

# DATA BUOY COOPERATION PANEL

## Thirty-Second Session

### La Jolla, California, USA 17 – 27 October 2016

JCOMM Meeting Report No. 129



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**WORLD METEOROLOGICAL  
ORGANIZATION**

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**INTERGOVERNMENTAL  
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(OF UNESCO)**

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**DATA BUOY CO-OPERATION PANEL**  
***THIRTY-SECOND SESSION***

La Jolla, California, USA  
17 – 21 October 2016

**FINAL REPORT**

JCOMM Meeting Report No. 129

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Note: The following complementary information will be provided in the DBCP Annual Report for 2016

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



DBCP-32, La Jolla, USA, 2016

## EXECUTIVE SUMMARY

The Thirty-Second Session of the Data Buoy Co-operation Panel (DBCP-32) was held in the Scripps Seaside Forum of the Scripps Institute of Oceanography, La Jolla, California, United States of America, from 17 to 21 October 2016. Jon Turton, Chairperson elected in 2014, was unable to attend, so the meeting was chaired by the vice-chairmen. Johan Stander (vice-Chair Southern Hemisphere) opened the meeting and thanked the SIO hosts and participants for their support of DBCP.

During the technical and scientific workshop organized during the first day of the session, 26 presentations and five posters were delivered on data buoy operational and scientific applications, technology, instrumentation, buoy programme implementation, including data monitoring and quality. Approximately 80 participants from 13 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. On behalf of Mr Jon Turton, Chairperson, the Secretariat reported on the chair's activities of the past year, including his participation with OCG. The Technical Coordinator, Ms Champika Gallage (Canada) presented some of the activities of the JCOMMOPS in support of the DBCP, including significant progress developing the new on-line databases and automatically generated status maps of the array. The Panel commended Ms Champika Gallage for work as DBPC Technical Coordinator and wished her success in her new position in WMO as a Scientific Officer for Marine and Ocean Meteorological Observations and Data Management.

The Panel discussed the report of the current status of the data buoy network. During the intersessional period the average number of drifting buoys reporting on the GTS was 1539 per month, 422 moored buoys and 103 fixed platforms, within 2.3% of the previous year, indicating stability in the array achieved after drifter lifetime problems of previous years had been solved.

Ms Gallage stressed the importance of key performance indicators that capture performance of network status, data delivery, international cooperation, instrumentation, and operational aspects of the buoy arrays. Charts and reports of performance indicators are now available through the new JCOMMOPS web application. The Session noted that these KPI and the JCOMMOPS database can be implemented only if Buoy Operators provide deployment and platform metadata information to JCOMMOPS.

Reports were provided by the DBCP Action Groups and decisions were taken according to their recommendations. The GDP suggested that total number of drifters is no longer a useful metric for judging the coverage density of the array. Transition to Iridium telecommunications is progressing faster than previously planned. IPAB and ISABP anticipate that the Year of Polar Prediction will increase deployment activities in the polar seas. OceanSITES co-chair Dr Bob Weller asked the DBCP Executive Board to change the status of OceanSITES with respect to DBCP from a formal Action Group to a peer network reporting primarily to the JCOMM Observations Coordination Group.

Reports were provided by the DBCP Task Teams, and Pilot Projects, and decisions were taken according to their recommendations. TT-Instrument Best Practices & Drifter Technology is concerned that drogue loss is now the most important issue limiting the viability of the array and has tasked the engineers to better understand and solve the problem. TT-Moored Buoys continued work to establish BUFR data transmission protocols in most buoys and responded to the emergence of Autonomous Surface Vehicles as platforms for in-situ marine measurements

by establishing a working group on ASVs. The TT- Capacity Building reported on several training events held in the past intersessional period, and elaborated plans for the 2016-17 intersessional. The Panel agreed that Pilot Project on Wave measurement Evaluation and Test from moored buoys (PP-WET) wave measurement evaluation has achieved its goals, while other exciting developments in buoy wave measurements are developing rapidly. Therefore, the Panel agreed that the PP-WET should be dissolved and the Task Team on Wave measurement (TT-WM) be created and directly interface with JCOMM developing standards and best practices. Due to demand from the satellite community for in-situ verification of SST, the PP-HRSST was reinstated.

The DBCP Session included a section which grouped Data Management concerns addressed by the TT-DM and issues of: Marine Climate Data Systems and its' Global Data Assembly Centres, Data Timeliness issues, metadata and data integration. Mrs. Mayra Pazos led off the session with a report on the Task Team on Data Management. The TT-DM continues to monitor metadata and data format issues, and is successfully driving the adoption of BUFR formats and implementation of GTS capability. The WMO MCDS is providing an effective gateway for the DBCP to interact with the WIS and WIGOS. The JCOMM Data Management Coordination Group (DMCG) and JCOMM OCG provided guidance on plans for data interoperability with WIGOS.

The Panel received a report by Ms Gallage on the JCOMMOPS web site and communication tools in session, and a side session on detailed user instructions for the web site presented by M. Belbeoch (JCOMMOPS Argo TC). The Panel greatly appreciated these tools and anticipates improved communications as a result.

Dr Venkatesan, Mr McArthur and Mr Ortiz reported on buoy vandalism and strategy to reduce it. The issue has been taken up WMO and IOC and is poised to be addressed by the highest levels of UN organizations. The DBCP must respond with engagement at all levels.

The Panel received a report of the first formal session of the WMO-IOC International Forum of Users of Satellite Data Telecommunication Systems (Satcom). The session decided to participate in future Satcom Forum activities. Additional presentations on the Iridium and Argos satellite communication systems were presented. The Panel agreed that the systems had differing useful features and services, and that both had roles to play in DBCP moorings and drifters.

The Panel reviewed activities and developments of JCOMM, including the Man approval of the Super OCG, Strategy on Integrated Marine Meteorological and Oceanographic Services within WIS and preliminary preparations for the JCOMM-V in 2017. The Panel reiterated its' adherence to JCOMM priorities and mandates, and expressed its' appreciation for the JCOMMOPS office support of DBCP activities.

The Panel discussed DBCP Trust Fund contributions, future commitments and budget related matters. The Panel noted that budget constraints will limit discretionary expenditures, and that the greatest priority must be to guarantee secure funding for the position of the DBCP Technical Coordinator. The Panel was encouraged to search for extrabudgetary and in-kind support for Capacity Development projects in 2017. 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. In view of the financial limitations on DBCP planned 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.

Written updates of the DBCP Implementation Strategy and Operating Principles as prepared by the chair in liaison with the Secretariat were presented to the Panel. The Panel was invited to review these documents, and provide feedback to the chair no later than 31 December 2016.



The Panel agreed that its next Session should take place at UNESCO headquarters, Paris, France. The Panel agreed on tentative dates for the DBCP-33, provisionally for either 18 – 22 Sept. or 25 – 29 Sept. 2017.

The Panel re-elected Mr Jon Turton (United Kingdom) as its chairperson, Shannon McArthur (USA) as vice-chairperson for North America, Johan Stander (South Africa) as vice-chairperson for the Southern Hemisphere, and Dr Ting Yu (China) as vice-chairperson for Asia.

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## GENERAL SUMMARY OF THE WORK OF THE DBCP-32 SESSION

### 1. OPENING AND WELCOME OF THE DBCP SESSION

- 1.1. The vice-chair DBCP, Johan Stander (South Africa), speaking on behalf of the chairperson of the Panel, Mr Jon Turton (UK) who was unable to attend, opened the Thirty-Second session of the Data Buoy Co-operation Panel (DBCP) and its associated Scientific and Technical Workshop at 09:00 hours on Monday, 17 October 2016, at the Scripps Seaside Forum of the Scripps Institute of Oceanography, La Jolla, California, United States of America.
- 1.2. On behalf of the Panel, Mr Stander welcomed all participants to the session and to the workshop, and expressed his appreciation for the commitment of the Panel Members. He complimented the preparations of the SIO for hosting and organizing the Session.
- 1.3. Opening addresses were given by the following officials: Margaret Leinen, UC San Diego Vice Chancellor for Marine Sciences, Director of Scripps Institution of Oceanography, and Dean of School of Marine Sciences; Johan Stander, vice-Chair DBCP; Champika Gallage, WMO Secretariat; Denis Chang, IOC of UNESCO Secretariat; Thomas J. Cuff, National Weather Service (USA), Director – Ocean Prediction Center.
- 1.4. During the opening addresses, all speakers emphasized the support for DBCP based on the global need for marine observation networks. The following points were mentioned:
  - Ms Leinen related that the Scripps Institute of Oceanography has ocean observations in its very DNA. 100 years of observations off the Scripps pier, decades of CO<sub>2</sub> measurements and 65 years of the CalCofi stations have built SIOs reputation. 2015-16 has been a year of recognition of the importance of oceans and long term marine observations. International meetings, COP-21, G7, Sendai Framework and Ocean Summit 2016 have all signalled a new interest, by the international community, in marine systems and observations.
  - The WMO 17<sup>th</sup> Congress recognized that it is through JCOMM that many member states participate in ocean observation systems.
  - These opportunities emphasize the need for a communication strategy which includes importance of data and observations.
  - Emphasized that observations are critical in support of the goals of IOC and WMO to delivery services to their constituents, including. accurate, timely and reliable forecasts and warnings of weather, delivery of environmental information, support of healthy ocean ecosystems and effective early warning systems and more.
  - In addition, it was highlighted that the tremendous value of marine shipping, industry and insurance is critically dependent upon essential marine observations verifying and aiding operational marine forecasting.
  - Mr. Cuff presented a case study from an explosively deepening 2016 coastal storm, highlighting the importance of buoy and ship observations to operational marine weather forecasters. While an individual observation may have little direct influence

on numerical weather predictions, he emphasized that these buoy and ship observations often act as the only early warning to forecasters for rapidly evolving hazardous conditions at sea.

- 1.5. The WMO and IOC Secretariat representatives 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. Sidney Thurston, NOAA, representing the USA organizing committee (SIO, NDBC and OCD) for the session, outlined various local arrangements. The session agreed to its hours of work and other logistic arrangements. The Secretariat introduced the session documentation.
- 1.7. Mr Stander then introduced the Scientific and Technical Workshop, co-chaired by himself and Mr Shannon McArthur (USA, vice chair DBCP for North America).

## **2. SCIENTIFIC AND TECHNICAL WORKSHOP**

- 2.1. The workshop opened at 10:00 on Monday, 17 October 2016 in Scripps Seaside Forum, SIO, and ended on the same day at 17:30 hours. The theme of the Workshop covered "Buoy Science, Technology, and Instrumentation", and included presentations covering the following areas: (i) sustainable Ocean Observations in support of Numerical models (ii) marine meteorological and oceanographic instrumentation, calibration, and traceability; (iii) technical development; (iv) operational enhancements; (v) marine forecast and disaster risk reduction (DRR); and (vi) research applications.

Twenty-six presentations and five posters were delivered by approximately 30 participants from 13 countries. Refer to ANNEX I for detailed list of presentations.

- 2.2. Mr Stander thanked the presenters for their excellent talks. The session noted that the four topics requested for the workshop were all addressed and continue to be very relevant to DBCP activities. Mr Stander indicated that the WMO is interested in Public Private Partnerships and how the value of data can be highlighted to the partnerships. In the WMO and IOC the Big Data is a hot topic. The value of the data might be examined. We would like to have six or seven presentations, representing this community, at the upcoming JCOMM V S&T workshop 2017.
- 2.3. The S&T presentations demonstrated the expansion of capabilities and technologies in ocean observations. The DBCP session decided that these advancements should be made known to the wider community, including GOOS, OCG and the JCOMM through specific recommendations to the JCOMM Man and presented in turn to the JCOMM V in 2017. The session discussed and approved a number of recommendations. Please refer to **recommendations DBCP-32/2 No 1-5 in ANNEX II.**
- 2.4. The Panel expressed its appreciation to all presenters for their contributions to the workshop, and the workshop co-chairpersons, Mr Stander, and Mr McArthur for their excellent work in organizing and chairing the workshop. As in previous years, all presentations will be published in a DBCP Technical Document series, and are available on the DBCP website. All authors were invited to submit their papers via e-mail to the Workshop Chairperson, via electronic format (MS Office compatible format only),

by 30 November 2016 (action; S&T workshop authors; 30 November 2016).

2.5. The Panel noted with appreciation that Mr Stander and Mr McArthur would act as the Workshop Co-chairpersons for 2017.

### **3. OPENING OF THE DBCP BUSINESS SESSION**

#### **3.1. Opening addresses for the main DBCP Session**

3.1.1. Following the Workshop on 17 October 2016, and side meetings of the DBCP Task Teams, Pilot Projects, and some of the Action Groups on 18 October, the Thirty-Second Session of the Data Buoy Co-operation Panel (DBCP) was re-convened by Mr David Legler (Chair OCG) on behalf of the Panel Chairperson, Mr Jon Turton, at 0900 on Wednesday 19 October 2016, in the Scripps Seaside Forum of the SIO, La Jolla, USA. Mr Legler welcomed participants to the session and thanked SIO for hosting it and providing excellent facilities. The Chairperson requested the participants to introduce themselves to the session.

#### **3.2. Adoption of the agenda**

The Panel adopted its agenda, as reproduced in Annex III.

#### **3.3. Working arrangements**

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 (18 October 2016). The Joint Secretariat then introduced the documentation in accordance with the provisional agenda.

The list of participants to the session is reproduced in Annex IV.

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

#### **4.1. Report by the Chairperson of the DBCP, and the Executive Board**

Speaking on behalf of the Chairperson of the DBCP, Mr Jon Turton, Mr Tom Gross (Secretariat) reported on a number of the chair's activities during the last inter-sessional period. Specifically, he attended the 7th session of the JCOMM Observations Coordination Group (OCG-6) in Esporles, Majorca (4 to 6 April 2016) as Vice Chair for WMO engagement and as Chair of DBCP. He reported on DBCP and the state of the drifting and moored buoy networks, the newly agreed performance metrics for its networks and development efforts (e.g. HRSST and wave measurements). During the session he also presented on the WMO Integrated Global Observing System (WIGOS) and its relevance to the JCOMM Observations Programme Area. The last day was a joint meeting with the OOPC (Ocean Observations Panel for Climate) where the focus was on the Essential Ocean Variable specifications feeding into the revised GCOS Implementation Plan

As OCG Vice Chair for WMO engagement he also has the role of R-Mar (Rapporteur on Marine Observing Systems) and presented a report to the WMO CBS/OPAG-IO/ICT-IO in April.

During the year, he also participated in a number of OCG WebEx/telecom meetings to progress the actions/workplan agreed at OCG-7 which is looking towards to two major events during the next five years: JCOMM-V and OceanObs19. In addition to his duties as DBCP Chair he also chaired the E-SURFMAR Expert Team on Data Buoys (who met in April), but has now stood down from the Chair after 11 years in that role.

During the year he also attended the Argo Steering Team meeting in Yokohama in March 2016, and has developed extensions to the Argo BUFR format to allow for the inclusion of bio-geochemical data, which are ready for validation. He has also attended various Euro-Argo meetings (Council, Management Board and STAG) during the year.

The DBCP Executive Board members are distributed widely around the world (China, South Africa and US) and with the support of the WMO and IOC Secretariats and the Panel's Technical Coordinator, communications, information and decisions are made efficiently and effectively. The Board was scheduled to meet the evening of 18 October and reported to Plenary on 20 October. The Panel continues to be proactive in meeting its objectives for observing the state of the global oceans using data buoys, and provides a model for other emerging observing systems to follow. This is only possible with the continuing engagement and support of all the Panel's members.

#### **4.2. Reports by the vice-Chairpersons of the DBCP**

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

4.2.1 The DBCP vice chairperson for the Southern Hemisphere, Mr Johan Stander, reported on activities of the past intersessional.

4.2.2 Most Southern Hemisphere countries, particularly the Developing Countries, and Small Island Developing States (SIDS) continue to rely strongly on the support from Developed Countries for sustained met-ocean platforms in this vast, under sampled ocean area. With this in mind, we would like to thank those countries, institutions and organisations and, in particular, NOAA, for assisting us in these observing activities.

4.2.3 During the recent WMO EC-68 session (May 2016), marine activities were once again raised as an element within the WMO that requires special attention and we are glad to report that clear resolutions were made in support of the DBCP. This support came after a request from DBCP-31 to elevate the importance of ocean observations at Executive Council level.

4.2.4 The vice-Chairperson for Southern Hemisphere also reported on the various other program meetings related to DBCP activities in Southern Hemisphere (eg. IBPIO, ISABP etc) and the challenges faced by the region. Detailed report is available in ANNEX V.

##### ***Report by the vice-Chairperson for North America***

4.2.5 For the intersessional period the DBCP vice-Chairperson for North America, Mr. Shannon McArthur, reported on U.S. activities during the last inter-sessional period. He reported the list of moored and drifting buoy networks used in the collection and dissemination of civil earth ocean observations are being operated and maintained by the National Oceanic and Atmospheric Administration (NOAA) National Data Buoy Center (NDBC).

4.2.5 The vice-chair reports that the NOAA and IOOS co-sponsored the development of the U.S. National Strategy for a Sustained Network of Coastal Moorings. He further reported on

progress and planning of the Tropical Pacific Observing System (TPOS) 2020 Project.

4.2.6 In February 2016 the WMO/IOC Joint Commission on Oceanography and Marine Meteorology (JCOMM) Regional Marine Instrumentation Center (RMIC) for WMO Region IV held an international workshop at US National Data Buoy Center (NDBC). The RMIC Region IV workshop focused on improvements in ocean waves observations and cross (WMO) region cooperation in wave observation sensor calibration intercomparisons.

4.2.7 The vice-chair reported the successful development and technical refresh of approximately 20% of the NDBC Coastal Weather Buoy (CWB) network with new Self-Contained Ocean Observing System (SCOOP) payloads. With SCOOP, NDBC aims to reduce operational costs and improve observing systems safety and reliability.

4.2.8 Status of the Global Drifter Program (GDP), activities of the US Army Corps of Engineers (USACE), PacIOOS, NERACOOS, and SECOORA, Details of PMEL's T-Flex mooring systems were also reported. Detailed report from the vice-chairperson for North America is available in ANNEX V.

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

4.2.9 Speaking on behalf of the vice-chairperson for Asia, Dr Yu Ting (China), Mr Sidney Thurston (USA, DBCP EB) delivered Dr Ting's report on activities during the last inter-sessional period. Dr Ting reported that the moored buoy networks are being maintained by USA (NOAA<sup>1</sup> / PMEL<sup>2</sup> for the RAMA<sup>3</sup> array), and China (SOA<sup>4</sup> and CMA<sup>5</sup>), India (NIOT<sup>6</sup>), Japan (JAMSTEC<sup>7</sup>), Korea (KHOA<sup>8</sup>) for their National Ocean Buoy Observation Network.

4.2.10 The Panel acknowledged the importance of tsunami monitoring a decade after the 2004 tsunami in South Asia, and noted that the technological advancement and preparedness level in this region have improved. The Tsunami buoy monitoring network is being maintained by Australia, USA, Chile, Ecuador, Colombia, Russia Fed., India, China, Thailand, Malaysia and Japan. Most of these countries are making data available through the National Data Buoy Center (NDBC) of NOAA.

4.2.11 National Marine Environmental Forecasting Center (NMEFC)/ SOA of China is responsible for operating the tsunami warning and mitigation system in China. It is the host center of South China Sea Tsunami Advisory Center (SCSTAC) under the framework of Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS). Two tsunami buoy and coastal seismic stations have been maintained by SOA to detect earthquakes that may trigger local tsunamis. Efforts have been made to re-deploy the tsunami buoy and keep it in stable service since June 2014. It is noted that the vandalism on

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1 NOAA: National Oceanic and Atmospheric Administration

2 PMEL: Pacific Marine Environmental Laboratory

3 RAMA: Research Moored Array for African-Asian-Australia Monsoon Analysis and Prediction

4 SOA: State Oceanic Administration

5 CMA: China Meteorological Agency

6 NIOT: National Institute of Ocean Technology

7 JAMSTEC: Japan Agency for Marine-Earth Science and Technology

8 KHOA: Korea Hydrographic and Oceanographic Agency

data buoys remains a severe problem in the region.

4.2.12 The vice-chairperson for Asia's report concluded by reporting on a productive and interactive year in Asia. Observational activities together with expertise in this region have improved in recent years due to increased interaction and collaboration.

4.2.13 Detailed report from the vice-chairperson for Asia's is available on ANNEX V.

## **5. REPORT BY THE TECHNICAL COORDINATOR**

5.1. The Technical Coordinator (TC), Ms Champika Gallage reported on her activities on behalf of the Panel during the last intersessional period from 1 September 2015 to 31 August 2016. On average, the TC DBCP spends 70% of her time on DBCP-related matters and 30% of her time for OceanSITES Project Office activities.

5.2. The TC of DBCP reminded the panel that starting from 12 September 2016, Ms. Gallage has moved to a new position in WMO as a Scientific Officer for Marine and Ocean Meteorological Observations and Data Management(MAR) unit. The panel should begin the process for hiring a replacement to be stationed in Brest where JCOMMOPS is currently located.

