted National Reports to submit their input to the Secretariat before the end of the year (**action; members; 31 Dec. 2011**).

#### **14 ELECTION OF THE CHAIRPERSON AND VICE-CHAIRPERSON**

14.1 The Panel re-elected Mr Al Wallace (Canada) as its Chairperson, to serve for a third term until the end of the next Panel session.

14.2 The Panel re-elected Mr Jean Rolland (France), Mr Johan Stander (South Africa), and Dr R Venkatesan (India) to serve for a third, second, and second terms as Vice-chairpersons for Europe, the Southern Hemisphere, and Asia respectively until the end of the next Panel Session.

#### **15 ADOPTION OF THE SESSION REPORT**

15.1 The Panel reviewed and adopted the draft session report prepared by the Secretariat. The list of action items arising from this Session is provided in **Annex XIX**.

#### **16 DATES AND PLACE FOR THE NEXT SESSION**

16.1 The Panel recalled its agreement – reflected in the DBCP Operating Principles – at DBCP-23 to hold DBCP sessions either in Paris or Geneva every other year as of its twenty-fifth session. The Panel agreed to organize next year's Session in Perth, Australia, at the kind invitation of the Government of Australia. Tentative dates for the session were agreed to be scheduled provisionally from 24 to 28 September 2012, ensuring minimum duplication with schedules for events of other JCOMM and related programmes.

#### **17 CLOSURE OF THE SESSION**

17.1 In closing the session, the Chairperson Mr Al Wallace once again thanked the WMO Secretariat, and especially Dr Wenjian Zhang for the warmth of his welcome, and the excellent facilities, support and hospitality that had been provided for the meeting, all of which had contributed substantially to its success.

17.2 Mr Wallace also thanked the participants, the Technical Coordinator, the Executive Board, the Task Team Chairpersons, the Action Groups and the Secretariats for their active and positive contributions to the meeting and to the work of the Panel.

17.3 The twenty-seventh session of the Data Buoy Cooperation Panel closed at 1630 on Thursday, 30 September 2011.

**ANNEX I**

**AGENDA**

- 1 Opening and Welcome**
- 2 Scientific and Technical Workshop**
- 3 Opening of the Session**
  - 3.1 Adoption of the agenda
  - 3.2 Working arrangements
- 4 Reports by the Chairperson, Vice-Chairpersons, and the Executive Board**
- 5 Report by the Technical Coordinator**
- 6 Report by the Task Teams**
  - 6.1 Task Team on Data Management (TT-DM)
  - 6.2 Task Team on Instrument Best Practices and Drifter Technology Development (TT-IBP)
  - 6.3 Task Team on Moored Buoys (TT-MB)
  - 6.4 Task Team on Capacity-Building (TT-CB)
- 7 Reports by the Action Groups**
  - 7.1 Surface Marine programme of the Network of European Meteorological Services, EUMETNET (E-SURFMAR)
  - 7.2 Global Drifter Programme (GDP)
  - 7.3 International Arctic Buoy Programme (IABP)
  - 7.4 International Buoy Programme for the Indian Ocean (IBPIO)
  - 7.5 WCRP-SCAR International Programme for Antarctic Buoys (IPAB)
  - 7.6 International South Atlantic Buoy Programme (ISABP)
  - 7.7 DBCP-PICES North Pacific Data Buoy Advisory Panel (NPDBAP)
  - 7.8 OCEAN Sustained Interdisciplinary Timeseries Environment observation System (OceanSITES)
  - 7.9 Tropical Moored Buoys Implementation Panel (TIP)
  - 7.10 International Tsunameter Partnership (ITP)
- 8 Pilot Projects**
  - 8.1 Drifter Iridium Pilot Project
  - 8.2 Pilot Project for the evaluation of Argos-3 technology
  - 8.3 Pilot Project on Wave Measurement from Drifters (PP-WMD)
  - 8.4 DBCP/ETWS Pilot Project on Wave measurement Evaluation and Test from moored buoys (PP-WET)
  - 8.5 DBCP/GHRSST Pilot Project for High Resolution SST (PP-HRSST)
- 9 Issues for the Panel**
  - 9.1 Information Exchange
  - 9.2 Deployment opportunities and strategies
  - 9.3 GTS delays
  - 9.4 Vandalism

- 9.5 Metadata
- 9.6 Technological developments in support of user requirements
- 9.7 Other issues to be discussed, as proposed by the Task Teams

**10 Information Reports**

- 10.1 Argo
- 10.2 Buoy data management centres
- 10.3 Argos operations and developments
- 10.4 Iridium operations and developments
- 10.5 Additional reports, as required

**11 Organizational Issues**

- 11.1 Recruitment of the new Technical Coordinator
- 11.2 JCOMM activities, including JCOMMOPS
- 11.3 Report on decisions of WMO and IOC governing bodies
- 11.4 User requirements
- 11.5 WMO Integrated Global Observing Systems (WIGOS)
- 11.6 Financial reports

**12 Report and Recommendations from the Executive Session**

- 12.1 DBCP implementation strategy
- 12.2 DBCP Operating Principles
- 12.3 Review of action items from the previous DBCP Session
- 12.4 Workplans and priority for the Panel and the Technical Coordinator

**13 National Reports**

**14 Election of the Chairperson and Vice-Chairperson**

**15 Adoption of the Session Report**

**16 Dates and Place for the Next Session**

**17 Closure of the Session**

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## ANNEX III

### OPERATING PRINCIPLES OF THE DATA BUOY CO-OPERATION PANEL (DBCP) *(as adopted by DBCP-XXVII)*

#### 1. INTRODUCTION

1.1 The Data Buoy Co-operation Panel (DBCP) is a subsidiary body of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM). The World Meteorological Organization (WMO) and Intergovernmental Oceanographic Commission of UNESCO (IOC) jointly sponsor the JCOMM, in order to undertake international / intergovernmental coordination of marine observational networks for which both organizations are mandated.

1.2 The DBCP was established in 1985 by WMO Resolution 10 (EC-XXXVII) and IOC Resolution EC-XIX.7. In 1993, the governing bodies of IOC and WMO agreed to change the name of the Panel to the Data Buoy Co-operation Panel (DBCP) with extended terms of reference, so that the Panel may provide international coordination required for both drifters and moored buoy programmes, which support major WMO and IOC programmes (IOC Resolution XVII-6 and WMO Resolution 9 (EC-XLV)). As the JCOMM was established in 1999, the Panel became a part of the JCOMM Observations Programme Area (Resolution 4 (EC-LII)). The Terms of Reference of the DBCP are reproduced in [Appendix I](#).

1.3 The DBCP addresses the requirements and needs for real-time or archival data from buoys, both drifting and moored, coordinates buoy deployments worldwide, maintenance and collection of data from instrumented oceanographic and meteorological drifting buoys and moored buoys on the high seas. The Panel provides a forum for the exchange of technical and related information on buoy technology, communications systems and the applications of buoy data, to both operations and research.

1.4 The Panel coordinates its activities with related regional and global programmes of WMO and IOC, such as the World Weather Watch (WWW), the Global Ocean Observing Systems (GOOS) and the ICSU / WMO / IOC / UNEP Global Climate Observing System (GCOS) and the ICSU / WMO / IOC World Climate Research Programme (WCRP), and serve their needs for the data buoy technology and the implementation of data buoy networks.

1.5 The Panel adheres to a data policy approved by itself at DBCP Sessions. The DBCP Data Policy is reproduced in [Appendix IX](#).

#### 2. PANEL MEMBERS AND PARTICIPANTS

2.1 The Terms of Reference for the DBCP are decided by the WMO and IOC Executive Bodies through proposition by JCOMM; the Panel is reporting to JCOMM and serves the needs of WMO and IOC Programmes. In this context, WMO and IOC Members / Member States designate National Focal Points for buoy programmes who become full Panel members. This is done by means of a letter from the Permanent Representative of a country with WMO to the WMO Secretary-General or by the IOC Action Addressee to the Executive Secretary of IOC. The lists of National Focal Points for buoy programmes are maintained by the WMO and IOC Secretariats, and published on the JCOMM website.

2.2 Participants in the DBCP activities can be operational agencies, meteorological and oceanographic institutes, research agencies, data centres, governmental and non-governmental

organizations, and commercial services interested in the global oceans who actively contribute to the aims of the Panel. Individuals with an interest in data buoy activities are also welcome to attend as observers.

### **3. KEY DBCP PERSONNEL, THE EXECUTIVE BOARD AND TECHNICAL CO-ORDINATOR**

3.1 The Panel elects a Chairperson and Vice-chairpersons at the end of its regular sessions with geographical representation from: (i) Asia; (ii) Europe; (iii) North America; and (iv) the Southern Hemisphere. Elections will be decided by a simple majority if a quorum of Panel members is present. A quorum will consist of six Panel members. If a quorum is not present at the regular meeting, elections will be by unanimous vote.

3.2 The elected Chairperson leads the DBCP during the next intersessional period within principles and financial limits defined by the Panel, and Chairpersons the next Panel Session. The Chairperson is supported by the WMO-IOC Joint Secretariat and the DBCP Executive Board, which is responsible for the day-to-day management of the Programme within the guidelines set at the regular meeting of Panel members. The Terms of Reference of the Executive Board are provided in [Appendix IV](#) to this document.

3.3 The Panel recruits a full-time Technical Co-ordinator whose position is fully financed by voluntary contributions from Panel members or other contributors. The Technical Co-ordinator acts as the focal point for the Programme and carries out the directives of the Panel, as appropriate, during the intersessional period. Upon the Panel's decision, the Technical Co-ordinator works for other related programmes to assist their implementation. Tasks and duties of the Technical Co-ordinator are detailed under section 11 of this document, and the Terms of Reference of the Technical Co-ordinator are given in [Appendix II](#).

3.4 By the decision at the 24th session, the Technical Co-ordinator works a third of his/her time on the OceanSITES Project Office support.

3.5 The Technical Co-ordinator would be requested to inform the Chairperson and the Secretariat of his / her wish, or otherwise, to continue to work as Technical Co-ordinator 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/her as Technical Co-ordinator, subject to the availability of funds, and subject to his / her specific contract limitations with his / her relay employer.

3.6 In case the Technical Co-ordinator wished to quit the position, he/she would be required to inform the Panel as soon as possible, and in any case preferably six months in advance, to assist in the recruitment and training of his / her successor, in order to ensure as full continuity as possible in the work of the Panel's Technical Co-ordinator.

3.7 The current contact details for key DBCP personnel are listed in [Appendix X](#).

### **4. TASK TEAMS**

4.1 Task Teams can be established to work proactively on key issues identified by the Panel, in order to ensure that the Workplan is duly implemented during the intersessional period. The Chairperson(s) of (a) Task Team(s) is / are appointed by the Panel. The Team(s) will report to the Panel on their activities at its regular sessions. The Terms of Reference and Membership of the current Task Teams are provided in [Appendix V](#).

4.2 From time to time, the Panel may decide to establish and fund Pilot Projects of limited duration to evaluate new technologies or procedures that might enhance its capabilities.

## **5. ACTION GROUPS**

5.1 The implementation of buoy deployments is coordinated at the regional level through global, regional, or specialized Action Groups. The definition of an Action Group is given in [Appendix III](#).

## **6. IMPLEMENTATION STRATEGY**

6.1 The Panel defines its Implementation Strategy and review it at its regular meetings. The Implementation Strategy is defined in such a way that it is consistent with the WMO and IOC Strategic plans.

## **7. WORKPLAN**

7.1 The Panel established and reviews the overall Workplan for itself and the Technical Co-ordinator at its regular sessions, for the coming intersessional period.

7.2 The DBCP Chairperson and the Executive Board may update the Technical Co-ordinator's Workplan during the intersessional period, as appropriate, and report on such changes at the next Panel Session.

## **8. FUNDING**

8.1 The DBCP is self-sustaining, by contributions of equipment, services (such as communications, deployment, archiving, and scientific or technical advice), and coordination. The contributions include monetary contribution to secure employment and activities of the Technical Co-ordinator, through IOC and WMO.

8.2 Monetary contributions - on a voluntary basis - are made by Panel members to the DBCP Trust Fund at WMO and/or IOC, as appropriate. The Terms of Reference of the DBCP Trust Fund at WMO are given in [Appendix VII](#). The Trust Fund at IOC follows the Financial Regulations of the IOC Special Account that are reproduced in [Appendix VIII](#) (Decisions in 157<sup>th</sup> Executive Board of UNESCO). The IOC Regulations follow the General rules and regulations of UNESCO on Trust Funds, which correspond to those of WMO, in principle.

8.3 The Panel can establish budget lines to implement the DBCP activities, based on its agreed Workplan. The current DBCP budget line items are provided in [Appendix VI](#).

8.4 Through the present arrangement, the Technical Co-ordinator is recruited by IOC, and the employment and activities of the Technical Co-ordinator depend on the DBCP Trust Fund in IOC and in WMO - the salary and logistical support are paid within the DBCP Trust Fund in IOC, whereas the expenses incurred for the TC's activities are executed within the DBCP Trust Fund in WMO.

8.5 Timely contribution from Panel members is critical to secure the TC employment contract, considering the yearly cycle of the administration within WMO and IOC. Panel members are encouraged to ensure that their contributions are made in good time.

8.6 The logistics for the DBCP Technical Co-ordinator are currently provided by the CLS (France), of which the terms and cost are defined by a MOU between the IOC and CLS on the logistic support for JCOMMOPS – where the Technical Co-ordinator belongs to. The annual cost is paid to the CLS from the DBCP Trust Fund in IOC. All actual expenses incurred by the host for the logistic support of JCOMMOPS, in excess of the amount of the contract signed with IOC to that effect, is considered as a contribution by the host to the work of the Panel.

8.7 The WMO and IOC Secretariats provide finalized financial statements of account on an annual basis to the Panel in early Year+1 as soon as the organizations' fiscal year accounting is

finalized. The Panel also reviews its financial situation at regular Panel sessions, with interim statements of the budget provided by the WMO and IOC Secretariats.

8.8 The Panel may appoint a Panel Member as finance advisor to act on its behalf of and to work with the WMO-IOC Joint Secretariat to produce a consistent, comprehensive and comprehensible set of annualized accounting reports to be presented to the Panel and its Executive Board at their regular meetings (see [Appendix X](#) for currently appointed person).

## **9. ORGANIZATION AND CONDUCT OF THE DBCP SESSIONS**

9.1 In odd years, the regular session of the DBCP will be held at either the WMO or IOC Headquarters, based on the agreement and decision by the Panel and the WMO-IOC Joint Secretariat, in order to lessen travel duties of the Secretariats and to provide opportunities for extended participation of other WMO or IOC officers in the session for wide range of information exchange and cooperation.

9.2 In even years, the regular session of the DBCP will be held at an external location, upon a suitable offer for hosting sessions. This is to advocate and support the Panel's activities in regional and national levels, and to encourage regional / national staff at all levels to actively participate in the work of the Panel, in particular through presentations to the Scientific and Technical Workshop and other networking opportunities.

9.3 The agenda and timetable of the regular session will be drawn up by the Panel Chairperson, in consultation with the Executive Board, other Panel members and the Joint WMO-IOC Secretariat. In principle, the Panel discussion at the regular session is to be completed within 3 days. In order to ensure efficiency of the session as well as the comprehensive review and exchange of information, some parallel or side sessions and focused discussion may be introduced, as required. The Panel will strive to reach decisions by consensus only; no voting should in principle take place. All decisions and relevant discussion will be recorded in the session report, which will be approved by the Panel before it disperses.

## **10. INFORMATION EXCHANGE AND REPORTING**

10.1 The Technical Co-ordinator maintains a website on behalf of the Panel. The URL for the website is: <http://dbcp.icommops.org/>.

10.2 The Technical Co-ordinator also maintains mailing lists for the Panel. The names of the mailing lists, their objectives, and membership are detailed on the DBCP website.

10.3 The Panel may produce and update the DBCP brochure. The contents, means of publication and distribution, and funding mechanisms for related activities are to be agreed by the Panel at its regular sessions.

10.4 The Panel members who represent DBCP at various events are to use a standard Powerpoint presentation template. The template is developed and maintained by the Technical Co-ordinator, and available from the DBCP website.

10.5 The Technical Co-ordinator also maintains a document describing the Panel's achievements since its establishment.

10.6 The Panel maintains series of DBCP Technical Publications that are issued by the WMO Secretariat. These publications can be with the form of paper copy, CD-ROM, DVD-ROM, or be web-based only. The list of current DBCP Publications is available at the DBCP website. The actual costs of editing, publishing, and distributing the DBCP Publications are being recuperated from the DBCP Trust Fund.

10.7 At its regular sessions, the Panel receives reports on activities during the intersessional period, from:

- the Executive Board;
- the Technical Co-ordinator;
- the Action Groups (annual basis), and
- the Member Countries (annual).

The annual reports by Action Groups and the Member Countries are also to be included in the DBCP Annual Report.

10.8 The Panel's regular session report and Annual Report will be consolidated into a single mailing, structured as follows:

- a. A 2-page covering letter containing important information for decision makers, including:
  - Executive summary of the Panel's achievements, activities and aspirations for the current year; and
  - Table of national contributions.
- b. A slimmed-down paper hard copy report containing information that needs to be referenced (and possibly annotated) rather frequently and quickly. This would essentially replace the existing session final report. The material in this report would include the following:
  - Executive summary of the Panel's achievements, activities and aspirations for the current year;
  - The final report of the regular session (i.e., the usual final report without the annexes);
  - Agenda;
  - List of participants;
  - Operating Principles of the Panel (this document, as updated and agreed at the annual session);
  - Summaries of the Action Group reports;
  - Executive Board report;
  - Finalised annual financial accounts, including the table of national contributions and budget for the following year;
  - If necessary, selected buoy and GTS statistics (showing trends in numbers, quality, delays, plus a few maps);
  - List of Actions and Workplan, and;
  - List of Acronyms.
- c. A CD-ROM containing the entire above, plus a complete set of meetings, and all other annexes generally attached to the two reports includes:
  - A full report by the Technical Co-ordinator;
  - National reports;
  - Full reports by the Action Groups;
  - Data Management Centre reports;
  - The current status and development of satellite communications (CLS/Argos, Iridium, etc);
  - GTS report;
  - National Focal Point list;
  - Contracts;
  - Other financial and administrative papers; and
  - Technical Document list, including available electronic versions.
- d. All of the above information will be available on-line via the JCOMMOPS website.



10.9 During the intersessional period, the Technical Co-ordinator provides for synthetic quarterly reports on his/her activities and the status of his/her Workplan's implementation to the DBCP Executive Board.

10.10 The Technical Co-ordinator produces monthly maps and statistical graphics on a monthly basis regarding the status of buoy programmes. This information is posted on the DBCP website and issued through the appropriate mailing lists.

10.11 Written reports to the Panel session will adhere to a format that will make clear to the Panel, by means of an Executive Summary, those issues that require discussion and decision. Similarly, presentations to the session will presume that written reports have been read by the Panel, and will concentrate solely on those issues, which require an action or decision by the Panel. Report presenters will submit a summary of their report and the ensuing discussion and actions to the secretariat for inclusion in the draft final report of the session.

## **11. ROUTINE TASKS OF THE TECHNICAL CO-ORDINATOR**

The following routine tasks of the Technical Co-ordinator (TC) comply with his/her Terms of Reference ([Appendix II](#)).

11.1 The Technical Co-ordinator acts as a clearing house for information on all aspects of buoy data use; he/she maintains DBCP and JCOMMOPS websites as appropriate.

11.2 The Technical Co-ordinator monitors the status of the global drifting and moored buoy networks in terms of: (i) spatial density; (ii) accuracy of the measurements; (iii) real-time data distribution and data timeliness; and (iv) buoy lifetime. The TC identifies gaps in the system, and makes recommendations to the Panel as appropriate. He/she also regularly provides information on instrument performances to the WMO Database as part of the CBS Rolling Review of Requirements (RRR).

11.3 Through direct contacts with programme managers, Principal Investigators, and buoy operators, the Technical Co-ordinator advertises the DBCP Programme, encourage use of buoy data, and active participation of new participants. The TC regularly contacts buoy programme managers of existing and new programmes in order to: (i) invite them, and possibly convince them, if useful, to authorise GTS distribution of their buoy data; (ii) offer technical assistance for that purpose if needed; (iii) collect information on buoy programmes, and the deployed buoys, including metadata; and (iv) collect information in buoy deployment opportunities for use by other buoy operators. Programme Managers may also directly contact the Technical Co-ordinator for receiving assistance with regard to the GTS distribution of their buoy data.

11.4 The Technical Co-ordinator provides information and assists as appropriate buoy data users for accessing data and platform/instrument metadata.

11.5 The Technical Co-ordinator also participates actively in buoy quality monitoring as defined in the DBCP Quality Control Guidelines (details on the DBCP website<sup>1</sup>). In particular, The TC monitors the dedicated mailing list, and information posted on the dedicated web page, reviews the buoy monitoring statistics, and provides feedback to buoy operators regarding the quality of their buoy data as appropriate and recommends action for those buoys reporting erroneous data. He/she assists in the resolution of specific technical problems regarding the GTS distribution of the data as appropriate (obtaining WMO numbers, looking at technical files, calibration curves, looking at data losses, etc.).

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1 : <http://www.jcommops.org/dbcp/2qgd.html>

11.6 The Technical Co-ordinator works closely with centres responsible for the collection, location, data processing, and real-time GTS distribution of the buoy data for: (i) monitoring the system and identifying possible problems; (ii) making sure these problems are corrected; and (iii) providing technical assistance as appropriate.

11.7 Upon request, the Technical Co-ordinators also provides the WMO and IOC Secretariats with status maps, statistical information and graphs, and documentation.

11.8 The Technical Co-ordinator maintains the DBCP list of buoy manufacturers and provides it on the DBCP website.

11.9 The Technical Co-ordinator liaises with the DBCP Action Group coordinators and prepares reports on DBCP activities for the regular meetings of the Action Groups. The TC represents the Panel or the Action Groups at relevant technical meetings, both inside and outside WMO and IOC, as required.

11.10 The Technical Co-ordinator assists the Chairperson and the Secretariats in the preparation of the DBCP Session, including the preparation of specific technical preparatory documents and presentations.

## **12. REVIEW OF THE MANAGEMENT STRUCTURE AND OPERATING PRINCIPLES**

12.1 The Panel reviews and updates its management structure, and operating principles at its regular sessions. This includes, in particular, the appropriate appendices of the DBCP operating principles, i.e., definition of an Action Group, Terms of Reference of the Executive Board, budget lines, and Terms of Reference of the DBCP Trust Fund at WMO and IOC.

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**APPENDIX I**

**Terms of Reference of the Data Buoy Co-operation Panel  
(Approved by WMO Resolution 4(EC-LXII) and UNESCO/IOC Resolution XVII-6)**

The Data Buoy Co-operation Panel shall:

Consider the expressed needs of the international meteorological and oceanographic communities for real-time or archival data from ocean-data buoys on the high seas and request action from its members, the Technical Co-ordinator or Action Groups to meet these needs;

1. Co-ordinate activity on existing programmes so as to optimize the provision and timely receipt of good quality data from them;
2. Propose, organize and implement, through the co-ordination of national contributions, the expansion of existing programmes or the creation of new ones to supply such data;
3. Support and organize as appropriate such Action Groups as may be necessary to implement the deployment of data gathering buoys to meet the expressed needs of oceanographic and meteorological programmes such as WWW, WCRP, GOOS and GCOS;
4. Encourage the initiation of national contributions to data buoy programmes from countries which do not make them;
5. Promote the insertion of all available and appropriate buoy data into the Global Telecommunication System;
6. Promote the exchange of information on data buoy activities and encourage the development and transfer of appropriate technology;
7. Ensure that other bodies actively involved in buoy use are informed of the workings of the Panel and encourage, as appropriate, their participation in the Panel deliberations;
8. Make and regularly review arrangements to secure the services of a Technical Co-ordinator with the terms of reference given in Part B;
9. Report formally to the Joint WMO / IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), and participate in and contribute to an integrated global operational ocean observing system, implemented and co-ordinated through JCOMM; and
10. Submit annually to the Executive Councils of the WMO and the IOC, to JCOMM and to other appropriate bodies of WMO and IOC, a report that shall include summaries of the existing and planned buoy deployments and data flow.

**APPENDIX II**

**Terms of Reference for the Technical Co-ordinator of the DBCP  
(Approved by WMO Resolution 4 (WMO EC-LXII) and UNESCO/IOC Resolution XVII-6)**

The Technical Co-ordinator of the Data Buoy Co-operation Panel shall:

1. Under the direction of the Data Buoy Co-operation Panel take all possible steps within the competence of the Panel to assist in the successful achievement of its aims;
2. Assist in the development, implementation, and management of quality control procedures for data buoy systems;
3. Assist in setting up suitable arrangements for notifying the appropriate user communities of changes in the functional status of operational buoys;
4. Assist in the standardization of buoy data formats, sensor accuracy, etc.;
5. Assist when requested with the development of cooperative arrangements for buoy deployment;
6. Assist in the clarification and resolution of issues between Service Argos and buoy operators;
7. Assist in promoting the insertion of all available and appropriate buoy data into the Global Telecommunications System;
8. Supply information about buoy developments and applications to the WMO and IOC Secretariats and assist the Data Buoy Co-operation Panel to promote an international dialogue between oceanographers and meteorologists;
9. Coordinate and monitor the flow of buoy data into appropriate permanent archives.