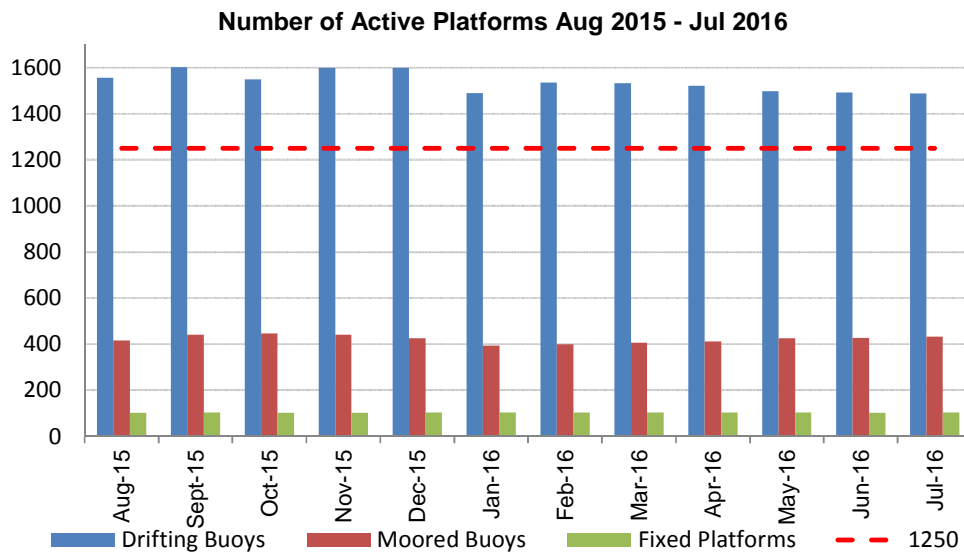
5.3. During the previous year, Ms. Gallage's time as TC was spent on the following:

- Review database design, metadata loading and reporting on new JCOMMOPS website
- Collect and prepare metadata to ingest to the new JCOMMOPS database
- Work on new JCOMMOPS database to populate the system with DBCP and OceanSITES information
- Review new website tools and functionalities
- Maintaining metadata in the JCOMMOPS database
- Producing monthly maps and GTS timeliness reports
- Producing monthly reports with information on network status, network performance and BUFR migration
- Provide user assistance and activity coordination
- Assisting Panel members with technical and programmatic issues
- Updating and maintaining DBCP and OceanSITES websites
- Maintaining mailing lists, contact details and user groups on DBCP, JCOMMOPS, and OceanSITES websites
- Monitoring the Quality-Control Relay traffic
- Tracking all buoy deployments, and mooring maintenance/installations
- Preparing for and attending meetings
- Organizing meetings, preparing meeting reports and documents
- Travelling to meet with various DBCP Members, Action Groups, and Teams

5.4. A great amount of TC time was spent essentially on new database development work.

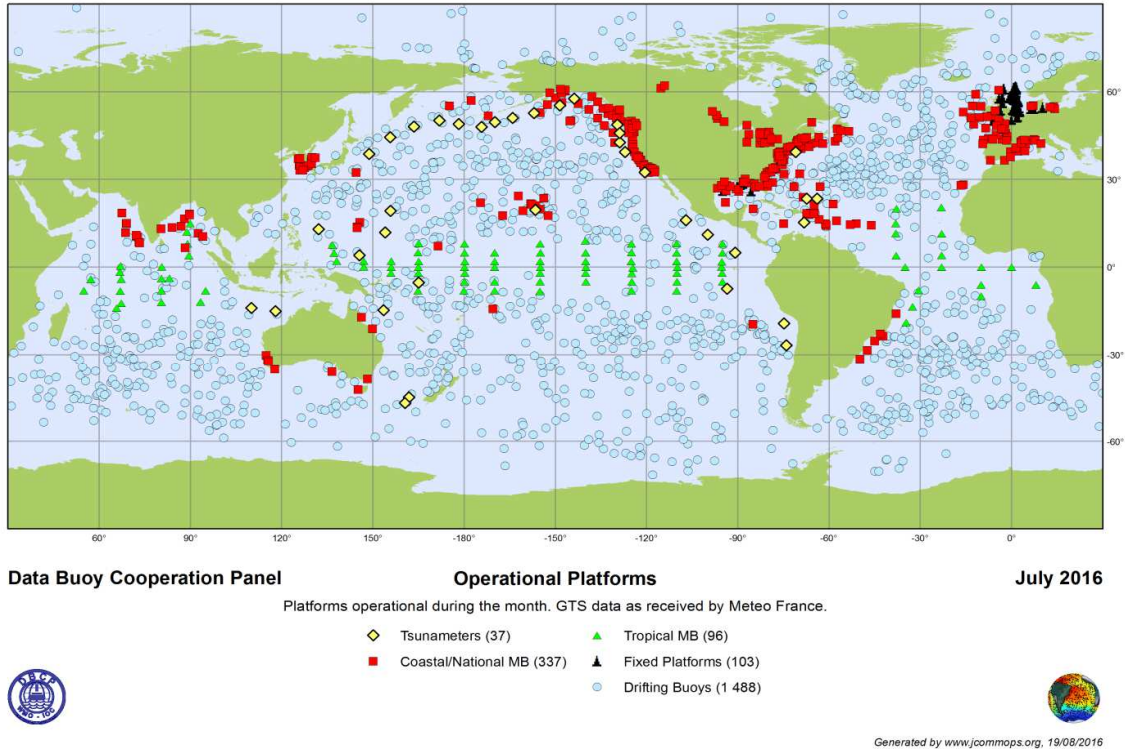
New JCOMMOPS web application was officially introduced to the DBCP community on 20 July 2016. Most of the essential features of the website are operational. Website improvement work will continue to add more features and to improve the functionality. Historical data of DBCP networks is not yet available in new database and will be gradually transferred from old to new database. (*action: JCOMMOPS to populate new JCOMMOPS database with historical data and metadata; DBCP-33*)

5.5. The TC outlined the current status of the data buoy network. During the past 12 months, the monthly average number of drifting buoys reporting on the Global Telecommunications System (GTS) was 1539, 422 moored buoys and 103 fixed platforms (Figure 1). During the intersessional period, the average number of drifting buoys per month has not increased significantly. The average monthly increase in operational drifting buoys is 2.3%. The number of operational drifters on the GTS for July, 2016 was at 1488. There were 337 coastal/national moored buoys, 96 tropical moored buoys, 33 tsunameter buoys and 103 fixed platforms were reporting on the GTS in July, 2016 (Figure 2).



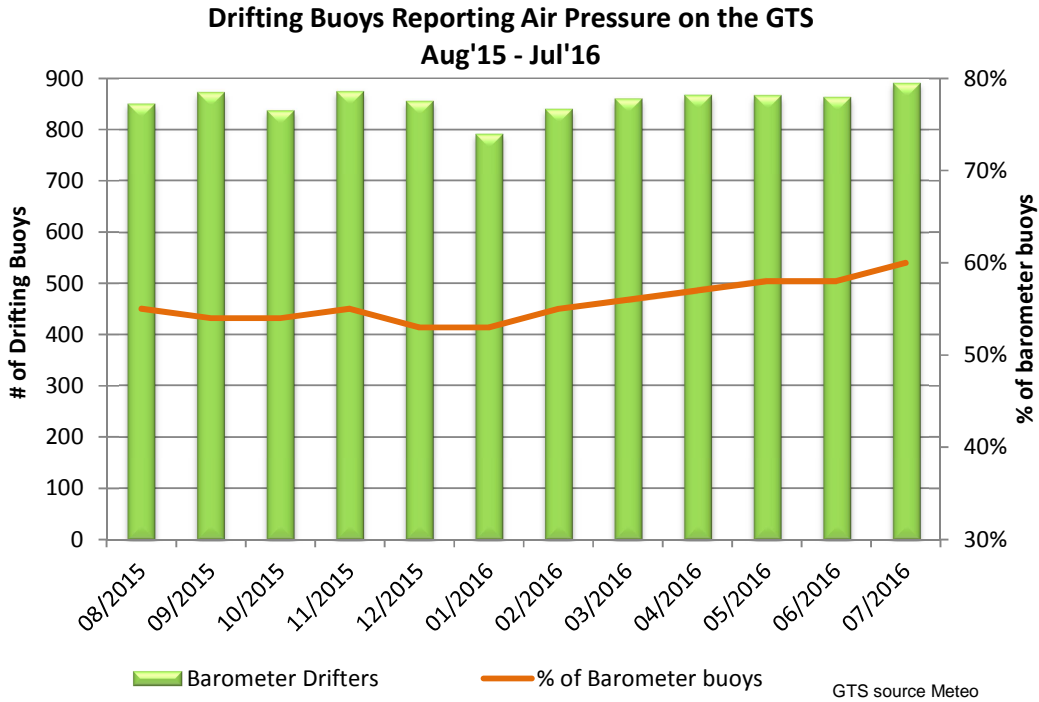
**Figure 1 - Number of operational drifting buoys, moored buoys and fixed platforms during the intersessional period**





**Figure 2 - Status of the operational array in July 2016.**

The average number of barometer drifting buoys during this intersessional period is 856 that has increased from 812 which is a 5% increase from the previous intersessional period. While the total number of drifting buoys reporting on the GTS has not changed significantly throughout the intersessional period, the yearly average percentage of barometer drifters has been around 56% yet showing a slight increasing trend (Figure 3)



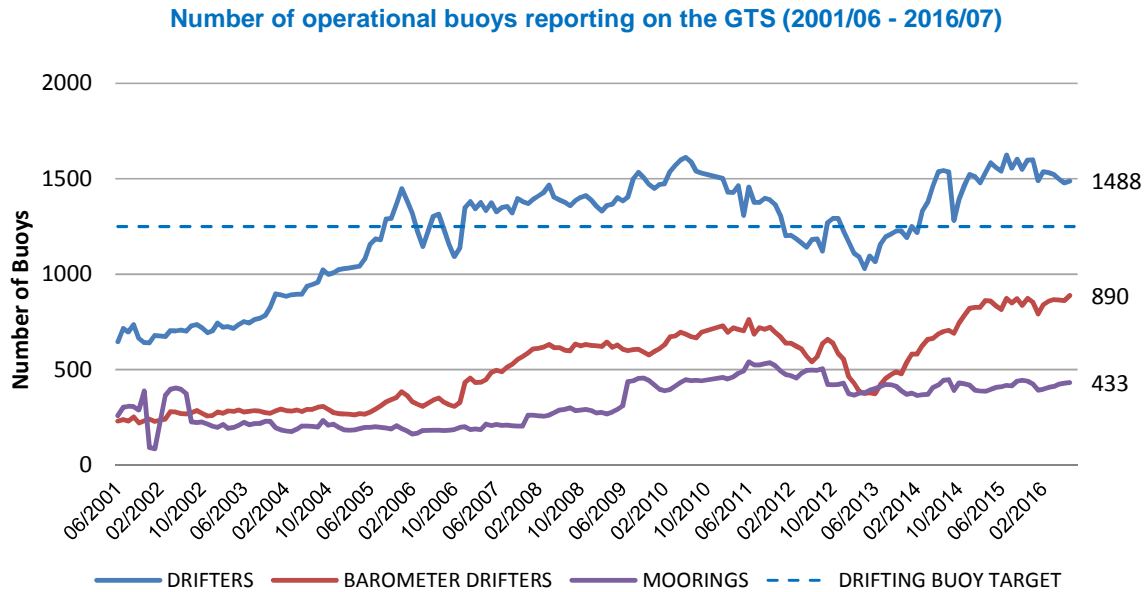
**Figure 3 - Status of Barometer drifting buoys during the last intersessional period.**

Atmospheric pressure measurements from moored buoys and fixed platforms have not changed significantly and maintained at average of 57% and 85% respectively during this intersessional period.

5.6. The Technical Coordinator reported that among the drifting buoys, moored buoys and fixed platforms reporting on the GTS in BUOY and/or BUFR formats, the following variables were reported in July 2016. Sea surface salinity measurement information is not available due to suspected decoding issue. TC is working with MeteoFrance to resolve the issue.

Variable	Any	Air T	Air P	SST	Sub Curr	Sub Sal	Sub T	Wa ve	Win d D	Win d S	RH
<b>Drifting Buoys</b>	1488	45	890	1409	00	06	08	04	00	00	01
<b>Moored Buoys</b>	433	320	265	363	24	100	114	282	328	325	154
<b>Fixed Platforms</b>	103	85	85	08	01	00	04	55	87	64	81

5.7. TC presented the status of drifting buoy and moored buoy networks together with number of barometer drifting buoys (Figure 4). It is apparent that number of platforms in each category has not changed significantly over the last intersessional period. However the significant decrease in drifting buoys during 2012-13 has recovered to acceptable levels since 2014 and stayed at around 1500 with approximately 55% barometer drifters. Total number of moored buoys has not changed significantly over the past few years.

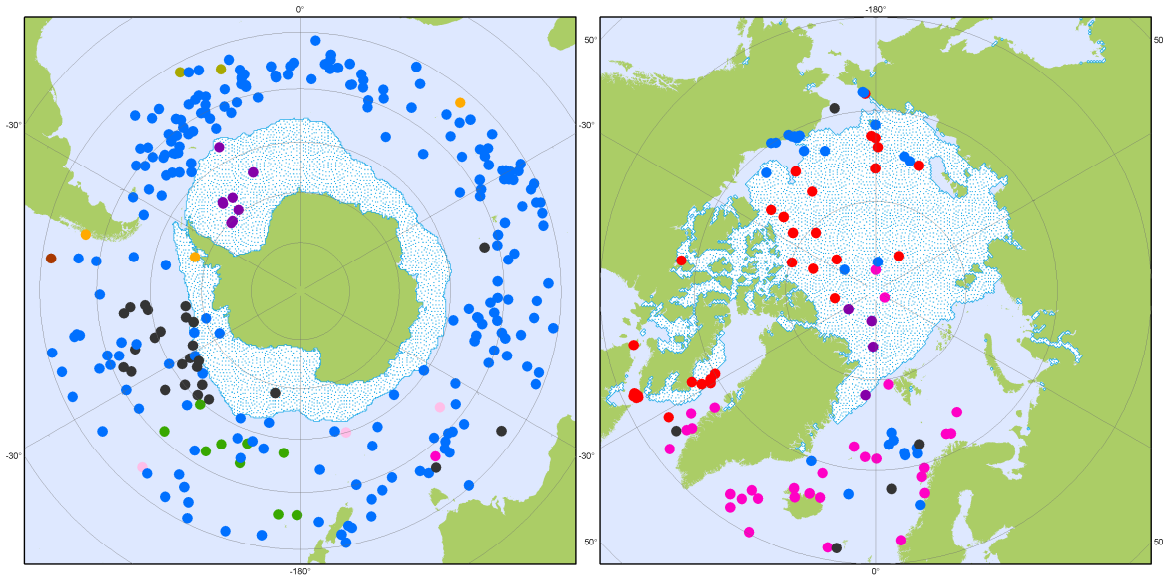


**Figure 4 – Growth of drifting buoys, moored buoys and drifters with barometers over the years from 2001**

5.8. Ms Gallage informed that starting from June 2016 most of the monthly maps are created automatically from pre-defined scripts using the information available on the new JCOMMOPS database by the end of the month. This has freed-up some time of TC. Nevertheless, TC has to spend time to keep the database with accurate and up-to-date information and to review monthly maps. Therefore, TC requests all platform operators to provide platform metadata information using tools provided on the new JCOMMOPS web application or send them to the TC in timely manner.

5.9. The TC reported that she modified a few monthly maps during this intersessional period to better illustrate the status of networks. Monthly map on all active buoys now identifies coastal/National moored buoys and tropical moored buoys as two distinct networks (Figure 2). Map of Antarctic region was modified to present together with Arctic region map. New combined map of Polar regions provides a focused view of active drifting buoys with their last location (Figure 5).

5.10. In addition to the changes shown above, the DBCP TC has created separate maps to show the drifter buoy observations density in 5X5 degree grid excluding high death rate regions, marginal seas and polar regions. This map provides a realistic representation of observations density throughout the month (Figure 6).

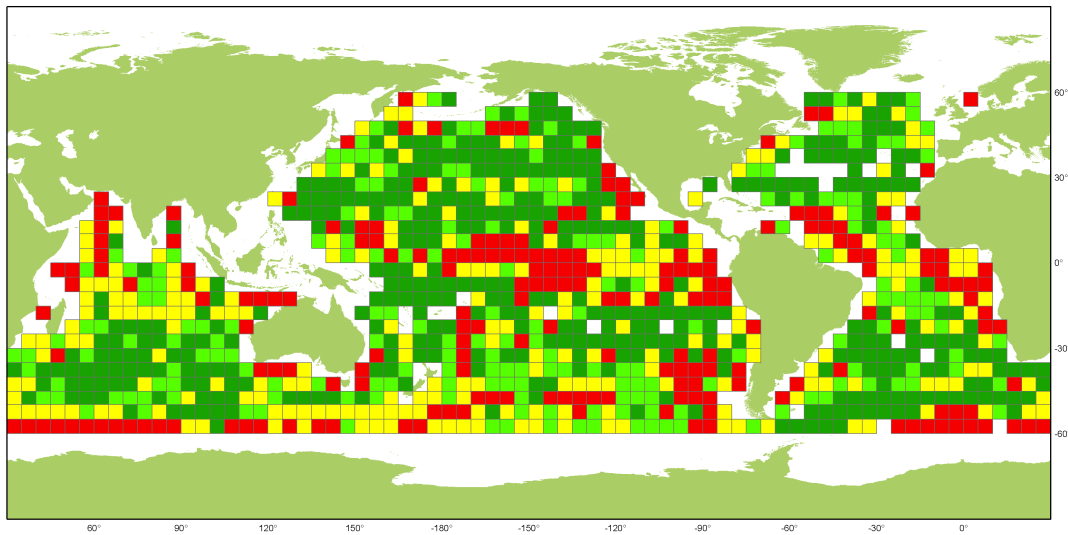


**Data Buoy Cooperation Panel** **Polar Drifting Buoys** **July 2016**  
 Drifting buoys providing data to the GTS during the month. GTS data as received by Meteo France

<b>Drifting Buoys-Antarctic</b>	GERMANY (8)	UK (2)		
AUSTRALIA (3)	ITALY (9)	USA (215)		
EUROPE (1)	NFWZFAI AND (1)	UNKNOWN (26)		
FRANCE (3)				
			<b>Drifting Buoys-Arctic</b>	
			CANADA (32)	EUROPE (30)
				GERMANY (5)
				USA (29)
				UNKNOWN (5)

Generated by www.jcommops.org, 22/08/2016

**Figure 5 – Status of buoy network in Arctic and Antarctic regions.**



**Data Buoy Cooperation Panel** **Observations Density of Drifting Buoys** **July 2016**  
 Density of observations from drifting buoys for the month. GTS data as received by Meteo France.

**Monthly Observation Density of Drifting Buoys in 5X5 degree grid (excluding high death regions, marginal seas and 60S<latitude<60N)**

0	1 - 720	721 - 1440	1441 - 7200	>7200
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Generated by www.jcommops.org, 22/08/2016

**Figure 6 - Map of observation density of drifting buoys for July 2016**

- 5.11. The TC reported on the status of the Tropical Atmospheric Ocean (TAO) buoy array. Starting from March 2015, monthly maps provide the Tropical moored buoy array (TAO/TRITON,RAMA,PIRATA) information separated from coastal/national moored buoy array. TAO array has been operating at a monthly average of 75% data availability during the intercessional period. This is a 5% average reduction in data availability compared to the previous reporting period. TC also highlighted that TAO data has been reporting on the GTS in BUFR format starting from 02<sup>nd</sup> March 2015. In the meantime, ASCII formatted messages in FM18 BUOY format continue to be distributed under the same headers as usual.
- 5.12. The TC reminded the panel that Deep-Ocean Assessment and Reporting of Tsunami (DART) Buoys information are available on JCOMMOPS database. The locations of these buoys are included on the monthly maps and in the reporting. Currently JCOMMOPS acquire data from DART buoys through Observing System Monitoring Center (OSMC). Starting from May 2016 machine to machine information transfer is in place to populate the JCOMMOPS database with DART buoy information. Yet, TC relies on monthly data availability reports produced by National Data Buoy Center to cross check the information on JCOMMOPS system.
- 5.13. The Southern Ocean Buoy Programme (SOBP), as part of the DBCP Implementation Strategy, aims to have 300 operational drifting buoys with barometers distributed across the Seas south of 40°S. As of July 2016, there were 269 drifters in the Southern Ocean and 188 (81%) of these were barometer drifters. Little progress has been made compared to the August 2015 number which was 244. A total of 216 drifting buoys deployed in the Southern Ocean during this intersessional period which is an 84% increase (117) compared to previous intersessional period. DBCP members should continue to look for deployment opportunities in this region to reach the target number of 300 buoys in the region (*action; Continue to look for deployment opportunities in SOBP region DBCP Members; ongoing*).
- 5.14. Ms. Gallage reported the Panel that monthly DBCP reports are made available to the DBCP community starting from January 2016. Monthly report includes information on network status for drifter buoys, coastal/national moored buoys, Tropical array, DART array and fixed networks. This report also includes the information on performance indicators and data format transition from Traditional Alphanumeric Codes (TAC) to Binary Universal Form for the Representation of meteorological data (BUFR).
- 5.15. The TC mentioned the importance of performance indicators that should capture performance of network status, data delivery, international cooperation, instrumentation, and operation aspects of the buoy arrays. She further reminded related discussions took place at DBCP-31 meeting including the proposed performance indicators for each network. Accordingly, TC worked with network groups to finalize the details. Performance indicators for Drifter Buoy network and coastal/national moored buoy network were reviewed by the respective network leads. Performance indicators for other networks are yet to be reviewed and finalized. TC requested Tropical buoy network, Tsunameter network, Arctic buoy network and Antarctic buoy network-leads to review and provide feedback on appropriate performance indicators for those networks. (*action; Tropical buoy network, Tsunameter network, Arctic buoy network and Antarctic buoy network to review and provide feedback on performance indicators; Network leads; asap*)

- 5.16. TC reported the Panel that starting from February 2016, a number of Performance Indicators are calculated and provided to the DBCP community on monthly reports. More developed performance indicators are now available through new JCOMMOPS web application starting from July 2016. Indicators for Global Drifter buoys network and national/coastal moored buoy network are validated through group leads. For all other networks few proposed Performance Indicators are available through the JCOMMOPS website.
- 5.17. DBCP community has been working on data format transition from TAC to BUFR for several years. TC reported that starting from March 2016 all drifter buoys are reporting in BUFR format to the GTS. All the drifter buoys except few from Japan are using validated BUFR format TM 315009. Currently majority of drifter buoys provided data to the GTS in BUFR and parallel TAC formats. The National Meteorological Centers which are not yet ready to accept BUFR data have request to continue to provide TAC data in parallel with BUFR until 01 November 2016, at which point data providers are ready to discontinue parallel TAC data to the GTS. In July 2016, 34% of moored buoys reported on the GTS in BUFR format where 8% of them report only in BUFR.
- 5.18. During previous intercessional period TC established procedures to collect moored buoy metadata. Majority of moored buoy operators have provided metadata in proposed format. As of July 2016 73% of national/coastal moored buoys and 98% of tropical moored buoys have submitted metadata. 16 agencies from 13 countries have provided moored buoy metadata to the DBCP. Compiled metadata CSV files and data submission instructions are accessible through a FTP site. TC has to work with JCOMMOPS IT to integrate moored buoy metadata into the JCOMMOPS database. JCOMMOPS should make this a priority in IT development. *(action: JCOMMOPS to integrate moored buoy metadata into the JCOMMOPS database; DBCP-33)*
- 5.19. TC has been emphasizing the importance of receiving metadata and deployment information in timely fashion at the DBCP. With new JCOMMOPS website tools, platform operators are able to upload the deployment information directly to the database without delay. She further elaborated the significance of receiving timely deployment information and metadata to include interactive maps and statistical summaries available through the JCOMMOPS web tool and to feed the OSCAR system within WIGOS framework. JCOMMOPS provides metadata to OSCAR system for all networks coordinated through JCOMMOPS. *(action; Buoy Operators provide deployment and platform metadata information to DBCP; ongoing)*
- 5.20. TC informed the panel that, there are many organizations which do not have direct connection with NWS are providing data or involved in other ways to submit data to the GTS. These groups want to check and access the data on the GTS. Currently this is possible only through NWS or Regional Telecommunication Hubs (RTH) where many of these data contributors do not have direct access to. Thus there is a growing need to have a tool available to access and download data in real (or near real) time from the GTS. TC suggested the Global data assembly centre (GDAC) is a suitable place for such a tool. TC recommended the panel to make a proposal to the GDACs to make available a tool to access (near) real time data for a wider audience. JCOMM OCG is addressing the lack of data access to the GTS information and providing data to the GTS through the OpenGTS project.