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### APPENDIX III

#### Definition of a DBCP Action Group

*(as approved at DBCP-X)*

1. A DBCP Action Group is an independent self-funded body that maintains, as a significant element of its responsibilities, an observational buoy programme providing meteorological and oceanographic data for real-time and / or research purposes in support of the World Weather Watch (WWW), the World Climate Research Programme (WCRP), the Global Climate Observing System (GCOS), and the Global Ocean Observing System (GOOS), and other relevant WMO and IOC programmes.
  2. Action Groups of the DBCP shall support the aims and objectives of the DBCP - as set out in the Terms of Reference of the DBCP - particularly with respect to:
    - Provision of good quality and timely data to users;
    - Insertion of real-time (or near real-time) data into the GTS;
    - Exchange of information on data buoy activities and development and transfer of appropriate technology.
  3. An Action Group may be regional or national in nature provided that its programme benefits a regional or international community.
  4. To be adopted as an Action Group of the DBCP, the Terms of Reference or operating principles of the body or programme shall be submitted to a session of the DBCP for formal approval. Once approved these shall be lodged with the Secretariats of WMO and IOC.
  5. The DBCP shall support the activities of its adopted action groups especially through the assistance of its key personnel (technical co-ordinator and the Secretariats of WMO and IOC) as far as resources allow.
  6. Action Groups of the DBCP shall submit annual reports of their activities to the Chairperson of the DBCP.
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## APPENDIX IV

### Terms of Reference of the DBCP Executive Board (as approved at DBCP-XXVI)

#### **The DBCP Executive Board shall:**

1. Seek guidance from the Panel at its regular sessions regarding specific issues to be addressed by the Executive Board and the Tasks Teams during the intersessional period;
2. Act promptly to deal with any administrative, financial and planning issues and opportunities that might arise, within the guidelines established and reviewed regularly by the Panel;
3. Authorise the Chairperson to commit any expenditure necessary for the resolution of these issues and the promotion of the Panel's aims and objectives, up to the maximum amounts that might be agreed in advance by the Panel at its regular session;
4. Review the DBCP Implementation Strategy to ensure that it is kept up-to-date and complies with ongoing activities and users' requirements;
5. Set working priorities for the Technical Co-ordinator according to the DBCP recommendations at its regular sessions, and provide further guidance during the DBCP intersessional period;
6. Confer primarily regularly by e-mail, and exploit opportunities afforded by attendance at other meetings (e.g., the JCOMM OCG meeting) for face-to-face meetings;
7. Conduct meetings annually, following an agenda drawn up by the DBCP Chairperson;
8. Consult with Panel members and the Chairpersons of the DBCP Task Teams during the intersessional period if required;
9. Report its activities to the DBCP at its regular Session, and throughout the intersessional period as appropriate.

#### **Membership:**

The following individuals are members of the DBCP Executive Board:

- DBCP Chairperson, or his / her appointed deputy (Executive Board Chairperson)
- DBCP Vice-chairpersons
- DBCP member (appointed by the Chairperson)<sup>1</sup>
- DBCP Technical Co-ordinator (*ex officio*)
- Representative of the IOC Secretariat (*ex officio*)<sup>2</sup>
- Representative of the WMO Secretariat (*ex officio*)<sup>3</sup>
- Representative of the Manufacturers (*ex officio*)<sup>4</sup>

Note 1: A quorum of the Board should consist of at least three members, and must include the Chairperson or his / her appointed deputy.

Note 2: Any Panel Member may attend DBCP annual Executive Board meetings as an observer, subject to the availability of adequate meeting room space. If required, the Chairperson of the DBCP Executive Board will make a final decision as to which observers may attend, and may also invite other persons to attend at his / her discretion.

Note 3: The term for the members of the Executive Board is for one year during the inter-sessional period. They shall be eligible for re-election in their respective capacities, but would serve in principle for no more than 4 terms.

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1 : Mr Sidney Thurston (USA) has been appointed by the current DBCP Chairperson, Mr Al Wallace to serve in the Executive Board

2 : Currently Mr David Meldrum

3 : Currently Mr Etienne Charpentier

4 : Nominated on rotating basis by the Panel. Currently Mr Andy Sybrandy (Pacific Gyre, USA)

**APPENDIX V**

**TERMS OF REFERENCE OF THE DBCP TASK TEAMS**

**TERM OF REFERENCE OF THE TASK TEAM ON DATA MANAGEMENT**

*(as adopted at DBCP-XXIV)*

***The DBCP Task Team on Data Management shall:***

1. Receive and review reports from the Data Management Centres specializing in buoy data, i.e., (i) the Météo-France SOC / DB, and (ii) the ISDM, Canada RNODC / DB; reconcile any overlaps with emphasis on differences;
2. Liaise with the DBCP Task Team on Quality Management for compiling table driven coding requirements for data buoy observations, for all relevant applications, and submit them in a consolidated way to the DMPA Task Team on Table Driven Codes;
3. Address issues to do with real-time distribution of data, including GTS issues, timeliness and methods to improve data / flows;
4. Address issues relating to delayed-mode distribution and archiving of the data;
5. Seek input from data users on which instrumental metadata is most important and how it is best managed and coordinate these activities with the JCOMM Meta-T Project;
6. Review all relevant JCOMM Publications, to make sure they are kept up-to-date and comply with Quality Management terminology;
7. Follow-up with regard to the development of the WIGOS Pilot Project for JCOMM and make sure that the developments proposed by the Task Team are consistent with the WIGOS and WIS requirements;
8. Make recommendations to the DBCP Executive Board or the DBCP for addressing the issues above; and
9. Report to the DBCP Executive Board and the DBCP at its biennial Sessions.

***Membership:***

The membership is open to all Panel members. The Chairperson, appointed by the Panel, has selected the following team members:

Ms Mayra Pazos (TT Chairperson and GDP representative);  
Mr Yann Bernard (CLS data manager);  
Mr. Pierre Blouch (France);  
Mr Bruce Bradshaw (RNODC representative);  
Dr Bill Burnett (NDBC data manager );  
Ms Emily Daniel (MetOcean);  
Mr Jean Rolland (SOC representative);  
Mr Johan Stander (SAWS);  
DBCP Technical Co-ordinator (*ex officio*).

**TERMS OF REFERENCE OF THE TASK TEAM ON INSTRUMENT  
BEST PRACTICES & DRIFTER TECHNOLOGY DEVELOPMENTS**  
*(as adopted at DBCP-XXIV)*

Note: The DBCP Evaluation Group is being merged into this Task Team.

***The DBCP Task Team on Instrument Best Practices & Drifter Technology Developments shall:***

*Instrument Best Practices and Quality Management*

1. When required by the DBCP, evaluate quality of buoy data produced by specific types of buoys, as well as functioning, efficiency;
2. Review existing practices for automatic real-time buoy data quality control, and delayed-mode buoy data quality control, and possibly suggest design changes for improvement (sensors, hardware, software, data formats) in liaison with the Task Team on technological developments;
3. Address instrument evaluation issues; suggest specific tests and / or evaluation deployments in different sea conditions to DBCP members in order to evaluate buoy quality as described in (1) above;
4. Share experience and results of evaluation with the DBCP and other interested parties;
5. Review and recommend Best Practices; work on specific technical issues in order to facilitate standardization and liaise with the other DBCP Task Teams as appropriate (e.g., DBCP recommended Argos message formats); and
6. Define specific criteria for evaluation purposes (e.g. ocean areas, definition of acceptable quality data, e.g., early failures, lifetimes, delays, accuracies, resolutions, etc.);

*Drifter technology developments*

7. Investigate developments in the fields of sensor technology, on-board processing, buoy hardware, hull design, energy generation and storage in order to better meet user requirements in terms of the range, reliability and quality of observed parameters and their cost-effectiveness;
8. Regularly review and document operational and upcoming satellite telemetry systems in terms of their ability to address user requirements such as bandwidth, timeliness, availability, geographical coverage, reliability, service quality, technical support, energy consumption and cost;, and make specific recommendations to the communications service providers on required / desired enhancements;
9. Review operational platform location systems, and whether they meet the user requirements;
10. Propose to the DBCP and its Executive Board any evaluation activities and pilot projects that it deems beneficial to data buoy operators;



11. Propose recommendations, both upon request and unsolicited, to the Argos Joint Tariff Agreement. Such recommendations shall be passed via the DBCP Executive Board or the DBCP as appropriate; and
12. Evaluate, test, and promote buoy designs that are resistant to vandalism;

*General*

13. Review all relevant JCOMM Publications to make sure they are kept up to date, comply with Quality Management terminology, and adhere to the WMO Quality Management Framework (QMF);
14. Provide the DBCP Executive Board and the DBCP, both upon request and unsolicited, with technical advice needed for addressing the issues above; and
15. Submit reports to the DBCP Executive Board and to the DBCP at its annual session that describe intersessional activities and propose a Workplan for the next intersessional period.

**Membership:**

The membership is open to all Panel members. The Chairperson, appointed by the Panel, has selected the following team members:

- Dr Bill Burnett, NDBC (TT Chairperson);
- Mr Andy Sybrandy, Pacific Gyre (TT Co-Chairperson);
- Mr Pierre Blouch, Météo-France;
- Ms Emily Daniel, MetOcean;
- Mr Shaun Dolk, NOAA / AOML;
- Ms Julie Fletcher, MSNZ;
- Mr Paul Freitag, NOAA / PMEL;
- Mr Frank Grooters, KNMI;
- Mr Michel Guigue, CLS;
- Mr Robert Jensen, USACE;
- Mr Chris Marshall, Environment Canada;
- Mr David Meldrum, SAMS;
- Mr Sergey Motyzhev, Marlin Yug;
- Dr Luca Centurioni, SIO;
- Ms Mayra Pazos, NOAA / AOML;
- Mr Steve Piotrowicz, NOAA; and
- Dr M Ravichandran, INCOIS
- Dr. Tim Richardson, Liquid Robotics
- Mr Jean Rolland, Météo-France;
- Mr Jon Turton, UK Met Office;
- Mr R. Venkatesan, NIOT, India;
- Mr Bill Woodward, CLS America;
- Mr David Murphy, Sea-Bird Electronics, USA
- Technical Co-ordinator, DBCP.

The Co-chairperson is representing the manufacturers and is selected on a rotating basis.

**TERM OF REFERENCE OF THE TASK TEAM ON MOORED BUOYS**  
(as adopted at DBCP-XXIV)

***The DBCP Task Team on Moored Buoys shall:***

1. Review and document operational moored buoy systems and their underlying requirements;
2. Liaise with the different communities deploying moorings, including TIP, OceanSITES, seabed observatories, as well as national moored buoy programmes (coastal and global), and promote the development of multi-disciplinary mooring systems;
3. Liaise with the GOOS Scientific Steering Committee (GSSC) and its technical sub-panel for Integrated Coastal Observations (PICO) to facilitate synergy between advances in GOOS implementation and the development of operational capabilities, in particular, for sustained coastal observations, analysis and related services by using mooring systems;
4. Liaise with the JCOMM Expert Team on Wind Waves and Storm Surges (ETWS) regarding the need for in situ wave observations;
5. Compile information on opportunities for the deployment and / or servicing of moored buoys;
6. Monitor technological developments for moored data buoys and liaise with the Task Team on Technological Developments on satellite data telecommunication aspects;
7. Review all relevant WMO and IOC Publications on Instrument Best Practices (e.g., JCOMM, CIMO) to make sure they are kept up to date, address WIGOS issues, and comply with Quality Management terminology;
8. Provide the DBCP Executive Board or the DBCP with technical advice needed for developing moored buoy programmes, including the issues above; and
9. Report to the DBCP Executive Board and the DBCP at its biennial Sessions, with periodically updated Workplans supporting implementation.

***Membership:***

The membership is open to all Panel members. The Chairperson, appointed by the Panel, has selected the following team members:

- Mr Jon Turton, UK Met Office (TT Chairperson);
- Dr Bill Burnett, NOAA / NDBC;
- Mr Richard L. Crout, NOAA / NDBC;
- Mr Paul Freitag, NOAA / PMEL;
- Dr Robert Jensen, USACE;
- Mr Chris Marshall, Environment Canada;
- Mr Chris Meinig, NOAA / PMEL;
- Mr Ariel Troisi, SHN;
- Mr R. Venkatesan, NIOT, India;
- Mr Al Wallace, MSC, and;
- Dr Uwe Send, SIO.

**TERMS OF REFERENCE FOR THE DBCP TASK TEAM ON CAPACITY-BUILDING**  
(as adopted at DBCP-XXIV)

***The DBCP Task Team on Capacity-Building shall:***

1. Initiate, plan and coordinate the implementation of the Training and Capacity-Building work programme including, in particular, the regular Training Course on Buoy Programme Implementation and Data Management;
2. Keep under review existing training material (paper and electronic) and advise on updating as well as for the development of new material;
3. Review and assess national, regional, and global requirements for capacity-building and develop / improve programmes as appropriate;
4. Liaise with other capacity-building programmes in relevant areas to develop and implement integrated activities, to explore potential synergies and opportunities for efficiently using resources available; liaise in particular with the JCOMM cross-cutting Team on Capacity-Building;
5. Endeavour to mobilize the resources required for DBCP capacity-building, including those needed for the implementation of the Training Courses;
6. Make recommendations to the DBCP Executive Board and / or the DBCP for addressing the issues above; and
7. Report to the DBCP Executive Board and the DBCP at its biennial Sessions.

***Membership:***

The membership is open to all Panel members. The Chairperson, appointed by the Panel, has selected the following team members:

- Dr Sidney THURSTON, NOAA/OCO (TT Chairperson);
- DBCP Chairperson;
- DBCP Executive Board members;
- DBCP Vice-chairpersons (or their respective deputies);
- DBCP Technical Co-ordinator;
- Hamad Mohammed AL GHEILANI (Oman)
- Mathieu BELBEOCH (JCOMMOPS)
- Bill BURNETT (USA)
- Walter FLORES SERVAT (Peru)
- Djoko HARTOYO (Indonesia)
- Dr G. LATHA (India);
- Byung-Gul LEE (Republic of Korea);
- Kwan-Chang LIM (Republic of Korea);
- Rick LUMPKIN (USA)
- Mr Ali MAFIMBO (Kenya);
- David Meldrum (UK)
- Lucy SCOTT (South Africa);
- R. VENKATESAN (India)
- Representative of the IOC Secretariat; and
- Representative of the WMO Secretariat.

**APPENDIX VI**

**Current DBCP budget line items**  
*(as approved at DBCP-XXVII)*

The DBCP budget includes the following line items:

1. Contract for the Technical Co-ordinator<sup>1</sup>;
2. JCOMMOPS logistical support<sup>2</sup>;
3. Travel of DBCP Chairperson<sup>3</sup>;
4. Travel for the Technical Co-ordinator<sup>3</sup>;
5. Travel of DBCP Representatives<sup>3</sup>;
6. Bank charge and support cost<sup>4</sup>;
7. Outreach and publication activities<sup>5</sup>;
8. JCOMMOPS Data/Development<sup>6</sup>;
9. JCOMMOPS information system migration<sup>7</sup>;
10. SOT<sup>8</sup>;
11. Provision for termination / transition of the Technical Co-ordinator;
12. Technical developments and evaluations<sup>9</sup>;
13. Implementation support to address regional system deficiencies;<sup>10</sup>
14. Consultancy
15. Capacity-Building<sup>11</sup>;
16. Collaborative Arrangements<sup>12</sup>;
17. JTA<sup>13</sup>, including Chairperson's contract, Executive Board, and Secretariat support;
18. Contingency.

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1: Includes the salary and benefits;

2: Expenses shared with the Argo Information Centre (AIC). This includes office space and use of furniture, personal computer, licenses for basic office software, secretarial support, telephone, Internet and e-mail access, and miscellaneous office supplies;

3: Missions on behalf of the Panel;

4: Bank charges and service charges from the WMO and IOC for supporting the DBCP Trust Fund;

5: DBCP and JCOMMOPS brochures and DBCP Publications;

6: Hardware and software, and host IT support for developing, running, and maintaining the JCOMMOPS Information System;

7: Provision for the migration of the JCOMMOPS Information System;

8: Expenditure in support of the JCOMM Ship Observations Team (SOT) activities to be decided by the SOT Chairperson;

9: For example, the DBCP Iridium Pilot Project;

10 : For example, improving data timeliness in areas where system weaknesses are identified;

11: Support for DBCP-related training courses: travel of trainers and / or trainees; training materials;

12: Support for collaborative arrangements with other international programmes, between Panel Members, or with private companies for the provision of coordination functions, or the deployment and / or operations of instruments; and

13: This expenditure is balanced by an equivalent contribution of the JTA to the DBCP Trust Fund.

**APPENDIX VII**

**Terms of Reference for the DBCP Trust Fund at WMO**

*(as adopted at DBCP-XXIV and further agreed by way of exchange of letters between the WMO Secretary General<sup>1</sup> and the DBCP Chairperson<sup>2</sup>)*

1. The purpose of the DBCP Fund is to support the activities of the Data Buoy Co-operation Panel (DBCP);
2. The DBCP Fund is a Trust Fund within the provisions of Articles 9.7<sup>3</sup>, 9.8<sup>4</sup> and 9.9<sup>5</sup> of the WMO Financial Regulations (Resolution 37, Cg-XV);
3. The Fund shall be managed by WMO under its applicable rules and procedures, according to an annual budget adopted by the DBCP at its regular Sessions and any other directions provided by the DBCP;
4. The budget will be constructed according to a format agreed by the Panel, in which all income and expenditures will be identified in general articles and specific chapters. The format of the budget may be revised by the Panel as necessary. The budget may take note of other monies and resources made available for support of the DBCP activities, but which are not included as part of the Fund. Only those monies placed in the Fund, however, shall be subject to these terms of reference. The DBCP will provide WMO with details of the share to be borne by participating Members and contributors for invoicing purposes;
5. The DBCP Executive Board, under its Terms of Reference, may authorise in writing through its Chairperson the WMO Secretariat to commit any expenditure necessary for the resolution of these issues and the promotion of the Panel's aims and objectives, as long as these are consistent with the DBCP Operating Principles agreed by the Panel at its previous session;
6. The unit of account shall be the United States dollar. When commitments are made, the appropriate funds will be converted, as necessary, to the currency of commitment in at least the amount of the commitment;
7. The income of the Fund will include:
  - (i) Annual contributions from participating Members / Member States;
  - (ii) Funds deposited for specific purposes, hereafter referred to as deposits;
  - (iii) Other contributions from third parties;
  - (iv) Interest on investments as may be made by the Secretary-General in accordance with the provisions of Financial Regulation 12.26 (Resolution 37, Cg-XV); and
  - (v) Miscellaneous income.

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1: Letter 11106-08/OBS/WIGOS/OSD/MAR/DBCP-ADM from Michel Jarraud dated 15 December 2008

2: Letter from David David Meldrum dated 5 January 2009

3: 9.7: Trust funds, reserve and special accounts may be established by the Secretary-General and shall be reported to the Executive Council.

4: 9.8: The purpose and limits of each trust fund, reserve and special account shall be clearly defined by the Executive Council. Unless otherwise provided by the Congress, such funds and accounts shall be administered in accordance with the present Financial Regulations.

5: 9.9: Income derived from investments of trust funds, reserve and special accounts shall be credited as provided in the provisions applicable to such funds or accounts or at the request of the donors at any time. In other circumstances, Regulation 10.1 shall apply.

6: 12.2: The Secretary-General may make long-term investments of moneys standing to the credit of trust funds, reserve and special accounts, except as may be otherwise provided by the appropriate authority in respect of each such fund or account and having regard to the particular requirements as to the liquidity of funds in each case.

8. The Fund will be used as agreed by the DBCP to:
- (i) Finance technical and operational support services for the DBCP, including in particular for supporting its Technical Co-ordinator salary, benefits, logistical support, and missions; DBCP capacity-building activities; data buoy Technical Evaluation and DBCP Pilot Projects; consultancy and missions of experts acting on behalf of the Panel; practical arrangements for the deployment or servicing of buoys; promotion and exchange of information about the Panel activities;
  - (ii) Finance the share of the DBCP in supporting the activities of JCOMMOPS and the Observing Programme Support Centre (OPSC) as agreed by the Panel at its regular sessions;
  - (iii) Provide support to the Argos Joint Tariff Agreement within the resources set aside by the DBCP under these activities;
  - (iv) Assist in the establishment and operation of data buoy programmes;
  - (v) Meet appropriate administrative costs incurred by WMO in providing support to DBCP activities;
  - (vi) Meet other administrative costs including such items as meetings and consultants;
  - (vii) Purchase specified goods or services; and
  - (viii) Support other activities required to meet the basic goal of the DBCP Panel;
9. Authority for the disbursement of funds, in respect of contracts and agreements properly concluded, is delegated to the Chairman of the DBCP. The Chairperson of the DBCP will request in writing the Secretary-General of WMO, or his representative, to disburse the funds;
10. Where required by their internal regulations, individual contributors to the DBCP Fund may wish to negotiate additional conditions governing the application, conditions of deposit and disbursement of funds. Such additional conditions shall not inhibit the efficient and proper use of the Fund nor modify the intent of the Fund. They shall require the acceptance in writing by the Chairperson of the DBCP and the Secretary-General of WMO or his representative;
11. The Fund shall be maintained on a continuous basis and amounts standing to the credit of the Fund at the end of any WMO biennial period shall remain in the Fund for use in the subsequent period;
12. Upon liquidation of the Fund for any reason, the DBCP shall make provision for the payment of unliquidated obligations and estimated expenses of winding-up business. It shall then arrange for repayment - to the extent that funds are available and according to the depositors instructions - of deposits for which no equipment or services have been received;
13. At the closure of the Fund:
- (i) Any remaining surplus after (12) above, shall be distributed among the then DBCP Members in proportion to their total contributions and deposits paid by them to the DBCP Fund; and
  - (ii) Any remaining deficit, including provision for the payment of unliquidated obligations and estimated expenses of winding-up business, shall be met by the DBCP Members in an equitable way, to be decided upon by the DBCP.

14. The Fund will be terminated not later than one year after the formal termination of the DBCP;
15. All funds credited to the DBCP Fund shall be subject to these terms of reference and to the Terms of Reference of the DBCP; and
16. Any revision or amendment to the present Terms of Reference is subject to a decision of the DBCP and the agreement of WMO.

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**APPENDIX VIII**

**Financial Regulations applicable to  
the Intergovernmental Oceanographic Commission (IOC)**

*(Excerpt from the Decisions by 157<sup>th</sup> Executive Board of the UNESCO)*

**Article 1 - Creation of a Special Account of UNESCO**

- 1.1 In accordance with Article 6, paragraph 6, of the Financial Regulations of UNESCO, there is hereby created a Special Account for the Intergovernmental Oceanographic Commission, hereinafter referred to as IOC.
- 1.2 The following Regulations shall govern the operation of this Special Account.

**Article 2 - Financial period**

The financial period shall correspond to that of UNESCO.

**Article 3 - Income**

- 3.1 As provided in its Statutes, the income of IOC shall consist of:
- (a) funds appropriated for this purpose by the General Conference of UNESCO;
  - (b) voluntary contributions from States, international agencies and organizations, as well as other entities allocated to it for purposes consistent with the policies, programmes and activities of UNESCO and IOC;
  - (c) such subventions, endowments, gifts and bequests as are allocated to it for purposes consistent with the policies, programmes and activities of UNESCO and IOC;
  - (d) fees collected in respect of the execution of projects entrusted to IOC, from the sale of publications, or from other particular activities; and
  - (e) miscellaneous income.
- 3.2 The Executive Secretary of IOC, hereinafter referred to as the Secretary, may accept income as set forth in Article 3.1 on behalf of IOC, provided that, in any case which would involve IOC in an additional financial liability, the Secretary shall obtain the prior approval of the IOC Executive Council and the consent of the Executive Board of UNESCO.
- 3.3 The Secretary shall report to the IOC Assembly and the IOC Executive Council on any subventions, contributions, grants, gifts or bequests accepted.

**Article 4 - Budget**

- 4.1 The Secretary shall prepare, in a form to be determined by the IOC Assembly, a biennial programme and budget and shall submit it to the IOC Assembly for approval.
- 4.2 The appropriations voted in the budget shall constitute an authorization to the Secretary to incur obligations and to make expenditures for the purposes for which the appropriations are voted and up to the amounts so voted.