- 5.21. TC thanked platform operators for following the WMO ID handling best practices proposed during DBCP-31. Proposed best practices are in line with WIGOS ID allocation principles and expect to have no issues when adopting to the WIGOS requirements. Further she requested DBCP members to continue to follow the proposed best practice.
- 5.22. MS Gallage highlighted new information added to the DBCP static website during this intersessional period. Information on "Evaluation of Unmanned Surface Vehicles" and a "Bibliography" has been added to the DBCP website. TC requested DBCP members to submit publications information in the format identified on the DBCP website under Bibliography. (**action: Submit publications information to TC; ongoing**)
- 5.23. The outgoing DBCP Technical Coordinator, Champika Gallage, thanked the DBCP Members, Task Teams, Chairs and Executive Board for their support and guidance during her tenure. She further thanked all DBCP members for an eventful 2 years and wishes the best to all members.
- 5.24. The Panel and the Secretariat thanked Ms Gallage for her informative and high quality report on the activities of the TC DBCP. The Panel congratulated Ms Gallage on her rapid development as TC DBCP, thanked her for efforts and wished her well on her new position with the WMO Observations Section.
- 5.25. The meeting made a number of **recommendations (DBCP-32/5 No. 6-11)** which are available in ANNEX II
- 5.26. **The meeting decided on the following action items:**
- Action 1.** Populate new JCOMMOPS database with historical data and metadata (**action; JCOMMOPS, DBCP-33**)
- Action 2.** DBCP members should continue to look for deployment opportunities in SOBP region (**action; DBCP members**)
- Action 3.** TAO network, Tsunameter network, Arctic buoy network and Antarctic buoy network communities to review and provide feedback on performance indicators; (**action; Network leads**)
- Action 4.** JCOMMOPS to integrate moored buoy metadata into the JCOMMOPS database (**action; JCOMMOPS, DBCP-33**)
- Action 5.** Buoy Operators to provide deployment and platform metadata information to DBCP; (**action; Buoy operators, ongoing**)
- Action 6.** DBCP members should upload deployment information to the new website in timely manner. (**action; DBCP Member; ongoing**)
- Action 7.** DBCP members to submit publications information in the format identified on the DBCP website under Bibliography. (**action; DBCP members, TC; ongoing**)

## 6. REPORTS BY THE ACTION GROUPS

6.1. Under this agenda item, the Panel was presented with reports by the DBCP Action Groups. Each group maintains an observational buoy program that supplies data for operational and research purposes. The implementation of buoy deployments is also coordinated through global, regional, or specialized Action Groups.

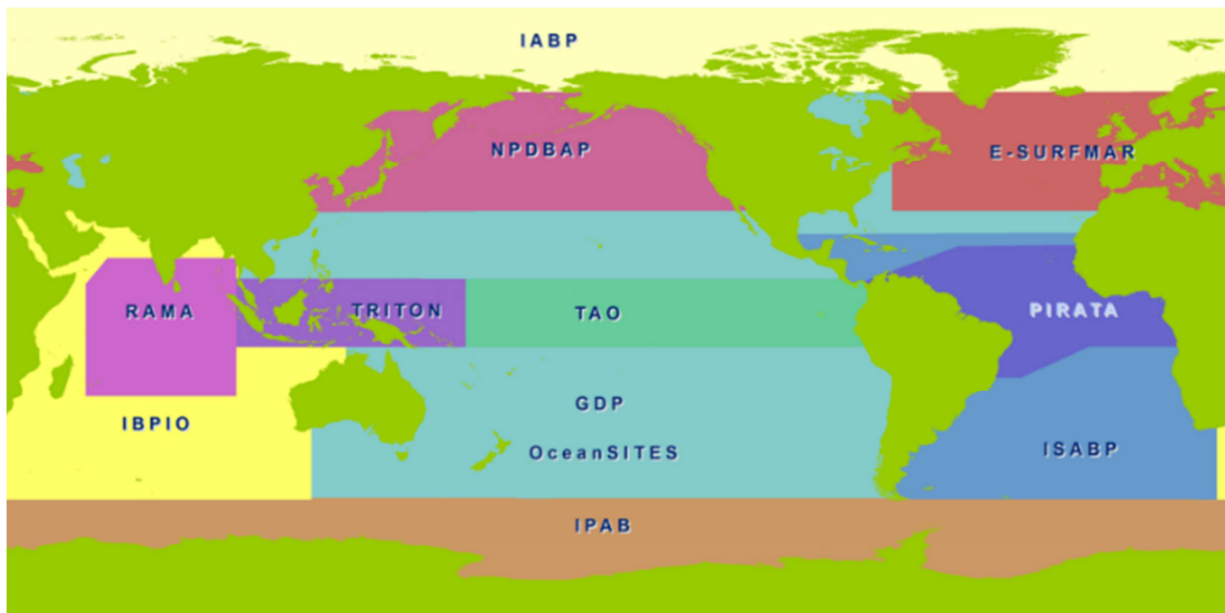


Figure 1: The regional extent of several of the DBCP Action Groups.

6.2. The reports included:

- (i.) **GDP**: Global Drifter Programme (verbal presentation by Rick Lumpkin (USA) on behalf of the GDP);  
Global Drifter Programme array evaluation should consider the coverage density within the 5x5 box spacing, not the total number of drifters deployed. This affects other indicators of global array coverage for the GOOS. Increased lifetimes of drifters are providing significant cost savings for the programme, allowing us to better focus the deployment strategy on needed areas. The Iridium transition plan to 80% Iridium+GPS by mid-2019 is on track. The session was pleased that the hourly data set is available on-line.
- (ii.) **E-SURFMAR**: Surface Marine programme of the Network of European Meteorological Services, EUMETNET (verbal presentation by Paul Poli (France), representing the E-SURFMAR officers);  
E-Surfmar is active in AtlantOS, a consortium formed in response to Horizon 2020 call to develop in-situ Atlantic Ocean Observations for management of marine resources. The system showed the great positive impact of the E-SURFMAR drifters on the validity of forecasts.
- (iii.) **IABP**: International Arctic Buoy Programme (verbal presentation by Dr. Ignatius Rigor (USA), representing IABP);  
The record of sea-ice retreat provided by the drifters documents significant changes over past decades. The IABP is looking for more partnerships to deploy off the Russian coast.
- (iv.) **IBPIO**: International Buoy Programme for the Indian Ocean (verbal presentation by Mr Shaun Dolk (USA) on behalf of the IBPIO);



The growth of the RAMA array dominates and invigorates the IBPIO providing more deployment opportunities and participation by more countries. To aid participation in the IIOE-2 the IBPIO recommends actions for the WMO/IOC secretariat to support communications and collaboration.

- (v.) **IPAB**: WCRP-SCAR International Programme for Antarctic Buoys (verbal presentation by Ignatius Rigor (USA) on behalf of the IPAB).  
The Southern Ocean is divergent and therefore very difficult to maintain good array coverage. The programme does not meet as regularly as it should. The resultant status of the array is "Dire". The Year of Polar Prediction is an opportunity that may help to get the array going.
- (vi.) **ISABP**: International South Atlantic Buoy Programme (verbal presentation by Mayra Pazos (USA), representing the ISABP);  
The ISABP is taking advantage of the barometer upgrade programme.
- (vii.) **NPDBAP**: DBCP-PICES North Pacific Data Buoy Advisory Panel (verbal presentation by Mr Shaun Dolk (USA), technical coordinator of the NPDBAP);  
Because the drifters are lasting longer, we are not deploying as many and there has been much less activity. The NPDBAP succession of leadership and a new Asian chair will allow the group to resume activity in coming years.
- (viii.) **TIP**: Tropical Moored Buoys Implementation Panel (verbal presentation by Ken Connell (TIP coordinator);  
TIP is largely concerned with the tropical moored buoy arrays of TAO/TRITON, PIRATA, and RAMA. The TAO/TRITON array is 97% implemented with 63 sites (67 total moorings); 54 of 55 TAO and 8 of 12 TRITON surface moorings are currently reporting data. However, the TRITON array is scheduled to be reduced to 2 sites by Jan. 2017. The PIRATA array is 100% implemented with 18 sites (19 total moorings) and has 15 of 18 surface moorings reporting data. The RAMA array is 78% implemented with 33 of 42 sites (36 of 46 total moorings) and has 21 of 32 surface moorings currently reporting data. The DBCP members are encouraged to read the First Report on the TPOS 2020 (<http://tpos2020.org/first-report>) which contains ideas for sustaining and developing the TAO/TRITON arrays. TPOS 2020 has also designed experiments to demonstrate technologies to enhance the Tropical moored arrays. PIRATA and RAMA depend critically upon international partnerships, e.g. India, Indonesia, Rep. Korea, US and others, as well as IIOE-2.
- (ix.) **ITP**: International Tsunameter Partnership (verbal presentation by Dr Venkatesan (India) on behalf of the ITP).  
The Draft Tsunameter Equipment Performance Standards and Guidelines was submitted to TOWS-WG Inter-ICG Task Team on Tsunami Watch from 23 to 24 February 2016 followed by TOWS-WG-IX, 9th session of Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG) from 25 to 26 February, 2016. The group appreciated the efforts of the ITP. The report is available at: [http://www.ioc-unesco.org/index.php?option=com\\_oe&task=viewDocumentRecord&docID=16620](http://www.ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=16620)
- (x.) **OceanSITES**: OCEAN Sustained Interdisciplinary Timeseries Environment Observation System (verbal presentation by Dr Bob Weller, co-chair OceanSITES);  
OceanSITES asked the DBCP Executive Board to consider a change in its status, shifting it from a formal Action Group under the DBCP. OceanSITES would remain reporting to the Observations Coordination Group under JCOMM OPS and would also remain as an observing element with strong interest in technical coordination and capacity building

that could be achieved under DBCP. OceanSITES would continue to share with DBCP the support of a technical coordinator at the JCOMM OPS office.

6.3. The Panel noted the recommendations and actions arising from the reports of the action groups and the **recommendations (DBCP-32/6 No. 12-13)** are available on ANNEX II.

**Action 8.** IPAB members from SA, Australia, NZ, USA and Brazil should have regular webex and the principles meet during the DBCP sessions. (action: Boris Kelly-Gerreyn, Petra Heil, Pablo Clemente-Colon, Ignatius Rigor, DBCP-33)

6.4. The full reports of the action groups are provided in DBCP-32-Doc. 6, Appendices A to J, and will be reproduced in the Panel's Annual Report.

## 7. REPORTS BY THE TASK TEAMS

### 7.1. Task Team on Instrument Best Practices & Drifter Technology Developments (TT-IBPD)

7.1.1 Dr Rick Lumpkin (USA), vice-Chairperson of the Task Team on Instrument Best Practices & Drifter Technology Developments (TT-IBPD), reported on the Task Team activities during the last inter-sessional period.

#### *Drifter lifetime*

7.1.2 The drifter lifetime across the board is sufficient to maintain an array that exceeds the goal of 1,250 drifters. 59% of the drifters are equipped with barometers, and increase from last year when, at the time of writing there were 54% barometer drifters. The TT-IBP stresses the importance of constantly monitoring the status of the global array to detect early sign of technical issues.

#### *Drogue detection and retention*

7.1.3 As per DBCP-29 discussion actions were taken to extend the drogue retention time. The statistics published in the in the Global Drifter Program Action Group Report and reported below still show a marginal improvement of drifter drogue life for the period 2012-2015.

#### **DROGUE HALF-LIFE (DAYS) (all drifters)**

<b>Manufacturer</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Clearwater	101	104	95	84	>293	>438	434	>431
DBi	*	*	*	279	227	243	228	>263
Marlin-Yug	72	57	167	*	0	*	20	*
Metocean	269	224	77	89	115	207	217	>232
Pacific Gyre	206	241	248	207	>228	241	229	206
SIO	*	*	*	*	66	>140	130	>149
Technocean	33	63	74	154	>62	0	>14	0

#### **PERCENT THAT HAD DROGUE OFF <90 DAYS (all)**

<b>Manufacturer</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Clearwater	36%	30%	36%	39%	14%	5%	16%	0%
DBi	*	*	*	25%	11%	12%	7%	6%

Marlin-Yug	41%	46%	40%	*	43%	*	71%	*
Metocean	17%	26%	40%	45%	33%	14%	21%	6%
Pacific Gyre	22%	17%	10%	16%	21%	9%	16%	15%
SIO	*	*	*	*	40%	23%	14%	20%
Technocean	78%	53%	46%	27%	33%	30%	44%	57%

#### **PERCENT THAT HAD DROGUE OFF <10 DAYS (all)**

<b>Manufacturer</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Clearwater	4%	7%	7%	5%	3%	2%	4%	0%
DBi	*	*	*	0%	4%	3%	0%	0%
Marlin-Yug	24%	33%	10%	*	43%	*	43%	*
Metocean	13%	6%	12%	6%	8%	5%	3%	0%
Pacific Gyre	11%	8%	2%	4%	7%	0%	1%	2%
SIO	*	*	*	*	25%	1%	0%	0%
Technocean	11%	10%	9%	3%	15%	15%	29%	57%

7.1.4 One recommendation is to increase the diameter of the tether to ¼" plastic impregnated wire rope and use the same material for the construction of the drogue harness. Experimentation of drogue harness stiffening is continuing at the Lagrangian Drifter Laboratory, Scripps Institution of Oceanography.

#### ***Global Positioning System performance***

7.1.5 During the intersessional period the Lagrangian Drifter Laboratory of the Scripps Institution of Oceanography started a detailed assessment of the performance of the GPS engine installed on their drifters. This is an important evaluation in light of the transition of the NOAA funded Global Drifter Program array to GPS/Iridium technology. The ability to obtain a high quality dataset for high resolution ocean currents and for high resolution SST will rely on the ability to minimize the GPS drop-out globally. Some preliminary results will be presented at the DBCP-32 Science and Technology workshop.

7.1.6 The TT-IBPD made eight **recommendations (DBCP-32/7.1 No. 14-21)** and these are available on ANNEX II

7.1.7 The Panel thanked Mr Centurioni and members of the Task Team for the comprehensive report. The Panel re-elected Dr Centurioni to Chair the Task Team during the next intersessional period. The full report of the Task Team is provided in Appendix A of DBCP-32 preparatory document No. 7.1, and will be included in the DBCP Annual Report for 2016.

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

7.2.1 Mr Bob Jensen (USA), Chairperson of the Task Team on Moored Buoys (TT-MB), reported on the Task Team activities during the last inter-sessional period. Over the last few years the metadata needing to be collected for moored buoy systems has been defined and an initial system for its submission to JCOMMOPS was set up in February 2015, with documentation and submitted metadata available via <ftp://ftp.jcommops.org/DBCP/metadata/>. At time of writing moored buoy metadata have been submitted by Brazil, Canada, Chile, France, Germany, Greece, India, Italy, Japan, New Zealand, Portugal, Slovenia, South Korea and US. Other moored buoy operators are requested to generate and provide their metadata to the DBCP-TC. Defining the metadata content for fixed platforms still needs to be progressed.

7.2.2 The Task Team was instrumental in the development and validation of the BUFR template (3-15-008) for moored buoy data, which was declared operational in May 2014. By July 2016 8% of moored buoys were reporting their data in BUFR only, 26% in both BUFR and TAC (Traditional Alphanumeric Code) and 66% in TAC only. Those moored buoy operators not issuing their data in BUFR (3-15-008) are requested to do so at the earliest opportunity, with parallel (BUFR and TAC) data distribution (as many operational centres are not yet ready to handle the BUFR data) until such a time it is agreed the TAC will be ceased. It is hoped that validation of the draft BUFR template for offshore platforms (3-15-017) will be validated over the autumn months.

7.2.3 Recommendation 16 from DBCP-31 was to establish a group within the TT-MB to facilitate exchange of information on ASV test and evaluation. A web-page has been set up on the DBCP web-site ([http://www.jcommops.org/dbcp/overview/evaluation\\_usv.html](http://www.jcommops.org/dbcp/overview/evaluation_usv.html)) to collect and disseminate information on experiences with unmanned surface vehicles. The DBCP Scientific and Technical Workshops will also provide a forum for presenting the latest results, with three ASV talks (to be) presented during the DBCP-32 session. Careful evaluation of ASV-based metocean measurements is required before they can be considered as a viable alternative to moored buoys.

7.2.4 The TT-MB has coordinated with TT-IBPD to define the performance metrics for national and coastal buoy networks. The metrics were implemented in early 2016.

7.2.5 During the year a number of technical developments to the various moored buoy systems and networks have been made, and the information is in ANNEX VI:

7.2.6 The meeting agreed to continue to progress the following DBCP-31 workplan actions, which should be carried over into the workplan for 2016-17.

Action 6. Provide deployment and platform metadata information [for moored buoys] to DBCP-TC. Completed

Action 16. Centers must switch to using BUFR template for [drifting and] moored buoys ([templates TM315009 for drifters and] TM315008 for moorings) as soon as possible. Note that parallel BUFR/TAC dissemination will be required for some time to allow operational centres to be ready for the change. This action remains as work in progress as of DBCP-32.

Action 18. The Panel recommended correcting the time stamp data according to WMO-8, draft CIMO guide and WMO-544 for meteorological data. A DBCP Technical Document should be produced to clarify these issues. Note action will be on moored buoy operators to implement the recommended time stamping for data issued in BUFR. As noted above this action remains as work in progress as the transitioning to BUFR implementation continues.

Action 78. The Panel urged the DBCP task team on moored buoys to consider an agenda item for DBCP-32 to explore options and cooperative mechanisms toward the international operational cooperation for recovering moored buoys gone adrift. There was no action in response to this activity.

7.2.7 In terms of recommendations from DBCP-31, Recommendations 14, 17 and 21 relate to Actions 16 and 18. Other Recommendations from DBCP-31 were Rec 15, 16, 18, 19, 20, 22,

23, and 24 are available on the DBCP-31 meeting report<sup>9</sup> ANNEX IV.

7.2.8 Recommendations for the TT-MB 2016-17 workplan are (**DBCP-32/7.2 No. 22-26**) available on ANNEX II.

7.2.9 Action items for the TT-MB 2016-17 workplan are;

Action Item 79: Establish a ASV working group, under TT-MB. This group will establish BUFR, metadata templates, formally document test and evaluation procedures for met oceanographic data collected on these systems (from Rec. 16, 23 and 24). This work will be reported at DBCP-33.

Action Item 19: As noted above, review guidelines documentation developed by R. Venkatesan that summarizes: support the activities which involve instruments/measurement techniques of ocean observations. It was also recommended a Task Team for Instrument Standards can be formulated with terms of reference during the next DBCP session R. Venkatesan lead.

7.2.10 The Panel thanked Mr Jensen and the members of the Task Team for the report. The Panel re-elected Bob Jensen (USA) to Chair the Task Team with Shannon McArthur (USA) as vice-Chair during the next inter-sessional period. The full report of the Task Team is provided in Appendix A of DBCP-32 preparatory document No. 7.2, and will be included in the DBCP Annual Report for 2016.

### **7.3. Task Team on Capacity-Building (TT-CB)**

7.3.1 Dr Sid Thurston (USA), Chairperson of the DBCP Task Team on Capacity Building (TT-CB), reported on the Task Team activities during the last intersessional period. Dr. Sid Thurston (USA), Chairperson of the DBCP Task Team on Capacity Building (TT-CB), reported on the Task Team activities during the last intersessional period. In particular, he provided comprehensive information on: 1) Outcomes and Recommendations of the Fourth North Pacific Ocean and Marginal Seas (NPOMS-4) "Applications of Ocean Observations for Improving Society's Understanding and Forecasting of Typhoons", 2-4 November 2015 and gratitude to Host Korea Maritime and Ocean University (KMOU) in Busan, Republic of Korea, 2) The Outcomes and Recommendations of the "Second Pacific Islands Training Workshop on Ocean Observations and Data Applications" (PI-2) and appreciation to Host Institut de recherche pour le développement (IRD) in Noumea New Caledonia, 24-27 May, 2016, and 3) Prospectus for DBCP Capacity Building Workshops in 2017.

7.3.2 Mr. Joe Swaycos and Ms. Jennifer Lewis described the capacity building workshop given by the US NDBC in its role as the RMIC for RAIV. It focused on Waves Technology and some participants from developing countries were supported by the DBCP trust fund to take part in the workshop.

7.3.3 The meeting agreed on the following:

- To convene the "Fifth DBCP in-Region North Pacific Ocean and Marginal Seas

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<sup>9</sup> <http://www.wmo.int/pages/prog/amp/mmop/documents/JCOMM-MR/JCOMM-MR-124-DBCP-31-Final-Report.pdf>

Capacity Building Workshop" (NPOMS-5), April/May 2017, Tianjin, People's Republic of China. Additional details for the workshop are detailed in Appendix C (*action; TT-CB; Autumn 2016*);

- To commence planning for the organization of the "Third Pacific Islands Workshop on Ocean Observations and Data Applications" (PI-3) June/July 2018. The South West Pacific Region is fertile ground for capacity building, particularly in ocean issues. The Region has good networks and there is a lot of interest in building the human capacity to digest and understand data from the ocean and climate observing systems. (*action; TT-CB; DBCP-32*).
- To explore with the IOC Sub-Commission for Africa and the Adjacent Island States for a possible future session of a DBCP Indian Ocean Capacity Building Workshop to focus on developing the contributions to the *Second International Indian Ocean Expedition (IIOE-2)*. (*action; TT-CB; DBCP-32*);
- To continue to employ 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; PI-3, NPOMS-5*);
- To Enhance Coordination and Cooperation between TT-CB and WMO Regional Associations (*action; TT-CB; DBCP-32*);
- To emphasize that the regional activities should create synergies and avoid duplication, at all cost, therefore requested to develop specialize activities that meet the interest of the respective regions, preferably with the identified resources within the regions. (*action; TT-CB; continuous*);

7.3.4 Recommendations made during the TT-CB side meeting Oct. 18, **(DBCP-32/7.3 No. 27-31)** are available in ANNEX II.

7.3.5 The Panel thanked Dr. Thurston and the members of the Task Team for the report. The Panel re-elected Dr. Thurston to Chair the Task Team during the next intersessional period. The full report of the Task Team is provided in Appendix A of DBCP-32 preparatory document No. 7.3, and will be included in the DBCP Annual Report for 2016.

## **8. REPORTS BY THE PILOT PROJECTS**

### **8.1. DBCP-ETWCH Pilot Project on Wave measurement Evaluation and Test from moored buoys (PP-WET) and Related Issues**

8.1.1 Mr Val Swail (Canada) reported on the development and current status of the joint DBCP<sup>10</sup>-ETWCH<sup>11</sup> Pilot Project on wave measurement evaluation and test from moored and drifting buoys (PP-WET).

8.1.2 As noted during the DBCP-31 session, the Pilot Project has been focusing on the multiple deployments at the buoy farm in Monterey Canyon. The Panel noted with appreciation that this buoy farm continued to provide a wealth of information, with a large number of platforms deployed and providing data either in real time or delayed mode. This was centered around

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10 DBCP: Data Buoy Cooperation Panel

11 ETWCH:JCOMM Expert Team on Waves and Coastal Hazard Forecasting Systems

FLOSSIE (Field Laboratory for Ocean Sea State Investigation and Experimentation), a 6m NOMAD buoy instrumented with a large number of present and historical wave sensors and processing systems for both Canadian and US systems. This deployment represents a key cornerstone of the PP-WET objectives. Results were presented by Dr. Robert Jensen, PP-WET Co-Chair, at the Technical Workshop preceding DBCP-32, and in the side meeting of PP-WET. Other intercomparisons were also carried out, from other platforms within the buoy farm, dual sensor buoy deployments, and a co-deployment of two identical Datawell waveriders at the Harvest location off the California coast. The Panel expressed its appreciation for the continued contribution, supported by the US Army Corps of Engineers, from the Coastal Data Information Program (CDIP) at the Scripps Institution of Oceanography, in setting up the intercomparison methodology, web site and metadata criteria, and in carrying out individual intercomparisons.

8.1.3 Data was also obtained from a UK waverider, co-deployed with two operational measurement systems, which will be provided to CDIP for analysis and posting to the web site. Other member countries were encouraged to participate in the Pilot Project intercomparison activities by submitting co-located spectral wave data, in an appropriate format, to the Coastal Data Information Program (CDIP) at the Scripps Institution of Oceanography. The Panel encouraged its member countries, and RMIC with marine responsibilities, to participate in the intercomparison activities that were led by this pilot project.

8.1.4 The Panel noted that evaluation results continue to be routinely added to the intercomparison web site <http://www.jcomm.info/wet> in near real time, if spectral data are routinely transmitted via satellite; if data must be retrieved from logging systems on the platforms, the analysis may be delayed by a year or more. Additional intercomparisons will be added to the web site once the information has been retrieved from the data storage systems on the buoys.

8.1.5 Mr Swail noted that work is also progressing well on the wave measurements from drifting buoys component of the Pilot Project. During the intersessional period, the Lagrangian Drifter Laboratory (LDL) at the Scripps Institution of Oceanography have continued testing the design of the Surface Velocity Program wave drifter (SVP-Wa). One instrument was deployed off the port of Naples, Italy, and was collocated with an upward looking acoustic Doppler current profiler. The comparison of the data obtained with the two instruments is underway.

8.1.5.1 The LDL has completed the fabrication of 45 SVP-Wa (undrogued). Five instruments have been deployed in the eastern Pacific Ocean, and the entire array will be deployed before the end of 2016; it will be the first large scale pilot array of wave *measuring drifters sponsored by the Global Drifter Program*.

8.1.5.2 The LDL is still planning to test the SVP-Wa sensor package inside the hull of a Datawell waverider (gimbaled version) as soon as a unit become available.

8.1.5.3 The latest results of the project were presented by Mr. Lance Braasch at the Technical Workshop preceding the DBCP-32 session, and are available on the DBCP web site. The Panel noted this progress with interest, and recommended that this development should continue, in cooperation with the GDP, to further the evaluation of the technology.

8.1.6 Mr Swail noted that efforts have continued to outreach the objectives and results of the Pilot Project to end users and data providers alike. Three sessions on wave measurement, two

on in situ measurement and one on remotely sensed measurements, were convened as part of the 14th International Workshop on Wave Hindcasting and Forecasting (WW-14, November 8-13, 2015, Key West, USA) to present evaluation results to the end-to-end scientific community and further develop guidelines and participation in the Pilot Project (<http://www.waveworkshop.org>). Presentations were also made to the ocean climate community at the JCOMM Fourth International Workshop on the Advances in the use of Historical Marine Climate Data (MARCDAT-4, July 18-22, 2016, Southampton, UK), the international wave modeling symposium WISE (22-26 May 2016, Venice, Italy), and the Regional Marine Instrumentation Center (RMIC) wave workshop (February 29 to March 2, 2016, Gulfport, MS). A section on wave measurement is also being written for the WMO Guide to Wave Analysis and Forecasting (WMO No. 702).

8.1.7 The overriding sentiment expressed by users at these meetings was that the primary user requirement was for high quality data. The requirement for the First-5 criteria for directional spectral measurements, or high quality frequency spectra, validated against a known reference, as documented in the US National Waves Plan, OceanObs'09 and the Pilot Project documentation, was considered to be more important than the deployment of new moored assets. The users expressed concerns that national agencies were increasingly sacrificing wave quality in favour of additional measurements on moored buoys, and deploying modified or new wave measurement technologies with limited or no testing and evaluation, in violation of GCOS principles. Mr Swail urged the wave measurement agencies to ensure that high-quality wave data was measured for the benefit of a wide range of users, and not to sacrifice quality for quantity. At the same time, Mr Swail supported the position reported by the Task Team on Moored Buoys (TT-MB), that wave metadata, and in particular historical metadata, remains in an abysmal state in many agencies, a point also raised by the recent MARCDAT-4 meeting.

8.1.8 The Panel agreed that the wave measurement evaluation part of this pilot project was now essentially mature and had achieved its goal of developing a continuous evaluation and testing program. It has contributed to the identification of wave user requirements, in particular noting the need for measurements which meet the First-5 criteria for directional wave measurements, the need for evaluation of any new systems proposed for wave measurement, and developing and providing to the community the analysis tools to carry out such evaluations. Information on best practices will be documented in appropriate media, including journal papers, WMO Guides and general information. The wave measurement from drifters is still in a pilot development phase, but rapidly moving towards the evaluation stage and eventual implementation; the Lagrangian Drifter Laboratory is the principal investigator in this activity, with collaboration as required for the evaluation process.

8.1.9 Mr Swail also reported on recent discussions of wave measurement issues, including the reviews of wave requirements in the GCOS Implementation Plan, the OOPC Essential Ocean Variables and the Tropical Pacific Observing System 2020 plan, as well as conversations between the PP-WET Co-chairs, the Co-President of JCOMM (N. Pinardi), the Chair of the Observations Programme Area (D. Legler) and the Secretariat on the broader issues involving wave measurement. Concerns were expressed about the lack of coordination and communication across the three JCOMM Programme Areas (Observations, Services, Data Management), and with GCOS/GOOS, OOPC and others with respect to in situ wave measurement.

8.1.10 In view of these broader issues, and the need for more widespread involvement and



discussion across the three JCOMM Programmes, the Panel session enthusiastically was recommended that a Task Team on Wave Measurement (TT-WM) should be created, to encompass not only the ongoing efforts in wave measurement evaluation and the continuing pilot on wave drifters, but to enable a broader dialogue for in situ measurement of waves, including interaction across the three Programme Areas of JCOMM, with the OOPC, GCOS/GOOS, and other relevant bodies. The Task Team would have a Chair and Vice-chair, and an open membership; the proposed Terms of Reference are described in (Appendix A). The Panel noted with appreciation the offer of Mr. Swail to serve as interim Chair for the first year of the Task Team, if approved by the Executive Board, and of Dr. Jensen to serve as the vice-Chair.

8.1.11 The Panel recognized that the proposed Task Team would contribute to JCOMM in developing standards and best practice, as well as to the relevant WIGOS exercise, and encouraged the its members to actively outreach these relevant activities, in relevant scientific and technical fora. In particular, it requested the new TT-WM, if approved by the DBCP Executive Board, to assess the interest and feasibility of convening a DBCP workshop on in situ wave measurement issues, including review of user requirements, measurement evaluation, best practices and emerging technologies, and develop a workshop proposal for consideration.

The Panel thanked the PP-WET co-chairs, Mr Val Swail and Dr. Robert Jensen, and Pilot Project members for their work on advancing this activity.

8.1.12 The meeting made six **recommendations (DBCP-32/8.1 No. 32-37)** and are included in the ANNEX II.

8.1.13 The Panel agreed to the establishment of a Task Team on Wave Measurement (TT-WM) and the dissolution of the PP-WET, subject to the completion of TT-WM ToRs.

8.1.14 The meeting decided on the following action items:

**Action 9.** Consider the proposal to establish a Task Team on Wave Measurement (TT-WM) as a focal point within DBCP for in situ wave measurement discussion, with a Terms of Reference and Year 1 Work Plan to be developed, as shown in Appendices 1 and 2 (action: DBCP Executive Board, PP-WET co-chairs, Secretariat; November, 2016);

**Action 10.** Assess interest and feasibility of convening a DBCP workshop on in situ wave measurement issues, including review of user requirements, measurement evaluation, best practices and emerging technologies, and develop a workshop proposal for consideration (action: Chair of TT-WM (if approved), Chair DBCP, Secretariat; December 2016)

## **8.2 Pilot project proposals**

### 8.2.1 Evaluation of Need for Task Team for Unmanned Surface Vehicles

8.2.5.1 The session was informed on the possible need for a Task Team or Pilot Project on the Evaluation of Unmanned Surface Vehicles.

8.2.5.2 Recommendation 16 from DBCP-31 was to establish a group within the TT-MB to facilitate exchange of information on unmanned surface vehicles (USV)

test and evaluation. A web-page has been set up on the DBCP web-site ([http://www.jcommops.org/dbcp/overview/evaluation\\_usv.html](http://www.jcommops.org/dbcp/overview/evaluation_usv.html)) to collect and disseminate information on USV and any available evaluation results. As such DBCP has not established a formal pilot project on USV and one of the discussions during the earlier TT-MB session was to find out whether the panel has enough people involved in USV testing/trialing to establish a viable pilot project or team, unless there are sufficient people active in this area, then DBCP can do little more than facilitate exchange of information.

8.2.5.3 The Glider Science/Steering Team (GST) is being established to provide scientific leadership to promote ocean sub-surface gliders as a tool for sustained ocean observations globally, responding to integrated requirements of the Global Ocean Observing System (GOOS), incorporating GCOS requirements, and reporting to the WMO/IOC JCOMM Observations Coordination Group (OCG). As such it is only concerned with sub-surface (underwater) gliders and not USV (which are also sometimes referred to as gliders).

8.2.5.4 The panel noted that three USV related talks were presented during the DBCP 32 Scientific and Technical Symposium.

8.2.5.5 The panel further took note of the action by the TT-MB to establish a USV working group. The panel requested:

**Action 11.** The TT-MB USV group to investigate the interest and feasibility of establishing a Pilot Project for USV, and report to next DBCP-33. (Action: TT-MB USV; DBCP-33)

#### 8.2.2 Evaluation of Need for Task Team for High resolution drifter SST measurements

8.2.2.1 Under this agenda item, Prof D Meldrum reported on the main outcomes of the ESA-supported drifter SST workshop that had been held at Scripps immediately prior to the current session, with the principal objective of improving the quality of drifter SST for use by the satellite community. Prof Meldrum reminded the Panel that it had initiated a dialogue with the satellite community in 2009 through interaction with the Group for High Resolution Sea Surface Temperature (GHRSSST), and that in due course it had created the DBCP-GHRSSST Pilot Project for HRSST (PP-HRSST). A significant number of HRSST drifters had been deployed under the auspices of this project, principally by E-SURFMAR and the UK Met Office, but a proper evaluation of the results had been hampered by the loss of ENVISAT and the high quality radiometer (AATSR) that it carried. Indeed the limited suite of intercomparison studies undertaken had failed to demonstrate any advantage in deploying HRSST sensors. Nonetheless, the advent of Iridium communications and the BUFR GTS code had led to a gradual migration towards HRSST, in terms of higher reported resolution if not absolute accuracy, being the default in drifter manufacture.

8.2.2.2 The Panel was pleased to note the new and strong interest of the space community in funding appropriate activities in the in situ sector, and thanked ESA and EUMETSAT for their commitment in this regard. In so doing, it invited the space sector to work closely with the Panel in defining and developing new opportunities for collaboration.

8.2.2.3 The GHRSSST workshop, attended by 20 participants encompassing a wide range

of interests in both the satellite and drifter SST communities, reached consensus on a number of issues, as listed below:

- Acceptance in principle of the GHR SST Standard (Table 1) for global drifter SST implementation and reporting, subject to the eventual validation of its usefulness;
- Acknowledgement that the space component and the drifter array are elements of a composite network and that both are required for different but complementary purposes;
- Acceptance in principle of the requirement for SI traceability of drifter SST;
- Endorsement of the efforts by Prof Meldrum to harmonize and publish available drifter metadata in a global dataset;
- Agreement that mechanisms must be found to maintain the harmonized metadata dataset in the future;
- Agreement that the routine reporting of diagnostic data (e.g. drifter internal temperature) and access to collateral information (e.g. wave spectral estimates) are important components of best practice for developing drifter capability in general and SI traceability in particular;
- Agreement that a working group be established to take forward the above and to further develop standards and best practices, possibly through reactivation of the DBCP's PP-GHR SST that had been disbanded in 2014;
- Agreement on the desirability of an online tool and access to data and metrics that would facilitate intercomparison of satellite and drifter SST: the development of such a tool to be an area for ongoing collaboration;
- Agreement to reconvene in a year's time, possibly just ahead of the next DBCP session.

<ul style="list-style-type: none"> <li>▪ Hourly measurements</li> <li>▪ Report design depth in calm water to <math>\pm 5</math> cm</li> <li>▪ Report geographical location to <math>\pm 0.5</math> km or better</li> <li>▪ SST total standard uncertainty <math>\pm 0.05</math>K or better, resolution 0.01K</li> <li>▪ Report time of SST measurements to <math>\pm 5</math> minutes</li> </ul>
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**Table 1:** *The GHR SST standard for drifter HR SST reports*

8.2.2.4 Following further discussion at the workshop, it was agreed to request a number of actions from the DBCP at its current session, namely:

- Note and endorse the efforts of the workshop and its participants;
- Advise the group as to its future workplan;
- Consider how it might assist the work of group by, inter alia:
  - a. Reactivating the PP-HRSST;

- b. Assigning sustained resources, possibly through JCOMMOPS, for the diligent maintenance of the drifter metadata database;
  - c. Endorsing any standards and best-practice guidance that might be developed by the group;
- Discuss whether the *modus operandi* and objectives of the group might in due course serve as a model for the timely implementation of best practice, not only for SST, but for other ECVs, particularly wave spectral data;
  - Report its deliberations with respect to all of the above to JCOMM, and seek additional resources as deemed necessary.
- 8.2.2.5 These requests were discussed both at the DBCP Executive Board and during open session and were broadly approved. In particular it was agreed to reinstate PP-HRSST with immediate effect (but without a budget), and Prof Meldrum was asked to act as interim chair, to revise the ToRs, suggest PP membership and draft a workplan and budget as soon as possible, for consideration at the next meeting of the Executive Board.
- 8.2.2.6 The Panel strongly endorsed the concept of a global drifter metadata database, a concept that already formed part of the mission and workplan for JCOMMOPS, and agreed that it should receive heightened priority and visibility within the JCOMMOPS operating principles.
- 8.2.2.7 The Panel agreed to highlight its activities and aspirations with regard to Pilot Projects, through the OCG, to the next JCOMM session and to seek their guidance for further developing these activities.
- 8.2.2.8 In closing this agenda item, the Panel thanked Drs Centurioni and Donlon and Prof. Meldrum for their efforts in bringing the space and in situ communities closer together, and asked to kept closely informed of future developments and opportunities. The complete report of the workshop is available as DBCP-32-Ref Report on SST: Scientific and Technical Workshop on Traceability of Drifter SST Measurements<sup>12</sup>,
- 8.2.2.9 Recommendation made at the meeting (**DBCP-32/8.2 No.38**) is included in ANNEX II.

**Action 12.** Reinstate PP-HRSST, without budget. Prof. Meldrum to act as interim chair, revise ToRs, draft workplan and suggest PP-HRSST membership. (Action: Prof. Meldrum; DBCP Exec Board)

## 9. DATA MANAGEMENT

### 8.3 Task Team on Data Management

9.1.1 Mrs. Mayra Pazos (USA), Chairperson of the DBCP Task Team on Data Management (TT-

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<sup>12</sup> [http://www.jcomm.info/index.php?option=com\\_oe&task=viewDocumentRecord&docID=17897](http://www.jcomm.info/index.php?option=com_oe&task=viewDocumentRecord&docID=17897).

DM) reported on the progress of the Task Team during the last intersessional period. The Task Team promoted discussion between its members, revised the recommendations proposed last year to assess actions taken and proposed new recommendations.

The meeting made seven recommendations(**DBCP-32/9.1 No. 39-45**) and are available on ANNEX II ):

9.1.2 The panel thanked Mrs. Pazos and members of the Task Team for their efforts. It was agreed that Mrs. 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 1 of DBCP-32 preparatory document No. 9.1 and will be included in the DBCP annual report for 2016.

#### **8.4 GTS data buoy reports timeliness**

9.2.1 The Technical Coordinator, Ms Gallage presented an overview of the pattern of buoy data availability delays (timeliness) for the intersessional period. TC reported that she produced JCOMMOPS monthly maps focusing on delays based on satellite systems. These maps are available on the DBCP Website and new JCOMMOPS website. During the 12-month period from August 2015 to July 2016, in average 47% of the drifting buoys reported to the GTS in less than 60 minutes and 92% reported in less than 120 minutes after observation time.

9.2.2 Average delay times are consistent throughout the year except a minor incidences cause extended delay from one data center in January 2016 and delays originated by ARGOS in May 2016.

9.2.3 The Panel is reminded that the moored buoys are removed from the timeliness reports. The proper method to analyze and represent moored buoys in a timeliness map has not been decided yet. This may become feasible with migration to BUFR. This task should be focused on during the next intercessional period.

9.2.4 The Panel noted that CLS is continuing its efforts to improve the coverage of the real-time antennas in the regions where they are needed. One of the areas of focus for DBCP requirements in previous intersessional period was the South-East Pacific. Data delivery times of the South East Pacific has increased with the installation of new antenna in Easter Island.

9.2.5 CLS reported that disposal times of the Mid and South Atlantic has improved with installation of new antenna in French Guyana and through the access to data from the Puerto Rico ground station. Upgrades to the Cape Ferguson antenna (Eastern Australia) which is now compatible with MetOp-A and Saral satellites has improved the timeliness of Western Pacific region.

9.2.6 Intermittent availability of the Buenos Aires antenna continues to have longer data delivery times in the South Atlantic. Lower performances in the East & South Indian Ocean areas due to ; intermittent availability of the Bali antenna, the Perth antenna and 2 Antarctica antennas - Casey and Davis. All other antennas of East Asia and Western Australia are compatible with NOAA satellites only and not with MetOp & Saral satellites.

9.2.7 As recommended during DBCP-28, JCOMMOPS and CLS have performed regular assessments of the global buoy timeliness and the results are in general agreement on the areas where timeliness is of the biggest concern (e.g. South Atlantic and South-East of Indian Ocean).

9.2.8 The representative of CLS mentioned that the Argos is working with the Australian BOM to improve the timeliness degradation in the SE Indian Ocean and expects rapid resolution of the problems.

9.2.9 The panel congratulated Ms Gallage for her talk and thanked the JCOMMOPS office for making possible the clear presentation of this information.

9.2.10 The recommendations (**DBCP-32/9.2 No.46-48**) made at the meeting are available on ANNEX II.

**9.2.11 The meeting made the following action items:**

**Action 13.** To continue to deploy Iridium drifting buoys in areas where delays are greater than 120 minutes (*action; DBCP members; ongoing*);

**Action 14.** DBCP continue to perform regular (every 6 months) assessments with CLS of the global data buoy timeliness by comparing JCOMMOPS delay maps with Argos Data Mean Disposal Time Maps (*action; CLS and TC DBCP; ongoing/semestrial*);

**Action 15.** To investigate timeliness of the moored array and determine the best way to represent these in the reports (*action; TC DBCP; DBCP-33*).

**8.5 Buoy Data Management Centres**

9.3.1 The Panel reviewed the report of the Marine Climate Data System (MCDS) trial Global Data Assembly Centres (GDACs), operated by Météo-France, presented by Mr Gilbert Emzivat (France). He noted the activities of CORIOLIS acting as trial GDAC DDB.

9.3.2 Mathieu Ouellet (Canada) reported on the activities of the Marine Climate Data System (MCDS) trial Global Data Assembly Centres (GDACs), operated by the Marine Environmental Data Section (MEDS) of Fisheries and Oceans Canada's Ocean Science branch (previously Oceanography and Scientific Data branch; formerly Integrated Science Data Management).

9.3.3 The panel noted the methodologies of Kriging for data interpolation can affect the spectral characteristics at high frequencies and suggested alternatives to be used.

9.3.4 The panel noted that drifter data is accessed by the drifter science community through these specific AOML and GDAC data sources. However, the public interface to the data is not so clear. Multiple on-line datasets, serving different purposes, is part of the confusion. This sets a challenge to the data providers to provide higher level services and to advertise the sources. JCOMMOPS is striving to provide such redirection links.

9.3.5 Recommendation (**DBCP-32/9.3 No. 49**) made at the meeting is available in ANNEX II

9.3.6 The panel discussed the relationship of MCDS to other programmes, such as GEOSS and IODE, noting that these interaction have not been optimal. Representation of MCDS at the DBCP could be useful to clarify these issues. OCG and DMG should look into the issue of engagement of MCDS.

**Action 16.** DBCP to encourage representatives from WMO Data Management Group and Observation Coordination Group look at the problem of, better map and recommend how to address the MCDS by the next Management Group meeting in

May 2017. (action: DBCP EB, May 2017)

9.3.7 The Panel thanked both centres for their reports. The full reports are provided in Appendices A and B respectively of DBCP-32 Doc. 9.3 and will be included in the DBCP annual report for 2016.