- 4.3 The Secretary is authorized to transfer funds between activities under the same appropriation line. The Secretary may be authorized by the IOC Assembly to transfer funds, when necessary, between appropriation lines within the limits established by the Appropriation Resolution voted by the IOC Assembly and shall report to the IOC Executive Council on all such transfers.
- 4.4 The Secretary is required to maintain obligations and expenditures within the level of the actual resources that become available to the General Account mentioned in Article 5.1 below.
- 4.5 Appropriations shall remain available for obligation during the financial period to which they relate.
- 4.6 The Secretary shall make allotments and any modifications thereon, within the limits of the Appropriation Resolution, which shall be communicated, in writing, to the officials authorized to incur obligations and make payments.
- 4.7 Appropriations shall remain available for 12 months following the end of the financial period to which they relate to the extent that they are required to discharge obligations for goods supplied and services rendered in the financial period and to liquidate any other outstanding legal obligations of the financial period.
- 4.8 At the end of the 12-month period provided for in Article 4.7 above, the then remaining unspent balance of obligations retained shall revert to the General Account mentioned in Article 5.1 below.

#### **Article 5 - The General Account**

- 5.1 There shall be established a General Account, to which shall be credited the income of IOC as described in Article 3 above and which shall be used to finance the approved budget of IOC.
- 5.2 The balance remaining in this General Account shall be carried forward from one financial period to the next.
- 5.3 The uses to which this balance may be put shall be determined by the IOC Assembly.

#### **Article 6 - Trust Funds, Reserve and Subsidiary Special Accounts**

- 6.1 In addition to a Working Capital Fund, the Secretary shall establish a Reserve Fund to cover end-of-service indemnities and other related liabilities; the Fund shall be reported to the IOC Assembly at the time of the budget approval.
- 6.2 Trust Funds, Subsidiary Special Accounts and any other Reserve Accounts may be established by the Secretary, who shall report to the IOC Assembly and the IOC Executive Council.
- 6.3 The Secretary may, when necessary, in connection with the purpose of a Trust Fund, Reserve or Subsidiary Special Account, prepare special financial regulations to govern the operations of these funds or accounts and shall report thereon to the IOC Assembly and the IOC Executive Council. Unless otherwise provided these funds and accounts shall be administered in accordance with these Financial Regulations.

**Article 7 - Accounts**

- 7.1 The UNESCO Comptroller shall maintain such accounting records as are necessary and shall prepare, for submission to the IOC Assembly and the IOC Executive Council, the biennial accounts showing, for the financial period to which they relate:
- (a) the income and expenditure of all funds;
  - (b) the budgetary situation including:
    - (i) original appropriations;
    - (ii) the appropriations as modified by any transfers;
    - (iii) the amounts charged against these appropriations;
  - (c) the assets and liabilities of IOC.
- 7.2 The Secretary shall also give such other information as may be appropriate to indicate the current financial position of IOC.
- 7.3 The biennial accounts of IOC shall be presented in dollars of the United States of America. Accounting records, may, however, be kept in such currency or currencies as the Secretary may deem necessary.
- 7.4 Appropriate separate accounts shall be maintained for all Trust Funds, Reserve and Subsidiary Special Accounts.

**Article 8 - External audit**

The audited accounts of IOC, which constitute an integral part of the statement of the financial position of UNESCO, and the report of the External Auditor of UNESCO on IOC, shall be submitted to the IOC Assembly for approval.

**Article 9 - General provision**

Unless otherwise provided in these Regulations this Special Account shall be administered in accordance with the Financial Regulations of UNESCO.

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**APPENDIX IX**

**DBCP DATA POLICY**  
*(as adopted at DBCP-XXV)*

***Data access policy***

1. The DBCP encourages timely, free and unrestricted access to data. Real time data sharing is achieved via the Global Telecommunications System<sup>109</sup> of WMO. DBCP also cooperate with data contributors to ensure that data can be accepted into and be used through the NODC and WDC network of the IOC/IODE as long-term repositories for oceanographic data and associated metadata.

2.

3. 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 web, either in the form of track plots 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 coordinated 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) and the IOC oceanographic data exchange policy defined in IOC Assembly Resolution XXII-6.

4.

***Data archiving***

5. Drifter data inserted on the GTS are routinely archived by ISDM, the IODE Responsible National Oceanographic Data Centres (RNODC) for Drifting Buoys. The AOML 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.

6.

***Instrumental Metadata***

7.

8. There has been an increasing demand for instrumental metadata in recent years to serve a number of applications - and climate studies in particular. The DBCP has established its own metadata collection system at JCOMMOPS and is participating in the water temperature metadata Pilot Project (META-T).

9.

***Quality control***

10.

11. Quality control procedures are in place to ensure the usefulness of real time data and also of data archives. A well-defined feedback mechanism is required to control real time data (see the DBCP QC Guidelines<sup>110</sup>).

***More information :***

- WMO data policy Resolution 40<sup>111</sup>
- IOC Oceanographic Data Exchange Policy<sup>112</sup>
- CLIVAR data policy<sup>113</sup>

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109 : <http://www.jcommops.org/DBCP/1gtsinfo.html>

110 : <http://www.jcommops.org/dbcp/2qgd.html>

111 : [http://www.wmo.int/pages/prog/www/ois/Operational\\_Information/AdditionalDataProducts/02\\_Resolution%2040.pdf](http://www.wmo.int/pages/prog/www/ois/Operational_Information/AdditionalDataProducts/02_Resolution%2040.pdf)

112 : [http://www.ioc-unesco.org/index.php?option=com\\_oe&task=viewDocumentRecord&docID=338](http://www.ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=338)

113 : [http://www.clivar.org/data/data\\_policy.php](http://www.clivar.org/data/data_policy.php)

**APPENDIX X**

**Current key DBCP personnel**  
(as elected / appointed at DBCP-XXVI)

**NORTH AMERICA**

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**ANNEX IV**

**ACTION GROUP SUMMARIES**

**REPORT BY THE GLOBAL DRIFTER PROGRAMME (GDP)**

<b>Name of Action Group</b>	<b>Global Drifter Programme (GDP)</b>
<b>Date of report</b>	31 July 2011
<b>Overview and main requirements addressed</b>	The goals of the GDP are to: 1. Maintain a global 5x5° array of 1250 satellite-tracked surface drifting buoys to meet the need for an accurate and globally dense set of in-situ observations of mixed layer currents, sea surface temperature, atmospheric pressure, winds and salinity; and 2. Provide a data processing system for scientific use of these data. These data support short-term (seasonal to interannual) climate predictions as well as climate research and monitoring.
<b>Area of interest</b>	The global ocean
<b>Type of platform and variables measured</b>	Lagrangian drifters measuring the following variables: Basic: surface velocity, SST; Other: surface pressure, wind, salinity, sub-surface temperature profiles
<b>Targeted horizontal resolution</b>	5 degree x 5 degree (1250 units)
<b>Chairperson/Managers</b>	Dr Rick Lumpkin, NOAA/AOML, USA Dr Luca Centurioni, SIO, USA
<b>Coordinator</b>	Operations Manager: Mr Shaun Dolk, NOAA/AOML, USA
<b>Participants</b>	Numerous national and international institutions
<b>Data centre(s)</b>	GDP Data Assembly Center (DAC) – Manager: Ms Mayra Pazos, NOAA/AOML, USA
<b>Website</b>	<a href="http://www.aoml.noaa.gov/phod/dac/gdp.html">http://www.aoml.noaa.gov/phod/dac/gdp.html</a>
<b>Meetings</b> <i>(meetings held in 2010/2011; and planned in 2011/2012)</i>	None
<b>Current status summary</b> <i>(mid-2011)</i>	Annual size of array maintained close to 1250 drifters. Current size as of June 20, 2011 is 1154 drifters.
<b>Summary of plans for 2012</b>	Maintain array at ~1250 drifters; re-evaluate drogue presence for historical data; begin incorporating salinity data into data stream; continue participation in Iridium and Argos 3 pilot projects; conduct ADB study of SVPB drifters.

**REPORT BY THE TROPICAL MOORED BUOY IMPLEMENTATION PANEL (TIP)**

<b>Name of Action Group</b>	<b>Tropical Moored Buoy Implementation Panel (TIP)</b>
<b>Date of report</b>	31 July 2011
<b>Overview and main requirements addressed</b>	<p>The Tropical Moored Buoys Implementation Panel (TIP) oversees the design and implementation of the following components:</p> <ul style="list-style-type: none"> <li>• The Tropical Atmosphere Ocean / Triangle Trans-Ocean Buoy Network (TAO / TRITON), a central component of the ENSO Observing System, deployed specifically for research and forecasting of El Niño and La Niña;</li> <li>• The Prediction and Research Moored Array in the Tropical Atlantic (PIRATA)</li> <li>• The Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA)</li> </ul>
<b>Area of interest</b>	The tropical ocean regions as part of an integrated approach to observing the climate system to address the research needs of CLIVAR and the operational strategies of GOOS and GCOS. Pacific Ocean: 8°N to 8°S; Atlantic Ocean: 20°N to 10°S; Indian Ocean: 15°N to 25°S.
<b>Type of platform and variables measured</b>	<p>Tropical moorings with surface meteorological and sub-surface oceanographic sensors measuring: Surface wind, air temperature, relative humidity, SST and SSS on all surface moorings. Air pressure, precipitation, short wave radiation, long wave radiation on some surface moorings. Sub-surface temperature profiles down to 500m-750m on all surface moorings. Salinity profiles as deep as 750m on some surface moorings. Current velocity on some moorings.</p> <p>Subsurface ADCP moorings measuring velocity profiles in the upper few hundred meters. Some have additional single point current meters at deeper levels.</p>
<b>Targeted horizontal resolution</b>	Tropical Pacific Ocean: 72 moorings ; Tropical Atlantic Ocean: 18 moorings ; Tropical Indian Ocean: 46 moorings
<b>Chairperson/Managers</b>	Dr. Mike McPhaden, PMEL, USA, Chairman Dr. Kentaro Ando, JAMSTEC, Japan, Vice-Chairman
<b>Coordinator</b>	Mr H. Paul Freitag, PMEL, USA
<b>Participants</b>	<p>TAO/TRITON: NOAA National Data Buoy Center (NDBC), NOAA Pacific Marine Environmental Laboratory (PMEL), Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Agency for the Assessment and Application of Technology (BPPT)</p> <p>PIRATA: NOAA PMEL, NOAA Atlantic Marine Oceanographic Laboratory (AOML), L'Institut de recherche pour le développement (IRD), Meteo-France, Instituto Nacional de Pesquisas Espaciais (INPE), Diretoria de Hidrografia e Navegacao (DHN)</p> <p>RAMA: NOAA PMEL, JAMSTEC, Indian National Center for Ocean Information Services (INCOIS), National Institute of Oceanography (NIO), Agency for the Assessment and Application of Technology (BPPT), Ministry of Marine Affairs and Fisheries (KKP), First Institute of Oceanography (FIO), Agulhas and Somali Current Large Marine Ecosystems (<a href="#">ASCLME</a>), University of Tasmania. Laboratoire d'Océanographie et du Climat: Expérimentations et approches numériques (LOCEAN)</p>

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<b>Data centre(s)</b>	PMEL, NDBC, JAMSTEC, NIO
<b>Website</b>	<a href="http://www.pmel.noaa.gov/tao/global/global.html">http://www.pmel.noaa.gov/tao/global/global.html</a>
<b>Meetings</b> <i>(meetings held in 2010/2011; and planned in 2011/2012)</i>	PIRATA-15/TACE/TAV, 2-5 March 2010, Miami, Florida CLIVAR/GOOS Indian Ocean Panel 7th Session 12-16 July 2010, Perth, Australia TIP Workshop, 26 September 2010, Oban UK. PIRATA-16/TACE/TAV, 14-18 March 2011, Fernando de Noronha, Brazil CLIVAR/GOOS Indian Ocean Panel 8th Session 25-29 July 2011, Chennai, India
<b>Current status summary</b> <i>(mid-2011)</i>	TAO/TRITON: 65 of 67 surface moorings reporting. PIRATA: 16 of 17 surface moorings reporting. RAMA: 17 of 24 surface moorings reporting.
<b>Summary of plans for 2012</b>	TAO/TRITON: Maintain 72 mooring array. PIRATA: Maintain 18 mooring array RAMA: Maintain 30 implemented sites.

**REPORT BY THE EUCOS SURFACE MARINE PROGRAMME (E-SURFMAR)**

<b>Name of Action Group</b>	<b>Surface Marine programme of the Network of European Meteorological Services, EUMETNET (E-SURFMAR)</b>
<b>Date of report</b>	31 July 2011
<b>Overview and main requirements addressed</b>	The EUMETNET Composite Observing System (EUCOS) surface marine (E-SURFMAR) programme is an optional programme involving 17 out of the 29 EUMETNET members, who fund the activity on a GNI basis. Its main objectives are to coordinate, optimise and progressively integrate the European meteorological services activities for surface observations over the sea – including drifting and moored buoys, and voluntary observing ships. E-SURFMAR is responsible for coordination of buoy activities carried out by the European meteorological services, and the programme supports a Data Buoy Manager (DBM) to manage these activities. The DBM is supported and advised by the E-SURFMAR Data Buoy Technical Advisory Group (DB-TAG) which is an action group of the DBCP.
<b>Area of interest</b>	Ocean areas potentially affecting NWP over European countries. This covers the North Atlantic Ocean North of 10°N and the Mediterranean Sea (90°N-10°N; 70°W - 40°E).
<b>Type of platform and variables measured</b>	<u>Drifting buoys</u> : air pressure, SST, (wind) <u>Moored buoys</u> : air pressure, wind, air temperature, SST, waves (directional spectra), relative humidity.
<b>Targeted horizontal resolution</b>	250 km x 250 km, >150 drifting buoys, 4 moored buoys for satellite calibration/validation.
<b>Chairperson/Managers</b>	Manager E-SURFMAR: Mr Pierre Blouch, Météo-France Chairperson, Data Buoy Technical Advisory Group (DB-TAG): Mr Jon Turton, UK Met Office
<b>Coordinator</b>	Data buoy Manager: Mr Jean Rolland, Météo-France
<b>Participants</b>	Belgium, Croatia, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, and the United Kingdom
<b>Data centre(s)</b>	Météo-France as SOC ISDM (Canada) as RNODC/DB
<b>Website</b>	<a href="http://www.eucos.net">http://www.eucos.net</a> , under the heading “EUCOS Public” in “EUCOS networks” <a href="http://esurfmar.meteo.fr">http://esurfmar.meteo.fr</a> (restricted working area web site for E-SURFMAR participants)
<b>Meetings</b>	DB-TAG meets once a year. DB-TAG8 Heraklion 24-25 May 2011
<b>Current status (mid-2011)</b>	89 drifting buoys in operation (50 Iridium, 39 Argos). 4 E-SURFMAR supported moored buoys in operation, plus a further 45 others operated by members.
<b>Summary of plans for 2012</b>	Maintain a network of 100 drifting buoys, and the 4 reference moored buoys in operation.



**REPORT BY THE INTERNATIONAL BUOY PROGRAMME FOR THE INDIAN OCEAN (IBPIO)**

<b>Name of Action Group</b>	<b>International Buoy Programme for the Indian Ocean (IBPIO)</b>
<b>Date of report</b>	31 July 2011
<b>Overview and main requirements addressed</b>	The International Buoy Programme for the Indian Ocean (IBPIO) was formally established at a meeting in La Reunion in 1996. The primary objective of the IBPIO is to establish and maintain a network of platforms in the Indian Ocean to provide meteorological and oceanographic data for both real time and research purposes. More specifically, the IBPIO supports the World Weather Watch Programme (WWW); the Global Climate Observing System (GCOS); the World Climate Research Programme (WCRP); the Global Ocean Observing System (GOOS); tropical cyclone forecast and monitoring; as well as the research activities of the participating institutions. The programme is self-sustaining, supported by voluntary contributions from the participants in the form of equipment and services (such as communications, deployment, storage, archiving, co-ordination...).
<b>Area of interest</b>	Indian Ocean North of 55°S and between 25°E and 120°E
<b>Type of platform and variables measured</b>	Drifting buoys: Air pressure, SST, (wind) Moorings: air pressure, wind, air temperature, SST, waves, relative humidity, SSS, current...
<b>Targeted horizontal resolution</b>	500 km x 500 km
<b>Chairperson/Managers</b>	Mr Graeme Ball, BoM, Australia
<b>Coordinator</b>	Mr Jean Rolland, Météo-France
<b>Participants</b>	Australia (ABOM), France (Météo-France), India (NIO, NIOT, INCOIS), Kenya (KMD), South Africa (SAWS), Mozambique (EMU); USA (GDP, Navocean), TIP (Tropical Moored Buoy Implementation Panel).
<b>Data centre(s)</b>	ISDM (Canada) as RNODC/DB, Météo-France as SOC AOML, NOAA/PMEL
<b>Website</b>	<a href="http://www.shom.fr/meteo/ibpio">http://www.shom.fr/meteo/ibpio</a>
<b>Meetings</b>	Annual meetings in conjunction with DBCP meetings. IBPIO 14 in GENEVA in September 2011
<b>Current status (mid-2011)</b>	152 drifters (126 with Air Pressure) 44 moored buoys (30 for RAMA 65% of the planned 46 site array)
<b>Summary of plans for 2012</b>	Maintain a network of more than 150 drifters. Maintain the moored buoy arrays.

**REPORT BY THE DBCP-PICES NORTH PACIFIC DATA BUOY ADVISORY PANEL (NPDBAP)**

<b>Name of Action Group</b>	<b>DBCP-PICES North Pacific Data Buoy Advisory Panel (NPDBAP)</b>
<b>Date of report</b>	31 July 2011
<b>Overview and main requirements addressed</b>	The goals of the NPDBAP are to deploy 60 SVPB drifters a year, and maintain 75 active buoys in the region.
<b>Area of interest</b>	North Pacific Ocean and marginal seas generally north of 30°N
<b>Type of platform and variables measured</b>	Lagrangian drifters measuring sea level pressure, SST, and sea-surface velocity
<b>Targeted horizontal resolution</b>	5° x 5°
<b>Chairperson/Managers</b>	Co-Chairperson for the NE Pacific: Al Wallace, MSC, Canada Co-Chairperson for the NW Pacific: Position vacant and to be proposed by PICES
<b>Coordinator</b>	Mr Shaun Dolk, NOAA / AOML
<b>Participants</b>	Al Wallace, Chris Marshall, Joe Linguanti, Ignatius Rigor, Bill Burnett, and Shaun Dolk
<b>Data centre(s)</b>	Global Drifter Assembly Centre (DAC) Integrated Science Data Management (ISDM), Canada
<b>Website</b>	<a href="http://npdbap.noaa.gov/">http://npdbap.noaa.gov/</a>
<b>Meetings</b>	Yearly meetings usually held in conjunction with DBCP meetings. Next meeting planned 27 September 2011 in Geneva, Swiss
<b>Current status (mid-2010)</b>	From 01 August 2010 to 31 July 2011, 140 drifters have been deployed. 59 of these drifters were equipped with barometers, while the remaining 81 drifters were basic SVP type units.
<b>Summary of plans for 2011</b>	The goal for 2012 is to again reach 100 drifter deployments, of which, at least 60 drifters shall be barometer equipped.

**REPORT BY THE INTERNATIONAL ARCTIC BUOY PROGRAMME (IABP)**

<b>Name of Action Group</b>	<b>International Arctic Buoy Programme (IABP)</b>
<b>Date of report</b>	27 July 2011
<b>Overview and main requirements addressed</b>	Participants of the IABP continue to work together to maintain a network of drifting buoys on the ice of the Arctic Basin to provide meteorological and oceanographic data for real-time operational requirements and research purposes including support to the World Climate Research Programme (WCRP) and the World Weather Watch (WWW) Programme.
<b>Area of interest</b>	Central Arctic Ocean and its marginal seas, excepting Exclusive Economic Zones, where agreements of the Coastal States have not been obtained
<b>Type of platform and variables measured</b>	Buoys on ice and/or in water measuring: Basic meteorological variables such as atmospheric air pressure and air temperature Other variables such as: atmospheric pressure tendency, air chemistry (e.g. ozone), snow and sea-ice properties, as well as sub-surface oceanographic characteristics (e.g. temperature and salinity)
<b>Targeted horizontal resolution</b>	250 km x 250 km
<b>Chairperson/Managers</b>	Chairperson: Christine Best, Meteorological Service Canada
<b>Coordinator</b>	Ignatius Rigor, Polar Science Center, University of Washington, USA
<b>Participants</b>	Participants range from Science Institutions to Universities to Government Agencies. <a href="http://iabp.apl.washington.edu/overview_participants.html">http://iabp.apl.washington.edu/overview_participants.html</a> Participant contributions are shown on this site <a href="http://iabp.apl.washington.edu/overview_contributions.html">http://iabp.apl.washington.edu/overview_contributions.html</a>
<b>Data centre(s)</b>	n/a
<b>Website</b>	<a href="http://iabp.apl.washington.edu/">http://iabp.apl.washington.edu/</a>
<b>Meetings</b> <i>(meetings held in 2010/2011; and planned in 2011/2012)</i>	Annual meetings spring or early summer in the Northern Hemisphere. 21 <sup>st</sup> Annual Meeting of the International Arctic Buoy Programme [IABP], hosted by Environment Canada, was held in Victoria, British Columbia, Canada, 1 – 3 June 2011
<b>Current status summary</b> <i>(mid-2011)</i>	Total of 72 buoys in the IABP array 19 July 2011 with an almost even split of Iridium and Argos for data transmission
<b>Summary of plans for 2012 and for remainder of 2011</b>	Participants will deploy buoys ranging from: SVP's providing surface air pressure, buoys providing air pressure and air temperature, Ice Mass Balance buoys, Oceanographic Profiling buoys measuring temperature and salinity to great depths and buoys that measure atmospheric air components such as ozone

**REPORT BY THE WCRP-SCAR INTERNATIONAL PROGRAMME FOR ANTARCTIC BUOYS (IPAB)**

<b>Name of Action Group</b>	<b>WCRP-SCAR International Programme for Antarctic Buoys (IPAB)</b>
<b>Date of report</b>	Sept. 2011
<b>Overview and main requirements addressed</b>	The IPAB was established in 1994 became an Action Group of the Panel in October 1994.
<b>Area of interest</b>	South of 55°S and that region of the Southern Ocean and Antarctic marginal seas within the maximum seasonal sea-ice extent
<b>Type of platform and variables measured</b>	<u>Basic variables</u> : Buoy position, atmospheric pressure and SST <u>Other variables</u> : air temperature, ice and / or snow temperature, atmospheric pressure tendency, wind, snow and sea-ice properties and oceanographic variables
<b>Targeted horizontal resolution</b>	500 km x 500 km
<b>Chairperson/Managers</b>	Mr Shuki Ushio, NIPR, Japan
<b>Coordinator</b>	Mr Christian Haas, University of Alberta, Canada
<b>Participants</b>	
<b>Data centre(s)</b>	
<b>Website</b>	<a href="http://www.ipab.aq/">http://www.ipab.aq/</a>
<b>Meetings</b> <i>(meetings held in 2010/2011; and planned in 2011/2012)</i>	Biennial meetings
<b>Current status summary</b> <i>(mid-2011)</i>	[not available at DBCP-27]
<b>Summary of plans for 2012</b>	[not available at DBCP-27]

**REPORT BY THE INTERNATIONAL SOUTH ATLANTIC BUOY PROGRAMME (ISABP)**

<b>Name of Action Group</b>	<b>International South Atlantic Buoy Programme (ISABP)</b>
<b>Date of report</b>	31 July 2011
<b>Overview and main requirements addressed</b>	The main objective of ISABP is to establish and maintain a network of platforms in the Tropical and South Atlantic Ocean in order to provide meteorological and oceanographic data for both real-time and research purposes. The task includes support to the World Weather Watch Programme (WWW), the Global Climate Observing System (GCOS), the World Climate Research Programme (WCRP), and the Global Ocean Observing System (GOOS), as well as to the research activities of participating institutions.
<b>Area of interest</b>	South Atlantic Ocean north of 55S plus Tropical Atlantic Ocean up to 20N
<b>Type of platform and variables measured</b>	Lagrangian drifters measuring sea level pressure, SST, salinity and sea-surface velocity
<b>Targeted horizontal resolution</b>	5 degrees x 5 degrees
<b>Chairperson/Managers</b>	Mr Ariel Troisi, SHN, Argentina
<b>Coordinator</b>	<b>Mayra Pazos, AOML-NOAA, USA</b> Johan Stander, SAWS, South Africa
<b>Participants</b>	
<b>Data centre(s)</b>	Historical drifter data are assembled, quality controlled at AOML, Miami, then sent to ISDM for archival and further distribution. Real time data is also archived at ISDM
<b>Website</b>	<a href="http://www.jcommops.org/dbcp/isabp/index.html">http://www.jcommops.org/dbcp/isabp/index.html</a> <a href="http://www.oceanlan.org/isabp/en/index.html">http://www.oceanlan.org/isabp/en/index.html</a>
<b>Meetings</b> <i>(meetings held in 2010/2011; and planned in 2011/2012)</i>	Meetings are held every other year, normally in May-July. ISABP-13 took place in Buenos Aires, Argentina, on April 19, 2010
<b>Current status summary</b> <i>(mid-2011)</i>	As of July 25, 2011, there were a total of 147 drifters in the South Atlantic region, (78 SVP, 69 SVPB).
<b>Summary of plans for 2012</b>	Continue to address observational gap areas specially, in the Gulf of Guinea and Angola Basin; pursue recommendation of conducting studies and evaluate the impact of drifter pressure data and SST on the skills of numerical weather forecasting models for the region; increase number of SVPB in the region.