#### Integration Aspects

9.3.8 Champika Gallage presented the overview of Marine Climate Data System (MCDS), evolution of the MCDS from Marine Climatological Summaries Scheme (MCSS) and the progress in developing the MCDS. Structure and vision of the MCDS with DACs, GDACs and Centres for Marine-Meteorological and Oceanographic Climate Data (CMOCs) was articulated with their respective responsibilities. She further reported on the progress that has been made in identifying the GDAC and CMOCs for each JCOMM data domain. Two trial GDACs for drifter buoy data (MCDS/Canada and Meteo-France/France) and one CMOC Centre in China has been established. MCDS will provide data, metadata and information fully inter-operable with the WMO Information System (WIS) and the IOC/IODE Ocean Data Portal (ODP), MCDS also will be compatible with, and contribute to the High Quality Global Data Management System for Climate (HQ-GDMSC) that is being developed by the WMO Commission for Climatology (CCI).

9.3.9 Recommendation (**DBCP-32/9.3 No. 50**) made at the meeting is available in ANNEX II.

### **8.6 Data Integration**

9.4.1 Kevin O'Brien (USA) reported on data integration methods and techniques being developed in response to users' needs and issues concerning the developments of WIGOS and JCOMM OCG. The JCOMM Observations Coordination Group has many responsibilities in support of JCOMM activities. This includes activities directly related to observation networks, including measuring performance of those networks against scientific requirements, assisting with observing logistics, identifying new observing system requirements, etc.

9.4.2 In addition, the JCOMM OCG is responsible for interfacing with the WMO in terms of supporting WIGOS and recommending or embracing data and data access standards and best practices. A strong aim of the OCG is to improve data integration and interoperability amongst the observing networks that call OCG home. The OCG would prefer to achieve this goal by embracing standards and conventions and leveraging existing, successful tools in an effort avoid duplicative efforts.

9.4.3 There are several different types of data integration relevant to this particular discussion: Integration within a particular network. For example, all Argo data existing within a central GDAC; Integration across networks; and Integration by parameter, or EOVS.

9.4.4 Though much work has been done to achieve the integration of data within a particular network, the JCOMM OCG is interested in improving integration across networks and by parameters. This goal would directly benefit those general users who would like access to ocean observations but are not part of, say, the Argo program themselves.

9.4.5 For example, often a scientist will want to look at a particular parameter, say temperature, in an integrated way by using and analyzing both model and observational data, without the delays and barriers that arise from differing formats and varied access services. Rather than having to access, download and reformat data from several different platform

networks, each with their own delivery mechanisms and data formats, it would be much more efficient if the user were able to access this data as a complete collection and in a known format accessible and useable by familiar software tools (see figure 1). Removing these barriers is the holy grail for achieving data integration and interoperability.

9.4.6 The goal in the JCOMM OCG is to find broadly applicable solutions to data integration problems for the ocean research and observing communities. We are focused on creating interoperable data frameworks, rather than data portals. It is our belief that without interoperable frameworks in which to serve the data, data portals will just become another stovepipe of data access. For true interoperability, machine to machine capabilities for data access, including RESTful capabilities, must be available. With these frameworks in place, building useful data portals will be much easier, as will creating synthesis products for specific science communities.

9.4.7 A good way to validate solutions is through demonstration in pilot projects, so as an organizing activity for the JCOMM OCG, we are implanting a prototype of an interoperable framework to support the platforms that are contributing data in the tropical Pacific in support of the TPOS 2020 effort. The framework is based upon a tool called ERDDAP and the scope for the prototype will be determined from well balanced and forward reaching use cases discussed with the community. They may be confined to a few specific parameters, e.g. surface temperature or salinity, and might include some supporting gridded climatological or model products that could be used as comparisons with the integrated in situ data framework. The idea of this pilot is to showcase integration of data by Essential Ocean Variable (EOV), rather than by platform or observing system network.

9.4.8 The panel was pleased with the efforts to open the GTS data to more users through development of the data integration tools.

9.4.10 The meeting made three recommendations (**DBCP-32/9.4 No. 51-53**) and are available in ANNEX II.

## **8.7 Metadata**

9.5.1 Technical Coordinator (TC), Ms, Champika Gallage reported on various activities dealing with metadata during the last intersessional period. Metadata for all JCOMMOPS programs reside in new JCOMMOPS database. Metadata information is regularly collected from platform operators and telecommunication providers either on deployment or as a status report.

9.5.2 Ms Gallage thanked the Moored Buoy operators providing regular updates to metadata and encouraged others to do the same. She outlined some examples of websites or email notifications that are useful for JCOMMOPS to update metadata and discussed the importance of this information.

9.5.3 TC has made good progress in collecting moored buoy metadata. Over the last intersessional period, moored buoy metadata data availability has increased after four more organizations submitted their metadata to DBCP. By the end of July 2016, 18 organizations from 13 countries have submitted moored buoy metadata. TC requested other moored buoy operators to do the same.

9.5.4 Moored buoy metadata submission [instructions documents](#) with CSV file format templates are available via an ftp site. DBCP has planned to integrate moored buoy metadata



into the new JCOMMOPS database and make appropriate tools available for the buoy operators to view and upload moored buoy metadata information directly to the database. This has been identified in the JCOMMOPS work plan as a priority item.

9.5.5 Ms Gallage emphasized the importance of receiving drifter buoy deployment plans in advance and defined a few metadata fields that would be necessary to have in the JCOMMOPS database. She mentioned that there is no much progress in collecting deployment plans during this intercessional period.

9.5.6 Few buoy operators have started to provide drifter buoy deployment information through new JCOMMOPS web application. JCOMMOPS has setup machine-to-machine transfer of new drifter deployments from AOML. Iridium buoy operators who are not providing deployment information to AOML are requested to continue to send information to the TC or they are highly encouraged to use the new JCOMMOPS website platform registration tool to submit their information.

9.5.7 TC reported that JCOMMOPS is in communication with Iridium VAR providers to create a metadata feed similar to the machine to machine transfer with the Argos system. The TC has been receiving regular metadata for Iridium Drifter buoys from Scotia Weather and entered into the JCOMMOPS database manually. TC has had number of discussions with Scotia Weather and Scotia Weather is in agreement to establish a metadata feed to JCOMMOPS. This activity needs special attention of incoming TC.

9.5.8 The Panel noted the importance of providing metadata to the JCOMMOPS. Within the larger framework of global compilations of WMO Integrated Global Observing Systems (WIGOS) metadata, JCOMMOPS is the metadata provider for all JCOMMOPS coordinated programs including DBCP. The Observing Systems Capabilities Analysis and Review tool (OSCAR) database of the WIGOS Operational Information Resource (WIR) which is the key source of WIGOS metadata is connected to JCOMMOPS database to provide up-to-date metadata to the OSCAR system. Hence, it is vital to provide platform metadata to the JCOMMOPS database in timely manner.

9.5.9 JCOMMOPS is currently equipped with more capabilities to address user and WMO OSCAR (Observing System Capability Analysis and review Tool) requirements. TC has spent lot of time organizing the DBCP metadata transfer to the new database. Currently new database holds DBCP platform information starting from January 2014. Continued IT resources and TC support is required to complete the new database with historical metadata and data.

9.5.10 The TC has initiated the work to formulate an appropriate metadata template to collect fixed platform metadata. TC has to continue to work with TT-MB and with the assistance from TT-PUB47 from Ship Observing Team (SOT) to finalize the template. TC suggested forming a sub group from TT-MB task team to focus on fixed platform metadata data template.

9.5.11 The recommendations (**DBCP-32/9.5 No. 54-57**) are available in ANNEX II.

**9.5.12 The meeting decided on the following action items:**

**Action 17.** Drifter buoy operators to upload new deployment information and drifter buoy metadata using new JCOMMOPS website tools. (**action; Panel members; ongoing**)

**Action 18.** Provide moored buoy metadata in CSV format following DBCP approved template to TC. (*action; Panel members; asap*)

**Action 19.** JCOMMOPS to develop tools to view and upload moored buoy metadata in new JCOMMOPS website. (*action; JCOMMOPS; asap*).

## **10.ISSUES FOR THE PANEL**

### **10.1 Information Exchange**

#### ***Websites***

10.1.1 Technical Coordinator, Ms Gallage reported on the progress of the new JCOMMOPS integrated web application development during the last intersessional period. The Panel was reminded of the official address for the new JCOMMOPS13 web application and DBCP website<sup>14</sup>.

10.1.2 It was noted that new JCOMMOPS web application holds dynamic information while DBCP website contains the static information. JCOMM Observations Programme Area content and DBCP and OceanSITES meeting information also available through the JCOMM web application<sup>15</sup>.

10.1.3 The TC reported that the following has been achieved:

- Release of the new integrated JCOMMOPS web application
- Review of the content of the DBCP and OceanSITES web pages to fix broken links and outdated content; and
- Changes and updates to the OceanSITES website reorganizing content as per the Steering team recommendations.

10.1.4 Ms. Gallage reported the official release of the new JCOMMOPS web application to the DBCP community on 20 July 2016. Although the preliminary work is complete, JCOMMOPS staff continues to work on the new web application to improve performance, fix bugs, add new features and most importantly to upload historical data and metadata.

#### ***News***

10.1.5 News item on the new JCOMMOPS web application is available via a twitter feed.

10.1.6 The Panel noted that JCOMMOPS has a twitter account (i.e. @jcommops) that users can follow.

#### ***Publications***

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13: <http://www.jcommops.org/board?t=DBCPC>

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

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

10.1.7 Ms Gallage reported on new or updated DBCP Technical Documents, and JCOMM Meeting and Technical Reports of interest to the Panel. The following ones of interest to the DBCP have been published during the last intersessional period:

- DBCP Technical Document No. 54<sup>16</sup>, DBCP Annual Report for 2015
- DBCP Technical Document No. 53<sup>17</sup>, Presentations at the DBCP Scientific and Technical Workshop, Geneva, Switzerland 19 October 2015
- DBCP Technical Document No. 56<sup>18</sup>, A Retrospective
- DBCP Technical Document No. 55<sup>19</sup>, Report and Recommendations of the Fourth Capacity Building Workshop of the DBCP for the North Pacific Ocean and its Marginal Seas ([NPOMS-4](#)), Busan, Republic of Korea, 2-4 November 2015

### **Information Products**

10.1.8 Ms Gallage then reported the following throughout the year as regular informational products to the community:

- DBCP Monthly Report<sup>20</sup> with maps and Key Performance Indicators (KPIs)
- Key performance indicators<sup>21</sup> for DBCP networks
- Evaluation of Unmanned Surface Vehicles information on DBCP website<sup>22</sup>
- DBCP Bibliography on DBCP website<sup>23</sup>
- Updated the List of GTS Bulletin Headers file on the DBCP website<sup>24</sup>
- Updated moored buoy metadata list<sup>25</sup>
- Modified few map products for better data representation<sup>26</sup>; i.e. maps with polar view, 5X5 degree grid for equatorial region

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16: <ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/dbcp/Dhcp54-Annual-Report-2015/index.html>

17: <ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/dbcp/Dhcp53-Workshop-2015/>

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

19: <ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/dbcp/Dhcp55/>

20: <http://www.jcommops.org/board?t=DBCPC>

21: <http://www.jcommops.org/board?t=DBCPC>

22: [http://www.jcommops.org/dbcp/overview/evaluation\\_usv.html](http://www.jcommops.org/dbcp/overview/evaluation_usv.html)

23: <http://www.jcommops.org/dbcp/overview/bibliography.html>

24: <http://www.jcommops.org/dbcp/data/sharing.html>

25: <http://www.jcommops.org/ftp/DBCPC/metadata/>

26: <http://www.jcommops.org/dbcp/network/maps.html>

- Email lists and communications:
- Maintained email lists relevant to DBCP and OceanSITES
- Regular emails to the DBCP list with updated maps and products available.

10.1.9 DBCP TC mentioned that the static content of the DBCP website (information and reference documents, manufacturer details, etc.) will be gradually transferred to the new JCOMMOPS website with an integrated perspective whenever possible. This information transfer is planned to be completed in few months. Existing website will be maintained with static information.

10.1.10 DBCP has been providing Quality Control (QC) notifications to the DBCP community. QC notification tool has been moved from old database to the new and available through new JCOMMOPS website with improved functionalities. An automated system has setup to generate QC notifications based on the MeteoFrance black list on Pressure, SST and location to notify the platform operators.

10.1.11 MeteoFrance QC information is integrated into the JCOMMOPS database. Information on blacklisted measurements and beached platforms are collected with platform history.

10.1.12 The meeting made four recommendations (**DBCP-32/10.1 No. 58-61**) and are available in ANNEX II.

10.1.13 The meeting decided on the following action items:

**Action 20.** DBCP Members to submit any relevant news items to the DBCP TC (**action; Panel members; ongoing**);

**Action 21.** DBCP Members to provide feedback on new JCOMMOPS web application for any issues to the DBCP TC (**action; DBCP members; ongoing**);

**Action 22.** DBCP Members to enter new deployment information to the JCOMMOPS database through new JCOMMOPS web application (**action; DBCP members; ongoing**);

**Action 23.** Add a new section to the DBCP Country report template to collect DBCP related publication information. (action; Secretariat; Dec. 31 2016)

**Action 24.** There is a need to update the AI Wallace retrospective regularly by the EB. (Action: EB; regularly)

## **10.2 Vandalism**

10.2.1 The Chair of the DBCP Working Group on Vandalism, Dr. Venkatesan (India), reported on the working group activities during the last intersessional period. He recalled that the Working Group initiated work in line with WMO Resolution 25 (Cg-16)), IOC of UNESCO Resolution XXVI-6, and the UN General Assembly urged UN Members to take necessary action to cooperate with IOC, WMO and the Food and Agriculture Organization (FAO) to address damage to ocean data buoys. The primary objective is to ensure the continuity of attention within the DBCP, WMO and IOC on the subject of buoy vandalism and to discover, share and promote counter vandalism best practices throughout the international buoy operator community

10.2.2 During the last intersessional period, the Working Group circulated the DBCP form for reporting incidents of vandalism on data buoys (Appendix A) to member countries. This is to promote the collection of 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 health, life, and social and economic impacts of vandalism and damage to ocean observing networks and data systems. The Panel was grateful to this feedback mechanism.

10.2.3 DBCP WG on Vandalism also informed to members about the WMO EC-68 decisions on Vandalism (in line with that of IOC EC-49) included below. Here you will further realize the efforts of international community in mitigating buoy vandalism and increasing awareness. It is important to collect the information on buoy vandalism to have a proper assessment of the situation and also important to share the information on initiatives for building awareness in your regions/countries.

10.2.4 Reports were received from Bureau of Meteorology/Australia; Environment Canada/Canada; MeteoFrance France, Hong Kong Observatory/ China; NIOT/ India; INCOIS/India; IRIMO/Iran; JAMSTEC/Japan; NZ Met Service/New Zealand; IMARPE/ Peru; Instituto Hidrográfico/Portugal, PUERTOS/Spain, PMEL, RAMA, AOML, NOAA NDBC and SOEST Hawaii/ USA;

10.2.5 India reported continued efforts of societal awareness and community interaction campaigns similar to previous years. One buoy which was found to be physically detached from mooring at 7N/88E was found beached near South East coast of India at Kolkata which was partially damaged. These fishermen interactive sessions were focused on fishermen associations. One Tsunami Buoy supplied by SAIC installed at southern Bay of Bengal was found to be drifting and in spite of swift action of India Navy to position the vessel a Site buoy system was lost and transmission has also stopped This location is strategically selected very close to the tsunamigenic region.

10.2.6 The WG also received reports on the improvements in buoy design like cameras for buoys (e.g. new generation BuoyCAM with night pictures), special anti-theft hardware on some moorings (e.g. RAMA, PMEL, India, China), However NOAA NDBC has removed reduction of the resolution of the moored buoy position on the GTS reports and the NDBC websites, and real time visual observation of a moored buoy from the shore (India).

10.2.7 The Panel agreed that efforts remain to be made on anti-vandalism data buoy designs, mechanisms for the monitoring of incidents, including by using webcams, and on awareness programmes.

10.2.8 The Panel noted that among the countries that provided information on vandalism for this report, the total number of incidences had decreased during the last intersessional period compared to the period before.

10.2.9 Shannon McArthur (USA) and Paul Ortiz (USA) described some of the methods and potential motivations of vandalism and buoy interactions by fishing vessels. Fishing vessels set fishing gear near the buoys and tie off to the buoys to exploit the buoys' effectiveness as fish aggregation devices (FADs). For certain fishing gear types like purse seines there can be a very large economic motivation to fish on the buoys, causing unintended damage. In addition, some fishermen appear to vandalize the buoys for economic or other unknown reasons. The DBCP has been tasked to develop a regionally relevant outreach and education strategy to

reduce damage to ocean data buoys from negative interactions. This strategy is a necessary part of the three components to addressing data buoy vandalism (technology, enforcement, and education and outreach). Regional fishery management organizations (RFMOs), the Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG), and the Food and Agriculture Organization, as well as other stakeholders such as local communities will all be important partners in the response to vandalism. The task group remains optimistic that members of the DBCP will join in this concerted effort so that it can be more effective in reducing vandalism to data buoys that dramatically increases costs and reduces data collection needed for protecting lives and property.

10.2.10 The DBCP vandalism strategy shall include a small working group to produce strategy and supporting analysis, which can be presented to the IOC-EC and WMO-EC. It is expected that the group will work with RFMOs and other partners to build an inclusive strategy.

10.2.11 The WMO-EC resolution speaks to capacity building and to vandalism. The WMO needs from DBCP a documented action outline ready by their next session to be submitted to the WMO-EC in May 2017. In addition, the report could be adopted by the JCOMM V.

**Action 25.** DBCP WG on Vandalism to submit draft action plan in outline form for presentation to WMO-EC in May 2017, noting that documentation is due in Feb. 2017. Full action plan to be presented to JCOMM V. (action: WG on Vandalism; Feb. 2017)

10.2.12 The Panel also made four recommendations (**DBCP-32/10.2 No. 62-65**) and are available in ANNEX II.

### **10.3 Other Issues to be Discussed, as Proposed by the Task Teams**

10.3.1 Sidney Thurston provided information about the Review of the Global Drifter Program (GDP) undertaken by NOAA following DBCP-32. The review will inform NOAA's climate observation division of a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of the value of the GDP to inform management decisions concerning the GDP. Drivers, Cost stressors, future plans and improvements of the programme into the future will all be featured in the review. The role of GDP in supporting operational oceanography, meteorology, research, ocean circulation experts, GOOS integration, WIGOS, instrumentation developments, products and the interface with OSCAR will be examined in the review. The internal draft assessment has been prepared and is provided to the reviewers in preparation for the review.

10.3.2 The Panel had no other technical issues requiring international coordination or action.

## **11. INFORMATION REPORTS**

### **10.4 Satcom Forum Report**

11.1.1 Satcom2016 was the first formal session of the WMO-IOC International Forum of Users of Satellite Data Telecommunication Systems (Satcom) following its establishment under Resolution 31 of the Seventeenth Session of the World Meteorological Congress (Res.31, Cg-17) in 2015. Participation was by voluntary self-registration and by invitation through WMO and IOC processes.

11.1.2 The meeting was held at IFEMA – Feria de Madrid, in Spain as a side event of the

Meteorological Technology World Expo 2016 (Meteo Expo), 27-29 September 2016 hosted by Spain. Meteo Expo also included CIMO TECO 2016 and the "Metrology for Meteorology and Climate, 2nd conference" (MMC-2016).

11.1.3 Satcom2016 was also supported by the Association of Hydro-Meteorological Equipment Industry (HMEI) and UKIP Media Events. The meeting was chaired by Dr Michael Prior-Jones (UK) and co-chaired by Mr Johan Stander (South Africa). Secretariat support was provided by WMO.

11.1.4 Number of recommendations were made at this meeting. The meeting decided to involve manufactures in the development of use cases demonstrating the user requirements and potential uptake. Meeting also agreed that Satcom should pay special attention to Least Developed Countries (LDC), Small Island Developing States (SIDS), etc with an aim to facilitating their use of satcom systems. The meeting also agreed to having JTA as a sub-programme of Satcom and a representative on the executive committee.

11.1.5 Please refer to ANNEX VII for the detailed information on Satcom Forum report .

11.1.6 The DBCP Session decided on the following action items:

**Action 26.** DBCP to participate in Satcom Forums and report to DBCP on future forums.  
(action: Panel, DBCP EB; future Satcom Forums)

### **10.5 Iridium operations and developments**

11.2.1 Under this agenda item, Prof D Meldrum reviewed the current status and future plans for the Iridium 2-way satellite communications system, which was now well established within most parts of the data buoy and environmental observation community for reasons of continuous availability, data throughput and timeliness, ease of implementation, energy efficiency, future availability and cost.

11.2.2 Prof D Meldrum presented the information on current status of the Iridium satellite system, planned improvements, new products and services, risks involved in some features such as 2-way architecture, and comparison of services provided by Argos and Iridium.

11.2.3 The meeting thanked Prof Meldrum for his informative presentation. Detailed information are on ANNEX VIII.

### **10.6 ARGOS Satellite Systems**

11.3.1 Yann Bernard (CLS France) presented a review of the Argos Satellite Communications system. The current status and capabilities of the system were reviewed. The future of Argos will be determined by the new Argos-4 satellites which will provide several significant enhancements and new capabilities. The Argos constellation plan of satellite lifetimes and launch plans indicates a healthy and capable system through 2035.

11.3.2 Scott Rogerson (NOAA) reviewed the Argos history of the past five years for Cooperative Data and Rescue Services (CDARS) which is now specified with out-year funding to FY21 in the FY2017 President's Budget.

11.3.3 Mr Bernard continued with summary of the ground station status, which has been significantly improved with several additional stations coming on line in 2016-17. These

constructions have improved the Argos Timeliness from May 2014 to Sept. 2016, with the exception of two areas, in the South Atlantic and Indian Ocean.

11.3.4 Argos services were highlighted, including improved and redundant computer systems and new user friendly web services allowing individuals to extract their data in near real time as well as archived data.

11.3.5 The panel thanked Mr Bernard and Mr Scott Rogerson for their very informative presentation and to CLS for its support of DBCP objectives.

## **12.ORGANIZATIONAL ISSUES**

### **10.7 JCOMM and JCOMMOPS Activities and Management**

12.1.1 The JCOMM Co-President, Mr Johan Stander (South Africa) reported on the activities and developments of JCOMM.

#### ***JCOMM related outcomes from JCOMM Management***

12.1.2 Mr Stander highlighted that the management committee approved the Super OCG by which OCG will have 4 new Vice Chairs focusing on various aspects of Observational work. They are;

- WIGOS/WIS
- Standards and Best Practices
- Data and Information
- New Technologies

**Action 27.** Panel members are requested to engage with the chair of OCG and make themselves available for these positions. Ensuring that we adhere to the JCOMM Man succession plan, we strongly recommend that members be sensitive with respect to regional representation as well as gender balance. (*action; Panel members; DBCP-33*).