**REPORT BY THE OCEAN SUSTAINED INTERDISCIPLINARY TIMESERIES ENVIRONMENT OBSERVATION SYSTEM (OCEANSITES)**

<b>Name of Action Group</b>	<b>Ocean Sustained Interdisciplinary Timeseries Environment observation System (OceanSITES)</b>
<b>Date of report</b>	Sep. 2011
<b>Overview and main requirements addressed</b>	
<b>Area of interest</b>	The global ocean
<b>Type of platform and variables measured</b>	Ocean stations measuring conductivity, salinity, water temperature, air relative humidity, air temperature, air pressure, wind, precipitations, radiation, water pressure, depth, currents, fluxes, dissolved oxygen, fluorescence, pCO <sub>2</sub>
<b>Targeted horizontal resolution</b>	89 reference stations
<b>Chairperson/Managers</b>	The current Executive Committee consists of: Uwe Send and Bob Weller (co-chairs), Thomas Trull, Makio Honda, Vsn Murty, Richard Lampitt, Doug Wallace, Tony Knapp, Bill Burnett, Sylvie Pouliquen, and Thierry Carval.
<b>Coordinator</b>	Mrs Kelly Stroker (JCOMMOPS)
<b>Participants</b>	
<b>Data centre(s)</b>	IFREMER (France) and NOAA / NDBC (USA)
<b>Website</b>	<a href="http://www.oceansites.org/">http://www.oceansites.org/</a>
<b>Meetings</b> <i>(meetings held in 2010/2011; and planned in 2011/2012)</i>	A major OceanSITES meeting is now planned for Nov.29-Dec.2 with both the Steering Team and the Data Management Team meeting back to back. Topics to address include possible broadening of OceanSITES, e.g. to include boundary current observations or coastal carbon/ocean acidification timeseries.
<b>Current status summary</b> <i>(mid-2011)</i>	<p>In January, 2011, the 12th POGO Annual Meeting was hosted by the Korea Ocean Research and Development Institute (KORDI) in Seoul, South Korea. The POGO meeting expressend support of OceanSITES in its final declaration and pledged financial support and donations.</p> <p>Additional activities took place at the Data Management level. Last year, the Data Management Team agreed on an update to the OceanSITES data format. This new data format is growing in acceptance and is being implemented by the current data providers. Data is flowing from most of the participants in the original OceanSITES Steering Team, and in some cases that is starting to include biogeochemical data (e.g. for EuroSITES).</p> <p>The project office activities for OceanSITES have suffered the past year with the departure of Hester Viola. In September, Kelly Stroker, was appointed so functions in the project office can continue. One of the first focuses with be migrating the</p>

	<p>OceanSITES webpages from WHOI to JCOMMOPS, where Kelly will maintain the sites. Bob Weller and Uwe Send held a face-to-face meeting with Kelly before her official start date in Denver to discuss several OceanSITES activities.</p>
<p><b>Summary of plans for 2012</b></p>	<p>The Executive Committee will initiate regular WebEx calls. The first goal of the new committee is to formalize adopting of new sites and review the current list of proposed new sites. The committee will also discuss some exciting new ideas to tackle the 'low-hanging fruit' in terms of network enhancements to fulfill a goal of OceanObs09. One such idea is to deploy deep microcats on all moorings. This relatively minimal cost would add great value to the network.</p> <p>Outreach, collaborations, and interfacing with other communities took place in various ways. Bob Weller represents the US OOI, is a member of OOPC, and attends many international meetings, building a connection to those. Uwe Send represents OceanSITES in the JCOMM panels such as OCG, in the Clivar GSOP Panel, in US and international AMOC, and at international meetings such as IUGG.</p>

**REPORT BY THE INTERNATIONAL TSUNAMETER PARTNERSHIP (ITP)**

Name of Action Group	International Tsunameter Partnership (ITP)
<b>Date of report</b>	31 July 2011
<b>Overview and main requirements addressed</b>	<p>The International Tsunameter Partnership (ITP) was established under the auspices of the IOC International Cooperation Group for the Indian Ocean Tsunami Warning and Mitigation System (IGC/IOTWS). Its purpose is to support the establishment, effectiveness and on-going viability and enhancement of tsunami detection and warning systems using deep ocean monitoring stations (tsunameters). The ITP has since become an Action Group of the Data Buoy Cooperation Panel (DBCP), which is a subsidiary body of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM).</p> <p>Main requirements met;</p> <ol style="list-style-type: none"> <li>1. An exchange of information on new technologies and products and platform applications, including cabled tsunameter systems, and multi-role tsunameter platforms.</li> <li>2. Shared experiences and lessons learned on operational practices for tsunameter systems qualification, deployment, maintenance and operational monitoring.</li> <li>3. Determined the status of real-time Tsunameter data exchange for all buoy types across all networks.</li> <li>4. Collated and finalise the data on vandalism and sustainability as part of the vandalism report.</li> <li>5. Identified issues and identified emerging technologies that could address the near-field tsunami warning problem.</li> </ol>
<b>Area of interest</b>	Tsunami detection
<b>Type of platform and variables measured</b>	Deep Ocean Tsunameter consisting of a moored surface buoy or shore to sea cable system and a bottom pressure recorder measure absolute sea level height.
<b>Targeted horizontal resolution</b>	Along Tsunamigenic zones based on national warning centre requirements
<b>Chairperson/Managers</b>	Chair: Mr Ross Hibbins (AUS - BOM) Vice Chair: Dr. Bill Burnett (US - NOAA)
<b>Coordinator</b>	N/A
<b>Participants</b>	Bill Burnett – US – NDBC Eddie Bernard – US – PMEL Robert Lawson – US – SAIC Christian Meinig – US – PMEL Nick Street – UK – Sonardyne Dr. R. Venkatesan – India – NIOT Ken du Vall – US – Lighthouse R&D K. Premkumar – India – Win Marine Consultancy David McGilvray – Australia – Australian Maritime Systems



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	Hamed Al Gheilani – Oman – Ministry & Fisheries David Murphy – USA – Sea- Bird Electronics Djoko Hartoyo – Indonesia – BPPT Donna Kocak – US – Csnet Ken Jarrott – AUS – BOM Ross Hibbins – AUS – BOM
<b>Data centre(s)</b>	There is no international data centre that archives the high resolutions data for Tsunameters as yet. Tsunami Watch Centres manage the real-time tsunameter data they receive based on operational needs.
<b>Website</b>	
<b>Meetings</b> <i>(meetings held in 2010/2011; and planned in 2011/2012)</i>	Last meeting - ITP #7 Geneva, Switzerland (1 <sup>st</sup> October 2011) Next meeting – ITP #8 Perth, Australia (before DBCP-28)
<b>Current status summary</b> <i>(mid-2011)</i>	Refer to Annex 1 of Appendix J of DBCP-27 Doc No. 7
<b>Summary of plans for 2012</b>	Refer to Annex 1 of Appendix J of DBCP-27 Doc No. 7

**ANNEX V**

**REPORT FROM THE EXECUTIVE BOARD MEETING**  
(Geneva, Switzerland, 28 October 2011)

1. The executive board of the Data Buoy Cooperation Panel met at the WMO Headquarters on Wednesday, September 28, 2011. In attendance were Al Wallace (Chairperson and Vice-Chairperson for North America), Johan Stander (Vice-Chairperson for the Southern Hemisphere), Jean Rolland (Vice-Chairperson for Europe), R. Venkatesan (vice-Chairperson for Asia), Sydney Thurston (member at large), Frank Grooters (Finance Advisor), Etienne Charpentier (Secretariat – WMO), David Meldrum (Secretariat – IOC), Candyce Clark (OPA), Bruce Sumner (HMEI, representing the manufacturers), and Kelly Stroker (Technical Coordinator).

2. The Board considered a number of items including membership, succession planning for Board members, recruitment of the technical coordinator, and budget items.

1. Membership

The EB first consider membership of the executive, and decided to continue with the current configuration. The Chair will ask one of the manufacturers to participate as a Board member.

2. Succession planning for the Chair, and vice-Chairs

EB understands the need for succession planning. All members are currently in their 1<sup>st</sup> or 2<sup>nd</sup> terms, and so are eligible to continue. One EB member indicated an intention to retire within 2 years, and an initiative to seek a replacement will begin.

3. Panel Session format

The Board agreed that the new DBCP Session structure has been working effectively, and permitted savings on the travel & DSA of many participants (except for those attending the JTA the following week). The side meetings stimulated discussion. The Board agreed to leave open the possibility to have side meetings on the Weekend preceding the session or the week before. The Board recognized that some extra time might be needed for some of the groups.

Johan Stander agreed to work with the Secretariat for developing a standard template for the reporting of the vice-Chairs at DBCP Sessions.

4. DBCP Budget

There was considerable discussion on the budget and how to effectively manage in future years. While there is a surplus this year, budget projections indicate that the DBCP expenditures will soon exceed revenues. The EB reviewed the budget and directed expenditure reductions in a number of areas. The EB recommends supporting a number of initiatives in the coming intersessional period as detailed in the table below.

<b>Expense</b>	<b>Maximum expenditure</b>	<b>Comment</b>
Purchase of 5 iridium drifters to be deployed in areas where data timeliness continues to be an issue	USD 10,000	
Purchase of drifters from Marlin-Yug to be used in the inter-comparison study conducted by AOML	USD 13,000	
Support to the pilot project on assessing sea level pressure and the impact on NWP	USD 65,000	

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Providing funding to support the 2 year pilot for a Ship Coordinator	USD 40,000	2 years
Support to the Asian Capacity Building workshop	USD 20,000	
Support to the third DBCP Capacity Building workshop for the Western Indian Ocean region	USD 25,000	
Support to the drogue loss pilot project	USD 25,000	New ad hoc expense
Support to 2 workshops on satellite communications in 2011 and 2012	USD 20,000	New ad hoc expense (2 years)
Support to the PP-WET Pilot Project	USD 7,500	
Support to the HR-SST Pilot Project	USD 7,500	
Publications	USD 1,000	
Technical Coordinator (salary, benefits, relocation, liability)	USD 120,000	
Technical Coordinator's missions	USD 20,000	
Missions of the chair and other DBCP representatives as meetings of interest	USD 10,000	Decreased
JCOMMOPS logistics (DBCP share)	USD 10,000	DBCP share
JCOMMOPS logistics (SOT share)	USD 5,000	SOT share
JCOMMOPS Information System	USD 7,500	
Cooperative arrangements	USD 0	Decreased
Contingencies	USD 100,000	

The Board noted the JTA contribution of USD 65,000, and the SOT contribution of USD 30,000.

5. Seeking additional DBCP contributions

The EB will request Panel members to increase their contributions in the coming years. It is recognized that in these difficult fiscal times that may be a difficult task. The EB will request countries that participate on the Panel but do not make a contribution to begin providing financial support.

6. Implementation Strategy

EB members were invited to review the implementation strategy and provide comments to the Chair.

7. Working priorities for the Technical Coordinator

The EB discussed priorities for the TC for the coming year. It is recognized that the TC has just commenced work, and that there is a significant learning curve. The EB requested that priority be given to updating the web site information (JCOMMOPS and DBCP) and updating the metadata data base. The Secretariat and Chair will have ongoing discussions with the TC on her priorities, and include consideration of the action items from DBCP XXVI and DBCP XXVII.

8. Other issues

The Board invited the Panel to consider strengthening the links with the IMO, and requested Dr Venkatesan to make specific proposals in this regard.

A line item "Voluntary contribution" with remaining funds from the Manufacturers sponsorship will be established in the DBCP budget.

9. The meeting then concluded.

**ANNEX VI  
INTERIM STATEMENTS OF ACCOUNT**

**TABLE 1: IOC STATEMENT OF ACCOUNT FOR THE  
PERIOD OF 1 JANUARY 2011 ~ 31 JULY 2011**



195C/BC/2010

**INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION**

**DBCP/SOOP Technical Coordinator: Salary, Missions and Other Costs**

**(Statement of Account from 1 January 2011 to 31 July 2011)**

**(Expressed in US Dollars)**

Cash Balance Brought Forward as at 1 January 2011	130,555.13
Funds Received from NOAA	
<u>Debit</u>	
Disbursements	-
Cash balance as at 31 July 2011	<u>130,555.13</u>
Un liquidated Obligations	6,688.00
Funds available as at 31 July 2011	<u>124,087.13</u>

**Note:** The IOC Statement for the period 1 January 2010 to 31 December 2010 can be found in the DBCP Annual Report for 2010.

**TABLE 2: WMO INTERIM STATEMENT OF ACCOUNT  
FOR THE PERIOD 1 JANUARY 2011 TO 31 AUGUST 2011**



World Meteorological Organization  
Organisation météorologique mondiale

Secrétariat  
7 bis, avenue de la Paix - Case postale 2300 - CH 1211 Genève 2 - Suisse  
Tél : +41 (0) 22 730 81 11 - Fax: +41 (0) 22 730 81 81  
wmo@wmo.int www.wmo.int

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**DATA BUOY CO-OPERATION PANEL**  
**Interim Statement of income and expenditure**  
**For the period 1 January to 31 July 2011**  
Amounts in United States dollars

1. Balance brought forward 1 January 2011		371,771
2. Income:		
2.1 Contributions		110,493
2.2 Exchange differences		63,335
2.3 Total income		<u>173,828</u>
3. Total available funds during reporting period		545,599
4. Expenditure		
4.1 Direct project costs		
4.1.1 Travel of staff to other WMO meetings	(1,541)	
4.1.2 Travel - other representatives ad hoc travel	19,394	
4.1.3 Travel - other representatives to attend other WMO meetings	20,882	
4.1.4 Total direct costs	<u>38,735</u>	
4.2 Indirect project costs		
4.2.1 Support costs at 3%	1,162	
4.2.2 Bank charges	232	
4.2.3 Total indirect costs	<u>1,394</u>	
4.3 Total project expenditure		<u>40,129</u>
5. Balance of fund at 31 July 2011		<u>505,470</u>
<b>Contributions</b>		
Australia		15,374
CLB /Service Argos, France		35,269
France -Météo France		54,945
South Africa		4,905
Total		<u>110,493</u>

Certified correct:

*Luckson Ngwira*  
Luckson Ngwira  
Chief, Finance Division  
22 August 2011

Notes: The WMO Statement for the period 1 January 2010 to 31 December 2010 can be found in the DBCP Annual report for 2010.

**ANNEX VII**

**TABLE OF NATIONAL CONTRIBUTIONS FOR 2012**

<b>Budget Country</b>	<b>JCOMMOPS</b>	<b>DBCP</b>	<b>OceanSITES</b>	<b>SOT</b>	<b>JTA</b>	<b>COMMENT</b>
<b>Australia</b>	EUR 11,700		USD 5,000			JCOMMOPS: including DBCP and SOT
<b>Canada</b>	CAD 27,500					JCOMMOPS, including DBCP and SOT
<b>CLS</b>					USD 65,000	USD 15,00 for JTA Chairperson USD 30,000 for the JTA-Executive Committee <sup>1</sup> USD 10,000 for the IOC Secretariat (paid directly to IOC) USD 10,000 for the WMO Secretariat
<b>E-SURFMAR</b>		EUR 40,000				Belgium, Croatia, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, and the United Kingdom
<b>Germany</b>				EUR 3,600		Support to SOOP
<b>India</b>		USD 3,000				India to work at making its contribution in Euro
<b>New Zealand</b>	EUR 1,800					JCOMMOPS, including DBCP and SOT
<b>South Africa</b>		EUR 4,000				
<b>USA</b>		USD 75,000	(USD30,000)	USD 30,000		DBCP and SOT Contributions made to IOC. OceanSITES contribution made to CLS

<sup>1</sup> : Unspent JTA EC contribution from the previous year are deduced from this amount.

DBCP-XXVII, ANNEX VIII

**ANNEX VIII**

**BUDGET FOR THE NEXT YEAR**

*(finalized interim accounts based on WMO and IOC statements in Annex VI,  
and planned income / expenditures for the remainder of the year, 2011 and 2012)*

**TABLE 1: INTERIM BUDGET FOR 2011 BASED ON WMO AND IOC ACCOUNTING FOR 2011 IN USD AS AT 31 JULY 2011**

INTERIM BUDGET 2011 BASED ON WMO and IOC FINANCIAL ACCOUNTS FOR 2011 IN USD as at 31 July 2011 (budget for 2012 and 2013 updated in accordance with the decisions made at DBCP27 in

Item	Actual			Actual			Budget			Budget		
	2010 Receipts	2010 Obligations	Balance at 31 Dec.	2011 Receipts	2011 Obligations	Balance at 31 July	2012 Receipts	2012 Obligations	Balance at 31 Dec.	2013 Receipts	2013 Obligations	Balance at 31 Dec.
<b>DBCP</b>												
Carried over	464,590			502,326			635,920			461,897		
Contributions	<b>291,348</b>			<b>120,493</b>			<b>289,477</b>			<b>289,477</b>		
Adjustment	<b>33,771</b>			63,335								
<b>Expenditure</b>												
Technical Coordination		50,236						120,000			120,000	
TC Relocation		3,161										
Consultancy		13,800										
JTA (Chair, EC, Secretariat)		37,290			11,224			65,000			65,000	
Travel DBCP		34,506			7,302			30,000			30,000	
SOT incl. travel <sup>8</sup>					7,549			30,000			30,000	
Bank Charges/Support Cost		14,763			1,394			12,500			12,500	
IOC												
Marine Programme												
JCOMMOPS		39,112						34,500			34,500	
Outreach and Publications		634						1,000			1,000	
Iridium incl. upgrades S. Pacific								10,000			10,000	
New Technical Evaluation (PPs)		35,548						15,000			15,000	
SVP Intercomparison								13,000				
Drogues Loss								25,000				
SLP Pilot								32,500			32,500	
SOT Ship Coordinator								20,000			20,000	
Workshops								30,000			10,000	
Capacity Building		47,867			22,765			25,000			25,000	
Contingency		10,466						100,000			100,000	
Collaborative Arrangements								0			0	
<b>Total DBCP</b>	<b>789,709</b>	<b>287,383</b>		<b>686,154</b>	<b>50,234</b>		<b>925,397</b>	<b>563,500</b>		<b>751,374</b>	<b>505,500</b>	
Unliquidated obligations					6,468							
<b>Balance of DBCP Trust Fund</b>			<b>502,326</b>			<b>629,452</b>		<b>361,897</b>				<b>245,874</b>
<b>Contingency</b>								<b>100,000</b>				<b>100,000</b>
<b>Carried over</b>			<b>502,326</b>			<b>635,920</b>		<b>461,897</b>				<b>345,874</b>

Rough estimation based on Final Statement as at 31 December 2010

Rough estimation

Rough estimation

TABLE 1

**TABLE 2: INTERIM STATEMENT FOR THE 2011 DBCP TRUST FUND: INCOME AND EXPENDITURE IN USD<sup>115</sup>**

Interim Statement for the 2011 DBCP Trust Fund: Income and Expenditure in USD (Estimated budget 2011-2013 updated in accordance with decisions made at DBCP27 in *Italics*) (based on WMO and IOC Financial Information as at 31 July 2011)

DBCP	Final Statement 1 January-31 December 2010				Interim Statement 1 January-31 July 2011				Estimated budget		Estimated budget	
	Jan-Dec 2010	IOC	Estimated budget	IOC	Jan-Dec 2011	IOC	Estimated budget	IOC	Jan-Dec 2012	IOC	Jan-Dec 2013	IOC
<b>Receipts</b>												
Brought Forward	333,109	131,481	74,729	229,695	371,771	130,555	371,771	130,555	311,981	160,555	177,958	120,555
Contributions (listed below)	176,348	115,000	173,710	115,000	110,493	10,000	173,710	115,000	174,477	115,000	174,477	115,000
Adjustment	<b>33,771</b>				<b>63,335</b>							
<b>Total Receipts</b>	<b>543,228</b>	<b>246,481</b>	<b>248,439</b>	<b>344,695</b>	<b>545,599</b>	<b>140,555</b>	<b>545,481</b>	<b>245,555</b>	<b>486,458</b>	<b>275,555</b>	<b>352,435</b>	<b>235,555</b>
<b>Expenditure/Oblig'ns</b>												
Consultancy	13,800							10,000				
JTA (Chair, EC, Secr)	27,290	10,000	55,000	10,000	1,224	10,000	55,000	10,000	55,000	10,000	55,000	10,000
Tech Coordination		50,236		100,000				40,000		120,000		120,000
TC Relocation		3,161	5,000				20,000					
JCOMMOPS logistic supp %		32,433		15,000				15,000		10,000		10,000
JCOMMOPS logistic supp SOT									5,000			5,000
Marine Programme												
<b>Travel/Missions</b>												
Tech Coordinator	12,622		20,000				5,000		20,000		20,000	
DBCP Chairman	2,195		21,000		5,866		21,000		8,000		8,000	
DBCP Representatives	19,689		2,000		1,436		2,000		2,000		2,000	
Bank Charges/SuppCost/Other	5,133	9,630	2,500	10,000	1,394		2,500	10,000	2,500	10,000	2,500	10,000
<b>Projects &amp; Activities</b>												
Outreach and Publications	634		10,000				1,000		1,000		1,000	
JCOMMOPS Data Devt			7,000				5,000		12,000		12,000	
JCOMMOPS IS migration	6,679		30,000				30,000		7,500		7,500	
SOT			20,000		7,549		20,000		30,000		30,000	
Iridium incl. upgrades S. Pacific			0				15,000		10,000		10,000	
New Technical Evaluation (PPs)	30,000		30,000				12,000		15,000		15,000	
SVP Intercomparison									13,000			
Drogue Loss									25,000			
SLP Pilot									32,500		32,500	
SOT Ship Coordinator									20,000		20,000	
Workshops									30,000		10,000	
Capacity Building	25,000		25,000		22,765		45,000		25,000		25,000	
Contingency*	28,415	10,466	30,000	20,000			24,000	20,000	50,000	50,000	50,000	50,000
Collaborative Arrangement			20,000				0		0		0	
<b>Total Expenditure</b>	<b>171,457</b>	<b>115,926</b>	<b>277,500</b>	<b>155,000</b>	<b>40,234</b>	<b>10,000</b>	<b>257,500</b>	<b>105,000</b>	<b>358,500</b>	<b>205,000</b>	<b>300,500</b>	<b>205,000</b>
Unliquidated Obligations							6,468					
<b>Balance of Fund</b>	<b>371,771</b>	<b>130,555</b>	<b>-29,061</b>	<b>189,695</b>	<b>505,365</b>	<b>124,087</b>	<b>287,981</b>	<b>140,555</b>	<b>127,958</b>	<b>70,555</b>	<b>51,935</b>	<b>30,555</b>
Contingency carry over			30,000	20,000			24,000	20,000	50,000	50,000	50,000	50,000
Carried over	371,771	130,555	939	209,695	505,365	130,555	311,981	160,555	177,958	120,555	101,935	80,555
<b>Contributions</b>												
CLS/Argos Inc												
Australia # 1	5,150		21,350		15,374		21,350		21,124		21,124	
Canada \$	47,307		24,250				24,250		27,905		27,905	
CLS	55,000	10,000	55,000	10,000	35,269	10,000	55,000	10,000	55,000	10,000	55,000	10,000
E-SURFMAR *	53,981		58,000		54,945		58,000		54,611		54,611	
France(incl E-SURFMAR)*												
Germany #	5,000		5,000				5,000		4,915		4,915	
Greece												
Iceland												
India #	3,000		3,000				3,000		3,004		3,004	
Ireland												
Japan												
Netherlands												
New Zealand \$ 1	2,410		2,610				2,610		2,457		2,457	
Norway												
South Africa #	4,500		4,500		4,905		4,500		5,461		5,461	
United Kingdom												
United States of America		105,000		105,000				105,000		105,000		105,000
WMO												
<b>Total</b>	<b>176,348</b>	<b>115,000</b>	<b>173,710</b>	<b>115,000</b>	<b>110,493</b>	<b>10,000</b>	<b>173,710</b>	<b>115,000</b>	<b>174,477</b>	<b>115,000</b>	<b>174,477</b>	<b>115,000</b>

E=Estimate

\* Contingency for overspending  
Nw. Techn. Evaluation (\$5548)  
Cap. Building (\$22966)  
\*Contingency for Interviews  
Post TC DBCP (\$10466)  
%Payment \$16464 for 2009 and  
\$15969 for 2010

Final Statement 2010  
adjusted per WMO Statement  
of 22-8-2011  
Cap. Building total \$30314