12.1.3 Mr Stander reported that JCOMM-V will be kindly hosted by Indonesia from 25 Oct – 01 November 2017 while the S&T workshop will be 23 and 24<sup>th</sup> October. At this stage it will most likely be held in Bali (Indonesia). CAS will also have their session in the same place, with the intent to reduce secretariat costs, and costs to the host country (Indonesia). . There is also a feeling to focus the second day of the S&T workshop on woman in science. Further communication in this regard will be communicated through the Chair of OCG.

**Action 28.** It is recommended that this Panel present some of its work at the JCOMM-V S&T workshop. (*action; Panel members; JCOMM-V*).

**Action 29.** The Panel requested its members to promote the execution of the WMO-EC decisions (As presented by WMO and IOC secretariats) and promote such activities at the national level (*action; Panel members; DBCP-33*).

#### ***JCOMM Strategy on Integrated Marine Meteorological and Oceanographic Services within WIS***

12.1.4 Mr Stander reported on the development of the JCOMM Strategy on Integrated Marine



Meteorological and Oceanographic Services within WIS, and the creation of the task team to implement the project, TT-MOWIS. The Task Team is fully operational and had their first face to face meeting in April 2016, and since several video links. A TT-MOWIS Member also represented JCOMM at a meeting of WIS in September 2016.

### **JCOMM Collaboration with CAS**

12.1.5 Mr Stander reported that WMO Commission for Atmospheric Sciences (CAS) may be working in collaboration with JCOMM and can go in coordination of Quality Assurance actions and extension of atmospheric observations of greenhouse gases over ocean using ocean measurement platforms. We need to improve understanding and better qualify the GHG exchange between atmosphere and ocean in the context on the Integrated Global Greenhouse Gas Information System. This system is complementary to national emission reporting and it is based on the observations and inverse modelling. In inversion we assume that ocean uptake is known, but it may change in the future. GHG observation over the ocean and in the ocean (dissolved CO<sub>2</sub>) will support implementation of Paris Agreement and address ocean acidification problem.

12.1.6 The way forward proposed by Mr Stander is that a paper be prepared for the JCOMM Management Committee (draft in Sept-Oct) in January -> recommendation goes to IOC Assembly (April 2017) -> recommendation made at EC-69 -> Greenhouse Gas Measurement Techniques meeting (August 2017) with broader ocean community involved -> JCOMM-V.

**Action 30.** Panel members are requested to seriously consider possible joint project with WMO CAS on GHG measurement techniques and consider nominating experts. (*action; Panel members; DBCP-33*).

### **JCOMM Observations Coordination Group (OCG-7)**

*See DBCP-32 Doc. 12 Annex X: Summary OCG-7 Actions*

12.1.7 The JCOMM OCG Co-Chair, Dr David Legler (USA) reported on the outcome of the seventh Session of the JCOMM Observations Coordination Group (OCG-7), which was held in Mallorca, Spain, from 4-6 April 2016 at the kind invitation of the Mediterranean Institute for Advanced Studies (IMEDEA) and Balearic Islands Coastal Observing and Forecasting System (SOCIB).

12.1.8 The Panel noted that at OCG-7, the observing network representatives, including Jon Turton (UK) for the Data Buoy Cooperation Panel (DBCP) had reported on their activities, focusing on (i) status against targets, (ii) outlook status (anticipated changes in the next 18 months against targets), (iii) requirements per GOOS templates, and (iv) plans for design evolution especially implementation plans likely to be proposed to the 2016 GCOS Implementation Plan (v) data interoperability standards in use, and (vii) consideration of HF Radar data as part of the DBCP Waves pilot project in part to address questions regarding validation of HF Radar wave information (Action 29, OCG-7)

12.1.9 Following OCG guidance and in line with the OCG workplan, the Panel agreed to review its own priorities and workplan. The Panel noted the OCG recommended actions for DBCP (DBCP Doc. 12.1 Appendix C), and integrated the actions into the DBCP-32 actions list, noting overlap with existing DBCP actions. In particular, the Panel noted the OCG priority for the

DBCP to improve engagement with IOCCP and OceanSITES.

12.1.10 The Panel directed all networks to work with JCOMMOPS to track implementation of BUFR in reporting real-time data on the GTS (Action 40, OCG-7)

12.1.11 The Panel notes the attention within OCG on interoperability and integration through data management tools and practices. Progress towards outstanding actions on collection of metadata of DBCP platforms is requested (section 4.2.2 OCG-7 Report) . Additionally, given the richness of DBCP data, encouraging integrated data access via interoperability tools (e.g. ERDDAP) have proven to be challenging. DBCP is encouraged to address these issues in advance of OCG-8 (OCG Work Plan Action 7)

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

12.1.12 JCOMMOPS reported on its current operations, infrastructure, funding information, and provided highlights from the recent achievements.

12.1.13 On behalf of JCOMMOPS team, M. Belbéoch concluded that JCOMMOPS has some exciting challenges for the next inter-sessional period:

- release officially the JCOMMOPS integrated website (currently under review)
- develop integrated monitoring tools and KPIs (EOVs oriented)
- add editorial content on the website(s) (core informational documents and links)
- develop and release an API to share further website content through machine to machine interoperable mechanisms
- Improve DBCP historical metadata database
- improve metadata management and monitoring tools for a number of networks (e.g. GO-SHIP/SOOP cruises, moorings, ships)
- further develop targets and KPIs for some network and for the integrated perspective
- prepare a transition plan to sustain its staff (in particular the Science & Communication Coordinator) when Britany budget will end.
- welcome and train a new DBCP/OceanSITES TC, with the hope to stabilize the position for more than 2 years.
- Start to monitor a number of coastal / regional stations
- Develop further international cooperation through donor programmes and
- Continue to address Panel members and OCG community requests through a reactive team.

12.1.14 The meeting made four recommendations (**DBCP-32/12.1 No.66-69**) and are included in ANNEX II.

## **10.8 Report on Decisions of WMO and IOC Governing Bodies**

### ***Forty-ninth Session of the IOC Executive Council***

12.2.1 The IOC Secretariat representative reported on the proceedings of the forty-ninth Session of the IOC Assembly (IOC/EC-XLIX/3, Paris, France, 7-10 June 2016). The Executive Council noted the important points raised including the role IOC has taken to highlight the Oceans in UN initiatives, including COP21, the 2030 Agenda for Sustainable Development and the recent G7 science meeting; the IOC capacity development strategy in the core areas of

IOC activities, such as observing and warning systems, data and information exchange and science-informed integrated coastal area management, with emphasis on regional and inter-regional cooperation. The Executive Council welcomed the development of a new IOC communication strategy to better engage and inform all stakeholders including DBCP actors; the progress of the Global Ocean Science Report and the International Polar Partnership Initiative. The Executive Council noted with satisfaction the organization of the 5th Session of the IOCINDIO, 25-27 April 2016, Chennai, India and approved the recommendations of IOCINDIO-V.

12.2.2 Several IOC and GOOS projects will continue to require coordination with the DBCP observation networks: TPOS2020 which seeks to improve the tropical Pacific observing system; the new European Commission Horizon 2020 funded project, AtlantOS, focused on optimizing and enhancing the Integrated Atlantic Ocean Observing System and; JCOMM's new Cross Cutting Task Team on Integrated Marine Meteorological and Oceanographic Services for WIS (TT- MOWIS) to improve the interoperability with WIS of the near real time and delayed mode data sets of ocean observations.

### ***Sixty-eighth WMO Executive Council Session***

12.2.3 The WMO Secretariat representative reported on the outcome of the sixty-eighth Session of WMO Executive Council seventeenth (EC-68, Geneva, Switzerland, 15-24 25 June 2016). EC-68 has approved 13 resolutions and 96 decisions; resolutions and decisions related to the DBCP community are listed below;

12.2.3.1 EC-68 Recognized the critical role that Regional WIGOS Centres (RWCs) will play in advancing operation of WIGOS and providing regional coordination, technical guidance, assistance and advice to Members and regional associations. Therefore EC-68 endorses the establishment of the RWCs and urges the members to familiarize themselves with the RWC concept and to actively participate in the implementation of the RWC. The Panel invited JCOMMOPS to engage with the RWCs and investigate synergies to be developed.

12.2.3.2 The draft Guide to WIGOS proposed by the Inter-Commission Coordination Group on the WMO Integrated Global Observing System (ICG-WIGOS) as provided at the WMO website. EC-68 invited members to use the Guide to WIGOS in their implementation of the relevant technical regulations and to provide feedback to the Secretary-General on how to improve subsequent versions of the Guide to WIGOS. The Panel requested its members to check the WIGOS Guide once approved and take its guidance into account when implementing the data buoy networks.

12.2.4 EC-68 adopted the Plan for the WIGOS pre-operational phase 2016-2019 and requested:

- Members, the regional associations and the technical commissions to organize their activities so as to realize WIGOS goals and associated outcomes as described in the Plan;
- The Commission for Basic Systems (CBS) and the Commission for Instruments and Methods of Observation (CIMO) to provide the technical lead in WIGOS pre-operational activities;

- The ICG-WIGOS to keep the Plan under regular review, and to update and report the progress in the implementation of the Plan to the Executive Council, and to submit a report to the Eighteenth World Meteorological Congress;
- Members to continue to provide resources, including through the WIGOS Trust Fund and/or seconded experts, to help support the implementation of WIGOS, in particular to assist with the operational deployment of OSCAR/Surface, and to support the translation of all WIGOS guidance material and user manuals into all official WMO languages;
- All Members to liaise with non-meteorological organizations who already provide oceanographic related information (i.e. metadata) from observing platforms they operate to JCOMMOPS to make the MET-Ocean data from these platforms available in real-time to GTS at least 4 times per day. NMHS's may be able to help in the assignment of WIGOS identifiers to these stations.

12.2.5 Year of Polar Prediction (YOPP) was endorsed by the EC-68 and urges members to coordinate with the Polar Prediction International Coordinating Office and contribute to and support YOPP. The Panel encouraged its members to consider contributing data buoys in polar regions in support of YOPP intensive observing periods.

12.2.6 In decision 49 on Technical Assessment of the Marine Meteorology and Oceanography Programme, EC-68 requested that the Marine Service ad hoc Working Group also address the issue of data buoy vandalism and additionally, recommend how to strengthen capacity development on all marine related aspects, including observations, data management and services. It further requests JCOMM to revisit the issue of buoy vandalism, and in doing so, assist to design a regionally relevant education and outreach strategy that will reinforce the WMO and IOC joint efforts to be tsunami- and weather-ready, which is consistent within the WMO mandate and overall, under the Sendai Framework for Disaster Risk Reduction 2015-2030. See agenda item 10.2

12.2.7 The Panel noted that Country-focused results-based framework and mechanism for WMO contributions to the Global Framework for Climate Services (GFCS) was approved at the EC-68. Accordingly, presidents of technical commissions are requested to provide relevant support for WMO contributions to the GFCS according to the results framework, including its country-level action plans, and in particular requests the president of the Commission for Basic Systems to ensure the contribution of the Global Data Processing and Forecasting System to the implementation of the GFCS Climate Services Information System. Further request was made by EC-68 to provide regular updates on activities and results achieved to regional associations through the mechanism, and feedback on lessons learned, through the joint meeting of presidents of regional associations and presidents of technical commissions.

12.2.9 12.2.8 The Panel recalled that the developing Marine Climate Data System (MCDS) under the JCOMM Data Management Programme Area (DMPA) is regarded as one of JCOMM's contribution to the GFCS. It further recalled that drifter data inserted on the GTS are routinely archived by Marine Climate Data System (MCDS) trial Global Data Assembly Centres (GDACs) (Canada, and France). The AOML Data Assembly Centre (DAC) archives all data from the GDP, and any other drifter data that are made available to it. The Panel and its action groups should actively encourage all buoy operators to forward their data to one or other of these responsible global archives. While noting that noted that there have been discussions for establishing a GDAC for moored buoy data.

12.2.10 See also agenda item 12.4 for Cg-17 decisions related to the WMO Integrated Global Observing System (WIGOS).

12.2.10 The session noted that raising awareness of what we do through the IIOE-2 has been previously encouraged by the IOC governing bodies. The IIOE-2. Jan. 2017 Perth meeting provides an opportunity that could be utilized.

**Action 31.** Plan representation of the DBCP and IPAB, to explore deployment opportunities offered by the IIOE-2 at IIOE-2 meeting Jan. 2017 Perth (action: Boris Kelly-Gerreyn, Shaun Dolk; Jan 2017 IIOE-2 Perth)

**Action 32.** Australia would like to offer aid in the form of example to member states developing a WIGOS implementation plan. Provide a presentation concerning WIGOS implementation plans. (Action: Australia; DBCP-33)

## **12.2 User Requirements**

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

12.3.1 The Panel appreciates that National contributions have enabled the IOC-WMO-UNEP-ICSU Global Ocean Observing System (GOOS) Steering Committee (GOOS-SC) to meet for its fifth session GOOS SC-5 in Sopot, Poland, May 2016 to review progress of activities across the expert panels, assess performance of the observing system as a whole and consider the future GOOS Strategy and Work Plan. The Panel welcomed reports of improvements in maintenance of the moored buoy array in the Tropical Pacific (TAO) in the Eastern/Central Pacific but voiced concern about the staged removal of TRITON Moorings in the Western Tropical Pacific. By 2017, of the original 16 moorings, only 2 will be in place (plus an additional subtropical mooring). This leaves a critical gap in the observing system as there are currently no concrete plans to maintain these time-series through other means. The GOOS-SC recognized the need to consider the technical coordination needs for a multidisciplinary GOOS, including coastal observing activities; in collaboration with JCOMM Observations Coordination Group (OCG) and the GOOS Regional Alliances (GRAs). GOOS requirements are being clarified by the development of the GOOS Strategic Mapping, a tool which visualizes the network of GOOS priorities, products, Essential Ocean Variables (EOVs) and observation networks. The Mapping will be used in communicating about the interdependence and integration of the observing system, as well as the key place the individual observing networks hold.

12.3.2 As part of the GOOS Strategic Mapping process, the Ocean Observing Panel for Climate (OOPC) and OCG are developing Variable and Network Specifications. OOPC recognizes the key priority for networks to clearly articulate the network missions and targets. This information enabled OOPC to develop actions for the GCOS Implementation Plan, will inform performance tracking of the observing system as well as to better articulate the connections within the GOOS Strategic Mapping.

12.3.3 The Panel noted that the Tropical Pacific Observing System, TPOS 2020 Project is finalizing the first (of 3) reports which provide recommendations on the future design of the Tropical Pacific Observing System. DBCP members were engaged in the review process. The coming year will focus on initiating pilots and process studies to further refine the TPOS, and establishing a Transition Team, to oversee transition of both the observing system, and its governance: it is anticipated that this team will be connected to JCOMM.

12.3.4 The WMO-IOC-ICSU-UNEP Global Climate Observing System (GCOS) is currently finalizing the 2016 GCOS Implementation Plan following public review, which will be presented to the United National Framework Convention on Climate Change (UNFCCC) Twenty Second Conference of the Parties (COP 22) in November 2016 in Marrakech, Morocco. The GCOS Project Office has been hosting the OOPC technical secretariat since early 2013, and has in doing so deepened its cooperation with GOOS. OOPC has sought input across the 3 panels of GOOS into this plan, strengthening the multidisciplinary requirements for ocean observations.

12.3.5 See also agenda item 12.1 (JCOMM activities and management) regarding the JCOMM Observations Coordination Group (OCG) perspective with regard to observational user requirements and how these should be addressed by the observing Panel under JCOMM and the associated programme.

12.3.6 Recommendation (**DBCP-32/12.3 No.70**) made by the meeting is available in ANNEX II.

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

12.3.7 The Panel recalled its discussion in previous DBCP meeting regarding the World Meteorological Seventeenth Congress decisions urging WMO Members to install barometers on all newly deployed drifters, to enhance their support to the Tropical Pacific Observing System (TPOS), and to reinforced the dialogue with the satellite observation community concerning their requirements for in situ observations used for calibration and validation purposes. The Panel agreed that recent efforts undertaken in the framework of the DBCP Pilot Project for high resolution SST were addressing such latter requirements.

12.3.8 The Panel recalled the discussion in previous DBCP meeting regarding the evaluation of the impact of Sea Level Atmospheric Pressure (SLP) data over the ocean from drifting buoys on Numerical Weather Prediction (NWP), and the results of the impact study that has been undertaken for the Panel by the European Centre for Medium-Range Weather Forecasts (ECMWF) in this regard (see agenda item 8.1 DBCP-31 for the Panels decisions in this regard). The results reinforced the need to install barometers on all newly deployed drifters (*action; Panel members; ongoing*)

12.3.9 The Panel reminded about the Statement of Guidance(SoG) for Ocean Applications prepared for RRR, updated in 2016, which summarizes key points that are related to DBCP group; A large part of marine and ocean observing systems is currently maintained by research funding with limited duration. This has the potential of leaving observational gaps unless ongoing funding for sustained observing networks is guaranteed. The ocean observing community should therefore ensure sustained funding for the key observing systems such as moored buoys, surface drifters with barometers, tropical moorings.

12.3.10 SoG for Ocean Applications also emphasize the fact that uneven geographical coverage of the in situ ocean observing network is an ongoing issue for ocean applications. Considering the regional variability in requirements as well as to ensure optimized planning for observing networks with limited resources, geographical variability in spatial/temporal resolution for ocean observations should be considered in network operations and plans. To be improved according to the SoG particularly include geographical and temporal coverage of wave measurements (significant wave height, dominant wave period, Wave 1-D and wave directional energy frequency spectrum), surface pressure, visibility, Sea surface Temperature (SST), Sea Surface Height Anomaly (SSHA), Sea Surface Salinity (SSS) and visibility

measurements, along with higher resolution geometry and extend open-ocean and coastal wind-wave observing networks (e.g. 400 time-series reporting in open ocean), possibly developing other existing observing sites (e.g. global sea level and tsunami monitoring network) into multi-purpose stations.

12.3.11 To address the identified gaps, it is recommended that ocean observing communities should (i) ensure that state-of-art technologies are employed to improve accuracy for all measurements; (ii) extend collaboration among themselves at national/regional levels to enhance wave measurement networks (e.g. moored buoy networks) for validation and evaluation; and (iii) develop visibility measurement capability over the ocean (consultation needed with JCOMM experts on how to practically achieve this).

12.3.12 Finally, the Panel recalled the recommendations to its members made at the previous DBCP Session regarding the planning of their national buoy programme activities (see paragraph 11.4.2.4 of JCOMM MR No. 93, also reflected in Appendix A). The Panel agreed that these recommendations remained valid.

### **12.3 WMO Integrated Global Observing Systems (WIGOS)**

#### ***WIGOS Regulatory Materials***

12.4.1 The Panel recalled the adoption by the seventeenth World Meteorological Congress (Cg-17, Geneva, Switzerland, 25 May – 12 June 2015) of new Technical Regulations relevant to WIGOS at its recommendation at the previous Panel Session urging its members to pay attention to those. Currently WIGOS is working on developing guidance material. Initial draft version of the Guide to WIGOS by the Inter-Commission Coordination Group on the WMO Integrated Global Observing System (ICG-WIGOS) was submitted to the Commission for basic Systems-16 (CBS-16, Guangzhou, China, 23- 29 November 2016) session for its review with the plan to have it approved by the 69th Session of the Executive Council in mid-2017.

#### ***Pre-operational Phase of WIGOS (2016-2019)***

12.4.2 The Panel noted that the WIGOS Pre-Operational Phase is being developed during the seventeenth WMO financial period with the goal to have Members and their partners benefit from a fully operational system from 2020. The plan for the WIGOS Pre-Operational Phase was approved at the Executive Council – 68 (EC-68, June 2016, Geneva, Switzerland).

12.4.3 The Panel further recalled the highest priority areas of the pre-operational phase of WIGOS i.e. (i) national WIGOS implementation; (ii) WIGOS Regulatory Material complemented with necessary guidance material to assist Members with the implementation of the WIGOS technical regulations; (iii) further development of the WIGOS Information Resource (WIR), with special emphasis on the operational deployment of the OSCAR<sup>27</sup> databases; (iv) development and implementation of the WIGOS Data Quality Monitoring System; and (v) concept development and initial establishment of Regional WIGOS Centres).

#### ***OSCAR Platform developments***

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27 Observing System Capabilities Analysis and Review tool – <http://oscar.wmo.int>

12.4.4 The Panel noted with appreciation that the OSCAR/Surface<sup>27</sup> had been developed and became operational on 2 May 2016, providing a single source of reference for information about all observing facilities that contribute to WIGOS. The Panel urged its members to make sure that their data buoy (both drifting and moored), and the Rigs and Platform metadata are routinely being provided to JCOMMOPS as the latter is automatically submitting marine observing platform metadata to OSCAR/Surface via machine to machine interface. The Panel stressed that the collaboration of the manufacturers is key for collecting the full range of WIGOS metadata which are mandatory, optional or conditional (when the condition is met) according to the WIGOS Metadata Standard as described in the WIGOS Manual (WMO No. 1160).

12.4.5 Recommendation **(DBCP-32/12.4 No.71)** made by the meeting is available in ANNEX II.

### **13. EXECUTIVE DECISIONS**

#### **13.1 Report and Recommendations from the Executive Session**

13.1.1 The Johan Stander, on behalf of the Chairperson, reported on the outcome of the Executive Board Session (EB) that was convened during the evening of Tuesday 18 October 2016 to discuss a number of issues that had arisen during the plenary session and to make recommendations to the Panel for its consideration.

13.1.2 The EB considered the WMO request to shorten the DBCP session and use a biennial schedule. The EB did not think that this would be advisable as the sessions are very effective and have recently been limited to only a two-day business meeting. However, the EB recognizes that a different way of working may be advisable, which focuses on specific items, reduces reporting and encourages substantive discussions.

**Action 33.** The EB invites the panel to discuss, through correspondence, innovations for the meeting in anticipation of adaptations for the next session (action: panel and EB; Dec. 31 2017)

13.1.3 The EB, after reviewing the financial situation, agreed to the expenditures as per table 1 and panel members were requested to seek extraordinary budget. However, the EB will be tasked with considering Capacity Building proposals.