Asia CB Workshop  
Satcom Forum Workshop Satcom Forum Workshop

Table 2

115: based on WMO and IOC Financial Information as at 31 July 2011



**TABLE 3 - ARGOS JOINT TARIFF AGREEMENT (JTA) EXECUTIVE COMMITTEE BUDGET**

**Argos Joint Tariff Agreement (JTA) budget within DBCP Trust Fund**

(as of 23 Aug 2011, [estimates in blue](#))

Item	Income/Expenditure	for JTA	JTA balance	for WMO	WMO balance	Comment
	USD	USD	USD	USD	USD	
<b>2010</b>						
Initial JTA balance			0		0	
CLS Contribution to DBCP TF at WMO (2010)	55,000.00	45,000	45,000	10,000	10,000	
Mission, J. Stander, JTA-EC, Sydney, 04/2010	-4,273.00	-4,273	40,727	0	10,000	
Mission, E. Charpentier, JTA-EC, Sydney, 04/2010	-3,321.00	-3,321	37,406	0	10,000	
Mission, J. Stander, JTA-30, Oban, 10/2010	-2,402.00	-2,402	35,004	0	10,000	
Mission, Greg Reed, IPET-DMI, 4/2010	-1,823.00	0	35,004	-1,823	8,177	
Frank Grooters JTA contract (SSA), 10/2010	-15,437.00	-15,437	19,567	0	8,177	
<b>2011</b>						
CLS Contribution to DBCP TF at WMO (2011)	35,269.00	25,269	44,836	10,000	18,177	
Mission, J. Stander, JTA-EC, Miami, 4/2011	-1,224.00	-1,224	43,612	0	18,177	
Mission, D. Meldrum, RMIC2, Tianjin, 7/2011	-2,583.00	0	43,612	-2,583	15,594	DSA paid (USD 904), ticket yet to be reimbursed
Mission, S. Issara, RMIC2, Tianjin, 7/2011	-3,829.00	0	43,612	-3,829	11,765	
Mission J. Trinanes, IPET/DRC, Melbourne, 9/2011	-2,100.00	0	43,612	-2,100	9,665	Planned expenditure
Mission ROC Botswana, JTA-31, Geneva, 9/2011	-4,000.00	-4,000	39,612	0	9,665	Planned expenditure
Mission J.Stander, JTA-31, Geneva, 9/2011	-4,015.00	-4,015	35,597	0	9,665	Planned expenditure
Frank Grooters JTA contract (SSA), 10/2011	-15,000.00	-15,000	20,597	0	9,665	Planned expenditure
Mission, E. Charpentier, RMIC RA-I, Casablanca, 12/2011	-2,000.00	0	20,597	-2,000	7,665	Planned expenditure
<b>2012</b>						
CLS Contribution to DBCP TF at WMO (2012)	34,403.00	24,403	45,000	10,000	17,665	Proposed income for 2012

**ANNEX IX**

**PROPOSED CHANGES TO THE TERMS OF REFERENCE OF THE DBCP AND ITS  
TECHNICAL COORDINATOR**

*Note: this is a track-changes version based on approved by WMO Resolution 4(EC-LXII) and UNESCO/IOC Resolution XVII-6. Additions are underlined. Deletions are ~~crossed-out~~.*

**Part A**

The Data Buoy Co-operation Panel shall:

Consider the expressed needs of the international meteorological and oceanographic communities for real-time or archival data from ocean-data buoys on the high seas, as well as rigs and platforms reporting surface marine meteorological and oceanographic data and request action from its members, the Technical Co-ordinator or Action Groups to meet these needs;

11. Co-ordinate activity on existing programmes so as to optimize the provision and timely receipt of good quality data and metadata from them;
12. Propose, organize and implement, through the co-ordination of national contributions, the expansion of existing programmes or the creation of new ones to supply such data;
13. Support and organize as appropriate such Action Groups as may be necessary to implement the deployment of data gathering buoys to meet the expressed needs of oceanographic and meteorological programmes such as WWW, WCRP, GOOS, and GCOS, GFCS, WIS, and WIGOS;
14. Encourage the initiation of national contributions to data buoy programmes from countries which do not make them;
15. Promote data exchange, including the insertion of all available and ~~appropriate buoy~~ relevant platform data and metadata into the Global Telecommunication System, and the submission of data and metadata to the appropriate archives;
16. Promote the exchange of information on data buoy activities and encourage the development and transfer of appropriate technology;
17. Ensure that other bodies actively involved in buoy use are informed of the workings of the Panel and encourage, as appropriate, their participation in the Panel deliberations;
18. Make and regularly review arrangements to secure the services of a Technical Co-ordinator with the terms of reference given in Part B;
19. Report formally to the Joint WMO / IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), and participate in and contribute to an integrated global operational ocean observing system, implemented and co-ordinated through JCOMM; and
20. Submit annually to the Executive Councils of the WMO and the IOC, to JCOMM and to other appropriate bodies of WMO and IOC, a report that shall include summaries of the existing and planned buoy deployments and data flow.

**Part B**

**Terms of Reference for the Technical Co-ordinator of the DBCP  
(Approved by WMO Resolution 4 (WMO EC-LXII) and UNESCO/IOC Resolution XVII-6)**

The Technical Co-ordinator of the Data Buoy Co-operation Panel shall:

10. Under the direction of the Data Buoy Co-operation Panel take all possible steps within the competence of the Panel to assist in the successful achievement of its aims;
  11. Assist in the development, implementation, and management of quality control procedures for ~~data buoy systems~~ relevant observing platforms;
  12. Assist in setting up suitable arrangements for notifying the appropriate user communities of changes in the functional status of relevant operational buoys observing platforms;
  13. Assist in the standardization of ~~buoy data~~ relevant observing platform formats, sensor accuracy, etc.;
  14. Assist when requested with the development of cooperative arrangements for buoy deployment;
  15. Assist in the clarification and resolution of issues between Service Argos and ~~buoy~~ relevant observing platforms operators;
  16. Assist in promoting the insertion of all available and ~~appropriate buoy~~ relevant observing platform data into the Global Telecommunications System;
  17. Supply information about buoy developments and applications to the WMO and IOC Secretariats and assist the Data Buoy Co-operation Panel to promote an international dialogue between oceanographers and meteorologists;
  18. Coordinate and monitor the flow of relevant observing platform ~~buoy~~ data into appropriate permanent archives.
-

**ANNEX X**

**DBCP IRIDIUM PILOT PROJECT UPDATE**

*(October 2011)*

1. The Iridium Pilot Project (IPP) was initiated by the Panel in 2007 with the objective of deploying and evaluating up to 50 Iridium equipped SVPBs throughout the global oceans. This was to be achieved cost-effectively by paying buoy manufacturers a nominal USD500 upgrade cost to convert conventional Argos equipped drifters, already being procured by buoy operators, to Iridium. In fact a number of buoy operators, notably ESURFMAR, Météo France and the Australian Bureau of Meteorology, elected to move to Iridium for their operational buoy fleets and did not call upon this upgrade offer, although they did remain participants within the IPP, in terms of notifying deployments and making data available to JCOMMOPS. As a result, more than 300 deployments have been made, although the original aim of a global distribution has not been fully achieved. Currently nearly 100 buoys report via the GTS, a number that has grown steadily over the lifetime of the project.
2. It was agreed at the last Panel session that remaining IPP funds should be used to upgrade drifters for deployment in those areas (Indian Ocean, S Atlantic and S Pacific) which continued to suffer from appreciable delays for data being transmitted by Argos. As a result, Météo France will use IPP upgrade funds to deploy a number of Iridium drifters in the S Pacific, whereas they have already deployed a number in the Indian Ocean entirely at their own expense.
3. Overall, as the trend towards longer buoy lifetimes continues, costs per observation for Iridium equipped drifters will tend to fall with respect to those for Argos SVPBs, especially for those users that are unable to benefit from the Argos large-user tariff. Typical yearly Iridium costs for an SVPB are USD200, compared to approximately 2000 euro for a European Argos user.
4. The IPP should now have completed its analysis phase but this has not been achieved for a number of reasons, including lack of available effort, lack of a TC and the fact that a number of IPP platforms are still operational. Thanks must go to Météo France in this regard for their efforts to continue deployments and to keep the IPP database updated.
5. Nonetheless, early analyses have clearly indicated the timeliness benefit that accrues from using Iridium, with the vast majority of data being delivered to agency processing centres within 30s of the time of transmission, and typically then being published on the GTS within 10 minutes or so. Further information and analysis on this important topic is presented under item 9.3.
6. It is recommended to the Panel that the IPP steering team should now disband, but that its chair, David Meldrum, in consultation with the TC and other experts, be tasked with completing the analysis, the publication of a final report, and the compilation of a best-practices guide for the use of Iridium in drifters.

---

**ANNEX XI**

**PROGRESS REPORT ON THE PILOT PROJECT FOR THE  
EVALUATION OF ARGOS-3 TECHNOLOGY**

Developments are being conducted in collaboration with the manufacturers (Pacific Gyre, Clearwater, Metocean, and Marlin-Yug). Michel Guigue (CLS) kept in contact with, and visited, most of the manufacturers of Argos 3 drifters during 2011. He also visited SIO twice to support the implementation of the Argos 3 PMT in a new drifter's microcomputer developed at SIO by the Drifters Lab. Regarding the manufacturers involved in the making of Argos-3 drifters:

**Pacific Gyre:** The Argos 3 drifters were built in the phase 1 of the project. Ten more units were built for phase 2, 7 of which have been deployed

**Clearwater:** All Argos 3 drifters built in phase 1 were deployed. Ten additional units were built for phase 2 and 9 of them were deployed. The failure rate is high.

**Metocean:** No more Argos-3 drifters were made.

**Marlin-Yug:** all the remaining buoys made in phase 1 were deployed.

*Data analysis and evaluation*

Similarly to the previous years, some PPT/system evaluations were done at CLS. A nearly final statistics are in the process of being completed at AOML (Mayra Pazos).

*Miscellaneous*

A careful evaluation of the new filtering method offered by CLS earlier this year (a Kalman filter, based on location fixes history, a velocity model and the actual Doppler frequency measurements) was performed by Dr. Luca Centurioni and Dr. Rick Lumpkin and other scientists that work with drifter data. The Global Drifter Program has decided to switch the whole drifter array from the least square location algorithm to the one that uses the Kalman filter. The new location technique should slightly increase the number of fixes of Argos 3 PMTs.

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**ANNEX XII**

**WORKPLAN OF THE PILOT PROJECT ON  
WAVE MEASUREMENT EVALUATION AND TEST FROM MOORED BUOYS (PP-WET)**

1. Coordinate intercomparisons of wave measurements from different platforms, on an opportunistic basis;
2. Publish intercomparison results and updated status reports on Pilot Project web site;
3. Develop a plan for a continuous testing and evaluation program;
4. Investigate the possibility of an alternative testing site if an ocean platform, were to be available through an industry partnership agreement; the evaluation framework would remain the same irrespective of the actual site;
5. Contribute to training material to educate users about how to deploy and operate wave sensors appropriately;
6. Contribute, as appropriate, to the JCOMM Standards and Best Practice Guides;
7. Decide if a case can be made to continue the pilot project for a further year and investigate follow-on mechanisms;
8. Present results to DBCP-XXVIII and other scientific fora.

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**ANNEX XIII**

**LIST OF COMPANIES WHO SPONSORED THE SESSION DINNER**

Approximately 70 delegates from more than 17 countries attended the annual session of the Data Buoy Co-operation Panel (DBCP), being hosted at the headquarters of the World Meteorological Organization from 26 to 30 September 2011. The DBCP came into existence in 1985, as weather forecasting agencies round the world moved away from ship observations towards small free-drifting data buoys, and encountered a whole new suite of problems concerning satellite communications and data quality, quantity and timeliness. Established under the auspices of the World Meteorological Organization (WMO) and the Intergovernmental Commission (IOC) of UNESCO, the DBCP receives funding from a number of countries and employs a Technical Coordinator, based in Toulouse, France. More than 25 years after its establishment, the DBCP is proud to coordinate the deployment and monitoring of more than 1300 drifting platforms, as well as a large number of deep-ocean moored buoys. These platforms are now used routinely by meteorological, oceanographic and climate agencies world-wide as part of the global environmental observing system. Other activities include the evaluation of new sensors, platforms and satellite communications systems that will eventually form part of the marine observing system of the future.

The following manufacturers and companies have sponsored the DBCP Session Dinner:

- Clearwater Instrumentation, Inc. - <http://clearwaterinstrumentation.com/>
- Collecte Localisation Satellites - <http://www.cls.fr/>
- Marlin Yug - <http://marlin-yug.com/>
- Metocean - <http://www.metocean.com/>
- Pacific Gyre, Inc. - <http://www.pacificgyre.com/>
- RDSEA and Associates, Inc. - <http://rdsea.com/>
- Technocean, Inc. - <http://www.technocean.com/>

For further information go to [www.jcommops.org/dbcp](http://www.jcommops.org/dbcp)

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## ANNEX XIV

### RECOMMENDATIONS REGARDING DATA BUOY VANDALISM

The DBCP Technical Document No. 41<sup>116</sup> recommends a nine point international action plan to build our understanding of the problem of data buoy vandalism, mitigate the impact on human communities, and promote public education to protect ocean observing networks and save human lives:

- Recommendation 1: Improve the ocean observing platform design to make more impervious to damage and install other mechanisms to prevent access to the individual buoys.
- Recommendation 2: Redesign networks and their operations to promote avoidance.
- Recommendation 3: Upgrade network operations to improve their availability
- Recommendation 4: Promote improved data exchange and network optimization in the Indian Ocean Tsunami Warning System that will establish enough redundancy to provide warnings even with outages.
- Recommendation 5: Encourage nations to recognize the issue of marine platform vandalism and develop, harmonize, and coordinate statutes to protect ocean observing systems.
- Recommendation 6: Call on Fisheries Management and Regulatory Bodies to develop measures and strategies to help mitigate the damage to ocean observing systems.
- Recommendation 7: Develop more reliable and consistent methods of maintaining records about vandalism that can be cross-referenced and analyzed to understand the global costs of the problem.
- Recommendation 8: Encourage States party to the Law of the Sea Convention to use this legal instrument to promote protection of ocean observing networks.
- Recommendation 9: Expand international education and outreach to both emphasize the importance of ocean observing systems and how everyone can help protect these systems from vandalism and negligent damage.

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116 : [http://www.jcomm.info/index.php?option=com\\_oe&task=viewDocumentRecord&docID=7150](http://www.jcomm.info/index.php?option=com_oe&task=viewDocumentRecord&docID=7150)



**ANNEX XV**

**GOALS FOR THE THIRD DBCP IN-REGION  
WESTERN INDIAN OCEAN CAPACITY BUILDING WORKSHOP (WIO-3)  
(Mombasa, Kenya April 2012)**

- Continue to Build Capacity Within Regional Institutes to Apply New Indian Ocean Observing System (IndOOS) Data, such as from RAMA and others, for Enhanced Predictive Capability for the Region as for Fisheries Management and Extreme Events,
- Continue to Find Synergy between DBCP in-situ ocean observations and Satellite Observations of the Regional Africa Monitoring of the Environment for Sustainable Development (AMESD),
- Enhance Coordination and Cooperation between TT-CB and WMO Regional Association (RA-I),
- Ensure advanced scientific and logistics information is conveyed to Participants well in advance of the Workshop,
- Demonstrate the Crucial Role of Ocean Observations for Understanding and Predicting Regional Weather, Ocean and climate,
- Discuss ways to mitigate implementation constraints by Regional Piracy to include potential coordination with African Ministerial Conference on Meteorology (AMCOMET),
- Continue to Build In-Region Modelling Development Teams (MDT) and Observation Development Teams (ODT), including for the implementation of buoy programmes, by ensuring continuity of Participants from WIO-2,
- Learn practical implementation aspects for the deployment of operational data buoys at sea, the collection of buoy data, and related data management,
- Learn Practical Application of Regional Models for Addressing Impacts from Climate Change in the Coastal and Marine Environment and ensure Trainees have similar tools at their home institute to follow-up intersessionally,
- Become Familiar with Tools for Identifying and Accessing Operational Data Streams for ocean/weather/climate Model Assimilation,
- Validate Model Products from Indian Ocean Observations,
- Coordinate Regional Institutes for Increasing in-situ Western Indian Ocean Observations to include enhanced coordination with DBCP International Buoy Program for the Indian Ocean (IBPIO),
- Utilize advances in Information and Communication Technology (ICT) to facilitate more effective Outreach and Capacity Building Activities on a larger scale.

## ANNEX XVI

### TERMS OF REFERENCE, DRAFT WORKPLAN AND INITIAL MEMBERSHIP OF THE HIGH RESOLUTION SST PILOT PROJECT (PP-HRSST) STEERING GROUP

Following a dialogue between the DBCP and the Group for High Resolution Sea Surface Temperature (GHRSSST), the 26<sup>th</sup> session of the DBCP recognised that drifter SST was critical for the validation of satellite-derived SST, and that the resolution and accuracy of currently reported drifter SST was inadequate. The Panel accordingly decided to establish a Pilot Project for HRSST, overseen by a Steering Group (SG), and with a defined workplan and a three-year duration. A draft of the Terms of Reference of the SG, its possible membership, and a workplan are listed below.

#### Terms of Reference of the SG

1. The SG will work closely with the GHRSSST to:
  - a. agree and review instrumentation standards
  - b. identify optimal target ocean areas that will be likely to deliver a high number of matchups and demonstrate the impact of drifter HRSST within the project lifespan
  - c. secure sufficient funding to allow the project to proceed expeditiously
  - d. work with buoy agencies and manufacturers to allow a sufficient number of upgraded HRSST drifters to be procured and deployed in the chosen target area(s)
  - e. ensure that HRSST data flow onto the GTS and are clearly identified as HRSST in associated meta-data and/or bulletin headers
  - f. assist in the analysis of the impact of the data on satellite SST retrievals
  - g. report to the Panel at its annual sessions and in the published literature
2. The SG chair and vice chair will be appointed by the Panel, and will recruit other members of the team, drawn from buoy operators, manufacturers, the scientific community, GHRSSST, end-users and other interested parties.
3. The SG chair will convene annual meetings of the SG, will communicate regularly with SG members by e-mail, and will report annually to the Panel.

#### Workplan

##### *Year 1: Planning*

1. Form SG and agree on working procedures
2. Recruit additional members as required, including key players from within the GHRSSST
3. Review progress to date with Metocean HRSST-1 and HRSST-2 drifters
4. Ensure that proposed technology solutions adequately address GHRSSST requirements
5. Identify the cost of an HRSST upgrade and identify buoy operators and manufacturers willing to participate in the PP
6. Work proactively with GHRSSST and buoy operators to define and cost a practicable PP plan
7. Present this plan to the annual GHRSSST science meeting (June 2012) and secure GHRSSST financial support
8. Draw up a detailed costed implementation plan for approval at DBCP-XXVIII

##### *Year 2: Implementation*

1. Agree a deployment schedule with buoy operator(s)
2. Procure HRSST upgrades
3. Oversee calibration/recalibration protocols
4. Implement BUFR encoding for HRSST data
5. Monitor buoy deployments, data flow and data ingestion by GHRSSST

6. Present at GHRSSST science meeting (June 2013)
7. Make interim report to DBCP-28

*Year 3: Analysis*

1. Continue with deployments as far as possible within budget
2. Attempt recovery of failed or failing buoys for analysis and sensor post-calibration
3. Review technology and data-flow performance and make recommendations as appropriate
4. Work with GHRSSST to identify impacts and shortcomings of PP
5. Agree recommendations for future activities, if any
6. Report to GHRSSST science meeting (June 2014)
7. Final report to DBCP-XXX
8. Work with GHRSSST on a journal article
9. Disband

**Membership**

Chair (DBCP appointee)  
Vice chair (DBCP appointee)

DBCP chair (*ex officio*)  
DBCP TC (*ex officio*)  
Buoy programme manager(s)  
Buoy data analyst(s)  
Buoy manufacturer(s)  
GHRSSST representative(s)  
Oceanographic user(s)  
Secretariat (*ex officio*)

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**ANNEX XVII**

**PROPOSAL FOR A PILOT PROJECT ON THE**

**“EVALUATION OF THE IMPACT OF SEA LEVEL ATMOSPHERIC PRESSURE DATA OVER THE OCEAN FROM DRIFTING BUOYS ON NUMERICAL WEATHER PREDICTION MODELS”**

**(Proposal from the Cooperative Institute for the Marine Ecosystem and Climate at the Scripps Institution of Oceanography to the Data Buoy Cooperation Panel)**

**By**

**Luca Centurioni**

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**1. Summary**

A DBCP pilot project that has the overall goal to evaluate the impact of air pressure measurements from drifters on NWP is proposed. The specific goals of the projects are to 1) quantify the impact of SLP data from the existing SVPB network on improving the quality of NWP; 2) Provide a scientific/operational rationale for designing the temporal and spatial resolution, as well as the optimal geographical distribution of the SVPB array taking into account all sources of data (e.g. moorings, ships). To accomplish the goals we propose the following actions: 1) assess the state of the art on the impact of sea-level air pressure data from drifters on NWP quality and leverage on existing resources to address specific aspects of the present array design and 2) evaluate the need for extending the already planned Observing System Experiments (OSEs) and design new OSEs and Observing System Simulation Experiments (OSSEs) to assist the GDP managers and contributors in optimizing the barometer drifter array and in securing funds. Action 1 will be addressed during phase 1 of this project. At the end of phase 1 the need to continue the project will be reassessed and, if needed, action 2 will be addressed with an extension of this pilot project (phase 2).

**2. Background**

The Global Drifter Program (GDP) [Niller, 2001] is the principal international component of the Joint WMO-IOC Technical Commission for Oceanography and Marine Measurements Meteorology (JCOMM) “Global Surface Drifting Buoy Array”. It is a Scientific Project of the Data Buoy Cooperation Panel (DBCP) of World Meteorological Organization (WMO) and the /International Intergovernmental Oceanographic Commission of UNESCO (IOC) contributing data in real-time and delayed-mode on a free and unrestricted basis to the programs of both Organizations, including the WMO-IOC-UNEP-ICSU Global Climate Observing System (GCOS), the WMO-IOC-UNEP-ICSU Global Ocean Observing System (GOOS), the WMO World Weather Watch (WWW), and the developing Global Framework for Climate Services (GFCS). In addition to serving the needs of scientific users in physical oceanography and beyond, GDP data thereby contribute to Numerical Weather Prediction (NWP), Ocean Mesoscale Forecasting, climate monitoring, marine services, marine climatology, and emerging climate services.

The GDP is a near-operational ocean-observing network that, through the ARGOS and Iridium satellite systems and the Global Telecommunication System (GTS) of the WWW, returns real time data primarily on ocean near-surface currents, Sea Surface Temperature (SST) and Sea-Level Atmospheric Pressure (SLP). The GDP provides a data processing system for the scientific utilization of these data. In addition to GDP-funded cruises (via NOAA), drifters are deployed by operational oceanographic and meteorological agencies and individual scientific research projects. These data are utilized by the GDP and in turn, GDP data are made available to operational users and to scientists at large [see *Lumpkin and Garzoli, 2005; Maximenko et al. 2009* for examples of scientific use of drifter data]. Wind-sensors, salinity sensors [*Reverdin et al, 2007*] and thermistor chains [*Black et al., 2007; Centurioni, 2010*] are also added to drifters, presently for specific operational and research requirements. The international protocols for these data exchanges and sensor additions are worked out each year by the DBCP.

SLP measurements are made from SVPB drifters (B stands for barometer) with an accuracy of +/- 1hPa [*Sybrandy et al. 2009*]. Deployments of SVPB drifters began in 1979, with large-scale deployments beginning around 2000. Surface pressure sensors, supported primarily by the Cooperative Institute for the Marine Ecosystem and Climate (CIMEC) with NOAA funds and to a lesser extent by NMHSs based on regional needs, now amount to about half of the drifters in the global array. Much of the barometer upgrades are therefore supported by climate research money while they have direct use for NWP assimilation. This proposed pilot project will help demonstrate the value of atmospheric pressure data from drifters in improving the weather forecast.

Since September 2005, the GDP array is made of 1250 drifters (nominal) with a 5°X5° global coverage. The array is composed of the NOAA/GDP supported drifters (~85%), purchased directly by CIMEC and by the Atlantic Oceanographic and Meteorological Laboratory (AOML) with NOAA funds, and of drifters fully or partially funded by international oceanographic and meteorological agencies (about 150 to 200 per year) and other principal investigators who are contributing to the GDP by making their data publicly available. In turn, their data is included in the GDP real-time data that is placed on to the GTS.

SVPB drifters-borne SLP measurements are widely recognized by meteorological agencies as a very important source of data for assimilation in Numerical Weather Prediction (NWP) models. The requirements for the SVPB array are described in the DBCP implementation strategy documents, which are revised every year. Emphasis in such documents is given to deployments in the tropical regions and in maintaining an array of 300 SVPB drifters in the southern ocean south of 40°S. Even sparse SLP data from SVPB drifters are regarded as a valuable validation tool for NWP pressure fields. While the DBCP has recommended outfitting the whole GDP array with barometers by 2012, the current funding level suggests that this target will be delayed.