<b>2017 Basic Budget</b>	
<b>DBCP TC (JCOMM TF)</b>	<b>\$120,000</b>
<b>DBCP Chair &amp; DBCP TC Travel</b>	<b>\$22,000</b>
<b>JCOMMOPS IT Support Costs</b>	<b>\$26,000</b>
<b>SOT</b>	<b>\$10,000</b>
<b>IOC Secretariat Support</b>	<b>\$10,000</b>
<b>Argos JTA Travel</b>	<b>\$10,000</b>
<b>WMO Indirects</b>	<b>\$18,000</b>
<b>Capacity Building</b>	<b>\$10,000</b>
<b>TOTAL</b>	<b>\$226,000</b>
<b>\$120,000 from JCOMM TF, \$106,000 from DBCP TF</b>	

*Table 1: DBCP budget and maximal expenditures for 2017*

13.1.4 The EB suggested changes to the ToR of the chair and vice-chair membership to assure that a chair is elected in addition to the four regional vice-chairs. This will assure that each region is represented by a vice-chair, and that the chair does not represent a region.

13.1.5 Post DBCP-33 Budget Change for 2017;

As a consequence of the DBCP Executive Board's review of the draft meeting report and action items, it was discovered that \$10,000 was not budgeted properly for SOT activities. It was decided to change the following DBCP 2017 budget allocations as presented in Table 1 on page 50 as follows: Reduce DBCP Chair and DBCP TC travel by \$3,000, reduce JCOMMOPS IT Support Costs by \$4,000, and reduce WMO Indirects by \$3,000. These reductions were redirected to the SOT budget line to total \$10,000.

**Action 34.** EB to compose language for the OP concerning appointments of Chair and vice-Chairs. (action: EB; DBCP-33).

**13.2 Budget and Financial Report**

13.2.1 Eric Locklear (USA) DBCP Financial Advisor presented the basic high level budget summary for DBCP. The DBCP financial report is difficult to assess and validate. The combination of multiple agency’s (WMO, IOC, CLS, Sponsor Interests) policies and procedures have been difficult to resolve. Fundamentally, the DBCP operates on contributions, with the exception of some secretariat support. The contributions are handled by two trust funds, DBCP TF and JCOMM TF. The JCOMM TF should only handle the TC support for DBCP. The DBCP TF handles that, plus other DBCP activities, plus some services for Argos JTA, OceanSITES and JCOMMOPS. The three year high level summary, Table 1, demonstrates that the total costs for DBCP activities have been continually reduced the past few years. These are “actual” costs lifted from the original WMO financial statements. The balance closing in the table may not represent encumbrances and expenses that are not resolved by these reports. Note that the JCOMM TF covers most of the cost of the DBCP TC, \$120,000. Table 2 for contributions demonstrates a fairly constant level of contributions. (Note: The USA contribution is in the JCOMM TF only.) The notional budget is fixed expenses which are committed.

DBCP Trust Fund						
A	B	C	D	E	F	
	DBCP-31 Geneva(2015)	DBCP-32 La Jolla (2016)		DBCP-33		
	2014 Jan - Dec Actual	2015 Jan - Dec Actual	2016 Jan - July Actual	2016 Aug - Dec Estimate	2017 Jan - Dec Estimate	
1	Balance Brought Forward	249,329	153,908	74,544	118,880	58,880
2	Contributions	126,275	94,348	105,674	30,000	133,267
3	Adjustments	64,195	-			
4	<b>Funds Available</b>	<b>439,799</b>	<b>248,256</b>	<b>180,218</b>	<b>148,880</b>	<b>192,147</b>
5						
6	Direct Costs	256,911	156,223	55,488	81,000	85,000
7	Indirect Costs	28,979	17,489	5,850	9,000	21,000
8	<b>Total Costs</b>	<b>285,890</b>	<b>173,712</b>	<b>61,338</b>	<b>90,000</b>	<b>106,000</b>
9						
10	<b>Balance Closing</b>	<b>153,909</b>	<b>74,544</b>	<b>118,880</b>	<b>58,880</b>	<b>86,147</b>
NOTE: The JCOMM Trust Fund includes \$120,000 of DBCP TC costs not included here						

Table 1: 3-Year High Level Summary

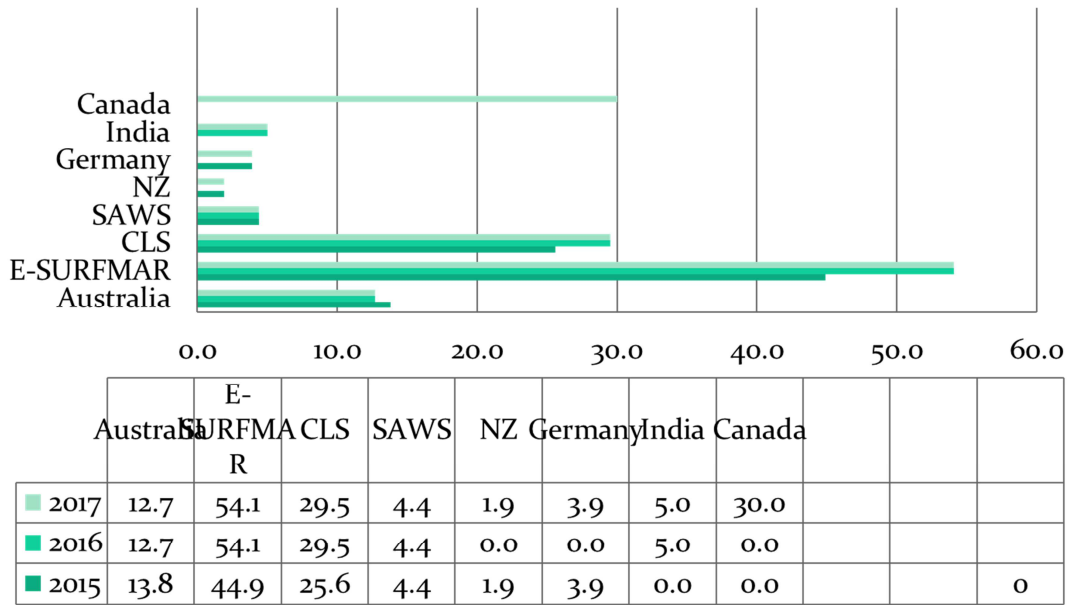


Table 2: 3-Year Contributions Table (\$K)

13.2.2 Mr. Locklear noted that contributions for 2016 from Canada and Germany are expected to arrive between August and December. The contribution from New Zealand was reported as sent, but not yet posted to the DBCP TF. Lastly, contributions for 2017 are assumed to equal 2016.

13.2.3 In light of the reduced yearly closing balance and uncertainty in carried forward obligations, the DBCP Financial Advisor cautioned against expenditures other than the most necessary, ie support for the DBCP / OceanSITES Technical Coordinator.

13.2.4 The panel expressed its appreciation for the skill and engagement Mr Locklear has demonstrated through his presentation.

13.2.5 The panel discussed the role of specific allocations and in-kind contributions in the financial statements. Mr Locklear emphasized that nations must take a realistic view toward how their in kind-contributions will support activities, because support costs are a necessary part of any DBCP activity. A rational balance between cash and in-kind contributions must be made. The WMO appreciates that in-kind contributions are a part of any engagement in WMO activities by nations and requests statements of such as an annex to the annual report.

**Action 35.** EB to investigate the inclusion of in-kind contributions as part of National Reports templates and make appropriate recommendations before the next session. (Action: EB; DBCP-33).

13.2.6 Recommendation made on budget and financial report **(DBC-32/13.2 No.72)** is available on ANNEX II.

### 13.3 DBCP implementation strategy

13.3.1 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 Chairperson and Secretariats, essentially to take into account the outcome and recommendations from the WMO and IOC governing bodies. The Chairperson asked the Panel to review the document (available from the web<sup>28</sup>) and to forward any comments to the Chairperson by the end of November 2015. The Executive Board was invited to propose how the implementation strategy could be reviewed by selected Panel members.

**Action 36.** Panel to review the draft DBCP Implementation Strategy (available from the web<sup>29</sup>) and to forward any comments to the Chairperson. (*action; Members; 31 Dec. 2016*).

**Action 37.** The Executive Board to propose how the implementation strategy could be reviewed by selected Panel members (*action; DBCP EB; ASAP*).

### 13.4 DBCP Operating Principles

13.4.1 The Panel reviewed its operating principles and approved them. The new operating principles are usually provided in Annex XI and on the web<sup>30</sup>. Chair has suggested that simplifications in the presentation and on-line availability of the Implementation Strategy and Operating Principles should be made:

**Action 38.** Secretariat to implement these suggestions for the Operating Principles: (*Action: Secretariat, DBCP-33*)

- Cease to include OP in meeting reports
- Publish standalone document on web, under a simple title, with permanent URL. (<http://jcomm.info/DBCP-OP> , <http://jcomm.info/DBCP-IS> )
- Remove OP appendices TORs of the various Task Teams, Lists of key personnel.
- Publish latest TORs of Task Teams, and Lists of key personnel separately. (Previous versions could be retained on-line.)
- Remove appendix of on-going actions and recommendations, as these are detailed actions, and not principles.
- Publish new separate document for the purpose of maintaining the on-going actions. Consider using Google Docs for continuous editing of status of actions. To be maintained by Secretariat.

13.4.2 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 39.** Panel to review the draft DBCP Operating Principles (available from the web ) and to forward any comments to the Chairperson (*action; Members; 31 Dec. 2016*).

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<sup>28</sup> [DBCP-32 Doc. 13.3 Draft Implementation Strategy](#)

<sup>29</sup> [DBCP-32 Doc. 13.3 Draft Implementation Strategy](#)

<sup>30</sup> [DBCP-32 Doc. 13.4 Draft Operating Principles](#)

### **13.5 Review of action items from the previous DBCP Session**

13.5.1 Champika Gallage, DBCP TC, reviewed action item tables from previous sessions (Annex X). Ms Gallage focused on actions and recommendations that were still underway and reasons for their continuation. The plan also included some outstanding actions from previous Panel sessions. The Panel should be aware that all actions are collated in the MS Excel file at the end of each DBCP session.

13.5.2 The session responded to the reading of the action items by questioning the technique of creating the action items. The session was reminded that the EB had addressed this issue and would consider the role of action items in the structure of DBCP meetings.

13.5.3 The ongoing actions and the set of recommendations are normally entered into the Operating Principles as an Annex.

**Action 40.** DBCP requested that EB review current actions and streamline appropriately (action: EB; DBCP-33)

### **14. NATIONAL REPORTS**

13.6 Mr Paul Poli, MeteoFrance, chaired the National Reports Session. The Panel received written reports on current and planned buoy programmes from, Australia, China SOA, China HK, France, Germany, Japan, Netherlands, New Zealand, Nigeria, Peru, Republic of Korea, South Africa, Spain, Sweden, United Kingdom, and the United States of America. As usual, these written reports, as well as others submitted to the Secretariat before 31 December 2016, would be published in the Panel's Annual Report.

13.7 Oral presentations were made during the Session on national activities by the following countries: Australia, Brazil, Canada, China, India, New Zealand, Republic of Korea, and the United States of America

13.8 The Panel agreed on the following:

**Action 41.** DBCP members who had not submitted National Reports to submit their input to the Secretariat before the end of the year (*action; members; 31 Dec. 2016*).

**Action 42.** To publish National Reports with the Panel's Annual Report (*action; Secretariat; Early-2017*).

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

14.1 The Panel recalled that according to its Operating Principles, the term for the members of the Executive Board is for one year during the intersessional period. They shall be eligible for re-election in their respective capacities, but would serve in principle for no more than 4 terms.

14.2 The Panel further recalled that the current core members of the Executive Board included:

- Dr Jonathan Turton (UK), DBCP Chairperson, first elected at DBCP-30, October 2014;
- Mr Shannon McArthur (USA), DBCP vice-Chairperson for North America, first elected at DBCP-30, October 2014;
- Mr Johan Stander (South Africa), DBCP vice-Chairperson for the Southern Hemisphere, first elected at DBCP-31, October 2015;
- Dr Ting YU (China), DBCP vice-Chairperson for Asia, first elected at DBCP-31, Oct. 2015;
- Dr Sid Thurston (USA), appointed by Mr Wallace (past DBCP Chairperson), to serve in the Executive Board in 2010.

14.3 The Panel re-elected Mr Jon Turton (UK) as its chairperson, and for Europe, to serve for a third term until the end of the next Panel session.

14.4 The Panel re-elected Mr Shannon McArthur (USA) as vice-chairperson for North America to serve for a third term until the end of the next Panel Session.

14.5 The Panel re-elected Dr Ting YU (China), as vice-chairperson for Asia to serve for a second term until the end of the next Panel Session.

14.6 The Panel re-elected Mr Johan Stander (South Africa) as its vice-chairperson for Southern Hemisphere to serve for a second term 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 III***.

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

16.1 Sidney Thurston on behalf of the Chair introduced the question of the date and place for the next DBCP session and recalled that the Panel had agreed in principle to hold the 2017 DBCP-33 Session at IOC/UNESCO headquarters, Paris France. The IOC secretariat proudly accepted the duty of hosting the DBCP-33. Scheduling of the 2017 session must take account of the schedule and preparation required for JCOMM-V Oct.23 - Nov. 1 2017. Tentative dates for the session were agreed to be scheduled provisionally for either 18 – 22 Sept. or 25 – 29 Sept. 2017, ensuring minimum duplication with schedules for events of other JCOMM and related programmes. The session also mentioned that to follow the Wave Workshop (11-15<sup>th</sup> Sept.) 18<sup>th</sup> - 22<sup>nd</sup> Sept. might be preferable.

16.2 The members were requested to consider hosting the DBCP-34 in 2018, and to inform the Chair as soon as a strong commitment can be made.

## **17 CLOSURE OF THE SESSION**

17.1 In closing the session, Mr Stander, speaking on behalf of the Chairperson Mr Jon Turton, expressed appreciation to the staff of Scripps Inst. Oceanography for

providing facilities, support and hospitality for the meeting. Mr Stander also thanked the Secretariat, the Executive Board, the Technical Coordinator, the Chairs of the Action Groups, Task Teams, and Pilot Project Steering Groups, national representatives, manufacturers and all participants for their active and positive contributions to the meeting and to the work of the Panel, building the data buoy community.

17.2 The Thirty-Second Session of the Data Buoy Co-operation Panel closed on Friday, 21 October 2016 at 16:00.

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## ANNEX I

Twenty-six presentations and five posters were delivered by approximately 30 participants from 13 countries. Refer to ANNEX I for detailed list of presentations. These included the following topics (presenters in bold):

### Posters:

- (1) *Drifter trajectories in the Agulhas System – does deployment position matter? (Poster by Jenthen d’ Hotman, Marc de Vos, Neiol Malan, Tamaryn Morris, Johan Stander, Juliet Hermes)*
- (2) *A National Strategy (USA) for a Sustained Network of Coastal Moorings (Poster by S. McArthur, K. Bailey, C. Jansen, R. Morrison, T. Murphy, J. Newton, S. Ruberg, U. Send, H. Worthington)*
- (3) *JCOMMOPS Ocean Observing System Status Map, (Poster by M. Belbeoch, C. Gallage, M. Kramp, A. Lize, E. Rusciano);*
- (4) *Latest Developments for Next Generation Wave Sensor Technology, (Poster by Alex Velasco)*
- (5) *A Redesigned Observing System for the Tropical Pacific: TPOS 2020 Project (Poster by W. Kessler, S. Cravette, N. Smith, S. Wijffels);*

### Presentations:

- (1) *Statistical simulations to evaluate the Global Drifter Array, (by **Rick Lumpkin**, Luca Centurioni, Renellys C. Perez);*
- (2) *Performance Assessment of a GPS-based Drifting Wave Buoy: Towards a Global Wave Buoy Array, (by **Eric Terrill**, Tony dePaolo, Kerstin Paulsson);*
- (3) *India’s Ocean Observations Network towards societal benefits, (by **R Venkatesan**, Simi Mathew, Jagdeesh Kadiyam);*
- (4) *NOAA Unmanned Systems to augment observations to meet its mission, (by **Helmut H. Portmann**);*
- (5) *NOAA National Data Buoy Center Self-Contained Ocean Observing Payload (SCOOP) – Overview and Improvements, (by **Lex A. LeBlanc**, James Elliott);*
- (6) *Quantifying Wave Measurement Differences in Historical and Present Wave Buoy Systems, (by **Robert Jensen**, Val Swail, Richard H. Bouchard);*
- (7) *A National Strategy for a Sustained Network of Coastal Moorings (by McArthur et al **Morrison** presenting)*
- (8) *Plans and early Results of Sentinel-3 SST validation with improved drifter measurements, (by **Anne O’Carroll**, Gary Corlett, Craig Donlon, David Meldrum);*



- (9) *Characteristics of Waves and Water temperatures using ocean buoys in Korea, (by Myung-won Park, **Young Taeg Kim**, Sungyong Park, Ho-Kyun Kim, Kuk Jin Kim, Jung won Kim, Junwoo Choi);*
- (10) *Wind and wave measurements from autonomous platform, (by **Jim Thomson** and James Girton);*
- (11) *Assessing a route to SI traceability for drifting buoy SST measurements, (by **C. Donlon**, D. Meldrum, N. Fox);*
- (12) *Drifter measurements of SST: past, present and future (by **D. Meldrum**, C. Donlan, A. O'Carroll)*
- (13) *Variability of near-surface circulation and sea surface salinity in the northern Indian Ocean, (by **Verena Hormann**, Luca R. Centurioni);*
- (14) *Long-time series of climate quality surface meteorology and air-sea fluxes and the role of withheld observations, (by **Dr. Robert A. Weller**);*
- (15) *Wave Sensing Using MEMS, (by **Timothy Crandle**)*
- (16) *2016 SIO Drifter Developments: SVP and the IoT, (by **Lance Braasch**, Luca Centurioni);*
- (17) *Iridium Transition at the Drifter Data Assembly Center (DAC), (by **Mayra Pazos, Erik Valdes**);*
- (18) *Results to show the impact of ocean surface and profile data, with emphasis on glider data, in the TC intensification forecast of Hurricane Gonzalo (2014) using a network of underwater gliders, (by Gustavo Goni, Francis Bringas, Jili Dong, George Halliwell, **Ricardo Domingues**);*
- (19) *100 % Solar powered buoys, (by Jose Luis Beloso)*  
*cancelled*
- (20) *New Technical Concepts for SVP drifters (**Andy Sybrandy**)*
- (21) *Observed meridional currents in the central and eastern equatorial Atlantic, (by **Renellys C Perez**, Rick Lumpkin, Gregory Foltz, Claudia Schmid, Verena Hormann, Peter Brandt, William E. Johns, Fabrice Hernandez, Bernard Bourlès);*
- (22) *Enterprise and Accounting: Great Lakes Region Perspectives for Funding Observing Networks and Harnessing the Power of Big Data, (by Kelli Paige);*  
*cancelled.*
- (23) *Development of the WIGOS Metadata Standard (WMDS), (by **Joseph W. Swaykos**);*
- (24) *Looking towards 2025: Data Automation Workflows in a Big Data World, (by*

**Kevin O'Brien**);

(25) *The Role of Indonesia PRIMA (Program Initiative on Maritime Observations and Analysis) to support Global Ocean Observing System (GOOS), (by **Nelly Florida Riama**, Dava Amrina);*

(26) *The U.S. IOOS QARTOD Project and the International Community Ensuring Effective interaction with the Data Buoy Cooperation Panel (by **Mark Bushnell**)*

(27) *Using Sairdrones to Examine Conditions in the Bering (by **Christian Meinig**)*

(28) *Stratified Coastal Ocean Processes in Land falling Hurricanes and Typhoons Enhance Ahead-of-Eye Cooling and Reduce Storm Intensity (by Glenn S. M. et al)*

cancelled

(29) *S-412, A Weather Overlay Product Specification for Electronic Chart Display and Information Systems (ECDIS), (by **LT Joseph Phillips**);*

**ANNEX II**

**DBCP-32 RECOMMENDATIONS**

<b>No.</b>	<b>Ref.</b>	<b>Recommendation</b>	<b>By</b>
1	DBCP-32 / 2	The DBCP encourages opportunities to carry out intercomparisons and intercalibrations to ensure information exchange, establish comparability of observations, and quantify field accuracies of moored observations. Results should be shared with data users and the DBCP.	Panel
2	DBCP-32 / 2	That the DBCP promotes the move towards open data access from all observation providers, both public and private.	Panel members
3	DBCP-32 / 2	That the DBCP encourages a better understanding of user requirements for buoy data.	
4	DBCP-32 / 2	Acknowledging the importance of in situ marine observations to operational forecasting and climate monitoring, the DBCP recommends that an active dialog be implemented in JCOMM among marine weather and ocean sensor developers, weather and climate modelers, and operational marine forecasters, to maximize the value of marine observations across the full spectrum of users and optimize sensor placement.	
5	DBCP-32 / 2	JCOMM's DBCP recognizes the importance of developing the S-412 Weather Overlay Product Specification in regards to its ability to enhance safe navigation practices and enable a new method of disseminating marine weather and oceanographic products. JCOMM DBCP supports this development and encourages inclusion of buoy, ship and coastal observations into this product specification. DBCP requests updates on the development of ECDIS and supports the principles of its development.	
6	DBCP-32 / 5	The panel recommended the Iridium service providers to provide deployment information to JCOMMOPS in agreed upon data format;	
7	DBCP-32 / 5	The panel recommended it's members to continue providing buoy deployment information through the new web tools or send them to the Technical Coordinator in the agreed upon format;	
8	DBCP-32 / 5	The Panel recommended to continue to follow guidelines proposed to better handle WMO IDs;	
9	DBCP-32 / 5	The panel recommended moored buoy operators who are not yet transmitting data to the GTS in BUFR format to start doing so using appropriate data formats	
10	DBCP-32 / 5	The panel recommended the moored buoy operators to provide Moored Buoy metadata in the appropriate data format to the TC; and	