It is proposed here to engage several DBCP members in a pilot project which has the overall goal to carefully quantify the role of SLP from drifters in improving the skills of NWP models.

### **3. Objectives**

Given the increasing cost of maintaining the GDP array, mainly influenced by inflation and rising energy costs, all of which is offsetting the purchasing power of the steady GDP US budget at CIMEC and AOML, there is urgency to optimize the SVPB drifter array implementation strategy. The objective of the proposed pilot project is two-fold:

- 1) Quantify the impact of SLP data from the existing SVPB network in the presence of high-density surface wind observations from satellite on improving the quality of NWP;
- 2) Provide a scientific/operational rationale for designing the temporal and spatial resolution, as well as the optimal geographical distribution of the SVPB array taking into account all sources of data (e.g. moorings, ships).

It is anticipated that addressing these two objectives will assist the GDP in planning the implementation, possible expansion and/or re-distribution of the SVPB array and will provide CIMEC, AOML and its international partners with guidelines for the technical developments of future SVPB platforms. The results of this project will also provide national policy makers and funding agencies with a solid background and a scientifically sound foundation to promote, support and eventually enhance the global SVPB array.

#### 4. Work Plan

The proposed work requires the active collaboration of NMHSs (specifically weather prediction centers) with their oceanographic counterparts.

OSes run by ECMWF to evaluate the impact of marine buoys and ship-borne SLP data [Andersson, 2009] have shown a large impact of such data on forecast accuracy, especially in the short term forecasts (48 to 72 hours) and that there is little need to enhance the North Atlantic array, which presently serves the forecast needs of Europe and North America. The ECMWF report also highlights the significance of SLP data over the ocean in improving the forecast of large storms and the need to run longer OSE to evaluate the impact of such data in rain forecast. This pilot project will also look at these issues.

It is worth noting that the WMO Commission for Basic Systems (CBS) has proposed addressing:

*What density of surface pressure observations over ocean is needed to complement high-density surface wind observations from satellites? Suggestions: (a) network density reduction OSE in N.Atlantic, (b) southern oceans OSSE*

as part of the forthcoming fifth International Workshop on the Impact of Observations on NWP (Sedona, Arizona, USA, 22-25 May 2012).

To address objective 1 we propose to run a set of “data denial/Observing System Experiments (OSE)” in the regions which are presently well populated with SVPB drifters and in few selected ocean areas not presently covered by SLP observations. The pilot project members will then address the issue of finding the resources to deploy SVPBs in such sparsely populated areas, such as the Arctic regions in boreal summer and the equatorial and tropical regions of the Pacific Ocean where tropical cyclones form. We anticipate that boreal summer deployment opportunities for SVPB drifters in the Arctic Ocean will arise in concert with several, already planned, US field programs (for example by ONR and NOAA, via the International Arctic Buoy Program).

To address objective 2, OSes will be run in regions populated with SVPB Iridium buoys to investigate the effect of downgrading the temporal resolution of SLP data. A global OSSE is also proposed to evaluate the optimal geographical distribution of SVPB resources and to evaluate the need for hourly, low latency, SLP data.

**The proposed duration of this pilot project is of one year (phase one), with the option to extend it by one year (phase 2).**

**In phase one** of the pilot project we will investigate the state of the art OSE on the impact of SLP from the existing network. ECMWF has already run a two month long global OSE targeted for the North Atlantic and it is currently running a six month long OSE. It is proposed to leverage on the existing resources by:

1. Investigating the possibility to expand the OSE planned at ECMWF in the near future to specifically address and isolate, **globally**, the effect of drifter-borne SLP observations for a period exceeding two to six months;
2. Supporting the attendance of approximately five members of the pilot project steering team at the upcoming fifth Workshop on the impact of observational data on NWP, Sedona, Arizona, USA, 22-25

May 2012. The purpose of this action will be to organize a side meeting with the NWP experts to present this pilot project, recruit participants, and plan with a greater level of details the proposed OSE (i.e. defining/adopting metrics, duration of OSE and global focus and planning a new OSE);

3. Investigating the possibility to run OSE with DBCP member's assets (e.g. Environment Canada, South Africa Weather Services);

4. Quickly compiling a report, which will be distributed to DBCP members, focused on the effect of drifter-borne SLP based on the existing OSE run at ECMWF and on the existing published literature and reports (ECMWF, EUMETNET and Météo-France are willing to share the results from their exiting studies);

At the end of phase one the need for continuing this pilot project will be reassessed. If necessary, a revised document will be submitted to the DBCP Panel with a request to support phase 2. It is anticipated that phase 2 will address the need to run new OSEs and to run OSSEs to better utilize existing SVPB resources and support funds for the expansion of the SVPB network if necessary.

### **5. Timeline and Budgetary Considerations**

The proposed duration of this pilot project is of one year (phase one), with the option to extend it further by one year (phase 2). During year 1, the GDP in partnership with Météo-France continues providing the pilot project members and ECMWF with a comprehensive quality controlled SVPB-SLP dataset. A mix of Argos and Iridium SVPB drifters will be deployed in poorly sampled areas which are deemed important by the pilot project members to support the OSE. The pilot project members will continue and enhance the collaboration with ECMWF for coordinating the OSE/OSSE efforts, for investigating the possibility to expand the scope of the already planned OSE and to plan at least a new OSE. The results of the first year of activities will be reported at the annual DBCP meeting.

In year 2 (optional) a workshop will be organized (location TBD), in which the results of year 1 experiments will be reviewed, a refined experimental strategy will be discussed and more experiments will be run. SVPB deployments in sparsely populated areas will continue. A final report will be produced at the end of year two. A preliminary budget of \$65K for phase one is requested to cover the cost of one OSE (\$40K) and meeting attendance (\$25K).

### **6. Proposed list of participants: steering committee**

Dr. Luca Centurioni (SIO) chair  
Dr. Rick Lumpkin (AOML) co-chair  
Jean Rolland (E-SURFMAR)  
Johan Stander (SAWS)  
Julie Fletcher (MSNZ)  
Pierre Blouch (MF)  
Val Swail (EC)  
Etienne Charpentier (WMO)

### **List of Participants**

David Meldrum  
Chris Marshall (EC)  
Ignatius Rigor (UW)  
Graeme Ball (BMM)  
Jon Turton (UKMO)  
NWP modelers (to be identified)

### **7. Terms of Reference**

The objectives outlined in the proposal fulfill the overall goal of this pilot project, which is to quantify the impact of SLP data over the ocean in improving the quality NWP outputs. It is anticipated that

proposed approach will be discussed, revised and adopted in year 1. The deliverable of this project will be a written report containing a set of recommendations, for the benefit of both scientists and policy-makers, on the requirements and best practices for managing the SVPB drifter array.

Dr. Centurioni and Dr. Lumpkin, who will be chairing this effort, represent the oceanographic component of the team. They will have an active role in planning the experiments, facilitating the drifter deployments and in the interpretation of the results. The other members of the pilot projects will be responsible to initiate and maintain a dialog with their offices and international agencies such as ECMWF to recruit the required numerical tools and human resources needed to run the proposed OSEs, OSSEs and to perform the data analysis, and will also contribute to the interpretation of the results.

Financial support will be sought from DBCP, and is required to accomplish the tasks described in the work plan.

### 8. References

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**ANNEX XVIII**

**ACTION LIST / WORKPLAN**

**DBCP WORKPLAN FOR THE NEXT INTERSESSIONAL PERIOD (2012)**

**-1- DBCP WORKPLAN**

*(ongoing actions from this and past Panel Sessions; actions arising from this Panel Session are indicated in bold)*

<b>No</b>	<b>Ref item</b>	<b>Action Item</b>	<b>Who</b>	<b>Supported by</b>	<b>Reporting to</b>	<b>When</b>	<b>Status</b>
		<b>ADMINISTRATIVE</b>					
1	D22/8.6.1.1, D22/9.3.2	To check the DBCP list of National Focal Points for logistical facilities and report discrepancies, changes, or additions to the WMO Secretariat.	Panel members	WMO Secretariat	WMO Secretariat	Continuous	Ongoing
2	D22/10.3.1	To inform chairman of her wish or otherwise to continue to work as TC/DBCP.	TC		Chair	End of each contract	Ongoing
3	D22/10.3	Continue the arrangements (including finance) to secure the services of a technical coordinator..	Chair	Secretariat	Secretariat	Continuous	Ongoing
4	D23/6.7.; D22/7.2.12	To consolidate and publish the Panel's session report (web only) and Annual Report (CD-ROM and web).	Chair, Secretariat	TC	Executive councils of WMO & IOC	End of each year	Ongoing
<b>5</b>	D27/13.1	to publish the written reports, as well as others submitted to the Secretariat before 30 November of year YYYY, in the Panel's Annual Report for YYYY	Secretariat		Panel	Early YYYY+1	
<b>6</b>	D27/13.2	Members who had not submitted National Reports for the year YYYY to submit their input to the Secretariat before the end of the year YYYY	Panel members		Panel	31 Dec. YYYY	
<b>7</b>	D25/11.6.2, D26/12.2.2, D27/12.2.2	The Panel recalled the dynamic nature of the DBCP Operating Principles document and invited its members to provide the Chairperson with comments by the end of the year.	Panel members	Chair	Chair, Panel	End of each year	Ongoing
8	D25/11.6.2	Collate Updates to the DBCP Operating Principles document.	Chair	Secretariat	Chair	End of each year	Ongoing
9	D26/9.3.11	to check the JCOMM list of NFP for logistic facilities and submit changes to the Secretariat .	NFP	Secretariat	Secretariat	ongoing	Ongoing
10	D26/9.5.4	to assist on developing collaborations with the IHO and the IMO, and to report at the next Panel Session .	WMO Secretariat		Panel	DBCP-28	
<b>11</b>	D27/11.2.2	to make that sure the new draft ToR of the DBCP are submitted to JCOMM-IV for endorsement	Secretariat		JCOMM-IV	end 2011	

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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
12	D27/11.5.3 (iv)	to deliver RMIC certificates officially to USA and China during JCOMM-IV	Secretariat		JCOMM-IV	JCOMM-IV	
13	D27/12.0.2 (iii)	to prepare a standard template for the reporting of the vice-Chairs to Panel Session	J. Stander	Secretariat	Panel	DBCP-28	
14	D22/10.4, D27/12.4.1	To review programme and establish working priorities of the technical coordinator. (DBCP-27: to revise the list of prioritized tasks for the Technical Coordinator as agreed at the previous Session, and discuss execution details with the Technical Coordinator)	Chair	EB, Panel members	Panel	asap after Panel Session	Ongoing
15	D26/5.12 (iv), D27/5.6, D27/12.4.2	to undertake the tasks as proposed by the Chair and to report at the next Panel Session (DBCP-27: to address during the next intersessional period as a matter of priority the high priority activities identified at DBCP-26)	TC	Panel members, EB, Secretariat	Panel	asap/ongoing	Ongoing
<b>CAPACITY BUILDING</b>							
16	D23/4.3.6, D27/6.4.2 (viii)	To develop and keep up to date standardized training materials in parallel with the organization of training programmes. To investigate ways to add training material from all capacity building activities to IOC/IODE OceanTeacher.	TT-CB	Secretariat	Panel	Next Panel Session	Ongoing
17	D27/9.2.8	to consider inviting mariners and shipping companies to the DBCP Capacity Building workshops as a way to advertise the ocean observation activities and seek their support	TT-CB	Secretariat	Panel	DBCP-28	
18	D22/2.2.1.2 (xii); D22/4.3.3; D22/4.3.5	To organize Capacity Building activities (training workshops, training materials, identifying lecturers).	TT-CB	Secretariat	Panel	Next Panel session	Ongoing
19	D22/4.3.6	To investigate on possible cooperation with relevant Capacity Building programmes in WMO and IOC.	Secretariat	Chair	Panel	Next Panel session	Ongoing
20	D27/6.4.2 (i), D27/6.4.2 (ii)	To convene the Third DBCP In-Region Western Indian Ocean Capacity Building Workshop, April 2012, Mombasa, Kenya. To coordinate workshop preparations with the DBCP, KMD, Kenya Marine & Fisheries Research Institute, NOAA/OCO, AMESD, and ASCLME	TT-CB: Ali S. Mafimbo, Thurston, Secretariat		Panel	Nov 2011	
21	D27/6.4.2 (iii)	to continue to build Observation Development Team (ODT) and Modelling Development Team (MDT) with Met/Ocean Institutes in the Western Indian Ocean Region	TT-CB	Secretariat	Panel	DBCP-28	
22	D27/6.4.2 (iv)	to Assemble a Team to explore recent advances in Information and Communication Technology (ICT) to help facilitate more effective DBCP TT-CB Outreach and Capacity Building Activities on a larger scale	TT-CB	Secretariat	Panel	DBCP-28	
23	D27/6.4.2 (v)	to Enhance Coordination and Cooperation between TT-CB and	TT-CB	WMO	Panel	DBCP-28	

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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
		WMO Regional Associations		Secretariat			
24	D27/6.4.2 (vi)	to Discuss Preparations and Funding Impact for an additional “South Asia Capacity Building Workshop” in Chennai India in November 2012	TT-CB & R. Venkatesan	Secretariat	Panel	DBCP-28	
25	D27/6.4.2 (vii)	to Discuss Preparations for an additional “NE Asia Capacity Building Workshop” in Jeju South Korea in 2012	TT-CB	Secretariat	Panel	DBCP-28	
		<b>DATA COLLECTION</b>					
26	ToR	To follow up and possibly assist in implementing requirements expressed by the buoy users within the Argos system..	CLS	TC	Panel, JTA meeting	Continuous	Ongoing
27	D23/8.4.2.4	To continue review of satellite data telecommunications systems – particularly supporting the DBCP Iridium Pilot Project.	D. Meldrum, TC	Panel members	Panel	Continuous	Ongoing
28	D23/8.4.2.2	To share experiences regarding usage of various satellite communications systems for buoy data and participate in the DBCP Iridium pilot project.	Panel members	Chair & TC	Chair	Continuous	Ongoing
29	D23/8.4.1.10	To notify of all deployments of Iridium Drifters via a dedicated mailing list (iridium-pp@jcommops.org) and eventually via a notification web page on the JCOMMOPS web.	Participants in IPP	TC	JCOMMOPS	Continuous	Ongoing
30	D26/6.1.5 (1)	to promote standardization of data transmission formats using DBCP-M2 concept . DBCP-27: TTDM has continued to encourage manufacturers to use standard DBCP-M2 formats and to add additional data if necessary as requested by buoy owners at the end of the existing data format.	TT-DM	TC	Panel	ongoing	Discussed at DBCP-27
31	D26/7.4.4; D24/8.4(iv)	to investigate the possibility of installing a third new station over the southern parts of the Indian Ocean to further improve data timeliness across the entire basin .	JTA & CLS		Panel	JTA-31	
32	D26/8.1.5	to investigate means for the production of a best-practice guide for the use of Iridium in drifters based on the collective experience gained from the Iridium PP .	IPP	TC	Panel	DBCP-28	
33	D27/4.2.2.3	to provide special attention to buoy data reception	INMARSAT		Panel members	ongoing	Ongoing
34	D27/8.1.7 (i)	to complete the IPP analysis, the publication of a final report, and the compilation of a best-practices guide for the use of Iridium in drifters.	David Meldrum & TC		Panel	DBCP-28	
35	D27/8.1.7 (ii)	to continue seeking improvements in Iridium buoy energy efficiency through the implementation of improved power management schemes and the latest low-power GPS receivers.	Buoy Manufacturers		Panel members	ongoing	
36	D27/8.2.4	to summarize the conclusions of the Argos-3 Pilot Project in the view to publish them as a DBCP Technical Document	L. Centurioni	Secretariat	Panel	end 2011	
37	D27/9.3.5	to deploy Iridium drifting buoys in the areas of the South Pacific	Panel members		Panel	DBCP-28	

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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
		Ocean and the South Atlantic Ocean were the average delays are greater than 120 minutes					
38	D27/9.5.9 (ii)	the operators of Iridium drifters to continue to actively report metadata to each other upon deployment beyond the life of the Iridium Pilot Project	Panel members	TC	Panel	ongoing	Ongoing
39	D27/10.4.9	to develop a short position paper regarding the 1-stop shop Iridium data processing and seek community approval	David Meldrum & CLS		Panel	asap	
40	D27/11.5.3 (viii)	to participate in the international forum of users of satellite data telecommunication systems for environmental use once established	Satcom operators		Satcom Forum	DBCP-28	
41	D22/11.1	To make recommendations to the following JTA Session.	Chair		JTA, Panel	JTA Session	Ongoing
42	D27/10.4.10	to develop a draft business case 1 stop-shop Iridium data processing, based on various funding scenarios, using their knowledge of the likely costs	CLS		Panel	mid 2012	
43	D27/10.4.11	to report back to the next Panel session regarding the 1-stop shop Iridium data processing, at which point the Panel would decide whether or not to proceed to an open ITT for an 1SS	David Meldrum & CLS		Panel	DBCP-28	
44	D27/10.4.12	to keep the Panel fully informed and involved with regard to the establishment of an international forum of users of satellite data telecommunication systems	D. Meldrum		Panel	ongoing	
		<b>DATA EXCHANGE</b>					
45	D23/3.3.8	To identify sources of buoy data not currently reported on the GTS and determine reason for non-availability, (particularly for the Arctic Buoys IABP)..	TC & CLS	Panel members & Secretariat	Chair & Panel for information	Continuous	Ongoing
46	D21	To routinely provide the list of moorings reporting in SHIP or BUOY format.	Panel members	TC	Panel	2013	
47	D25/10.2.5; D24/12.1.14 .	to contribute to feeding the JCOMM database extreme wave events when such events are observed by data buoys and are recorded by Panel Members.	Panel members	NODC	Panel	Continuous	Ongoing
48	D26/6.1.5 (3), D26/5.12 (i), D25/10.2.4, D24/12.1.5	to include drifter data in "The Oceanographer's and Marine Meteorologist's Cookbook for Submitting Data in Real Time and In Delayed Mode" cookbook From DMCG April 2010. Action 45 (ref. 7.1.1.1 (ii)).	TC, TT-DM	NDBC, Secretariat, OPA & DMPA Chairs	JCOMM DMCG	Continuous	Ongoing
49	D27/6.1.2 (ii), D26/6.1.5 (2)	to assist Pierre Blouch and Jon Turton in preparing a methodology to compare non-GTS buoy data with NWP/Ocean models, open to anyone via the web. (Continuation of DBCP-25 Action 8.8.2). TC to report any progress made with respect to related web tools by	TT-DM	TC	Panel	DBCP-28	DBCP-27: Progressing

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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
		the next DBCP Session.					
50	D26/6.1.5 (5)	to assess the adoption of BUFR by GTS nodes and ensure that all data that is expected is definitely received at modeling and archiving centers (especially ISDM, NODC and ECMWF) by reviewing the differences between BUFR and BUOY messages received at each center .	TT-DM & TC	Secretariat	Panel	DBCP-28	DBCP-27: TC to follow up
51	D25/8.6.3, D24/10.5.3	To review of the buoy template for buoy data (for additional metadata and to cater to different platforms, and pilot projects e.g. waves) and propose creation of additional template(s) if required.	TC	TT-TDC		Continuous	Ongoing
52	D27/11.2.9, D27/11.2.10 , D27/6.3.6, D26/6.1.5 (6)	to consider the BUFR template(s) for moored buoys (e.g. met. buoys, waves, OceanSITES), profiling and sub-surface & surface wave gliders, and to recommend by end 2011 the approach(es) to be put to the JCOMM Task Team on Table Driven Codes (to include new requirements for observations, as well as the additional metadata identified as critical). Drafts to be circulated at DBCP-28.	TT-MB, TT-DM	TC	Panel	DBCP-28	Progressing
53	D27/9.5.9 (iii), D26/9.6.7 (3)	to participate actively in the JCOMM Task Team on Table Driven Codes (TT-TDC) and to work more closely on the development and testing/validation of BUFR templates for marine platforms.	Panel members	TT-TDC	Panel	DBCP-28	DBCP-27: new recommendations made
54	D26/9.8.2	to check with operational users of BUFR reports whether there are any discrepancy between the BUOY and BUFR reports received by those centres and whether any changes need to be made in the reporting of BUFR messages in the view to fix any possible problem and properly complete the migration of GTS distribution of buoy data to BUFR in 2012 .	TC	Panel members	Panel	DBCP-28	
55	D26/10.2.3	the users of the RNODC/DB and SOC/DB products to provide feedback to ISDM and Météo France respectively, and propose further improvements if needed .	Panel members		ISDM & Météo France	ongoing	
56	D27/6.1.2 (i)	to implement the required changes for all 5-digits old WMO numbers be converted to use the equivalent 7-digit WMO number to refer to drifters in all metadata files (e.g. GDP deployment log, JCOMMOPS cross-reference lists, etc)	GDP & JCOMMOPS		Panel	DBCP-28	
57	D27/6.1.2 (iv)	to monitor GTS bulletin headers used for GTS distribution of buoy data, reconcile the differences found, and publish the list on the JCOMMOPS website and Meteo-France QC tools	Météo France & ISDM, JCOMMOPS		Panel	ongoing	
58	D27/6.1.2 (v)	to communicate to GTS data users that they will stop receiving	WMO Secretariat		Panel	DBCP-28	

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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
		BUOY reports from drifters using 7-digit WMO numbers, as such reports will only be distributed in BUFR format					
59	D27/6.1.2 (vi)	to inform all GTS focal points that the BUFR subcategory for "missing value" is being changed from the currently used value of 255 to 25, to conform with WMO rules	WMO Secretariat		Panel	DBCP-28	
60	D27/6.1.5	to coordinate this activity, and report findings at the next Panel Session: The GDP DAC, the two data management centres for drifting buoys, and JCOMMOPS to monitor the situation regarding the various sources for GTS insertion of buoy data	TC	AOML, RNODC/DB, SOC/DB, JCOMMOPS	Panel	DBCP-28	
61	D27/7.3.5	to contact the programme operators to promote data exchange and GTS distribution of the data in real-time	I. Rigor	TC	Panel	ongoing	
62	D27/7.8.8	to play an active role in the development of strategy and workplan for a new Marine Climate Data System (MCDS) in the view to have the OceanSITES Data System contribute to the MCDS	OceanSITES	TC	Panel	Nov. 2011	
63	D27/9.3.6	to work with Panel members, the Task Team on Data Management, and CLS in the view to establish a monitoring scheme (i.e. regular (every 6 months) assessments of the global data buoy timeliness by jointly comparing the JCOMMOPS Delay Maps and the Argos Data Mean Disposal Time Maps for that time period), and to report on preliminary results, and proposed scheme at the next Panel Session	TC	TT-TDC, CLS	Panel	DBCP-28	
64	D27/11.2.11	to participate actively in the JCOMM Task Team on Table Driven Codes and to work more closely on the testing and use of BUFR templates for marine platforms	Panel members	TC, TT-TDC	Panel	DBCP-28	
65	D26/10.2.5; D26/11.2.9; D25/9.2.4; D24/11.2.5; D23/7.1.5	to collaborate in the integration of SOC/DB and RNODC/DB into a single system of dedicated centres contributing to the ODP, and with specialized functions (archive, QC, monitoring, etc.).	SOC/DB & RNODC/DB	Secretariat	DMCG Chair & Panel	end 2010	
<b>METADATA</b>							
66	D27/11.5.3 (ii), D26/6.3.3, D24/10.5.6; D23/6.14; D21/8.6.4.5.	Buoy operators to provide metadata to JCOMMOPS; Manufacturers to collaborate with buoy operators and JCOMMOPS and submit the instrument/platform metadata using the recommended mechanisms (paying particular attention to SST and SSS data); both to comply with buoy metadata collection scheme. DBCP-27: JCOMMOPS to negotiate metadata formats on ad hoc basis	Buoy operators & manufacturers	TC	Panel	Continuous	Ongoing
67	D27/9.5.9 (iv), D26/6.3.3,	to investigate using other formats such as NetCDF for the collection of moored buoy metadata, including in close cooperation	TT-MB, TT-DM	TC	Panel	DBCP-28	

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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
	D26/9.6.9	with the OceanSITES. DBCP-27: JCOMMOPS to negotiate metadata formats on ad hoc basis.					
68	D26/6.3.3	to develop a web interface and file upload .	JCOMMOPS		Panel	DBCP-28	
69	D26/6.3.3	to regularly forward collected metadata to the ODAS Metadata Service (ODASMS, China) .	JCOMMOPS	Secretariat & ODASMS	Panel	Ongoing	
70	D26/9.1.2	to collaborate with the HRSST Pilot Project Steering Team and assist in setting up appropriate arrangements regarding the collection of required metadata .	JCOMMOPS	TC	Panel	DBCP-28	
71	D26/9.6.7 (2)	to review the categories defined by the Task Team on Moored buoys, and to forward comments to Bill Burnett and Jon Turton .	Panel members	TT-MB	W. Burnett & J. Turton	DBCP-28	DBCP-27: some progress. TC to finalize specification for metadata collection
72	D26/9.6.8	to address the issue of providing moored buoy metadata through website(s), and make recommendations in this regard .	TIP	JCOMMOPS	Panel	ASAP	
73	D27/6.2.4	to provide GDP/AOML with manufacture dates for all buoys built within the last 5 years.	Manufacturers	AOML	Panel	ongoing	
74	D27/6.2.4	to provide barometer/SLP data to the GDP/AOML	Met. Services	TC	Panel	ongoing	
75	D27/6.2.4	to incorporate manufacture date and barometer death date into the GDP (AOML) metadata and make it available online (including creating additional columns in the GDP metadata)	AOML		Panel	ongoing	
76	D27/6.2.4	to provide drifter specifications on all drifters in the GDP metadata (this manufacturing number/code is to be listed and used to reference buoy types, as well as any changes made to the buoy)	AOML		Panel	asap	
77	D27/6.3.8 (i)	to follow up on actions related to the metadata issue that were agreed upon at DBCP-26, and discussed above, to report at the next Panel Session	TC		TT-MB	DBCP-28	
78	D27/8.6.3	to work closely with the OceanSITES, particularly on harmonizing data management aspects, including metadata between these two groups	IOCCP	TC	Panel	asap	
79	D27/9.5.9 (v)	to review the categories defined by OceanSITES and to forward comments to the OceanSITES Data Management Team co-lead	Panel members	TC	OceanSITES	March 2012	

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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
		(Bill Burnett)					
80	D27/11.5.3 (vi)	to make sure that discovery metadata about buoy observational data-sets are properly compiled and made available through the Ocean Data Portal (ODP) and the WMO Information System (WIS) using the required ISO-19115 profiles	Panel members	TC, Secretariat	Panel	ongoing	
		<b>FINANCES</b>					
81	D27/11.6.10, D26/11.6.12 (1), D25/10.6.7	Liaise with Mr Frank Grooters for updating the interim financial report with the most accurate and current information..	EB	F Grooters		End of each year	Ongoing
82	D27/11.6.11, D26/11.6.12 (2), D25/10.6.7	The joint Secretariats and the DBCP financial advisor to work together to distribute the final statement for the previous year to the Panel members as soon as the IOC and WMO Final Statement of accounts for that year are finalized. Statements to be included in the DBCP Annual report.	Secretariat	F Grooters	Panel members	Jan. each year	Ongoing
83	D27/12.0.2 (iv), D26/12.0.2 (2)	to write to a number of countries not currently contributing to the DBCP Trust Fund (e.g. Brazil, China, Republic of Korea, Japan, etc. ) and seek their contribution	Secretariat		Panel	DBCP-28	
84	D27/11.1.3	to continue their budgetary contribution to the Trust Fund in Timely manner	Panel members			continuous	
85	D27/11.6.14, D26/11.1.7	to facilitate the transfer of sufficient funds from the DBCP Trust Fund at the WMO to the DBCP Trust Fund at the IOC if needed to permit covering all related expenses from the IOC	WMO Secretariat			DBCP-28	
86	D21	To identify necessary funding to allow for expansion of JCOMMOPS and AIC staffing and resources..	Secretariat & Panel members	OCG	Panel	Next Panel session	
87	D22/10.1.8; D22/10.1.10	To prepare and distribute revised budget estimates for the following year, and final financial statement.	Finance Advisor	Secretariat & Chair	Panel	March each year	Ongoing
88	D22/10.1.10	To prepare interim statement of the budget for the next DBCP session.	Finance Advisor	Secretariat	Panel	July each year	Ongoing
		<b>IMPLEMENTATION</b>					
89	D27/5.10	to make use of the barometer drifter upgrade scheme (see <a href="http://www.jcommops.org/dbcp/platforms/barometer.html">http://www.jcommops.org/dbcp/platforms/barometer.html</a> ) by purchasing barometers for GDP-funded SVP drifters and negotiating their deployment positions with AOML	Panel members	AOML	Panel	ongoing	
90	D27/11.3.1; D27/11.3.2.1	to take the recommendations from the IOC XXVI Assembly and the WMO 16th Congress into account when developing their activities in support of the Panel	Panel members	Secretariat, TC	Panel	ongoing	
		<b>IMPLEMENTATION STRATEGY</b>					
91	D25/11.1.1.4.2.5;	To finalise updates to the DBCP implementation strategy ( DBCP TD 15) including reference to the Capacity Building efforts being	Chair	Panel members	Panel	End of each year	Ongoing



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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
	D23/4.3.10.4.4.1; D22/4.2.3.	undertaken by the Panel – feedback sought by members .					
92	D27/12.1.1, D26/12.1.1	to review the DBCP Implementation Strategy document at <a href="http://www.jcommops.org/doc/DBCP/DBCP_Impl_Strategy.pdf">http://www.jcommops.org/doc/DBCP/DBCP_Impl_Strategy.pdf</a> and to forward any comments to the Chairperson by the end of November each year	Panel members	Secretariat	Chair & Panel	Nov. each year	
93	D27/12.1.1	to provide to the Secretariat an updated map for figure 2 in the DBCP Implementation Strategy document	TC		Secretariat	Nov. 2011	
<b>IMPLEMENTATION / ACTION GROUPS</b>							
94	ToR	To support, as required, existing DBCP action groups, and provide assistance on request to other internationally coordinated buoy programme developments..	TC & Secretariat	Chair	Panel	Continuous	Ongoing
95	D20	To coordinate with IOP implementing strategy for the Indian Ocean Observing System as far as data buoys are concerned..	IBPIO	Chair, TC, Secretariat	Panel	Continuous	Ongoing
96	D23/4.2.4; D16	To produce a table of national commitments in the Southern Ocean. To seek additional commitments for barometer upgrades, and deployment opportunities in the Southern Ocean to achieve a level of 300 buoys south of 40S..	TC	Panel members	Panel	Continuous	Ongoing
97	D27/7.4.4	to request all African countries to provide their plans to the various Action Groups of the DBCP with specific reference to buoy deployments in the Indian and Atlantic Ocean, and including all logistical arrangements	WMO Secretariat		Panel	end 2011	
98	D27/7.7.4	to inform the NPDBAP Coordinator about deployment opportunities in the Sea of Okhotsk	Panel members	TC	NPDBAP	DBCP-28	
99	D26/7.5.4	to establish contacts with the IPAB Coordinator, and other sponsors such as WCRP and SCAR and seek enhanced communication for the future .	A. Wallace	Secretariat & TC	Panel	DBCP-28	
100	D27/7.5.3	to liaise with Mr Johan Standers and approach IPAB in the view to have their operating principles updated according to the DBCP proposal	I. Rigor	Secretariat	Panel	DBCP-28	
101	D27/7.5.4	to reinvigorate IPAB, and plan an IPAB meeting in the foreseeable future	IPAB	Secretariat	Panel	DBCP-28	
102	D27/10.5.1	to submit a proposal for an ITP Pilot Project to the DBCP Executive Board	ITP	TC, Secretariat	Panel	asap	
<b>IMPLEMENTATION / LOGISTICS</b>							
103	D27/9.2.3, D27/9.5.9, (i)D23/7.2.4; D23/8.6.1.1; D22/8.6.1.13	To provide information on deployment opportunities to JCOMMOPS (preferably through a national website similar to AOML, NDBC and Canada) for all buoys, as well as to continue e-mail notifications as necessary – annual reports, action group	Panel members & TT-CB	TC	JCOMMOP S & Panel	Continuous	Ongoing

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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
		annual planning, ship schedules, national plans, national contact points etc. To subscribe on the list and systematically post their deployment opportunities on the ships@jcommops.org mailing list as well					
104	D19	To maintain close links with SOT members so that support on deployment opportunities can be obtained from the SOOP and VOS panels of SOT..	Chair	TC	Panel	Continuous	Ongoing Discussed at PMO IV & followed up.
105	D23/8.6.1.10	To provide information to Panel members or on its website, about where inventories of buoys are held, to aid in deployment planning..	GDP		Next Panel session	Continuous	Ongoing . DBCP-27: To be discussed
106	D26/11.2.11, D23/8.5.1.8; D22/8.5.1.9.; D22/8.5.3.	To implement JCOMMOPS work-plan – particularly with respect to Deployment opportunities.	TC & TC/Argo	JCOMM	Next Panel session	Continuous	Ongoing
107	D26/9.6.6 (v), D26/9.6.7 (1)	to provide recommendation to moored buoy operators on the required content as well as possible formats (i.e csv, XML etc.) for more effective and consistent exchange of deployments .	JCOMMOPS	TT-MB	Panel	DBCP-28	
108	D26/11.4.2	to keep the Panel informed of future developments and opportunities regarding the OceanOBS'09 Task Team activities for assisting other observing groups .	D. Meldrum	Secretariat	Panel	ongoing	
109	D27/9.2.4	to consider using the Lady Amber on a cost-shared basis for the deployment of drifters, e.g. in the Southern Hemisphere data sparse areas	Panel members	JCOMMOPS	Panel	ongoing	
110	D27/9.2.5	to review the Terms of Reference of the JCOMMOPS “Ship Logistics Coordinator” position, provide feedback, and consider funding part of it as of 2012	Panel members	JCOMMOPS	Chair	Nov. 2011	
11	D26/9.3.7	to provide a table of inventories at its various warehouses to the Technical Coordinator before June each year, so that it can be presented to the Panel at each DBCP Session, and therefore assist Panel members of identifying how they can assist with the deployments. .	R. Lumpkin	Panel members	TC	June each year	
		<b>MONITORING</b>					
112	ToR	To maintain a list of national contact points for the DBCP and	Secretariat	Panel	Chair &	Continuous	Ongoing

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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
		within other relevant bodies with potential for involvement in DBCP activities..		members	Panel for information		
113	D23/8.4.2.4	To maintain a catalogue of existing ongoing ocean data buoy programmes.	TC	Panel members & Secretariat	Chair & Panel for information	Continuous	Ongoing
114	D21	To provide input on buoy models for JCOMMOPS database.	Manufacturers	TC	Panel	Continuous	Ongoing
115	D21	To provide Service Argos with list of most used buoy models and formats they operate.	Manufacturers	TC	Service Argos	Before deployment	Ongoing
116	D24/12.5.5	Investigate developing an easy-to-calculate global statistic that reports the status of the array, also taking into account drifter distribution targets.	TT IBPD			DBCP-28	
117	D26/9.6.10	to assist JCOMMOPS in feeding its database and undertaking its monitoring activities by routinely and operationally providing JCOMMOPS with buoy deployment and daily location information.	GTS data processing centres	TC	JCOMMOPS	DBCP-28	
118	D27/5.5, D27/9.3.4	to resume DBCP monitoring activities, and reconstruct the missing records and monitoring products, including the DBCP monthly maps normally produced by JCOMMOPS for the end of 2010 and the beginning of 2011	TC	Argo TC, CLS	Panel	asap	
119	D27/5.9	to investigate the causes of discrepancies with regard to the number of buoys reporting pressure from the Southern Hemisphere, to work with Panel members on possible solutions, and to report findings at the next Panel Session	TC	Panel members	Panel	DBCP-28	
120	D27/6.1.2 (iii), D27/9.3.3	to resume producing the cross reference list of WMO IDs vs. Transmitter ID operationally	TC		Panel	asap	
121	D27/9.3.7	to make their "timeliness maps" available publicly on a routine basis	CLS	TC	Panel	asap & ongoing	
122	D27/9.4.2	to update the template for DBCP National Reports in the view to include a section permitting the reporting of vandalism incidents	Secretariat	ITP	Panel	DBCP-28	
123	D27/10.1.5	to review the content of the Google Earth Argo products. Temperature and Salinity overlays and adapt the product to DBCP needs	TC		Panel	DBCP-28	
124	D27/11.3.2.3	to investigate how a systematic survey of marine meteorological and oceanographic observations (to assess the strength and weaknesses of Member countries) could be realized in the view to make a proposal at the next Panel Session	TC	Secretariat	Panel	DBCP-28	
125	D26/10.3.6	to make the information from CLS on the new monitoring tools available via its website .	JCOMMOPS	CLS	Panel	DBCP-27	
		<b>REQUIREMENTS</b>					
126	ToR	To maintain summary of requirements for buoy data to meet	TC	Panel	Chair for	Continuous	Ongoing

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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
		expressed needs of the international meteorological and oceanographic communities.		members & Secretariat	presentation to the Panel		
127	D24/12.1.13	to address user requirements and particular observing systems deficiencies as expressed in the JCOMM Statement of Guidance for Ocean Applications.	Panel members		Panel	Continuous	Ongoing
		<b>INFORMATION EXCHANGE</b>					
128	D22/7.2.3	To provide info/materials for DBCP/JCOMMOPS websites (news, brochure).	Panel members	TC	Panel	Continuous	Ongoing
129	D21	To actively communicate with national coordination for GEO to fully inform on the Panel's activities and capabilities in this regard..	Panel members		Panel	Continuous	Ongoing
130	D23/6.7	Compile a CD-ROM of scientific and technical workshop at the last Panel Session.	Chair & Secretariat	TC	Executive councils of WMO & IOC	End of each year	Ongoing
131	D26/13.2, D25/12.1	To submit their national reports to the Secretariat before the end of the year (input submitted before 30 November to be published in the Panel's Annual Report).	Panel members	Secretariat	Secretariat	30 Nov. each year	
132	D27/2.2, D26/2.7	to submit their papers via e-mail or CD-ROM to the Workshop Chairperson, via electronic format (MS Office compatible format only) .	S&T workshop authors	Secretariat	Chairperson	30-Nov each year	
133	D26/6.2.6 (1)	to identify authors who are willing to provide the updates to DBCP related standards document as listed on the DBCP website.	TT-IBP	TC & Secretariat	Panel	Continuous	
134	D26/13.1	to publish the national reports in the Panel's Annual Report .	Secretariat	Panel members	Panel	Early-2011	
134	D27/2.3	to act as Co-chairperson for the Workshop and assist with its organization from a regional perspective	W. Burnett & R. Hibbins	Secretariat	Panel	DBCP-28	
136	D27/9.1.3.3	to publish the DBCP Technical Document No. 42 on the JCOMM website	Secretariat		Panel	asap	
		<b>INSTRUMENT PRACTICES</b>					
137	D27/6.2.3	to start systems for record keeping for instrument calibration, replacement and validation that conform to ISO recommended specifications	Panel members	TT-IBP	Panel	ongoing	
138	D26/6.3.4	in liaison with Johan Stander (South Africa) and the TT-IBP, to address the issue of developing a proper certification process, and procedures for the calibration, and investigate what calibration information should be collected internationally and recorded in the ODASMS .	TT-MB	TT-IBP & J. Stander	Panel	DBCP-28	DBCP-27: Feedback needed
139	D21	To review best practices prior to drifter purchase for safety, and GTS data processing purposes.	Panel members	TT-IBP & TC	Panel	Continuous	Ongoing

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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
140	D24/12.6.8.4	to follow the best practices and standards eventually proposed under WIGOS, and in particular, to provide the buoy platform / instrument metadata to JCOMMOPS, META-T servers, and the ODASMS as appropriate.	Panel members	TC & Secretariat	Panel	Continuous	Ongoing
141	D24/12.1.2	Seek information from Panel members on data buoy-related instrument Best Practices, calibration procedures, and standards for inclusion in the JCOMM Catalogue of Best Practices and Standards.	TC		Panel	End 2008	Commenced
142	D25/7.3.7	Progress with its work on Wave Drifter tests as quickly as possible, and to interact with other groups, such as ESA, who were pursuing initiatives to improve the quality of in situ data in support of cal/val activities for a number of Essential Climate Variables (ECVs).	David Meldrum & PP-WMD		Panel	asap	
143	D26/11.2.8	to look at those buoy related practices elements, identify appropriate publication(s) to which the identified observation practices should be relocated, and make recommendations to the CBS as appropriate .	TT-DM	D. Meldrum; Secretariat	Panel	asap	
144	D26/11.5.10	to address the recommendations from the WMO-BIPM workshop .	PP-HRSST	Secretariat	Panel	ongoing	
145	D27/11.5.3 (iv), D26/11.5.5	to use the RMIC facilities as appropriate, and participate at future workshops	Panel members	Secretariat	Panel	ongoing	
146	D27/11.5.3 (v), D24/10.7.3	Investigate participating in the Association of Hydro-Meteorological Equipment Industry (HMEI - <a href="http://www.hydrometeoindustry.org/">http://www.hydrometeoindustry.org/</a> ) as a way to be represented at JCOMM meetings.	Manufacturers		Panel	Continuous	Ongoing
147	D26/12.1.3	to include requirements for traceability to standards, and instrument calibration in the Implementation Strategy, and to provide input to the Chair and the Secretariat .	Panel members	Secretariat	Chair & Panel	30-Nov-10	
148	D27/9.1.1.3	to review the content of the DBCP web page on best practices and to provide feedback to the Technical Coordinator as appropriate.	Panel Members	TC	Panel	DBCP-28	
<b>QUALITY MANAGEMENT</b>							
149	D27/11.5.3 (vii)	to comply with the WMO Quality Management Framework (QMF) and quality management principles	Panel members	Secretariat	Panel	ongoing	
<b>QUALITY MANAGEMENT / INSTRUMENT EVALUATION</b>							
150	D27/2.1.5	to consider further research with regards to the cause of buoy failures for the last 10 years (incl. providing break down with regard to the failing of buoys at deployment, drogue loss, and the number of days transmitting for each manufacturer during the period; Findings shall be submitted to the DBCP Scientific and Technical workshop in 2012)	AOML		Panel	DBCP-28	

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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
151	D27/6.2.2	to review their procedures, and resume reliable functioning of SVPBs	Manufacturers		Panel	asap	
152	D27/9.7.5 (ii)	to establish a detailed chronology of drogue loss events from the historical record, going back as far as possible	R. Lumpkin		Panel	DBCP-28	
153	D27/9.7.5 (iii)	to cross-correlate the two chronologies (i) drogue design changes, and (ii) drogue loss events, in the hope of elucidating critical design changes	L. Centurioni & R. Lumpkin		Panel	DBCP-28	
154	D27/9.7.5 (iv)	to reactivate dormant actions to deploy intensively instrumented drifters that would allow detailed characterization of drogue performance and attendant stresses on its connection to the buoy hull	L. Centurioni & A. Sybrandy		Panel	DBCP-28	
155	D26/6.2.5	to address a number of issues (HRSST, life time of drogues, quality of pressure data, environmental impact of drifters, Using solar cells on drifters) .	TT-IBP	TC & Panel members	Panel	Ongoing	
156	D27/9.7.5 (i)	to establish a detailed chronology of drogue design changes, going back as far as possible	L. Centurioni		Panel	DBCP-28	
157	D27/9.7.4; D27/9.7.6	The in-session ad hoc working group on the drogue loss/detection issue to constitute itself as a working group within the existing TT-IBP, and to work by e-mail to agree a structure and workplan regarding the drogue loss/detection issue by the end of October 2011.	ad-hoc drogue loss task team & Chair TT-IBP		Panel	31 Oct 2011	
<b>QUALITY MANAGEMENT / INTERCOMPARISONS</b>							
158	D26/8.4.10	to contact the Chairperson of the PP-WET in case they are undertaking wave observation and evaluation activities .	Panel members	TC	PP-WET Chair	ASAP	
159	D27/8.3.5 (ii)	to deploy the Scripps GPS sensor within the PP-WET evaluation and inter-comparison exercise.	PP-WMD & PP-WET		Panel	asap	
160	D27/8.3.5 (iii)	to give early consideration to a protocol for characterizing the performance of the sensor when incorporated within a SVP drifter hull.	PP-WMD & PP-WET		Panel	mid-2012	
161	D27/8.4.10	to assist the PP-WET Pilot Project and play a role in PP-WET activities (by existing RMICs with wave capability, and particularly the RMIC for RA-IV)	RMIC RA-IV & II		Panel	ongoing	
162	D27/11.5.3 (iii)	to contribute to the development of JCOMM guidelines for marine instrument intercomparisons through the Pilot Project on Wave Measurement Evaluation and Testing (PP-WET), and the Task Team on Instrument Best Practices and Drifter Technology Development (TT-IBP), and liaise with the JCOMM Observations Coordination Group (OCG) as appropriate	TT-IBP		Panel	DBCP-28	
163	D27/8.4.9 (i), D26/8.4.9 (i)	to organize a third meeting of the PP-WET Steering Team in	PP-WET &	TC	Panel	ASAP	

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No	Ref item	Action Item	Who	Supported by	Reporting to	When	Status
		November 2011.	Secretariat				
164	D27/8.3.5 (i)	to review PP-WMD chair and membership, and consider possible incorporation of PP-WMD within PP-WET	EB		Panel	asap	
<b>QUALITY MANAGEMENT / QUALITY CONTROL</b>							
165	ToR	To coordinate operations of DBCP QC guidelines..	TC	Panel members & Data Quality centres	Panel	Continuous	Ongoing
166	D23/8.1.2	To encourage other centres to act as PMOC and existing centres to invest more resources in the implementation of QC guidelines.	Panel members	TC	Panel	Continuous	Ongoing
167	D26/5.12 (iii)	to add the appropriate tests and procedures regarding Quality Control of Salinity Data to the DBCP Technical documents which already exist .	TT-IBP	TC & Secretariat	Panel	DBCP-27	
<b>SAFETY / VANDALISM / SECURITY</b>							
168	D17	To enhance buoy safety through improved design (refer recommendations) and keep the Panel informed about related changes..	Manufacturers & Panel members	Panel members, TC	Panel	Continuous	Ongoing
169	D22/8.6.5.2	To design deployment packages for safe deployments from 20m height from 25 knots ships.	Manufacturers	Evaluation Group	Next Panel session	DBCP-26	
170	D27/9.4.11	to collect statistics and information on actual vandalism occurrences, and maintain relevant information on the DBCP website	TC		Panel	ongoing	
171	D27/9.4.11	to propose a methodology, and conduct comprehensive cost-benefit assessments and risk-value analyses in the view to present its findings at the next Panel Session	Vandalism WG		Panel	DBCP-28	
172	D27/9.4.12	to make sure the data buoy vandalism aspects are being addressed as part of its activities	TT-CB		Panel	ongoing	
<b>TECHNOLOGY DEVELOPMENT</b>							
173	D27/8.5.2	to pursue GHRSSST regarding its response and contribution to the PP-HRSST as a matter of urgency.	PP-HRSST	Chair, Secretariat	Panel	DBCP-28	
174	D27/8.6.2	to work with Dr Telszewski to progress on investigating adding biogeochemical sensors to data buoys	TC & M. Telszewski	TT-IBP	Panel	DBCP-28	
175	D27/8.5.4	to develop a PP-HRSST workplan for the next three years and to report back to the next Panel session on its progress	PP-HRSST	TC	Panel	DBCP-28	
176	D27/8.5.5	to finalize the membership of the PP-HRSST	EB		Panel	asap	
177	D26/8.3.1	to conduct a full desk study of the new literature on wave-spectral measurements, to contact the main players in the field and to propose an action plan for consideration by the Executive Board and by the Panel at its next session .	D. Meldrum		EB & Panel	DBCP-27	

**2- RECOMMENDATIONS**

*(ongoing recommendations from this and past Panel sessions; recommendations arising from this Panel Session are indicated in bold)*

<b>CAPACITY BUILDING</b>			
<b>No.</b>	<b>Ref.</b>	<b>Recommendation</b>	<b>By</b>
1	DBCP-26 / 11.3.13 (i)	The Panel agreed that it should continue to be involved in Capacity Building activities, including through the provision of funding from its Trust Fund;	Panel
2	DBCP-26 11.3.10	to discuss the issue nationally in the view promote the commitments of WMO Members to PANGEA activities through the VCP	Panel members

<b>DATA EXCHANGE</b>			
<b>No.</b>	<b>Ref.</b>	<b>Recommendation</b>	<b>By</b>
3	DBCP-26 / 9.6.6 (iii)	DBCP has only just begun to develop a new BUFR template for drifting and moored buoy data. To make progress on this, a clear strategy for collaborating with the JCOMM TT-TDC in future, is necessary.	TT-DM
4	DBCP-27 / 6.1.4, DBCP-26 / 9.8.1	To keep the same WMO number for a mooring's position as long as moorings are maintained at that position. In case a mooring ceases to be maintained at a given position, the WMO number should not be re-used for another location. 7-digit WMO numbers for drifters or for moorings should not be reallocated, until available numbers are exhausted, which is not expected to happen in the foreseeable future.	Panel members
5	DBCP-26 / 11.2.15 (iii)	The Panel invited its members to contribute to the JCOMM Extreme Wave database by submitting information on extreme wave events to the US National Oceanographic Data Center (NODC).	Panel members
6	DBCP-26 / 6.3	to consider reporting as much OceanSITES buoy data as possible in real-time through the GTS.	OceanSITES

<b>FINANCES</b>			
<b>No.</b>	<b>Ref.</b>	<b>Recommendation</b>	<b>By</b>
7	DBCP-27 / 11.6.8 DBCP-26 / 11.6.11 (1)	to consider contributing to the DBCP/SOOP Trust Fund in Euros.	Panel members
8	DBCP-27 / 11.6.9 DBCP-26 / 11.6.11 (2) & 11.1.7	Panel members should pay their contributions in a timely fashion.	Panel members
9	DBCP-27 / 11.6.9 DBCP-26 / 11.6.11 (3) DBCP-25 / 10.6.7	Panel members not contributing to the Trust Fund are invited to discuss nationally whether a contribution could be made in the future.	Non contributing Panel members
10	DBCP-27 / 11.6.9 DBCP-26 / 11.6.11 (4) DBCP-25 / 10.6.7	Panel members contributing to the Trust Fund are invited to investigate nationally whether their contribution could be increased.	Contributing Panel members



11	DBCP-26 7.8.3 & 11.2.12	to increase its contribution to the DBCP Trust Fund.	OceanSITES, SOT-
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**IMPLEMENTATION**

No.	Ref.	Recommendation	By
12	DBCP-27 / 9.2.9	to consider offering awards to ships which are actively contributing deployment opportunities as a way to further encourage their participation as well as the participation of others.	Panel members
13	DBCP-27 / 9.4.2	To address the recommendations on data buoy vandalism from the DBCP Technical Document No. 41 <sup>117</sup> – “Ocean Data Buoy Vandalism - Incidence, Impact and Responses” (these recommendations are also reproduced in DBCP-27/Annex XIV).	Panel members
14	DBCP-26 / 11.2.15 (iv) DBCP-25 / 6.3	The Panel urged its members to make use of the DBCP barometer upgrade scheme implemented through the Global Drifter Programme (GDP) and supported by the United States for all newly deployed drifters, including those deployed in tropical regions.	Panel members
15	DBCP-26 / 11.2.15 (vi)	The Panel agreed to develop further the JCOMMOPS proposal for the establishment of a Cruise Technical Coordinator position at JCOMMOPS to act as an international focal point on ship cruises opportunities in support of global ocean observations.	Panel
16	DBCP-25 / 6.3	Research programmes (e.g. DAMOCLES) to put real-time and/or near-real-time data on GTS to address spatial gap in Russian sector of the Arctic region.	Arctic Research Programs
17	DBCP-23 / 2.2.1.3 (xxiii) & 2.2.2.7	Encourage cooperation with OceanSITES and the Tsunameter network at a national level.	Panel members

**INSTRUMENT PRACTICES/CALIBRATION**

No.	Ref.	Recommendation	By
18	DBCP-27 / 6.2.3 DBCP-26 / 6.3.4	The Panel recalled the importance of traceability of observations to standards and SI units, and in particular of establishing a proper certification process and procedures for the calibration. Recording the history of calibration and providing calibration certificates from instrument manufacturers was particularly important. To start systems for record keeping for instrument calibration, replacement and validation that conform to ISO recommended specifications.	Panel members
19	DBCP-26 / 11.5.8 (2)	More systematic calibration of the instruments should be performed, traceable to IS, and documented. More stringent requirements on the accuracy of drifting-buoy measurements are needed. Accuracy claims should be validated.	Panel members
20	DBCP-26 / 11.5.8 (3)	Post-calibration of drifter SST sensors should be performed as much as practicable (see the presentation “Examining the long term stability of SST measurements made by drifting buoys (R.O. Smith, J.J. Kennedy, N. Rayner)” made at the DBCP Scientific and Technical workshop).	Panel members

**INSTRUMENT PRACTICES/INTERCOMPARISONS**

117: [http://www.jcomm.info/index.php?option=com\\_oe&task=viewDocumentRecord&docID=7150](http://www.jcomm.info/index.php?option=com_oe&task=viewDocumentRecord&docID=7150)

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<b>No.</b>	<b>Ref.</b>	<b>Recommendation</b>	<b>By</b>
21	DBCP-27 / 8.4.4 DBCP-26 / 8.4.4 DBCP-26 / 8.4.8 (iii)	The Panel encouraged its member countries to participate in the intercomparison activities that being led by the PP-WET pilot project.	Panel members
22	DBCP-27 / 8.4.6 DBCP-26 / 8.4.6	The Panel recognized that the pilot project would contribute to JCOMM in developing standards and best practice, as well as to the relevant WIGOS exercise, and encouraged the co-chairs and SC members to actively outreach these relevant activities with the progress in the inter-comparison exercise.	PP-WET
23	DBCP-26 / 8.4.8 (i)	Continue to support the PP-WET Pilot Project for the next year.	PP-WET
24	DBCP-26 / 8.4.8 (ii)	Encourage the co-chairs and SC members to contribute the results of the intercomparison exercise to JCOMM and WIGOS in developing standards and best practice.	PP-WET
25	DBCP-26 / 11.5.8 (1)  DBCP-25 / 5.2.3 & 6.3	Inter-comparisons of drifting-buoy measurements for different manufacturers should be regularly performed in order to assess and improve measurement accuracy. The Panel noted the usefulness of the drogue sensor evaluation for the SVP buoys, which was conducted by the NOAA/AOML, and recommended to continue this valuable exercise with extended involvement of all currently operating buoy manufacturers.	AOML
26	DBCP-25 / 7.4.6	The Panel encouraged the co-chairs and SC members to actively share outcomes of these relevant activities and progress in intercomparison exercises with the JCOMM Community.	PP WET Chair

**INSTRUMENT PRACTICES/METADATA**

<b>No.</b>	<b>Ref.</b>	<b>Recommendation</b>	<b>By</b>
27	DBCP-26 / 9.6.6 (i)	JCOMMOPS would like to recommend that all buoy operators provide a website or web accessible CSV files of deployment information (as provided to the Iridium PP team) for all buoys similar to AOML, NDBC and Canada (examples provided in the report) as well as continuing email notifications as necessary. JCOMMOPS can in turn feed information from those websites into the JCOMMOPS database of metadata.	Panel members
28	DBCP-26 / 9.6.6 (iv)	Close cooperation between OceanSITES and the rest of the DBCP Moored Buoy community is recommended when considering metadata content and standards.	OceanSITES & Panel members
29	DBCP-26 / 9.6.6 (v)	JCOMMOPS will provide recommendation to moored buoy operators on the required content as well as possible formats (i.e csv, XML etc.) for more effective and consistent exchange of deployments.	JCOMMOPS
30	DBCP-26 / 11.2.15 (i)	That the JCOMM Management Committee considers reviewing the Terms of Reference of the DBCP in order for the Panel to also address issues relevant to rigs and platforms making automated observations.	MAN
31	DBCP-26 / 11.2.15 (ii)	Considering the importance of instrument/platform metadata for marine climatology purposes in particular, the Panel urged its members to collect, record, and make buoy instrument/platform metadata available via JCOMMOPS.	Panel members
32	DBCP-26 / 11.3.13 (ii)	The Panel agreed that it should continue to contribute to the development of WIGOS by providing assistance, as required, on (i) instrument standards and practices issues, (ii) data and instrument/platform	Panel

	metadata exchange, and (iii) quality management issues.	
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<b>SATELLITE DATA TELECOMMUNICATION</b>			
<b>No.</b>	<b>Ref.</b>	<b>Recommendation</b>	<b>By</b>
33	DBCP-26 / 9.4.4	The Panel was very pleased in the expected improvements in the Central Pacific and the Indian Ocean, but encouraged CLS to consider how it could improve the situation in the southern Atlantic or Western Pacific future.	CLS
34	DBCP-26 / 9.6.6 (ii)	Operators of Iridium platforms have continued to actively report metadata to each other upon deployment, which was valuable and should continue beyond the life of the Iridium Pilot Project.	Iridium operators
35	DBCP-26 / 11.2.15 (v)	The Panel recommended to the Argos Joint Tariff Agreement to consider the DBCP requirements for timely data as a high priority and develop the new regional network of Local User Terminals in the view to minimize data availability delays in all ocean regions, including the South Atlantic, Ocean, and South East Pacific Oceans.	JTA
36	DBCP-26 / 11.5.7	The Panel concurred with the legacy recommendations from the draft Project Report of the JCOMM Pilot Project for WIGOS, in particular regarding establishing an international forum of satellite data telecommunication users in the view to expand the scope of the Argos Joint Tariff Agreement (JTA) to address remote data communication requirements for automatic environment observing systems coordinated through WMO and those partner organization, system deficiencies, negotiate tariffs and potential improvements of the rendered services with all relevant operators of satellite data telecommunications systems.	JTA, CBS
37	DBCP-25 / 6.3	to deploy more Iridium drifters in the Indian Ocean region and other areas where the delay of data delivery is particularly an issue.	DBCP members

<b>TECHNOLOGY DEVELOPMENT, PILOT PROJECTS</b>			
<b>No.</b>	<b>Ref.</b>	<b>Recommendation</b>	<b>By</b>
38	DBCP-25 / 5.2.4	Panel agreed that it should be engaged in the future development of wave glider and invited Liquid Robotics to continue participating in future sessions and discussion.	TT IBP
39	DBCP-25 / 7.1.8, 8.7.3	The notification of all Pilot Project buoy deployments (Iridium, Argos-3, waves, HRSST etc) must be completed by the buoy operator, as soon as possible after the deployment..	Pilot Project Team members and Buoy Operators
40	DBCP-25 / 7.4.3	The Panel encouraged its member countries to participate in the wave measurement intercomparison activities which was led by this pilot project.	DBCP members
41	DBCP-25 / 8.7.3	The Panel noted there was a need to flag HRSST and other high-performance sensors appropriately within platform metadata which would require a deployment notification to be sent to JCOMMOPS, as with other Pilot Projects.	DBCP members

**ACRONYM LIST**

AG	DBCP Action Groups
AHRPT	Advanced High Resolution Picture Transmission
AIC	Argo Information Center
AMESD	African Monitoring of the Environment for Sustainable Development
AMCOMET	African Ministerial Conference on Meteorology
AMOC	Atlantic Meridional Overturning Circulation
AOML	NOAA Atlantic Oceanographic and Meteorological Laboratory (USA)
AP	Air Pressure
APL	University of Washington Applied Physics Laboratory (USA)
Argo	Argo Profiling Float Pilot Project
AST	Argo Steering Team
ATLAS	Autonomous Temperature Line Acquisition System
AWS	Automatic Weather Station
BOBP-IGO	Bay of Bengal Programme Inter-Governmental Organization
BOM	Bureau of Meteorology (Australia)
BUFR	FM 94 BUFR GTS format: Binary Universal Form for Representation of meteorological data
BUOY	FM 18 BUOY GTS format: Report of a buoy observation
CB	Capacity-Building
CBS	Commission for Basic Systems (WMO)
CBS-MG	CBS Management Group
CCI	Commission for Climatology (CCI)
CDIP	Coastal Data Information Program
CDMP	Climate Database Modernization Programme (USA)
CEO	Chief Executive Officer
Cg	Congress (WMO)
CIMEC	Cooperative Institute for Marine Ecosystems and Climate (USA)
CIMO	Commission on Instruments and Methods of Observation (WMO)
ClC	Climate and Cryosphere Project (WCRP, IASC, SCAR)
CLIVAR	Climate Variability and Predictability (WCRP)
CLS	Collecte Localisation Satellites (France)
CNES	Centre National D'Etudes Spatiales (France)
CNRS	Centre National de Recherche Scientifique (France)
CONOPS	WIGOS Concept of Operations
CPO	Climate Programme Office (NOAA, USA)
CREX	FM 95–XII CREX GTS format: Character form for the REpresentation and eXchange of Data
CSIRO	Commonwealth Scientific and Industrial Research Organisation (CSIRO)
DAC	Data Assembly Centre
DAR	Data Discovery, Access and Retrieval service (WMO WIS)
DART	Deep-ocean Assessment and Reporting of Tsunami (Tsunameter)
DB	Data Buoy
DBCP	Data Buoy Co-operation Panel (WMO-IOC)
DB-TAG	E-SURFMAR Data Buoy Technical Advisory Group
DCP	Data Collection Platform
DCPC	Data Collection and Production Centres (WMO WIS)
DCS	Data Collection System
DMCG	Data Management Coordination Group (JCOMM)
DMPA	Data Management Programme Area (DMPA)
DTM	Data Management Team
EB	DBCP Executive Board
EBD	Equivalent Buoy Density
EC	Executive Council
ECMWF	European Centre for Medium-Range Weather Forecasts
EEZ	Exclusive Economic Zone

DBCP-XXVII, Acronym list

EGOS-IP	Implementation Plan for the Evolution of Global Observing Systems (WMO)
EOV	Essential Ocean Variable
ER	Expected Result
E-SURFMAR	Surface Marine programme of the Network of European Meteorological Services, EUMETNET
ET/DRC	CBS Expert Team on Data Representation and Codes (WMO)
ET/EGOS	CBS / IOS Expert Team on the Evolution of the Global Observing System (WMO)
ETDMP	Expert Team on Data Management Practices (JCOMM)
ETMC	Expert Team on Marine Climatology (JCOMM)
ETSI	Expert Team on Sea Ice (JCOMM)
ETWS	Expert Team on Wind Waves and Storm Surge (JCOMM)
EUCOS	EUMETNET Composite Observing System
EUMETNET	Network of European Meteorological Services
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
EuroSITES	European integrated network of open ocean multidisciplinary observatories
FAO	Food and Agriculture Organization
FG	First Guess Field
FTP	File Transfer Protocol
GCC	Global Collecting Centre (of MCSS)
GCOS	Global Climate Observing System
GCW	Global Cryosphere Watch
GDAC	Global Data Assembly / Acquisition Centre
GDC	Global Drifter Centre
GDP	Global Drifter Programme
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GFCS	Global Framework for Climate Services
GHRSSST	Group for High-Resolution SST
GIPPS	Global Integrated Polar Prediction System
GIS	Geographical Information System
GISC	Global Information System Centres (WMO WIS)
GLOBE	Global Learning and Observations to Benefit the Environment
GLOSS	Global Sea-level Observing System (JCOMM)
GOOS	Global Ocean Observing System (IOC, WMO, UNEP, ICSU)
GOS	Global Observing System (WMO)
GPS	Global Positioning System
GSOP	CLIVAR Global Synthesis and Observations Panel
GSM	Global System for Mobile Communications
GSSC	GOOS Scientific Steering Committee
GTS	Global Telecommunication System (WWW)
HMEI	Association of Hydro-Meteorological Equipment Industry
HRPT	High Resolution Picture Transmissions
HRSSST	High Resolution SST
IABP	International Arctic Buoy Programme
IARC	International Arctic Research Center (USA)
IASC	International Arctic Science Committee
IBPIO	International Buoy Programme for the Indian Ocean
ICG	Intergovernmental Coordination Group
ICG/IOTWS	ICG for the Indian Ocean Tsunami Warning and Mitigation System (IOC)
ICOADS	International Comprehensive Ocean-Atmosphere Data Set (USA)
ICSU	International Council for Science
ID	Identification Number
IFREMER	Research Institute for the Exploitation of the Sea (France)
I-GOOS	Intergovernmental IOC-WMO-UNEP Committee for GOOS
IMB	Ice Mass Balance
IMEI	International Mobile Equipment Identity

DBCP-XXVII, Acronym list

IMO	International Maritime Organization
IndOOS	Indian Ocean Observing System
INMARSAT	International maritime satellite private company (previously International Maritime Satellite Organization)
INSU	Institut national des sciences de l'Univers (France)
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
ICT	Information and Communication Technology
IOCCP	International Ocean Carbon Coordination Project
IODE	International Oceanographic Data and Information Exchange (IOC)
IOTWS	Indian Ocean Tsunami Warning and Mitigation System (IOC)
IPAB	WCRP-SCAR International Programme for Antarctic Buoys
IPET-DRC	Inter-Programme Expert Team on Data Representation and Codes
IPD	International Polar Decade
IPP	DBCP Iridium Pilot Project
IPY	International Polar Year (2007-2008)
ISABP	International South Atlantic Buoy Programme
ISDM	Integrated Science Data Management (formerly MEDS, Canada)
ISFET	Ion Sensitive Field Effect Transistor
ISO	International Organization for Standardization
ISRO	Space Research Organization (India)
IT	Information Technology
ITP	International Tsunameter Partnership
ITT	Invitation To Tender
IUGG	International Union of Geodesy and Geophysics
JAMSTEC	Japan Agency for Marine-Earth Science and Technology
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
JCOMM-III	Third Session of JCOMM (Marrakech, Morocco, 4-11 November 2009)
JCOMMOPS	JCOMM <i>in situ</i> Observations Programme Support Centre
JTA	Joint Tariff Agreement (Argos)
KHOA	Korea Hydrographic and Oceanographic Administration
KML	Keyhole Markup Language
KORDI	Korea Ocean Research and Development Institute
LOCEAN	Laboratoire d'Océanographie et du Climat (France)
LOI	Letters of Intent
LUT	Local User Terminal (Argos)
MAN	JCOMM Management Committee
MARCDAT	International Workshop on Advances in the Use of Historical Marine Climate Data
MCDS	Marine Climate Data System (in development by JCOMM)
MCSS	Marine Climatological Summaries Scheme
MDT	Modelling Development Team
MEDS	Marine Environmental Data Service (Canada, now ISDM)
META-T	Water Temperature instrument/platform Metadata Pilot Project (JCOMM)
METOP	Meteorological Operational satellites of the EUMETSAT Polar System (EPS)
MG	Management Group
MOFS	Met-Ocean Forecasts and Services
MOI	Mauritius Oceanography Institute
MOU	Memorandum of Understanding
MSC	Meteorological Services of Canada
NAVOCEANO	Naval Oceanographic Office (USA)
NC	National Centres (WMO WIS)
NCDC	NOAA National Climatic Data Center (USA)
NCEP	NOAA National Center for Environmental Prediction (USA)
NCOSM	National Centre of Ocean Standards and Metrology (SOA, China)
NDBC	NOAA National Data Buoy Center (USA)
NESDIS	NOAA National Environmental Satellite Data and Information Service (USA)

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NetCDF	Network Common Data Format
NFP	National Focal Point
NIOT	National Institute of Ocean Technology (India)
NMDIS	National Marine Data and Information Service (China)
NMHS	National Meteorological and Hydrological Service
NMS	National Meteorological Service
NOAA	National Oceanic and Atmospheric Administration (USA)
NODC	National Oceanographic Data Centre
NPDBAP	DBCP-PICES North Pacific Data Buoy Advisory Panel
NPOESS	National Polar-orbiting Operational Environmental Satellite System (USA)
NSF	National Science Foundation (USA)
NWP	Numerical Weather Prediction
NWS	NOAA National Weather Service (USA)
OceanSITES	OCEAN Sustained Interdisciplinary Timeseries Environment observation System
OCG	Observations Coordination Group (JCOMM)
OCO	NOAA Office of Climate Observation (USA)
ODAS	Ocean Data Acquisition Systems
ODASMS	ODAS Metadata Service (operated by China on behalf of JCOMM)
ODINAFRICA	Ocean Data and Information Network for Africa (IODE)
ODP	Ocean Data Portal (IODE)
ODT	Observation Development Team
OGP	Oil and Gas Producers
OOI	Ocean Observatories Initiative (USA)
OOPC	Ocean Observations Panel for Climate (GCOS-GOOS-WCRP)
OPA	Observations Programme Area (JCOMM)
OPAG	Open Programme Area Group
OPAG-IOS	CBS OPAG on the Integrated Global Observing System
OPeNDAP	Open-source Project for a Network Data Access Protocol
OPSCOM	Argos Operations Committee
OSE	Observing System Experiment
OSMC	NOAA Observing System Monitoring Center (USA)
OSSE	Observing System Simulation Experiment
PA	Programme Area (JCOMM)
PANGEA	Partnerships for New GEOSS Applications
PGC	Principal GTS Co-ordinator (DBCP)
PICES	North Pacific Marine Science Organization
PICO	Panel for Integrated Coastal Observations
PIRATA	Pilot Research Moored Array in the Tropical Atlantic
PMEL	NOAA Pacific Marine Environmental Laboratory (USA)
PMO	Port Meteorological Officer
PMOC	Principal Meteorological or Oceanographic Centres responsible for quality control of buoy data (DBCP)
PMT	Platform Messaging Transceivers
POES	Polar Orbiting Environmental Satellite
POGO	Partnership for Observation of the Global Oceans
PP-HRSST	DBCP-GHRSST Pilot Project on High Resolution SST
PP-WMD	DBCP Pilot Project on Wave Measurement from Drifters
PP-WET	DBCP-ETWS Pilot Project on Wave measurement Evaluation and Test from moored buoys
PTT	Platform Transmitter Terminal (Argos)
QA	Quality Assurance
QC	Quality Control
QMF	WMO Quality Management Framework
QMS	Quality Management Systems
RA	Regional Association (WMO)

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RAMA	Indian Ocean Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction
RMIC	WMO-IOC Regional Marine Instrument Centre
RMS	Root Mean Square
RNODC	Responsible Oceanographic Data Centre (IODE-JCOMM)
RNODC/DB	RNODC for Drifting Buoys
RRR	Rolling Review of Requirements
RTMC	VOSCLim Real-Time Monitoring Centre
RUDICS	Iridium Router-Based Unrestricted Digital Interworking Connectivity Solution
RV	Research Vessel
SAIC	Science Applications International Corporation (USA)
SAMS	Scottish Association for Marine Science
SARAL	Satellite with ARGOS and ALtika (France, India)
SAT	Site Acceptance Test
SAWS	South African Weather Service
SBD	Short Burst Data (Iridium)
SC	Steering Committee
SCAR	Scientific Committee on Antarctic Research
SCG	Services Coordination Group (JCOMM)
SeaDataNET	Pan-European infrastructure for Ocean & Marine Data Management
SensorML	OpenGIS® Sensor Model Language Encoding Standard
SFSPA	JCOMM Services and Forecasting Systems Programme Area
SG	Steering Group
SIA	Seasonal to Inter-annual Forecast
SIDERI	Strengthening the International Dimension of the Euro-Argo Research Infrastructure
SIO	Scripps Institution of Oceanography (University of California, USA)
SLP	Sea Level Atmospheric Pressure
SMOS	Soil Moisture and Ocean Salinity mission
SOA	State Oceanic Administration (China)
SOBP	Southern Ocean Buoy Programme
SOC	Specialized Oceanographic Centre (JCOMM)
SOC/DB	SOC for Drifting Buoys (operated by Météo France)
SOCIB	Balearic Islands Coastal Observing System
SoG	Statements of Guidance
SOOP	Ship-Of-Opportunity Programme
SOOPIP	SOOP Implementation Panel (JCOMM)
SOT	Ship Observations Team (JCOMM)
SPA	JCOMM Services Programme Area (now SFSPA)
SSA	WMO Special Service Agreement
SSG	Scientific Steering Group
SSS	Sea Surface Salinity
SST	Sea-Surface Temperature
STIP	Stored Tiros Information Processing
SVP	Surface Velocity Programme (of TOGA and WOCE, replaced by GDP) drifter
SVPB	SVP barometer drifter
SVPBS	SVP drifter with salinity
SVPBTC	SVP drifter with temperatures in depth
SVPBW	SVP Barometer and Wind at a drifter
TAO	Tropical Atmosphere Ocean Array
TC	Technical Co-ordinator
TD	Technical Document
TIP	Tiros Information Processing
TIP	Tropical Moored Buoys Implementation Panel
TOGA	Tropical Atmosphere and Global Ocean programme
ToR	Terms of Reference



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TOWS-WG	Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems
TRITON	Triangle Trans-Ocean buoy network
TT	Task Team
TT-CB	DBCP Task Team on Capacity-Building
TT-DM	DBCP Task Team on Data Management
TT-MB	DBCP Task Team on Moored Buoys
TT-IBP	DBCP Task Team on Instrument Best Practices & Drifter Technology Developments
TT-QM	DBCP Task Team on Quality Management (now merged into TT-IBPD)
TT-TD	DBCP Task Team on Technological Development (now merged into TT-IBPD)
TT-TDC	DMPA Task Team on Table Driven Codes
UK	United Kingdom
UN	United Nations
UNCLOS	UN Conventions on the Law of the Sea
UNDP	United Nations Development Programme
UNESCO	UN Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	UN General Assembly
URL	Uniform Resource Locator
USA	United States of America
USD	United States Dollar
VAR	Value Added Reseller
VCP	Voluntary Cooperation Programme (WMO)
VOS	Voluntary Observing Ship (JCOMM)
VOSclim	VOS Climate Project
WCRP	World Climate Research Programme
WCC-3	World Climate Conference 3
WDIP	WIGOS Test of Concept Development and Implementation Plan
WDIS	WIGOS Development and Implementation Strategy
WESTPAC	IOC Sub-Commission for the Western Pacific
WHOI	Woods Hole Oceanographic Institution
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization (UN)
WOCE	World Ocean Circulation Experiment
WWW	World Weather Watch (WMO)
XBT	Expendable BathyThermograph
WML	Extensible Markup Language

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