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11	DBCP-32 / 5	The panel agreed to communicate with GDACs to establish appropriate tools to access (near) real-time data from the GTS.	
12	DBCP-32 / 6	The DBCP should support the Year of Polar Prediction (YOPP) by: <ol style="list-style-type: none"> <li>1. Engaging with neighbouring Arctic and Antarctic nations to facilitate deployments, including in their EEZ as deemed necessary for the scientific objectives of YOPP.</li> <li>2. Members to provide barometer fitted drifters, or upgrades to assist with improved forecast of climate and weather conditions, as well as for YOPP research objectives.</li> </ol>	
13	DBCP-32 / 6	Encourage members to identify stations to support the WMO Global Cryosphere Watch programme.	
14	DBCP-32 / 7.1	Drogue Retention: ¼" plastic impregnated wire rope is recommended with high quality impregnation. The synthetic tether investigation should continue	
15	DBCP-32 / 7.1	SST calibration and traceability: refer to the GHRSSST report	
16	DBCP-32 / 7.1	Monitor GPS performance. A GPS fix with valid time and location should be transmitted with standard quality indicator. By standard we mean (HDOP, PDOP, GDOP, # of sats, TTFF, SNR,	
17	DBCP-32 / 7.1	Increase the resolution of the geolocation in the iridium message to meter resolution	
18	DBCP-32 / 7.1	Digit truncation of significant figures is not a good practice. Proper rounding is recommended together with transmission of all significant digits. However, the BUFR template should not be modified for now	
19	DBCP-32 / 7.1	Define a GTS message template for wave drifters asap	
20	DBCP-32 / 7.1	Investigate new drifter packaging for portability and to extend drifter lifespans.	
21	DBCP-32 / 7.1	Magnets should never be removed. This should be communicated to all the parties.	
22	DBCP-32/7.2	BUFR transition to continue and move to TT-DM. Monitor progress of BUFR transition through TC coordination with TT-MB	
23	DBCP-32/7.2	Lessons Learned Instrumentation-Practices. Develop template (modified from Vandalism) submitted by TT-MB to TC	
24	DBCP-32/7.2	Acknowledge other autonomous vehicles, e.g. Air and ocean (DBCP-32 S&T Workshop), but concentrate on the development of a working group on ASV's sharing information on various deployments, lessons learned, met ocean collected data, developing BUFR template, metadata template, test and evaluation plan	

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25	DBCP-32/7.2	Metadata template modification to include wave sensor, payload-analysis packages version control. Expand the metadata entries to capture all historical information. Recommendation will be coordinated with TC	
26	DBCP-32/7.2	Investigation and identification of new met and ocean sensor technologies. Solicit input from DBCP-32 S&T presentations. Establish requirements for test and evaluation procedures of new sensors, and plan summarizing steps from testing to operations.	
27	DBCP-32 / 7.3	TT-CB to Engage with IOC's E-Learning Program for online training and certification,	
28	DBCP-32 / 7.3	TT-CB to Engage with WMO-IOC Regional Marine Instrument Centres (RMICs) as Appropriate,	
29	DBCP-32 / 7.3	TT-CB to Include Vandalism Mitigation outreach whenever possible,	
30	DBCP-32 / 7.3	TT-CB to Develop Performance Metrics to Document Success of Capacity Building Workshops to the Community,	
31	DBCP-32 / 7.3	TT-CB to Engage with Brazilian Navy Hydrography/Navigation Cruise in April 2017.	
32	DBCP-32 / 8.1	Urge the wave measurement agencies to ensure that high-quality wave data is measured for the benefit of a wide range of users, and not to sacrifice quality for quantity -- action all DBCP members	
33	DBCP-32 / 8.1	Encourage member countries, and RMICs with marine responsibilities, to participate in the ongoing intercomparison activities;	
34	DBCP-32 / 8.1	Continue the development of wave measurements from drifting buoys, in cooperation with the GDP, to further the evaluation of the technology	
35	DBCP-32 / 8.1	Establish a Task Team on Wave Measurement (TT-WM), to encompass not only the ongoing efforts in wave measurement evaluation and the continuing pilot on wave drifters, but to enable a broader dialogue	
36	DBCP-32 / 8.1	Encourage TT-WM members to actively outreach these relevant activities, in relevant scientific and technical fora, and to JCOMM and WIGOS in developing standards and best practices;	
37	DBCP-32 / 8.1	Encourage responsible national agencies to address the ongoing deficiencies in wave metadata, and in particular historical metadata.	
38	DBCP-32 / 8.2	DBCP endorses the activities with the GRHSST Working Group to develop the SI traceability of drifters to improve evolving satellite climate data records.	

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39	DBCP-32 / 9.1	The trial JCOMM Global Data Assembly Centres (GDACs) for drifting buoys of MétéoFrance (former SOC) and ISDM (former RNODC/DB) to continue to work towards the implementation of a routine procedure to compare GTS Bulletin Headers between the two centres,	
40	DBCP-32 / 9.1	Manufacturers are invited to use the existing active templates prior to the creation of their own. In case none of the existing templates is suitable for a given set of buoys, a new one may be designed in coordination with the DBCP - TTDM team.	
41	DBCP-32 / 9.1	Adopt a new Iridium SBD raw data format #003 for SVP and SVP-B Iridium drifters and make sure all buoy manufacturers adhere to the standard and approved DBCP data formats.	
42	DBCP-32 / 9.1	Centers must switch to using BUFR template for drifting and moored buoys (templates TM315009 for drifters and TM315008 for moorings) as soon as possible. This concerns JMA for drifting buoys; DWD, Met Office, NOAA/NDBC, Puertos del Estado for moored buoys.	
43	DBCP-32 / 9.1	Buoy data users to finalize the migration of their applications to BUFR.	
44	DBCP-32 / 9.1	GTS centers that convert, for local use, observation data received from a foreign GTS center (e.g. BUFR converted into FM13) must not resend the converted data onto the GTS.	
45	DBCP-32 / 9.1	The panel and WMO should find a way to provide a tool to give GTS data access to the community in near real time, without going through the National weather services. GDACs don't have this feature available, and third party websites like Sailwx is not a suitable solution to this problem.	
46	DBCP-32 / 9.2	To continue to deploy Iridium drifting buoys in areas where delays are greater than 120 minutes	
47	DBCP-32 / 9.2	DBCP continue to perform regular (every 6 months) assessments with CLS of the global data buoy timeliness by comparing JCOMMOPS delay maps with Argos Data Mean Disposal Time Maps and	
48	DBCP-32 / 9.2	To investigate timeliness of the moored array and determine the best way to represent these in the reports	
49	DBCP-32 / 9.3	All entities serving drifter data should coordinate their web sites so that the different versions of the data and potential uses are clear, and other versions of the data clearly linked and explained.	
50	DBCP-32 / 9.3	Encourages recipients of GDAC invitation letters to respond by Nov. 2016	
51	DBCP-32 / 9.4	OCG to continue working with global observing networks to implement data interoperability framework in close consultation with JCOMM Data Management Coordination Group (DMCG);	
52	DBCP-32 / 9.4	OCG to refine the vision of EOVS pilot project and consult with observing networks to determine interest;	

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53	DBCP-32 / 9.4	OCG to engage with GOOS regional Alliances to provide data framework in support of GOOS Regional Alliance data portals and Ocean Data Portal (ODP)	
54	DBCP-32 / 9.5	The Panel encourages all buoy operators to register deployment plans and metadata through JCOMMOPS website tools <a href="http://www.jcommops.org/board?t=DBCP">http://www.jcommops.org/board?t=DBCP</a>	
55	DBCP-32 / 9.5	Panel requests buoy operators to check their platform information on JCOMMOPS database for accuracy.	
56	DBCP-32 / 9.5	Panel reminded all moored buoy operators to provide moored buoy metadata in suggested format to JCOMMOPS.	
57	DBCP-32 / 9.5	Panel reminded the buoy operators that JCOMMOPS feed the WMO OSCAR system with metadata information for all JCOMMOPS coordinated platforms including DBCP, thus it is extremely important to provide accurate and timely metadata information to the JCOMMOPS.	
58	DBCP-32 / 10.1	For the DBCP TC to continue to provide regular updates on maps and statistics to the community.	
59	DBCP-32 / 10.1	DBCP platform operators to verify the information of their networks on JCOMMOPS web application.	
60	DBCP-32 / 10.1	Platform operators to enter new deployment information to the JCOMMOPS database using new web tool.	
61	DBCP-32 / 10.1	The panel would like the AI Wallace retrospective to be made more accessible to the public, by posting more prominently on DBCP and JCOMM web sites, with the recommendations removed.	
62	DBCP-32 / 10.2	Urging WMO and IOC to take data buoy vandalism issue up to the next level of other UN bodies IMO FAO & IHO – Inter UN bodies working group	
63	DBCP-32 / 10.2	During the next meeting of IOC FAO and IMO member countries could be sensitized by organizing a side meeting on Vandalism of Observing platforms at Congress Displays Poster Videos can be presented	
64	DBCP-32 / 10.2	WGV acknowledged difficulty faced by member countries to sustain observations with these incidents and will jeopardies the goal of global observation initiatives	
65	DBCP-32 / 10.2	Encourage states to develop legal mechanisms to address buoy vandalism.	
66	DBCP-32 / 12.1	JCOMMOPS continues to provide urgent support to the DBCP community until a replacement for TC DBCP will be in place.	

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67	DBCP-32 / 12.1	Platform operators to consider using the new website for platform registration, including deployment plans, and at least CC the TC on every implementation plan.	
68	DBCP-32 / 12.1	Panel to feedback on Key Performance Indicators set up on website	
69	DBCP-32 / 12.1	DBCP requests JCOMMOPS and the OBS Program Area to facilitate more collaboration and cooperation in deploying drifters, especially through VOS in support of services such as DRR and Capacity Building Initiatives.	
70	DBCP-32 / 12.3	That the DBCP adopts the technology readiness approach articulated in the GOOS Framework for Ocean Observations for transitioning concepts into mature products for operationalizing.	
71	DBCP-32 / 12.4	Panel members to negotiate with the manufacturers, and make the provision of their platform and instrument metadata to JCOMMOPS as a contractual condition (action; Panel members; ongoing).	
72	DBCP-32 / 13.2	Nations are encouraged to inform the Secretariat of contributions to the DBCP Trust Fund in addition to their communications with WMO financial department.	



## ANNEX III

### AGENDA DBCP-32 2016

#### **1 Opening and Welcome of the DBCP Session**

#### **2 Scientific and Technical Workshop**

#### **3 Opening of the DBCP Business Session**

3.1 Adoption of the agenda

3.2 Working arrangements

#### **4 Reports by the Chairperson, and Vice Chairpersons**

#### **5 Report by the Technical Coordinator**

#### **6 Reports by the Action Groups**

6.1 Global Drifter Programme (GDP)

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

6.3 International Arctic Buoy Programme (IABP)

6.4 International Buoy Programme for the Indian Ocean (IBPIO)

6.5 WCRP-SCAR International Programme for Antarctic Buoys (IPAB)

6.6 International South Atlantic Buoy Programme (ISABP)

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

6.8 Tropical Moored Buoys Implementation Panel (TIP)

6.9 International Tsunameter Partnership (ITP)

6.10 OCEAN Sustained Interdisciplinary Timeseries Environment observation System (OceanSITES)

6.11 Other regional activities

#### **7 Reports by the Task Teams**

7.1 Task Team on Instrument Best Practices and Drifter Technology Development (TT-IBPD)

7.2 Task Team on Moored Buoys (TT-MB)

7.3 Task Team on Capacity-Building (TT-CB)

## **8 Pilot Projects**

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

8.2 Pilot Project Proposals

8.2.1 Unmanned Surface Vehicles

8.2.2 High Resolution Drifter SST Measurement

8.3 Other Pilot Activities

## **9 Data Management**

9.1 Task Team on Data Management (TT-DM)

9.2 Data timeliness

9.3 Buoy Data Management Centres

9.4 Data Integration

9.5 Metadata, including Moored Buoys Rigs and Platforms metadata

## **10 Issues for the Panel**

10.1 Information Exchange

10.2 Vandalism

10.3 Other issues

## **11 Information Reports**

11.1 Satcom Forum Report

11.2 Iridium Operations

11.3 ARGOS Satellite Systems

11.4 Additional reports, as required

## **12 Organizational Issues**

12.1 JCOMM and JCOMMOPS activities and management

12.2 Report on decisions of WMO and IOC governing bodies

12.3 User requirements

12.4 WMO Integrated Global Observing Systems (WIGOS)

## **13 Executive decisions**

13.1 Report and Recommendations from the Executive Session

13.2 Budget and Financial Report

13.3 DBCP implementation strategy

13.4 DBCP Operating Principles

13.5 Review of action items from the previous DBCP Session

**14 National Reports**

**15 Election of the Chairperson and Vice Chairperson**

**16 Adoption of the Session Report**

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

**18 Closure of the Session**

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**ANNEX V****Report by the Chairperson of the DBCP, and the Executive Board***Report by the vice-Chairperson for Southern Hemisphere*

The DBCP Vice Chairperson for the Southern Hemisphere, Mr Johan Stander, reported on activities of the past intersessional.

## 1) Executive Summary

Most Southern Hemisphere countries, particularly the Developing Countries, and Small Island Developing States (SIDS) continue to rely strongly on the support from Developed Countries for sustained met-ocean platforms in this vast, under sampled ocean area. With this in mind, we would like to thank those countries, institutions and organisations and, in particular, NOAA, for assisting us in these observing activities.

During the recent WMO EC-68 session (May 2016), marine activities were once again raised as an element within the WMO that requires special attention and we are glad to report that clear resolutions were made in support of the DBCP. This support came after a request from DBCP-31 to elevate the importance of ocean observations at Executive Council level.

## 2) DBCP related meetings attended

As most countries find it increasingly difficult to attend all DBCP related meetings, the various program meetings (eg. IBPIO, ISABP etc) will continue to occur prior to the DBCP Panel Session. With this in mind, it remains a real concern that the International Program for Antarctic Buoys (IPAB) is not communicating with the Southern Hemisphere countries active in the Antarctic, even though concerted attempts have been made to rectify this. The DBCP Panel is therefore requested to provide guidance in this regard.

## 3) JCOMM/WMO/IOC related meetings/workshops attended

As Co-President of JCOMM, it was a privilege to attend various meetings where the work of the DBCP was highlighted and elevated. Below is a list of meetings in which the DBCP and related activities were highlighted since the last Panel Session:

- I. JCOMM Management meeting;
- II. Presidents of Technical Commissions and Regional Associations;
- III. Ad-Hoc working group for improved Marine Services;
- IV. ICG-WIGOS;
- V. SATCOM Forum Management;
- VI. Southern African Search and Rescue;
- VII. Executive Committee of the JTA;
- VIII. WMO Task Team on Data and Strategy; and
- IX. Technical Conference in Spain.

## 4) Capacity Development

We thank the Capacity Building task team and, in particular, Dr Sidney Thurston for considering Capacity Building (CB) workshops for SIDS

## 5) Challenges by region

- a. Insufficient CB for Developing Countries and SIDS in the Pacific

- b. Insufficient funding from Developing Countries and SIDS to deploy and/or maintain current met-ocean observation networks.
- c. Insufficient computer and related equipment enabling Developing Countries and SIDS to access JCOMMOPS data and/or start on research based on met-ocean sponsored platforms

*Report by the vice-Chairperson for North America*

For the intersessional period the DBCP vice-Chairperson for North America, Mr. Shannon McArthur, reported on U.S. activities during the last inter-sessional period. He reported that moored and drifting buoy networks used in the collection and dissemination of civil earth ocean observations are being operated and maintained by the National Oceanic and Atmospheric Administration (NOAA) National Data Buoy Center (NDBC), the NOAA Pacific Marine Environmental Laboratory (PMEL), the NOAA Atlantic Oceanographic and Meteorological Laboratory (AOML), the NOAA National Ocean Service, the United States Army Corps of Engineers, the Scripps Institute of Oceanography, the Woods Hole Oceanographic Institute, the Alaska Ocean Observing System (AOOS), the Caribbean Coastal Ocean Observing System (CARICOOS), the Central and Northern California Ocean Observing System (CeNCOOS), the Gulf of Mexico Coastal Ocean Observing System (GCOOS), the Great Lakes Observing System (GLOS), the Mid-Atlantic Regional Association Coastal Ocean Observing System (MARACOOS), the Northwest Association of Networked Ocean Observing Systems (NANOOS), the Northeastern Regional Association of Coastal Ocean Observing Systems (NERACOOS), the Pacific Islands Ocean Observing System (PacIOOS), the Southern California Coastal Ocean Observing System (SCCOOS), and the Southeast Coastal Ocean Observing Regional Association (SECOORA). The Integrated Ocean Observing System (IOOS®) is a national-regional partnership working together to provide new tools and forecasts to improve safety, enhance the economy, and protect our environment.

The vice-Chair reports that the NOAA and IOOS co-sponsored the development of the U.S. National Strategy for a Sustained Network of Coastal Moorings. The strategy aims to identify, preserve, monitor, and adaptively manage and integrate a network of coastal moorings. The strategy was developed to establish a framework for in-depth planning and implementation of a sustained national coastal mooring network. It enables enhanced integrated stakeholder management by establishing a planning framework by which operators, users, and stakeholders of the coastal mooring network may stay engaged, provide cyclic peer review, and offer input into the progressively evolving architecture and design of the national network.

The vice-Chair reports on continued progress and planning of the Tropical Pacific Observing System (TPOS) 2020 Project to evaluate, and where necessary change, the elements that contribute to the Tropical Pacific Observing System based on a modern understanding of tropical Pacific science. The project aims for enhanced effectiveness for all stakeholders, informed by the development and requirements of the operational prediction models that are primary users of TPOS data. TPOS 2020 embraces the integration of diverse sampling technologies, with a deliberate focus on robustness and sustainability, and will deliver a legacy of improved governance, coordination and supporting arrangements.

The vice-Chair reports that in February 2016 the WMO/IOC Joint Commission on Oceanography and Marine Meteorology (JCOMM) Regional Marine Instrumentation Center (RMIC) for WMO Region IV held an international workshop at US National Data Buoy Center (NDBC). The purpose of the RMIC workshop was to organize and facilitate subject matter experts to pursue outcomes focused on improvements in ocean waves observations and cross

(WMO) region cooperation in wave observation sensor calibration intercomparisons. Targeted workshop objectives included building upon the outcomes of the Data Buoy Cooperation Panel Pilot-Project on Waves Evaluation Testing from Moored Buoys (PP-WET) and the DBCP Pilot Project on Wave Measurements from Drifters (PP-WMD). These international projects form the basis for the continuous testing and evaluation of existing/planned wave buoy measurements in order to establish confidence in the user community of the validity of wave measurements from the various ocean observation systems. 56 technical experts from 13 nations participated in the workshop.

The vice-Chair reports the successful development and technical refresh of approximately 20% of the NDBC Coastal Weather Buoy (CWB) network with new Self-Contained Ocean Observing System (SCOOP) payloads. With SCOOP, NDBC aims to reduce operational costs and improve observing systems safety and reliability.

The vice-Chair reports that during the intersessional period, NOAA/AOML and SIO collaborated with numerous partners to maintain a global drifter array of ~1300 drifters and to implement and test methodologies to increase drogoue lifetime. A peer-reviewed study (Lumpkin et al., 2016) was conducted to evaluate the composition of the global array needed to maintain GOOS/GCOS sampling requirements; results of this study will be reported at DBCP-32. In order to maximize cost savings and data timeliness, the Iridium transition plan was accelerated; during the year, no further Argos-based drifters were purchased from the manufacturers, while inventories of Argos drifters were deployed. As of mid-September 2016, the fraction of the global array that is Iridium is rapidly increasing and now exceeds 35%.

The vice-Chair reports that the US Army Corps of Engineers (USACE) continues to operate and co-operate 64 buoys along the US coast, the Hawaiian Islands, Puerto Rico, Guam, Marshall, and Saipan, collaborated with other US Federal (US Navy, NOAA/IOOS), State (California, Virginia) agencies, local, and industry partners. Three new deployments occurred, Cape Cod, MA, Wallops Island, MD, and Onslow Bay, NC. Data are disseminated via the Coastal Data Information Program (CDIP). All wave measurements are obtained from Datawell Directional Waverider buoys. Iridium communications are used in 95% of the sites, with planned transition over the next year to 100%. Real-time data return on the deployed buoys is ~95%. Complete data return (~99 to 100%) occurs when the on-board flash drive is recovered, processed, and analyzed. However with some partner buoys the return is slightly lower (data gaps amounting to days/weeks) because of delays in re-deployment of a replacement, bad batteries from the manufacturer, and/or weather delays. Failures of the system generally are a result from vessel collisions.

The vice-Chair notes that the network of 13 PacIOOS wave buoys across the Pacific Islands is an important resource to monitor real-time ocean conditions, 24/7. Stakeholders in the region rely upon PacIOOS wave buoys data to make safe decisions. PacIOOS will continue to maintain its wave buoys, and improvements to the mooring line will be tested to extend the longevity of the buoy set-up.

The vice-Chair notes that NERACOOS spans coastal waters from the Canadian Maritime Provinces to the New York Bight. NERACOOS provides weather and ocean data to fishers and commercial shippers determining if conditions are safe for passage and to emergency managers issuing storm warnings. NERACOOS is advancing efforts to improve water quality monitoring, harmful algal bloom predictions and warnings, and coastal flooding and erosion forecasting systems. For the past 14 years NERACOOS buoy A has been monitoring water

temperature and other ocean conditions in Massachusetts Bay.

The vice-Chair notes that on Wednesday August 31, 2016 Tropical Depression Nine was upgraded to Tropical Storm Hermine. Tropical Storm Hermine is the 8th named storm of the 2016 Atlantic hurricane season. SECOORA marine weather buoys, C10, C12 and C13, in the Gulf of Mexico captured observations from Tropical Storm Hermine in real time.

The vice-Chair reports that in the past year, PMEL's T-Flex mooring systems replaced legacy ATLAS moorings at 5 RAMA and 3 PIRATA sites. Additional T-Flex replacements are planned for 2017. During the past year PMEL supported 5 cruises in the Indian Ocean to service PMEL RAMA moorings, 3 cruises in the Atlantic to service PIRATA moorings, and 2 cruises in the Pacific to service Ocean Climate Stations (OCS) moorings. The draft of the First Report on the Tropical Pacific Observing System (TPOS) 2020 was posted to the TPOS 2020 website: <http://www.tpos2020.org> in August 2016 and is available for download, review, and comment. Four TPOS 2020 experiments to be conducted over a four-year period have been funded by NOAA. These experiments include:

- Enhanced ocean boundary layer observations on the TAO moorings
- Profiling Rainfall, Wind Speed, and Biogeochemical Sensors for Use in the Tropical Pacific Observing System
- Autonomous Surface Vessels (Saildrone) as Low-Cost TPOS Platforms for Observing the Planetary Boundary Layer and Surface Biogeochemistry
- Development and Testing of Direct (Eddy Covariance) Turbulent Flux Measurements for NDBC TAO Buoys

PMEL conducted a multi-year (2008-2014) process study within RAMA with the addition of 9 subsurface ADCP moorings in the region spanning 2.5°N to 4°S and 78°E to 83°E. After removal of some sites in 2014 to 2016, the array will continue with 3 ADCP sites in addition to those formally implemented in RAMA.

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

Speaking on behalf of the vice-Chairperson for Asia, Dr Yu Ting (China), Mr Sidney Thurston (USA, DBCP EB) delivered Dr Ting's report on activities during the last inter-sessional period. Dr Ting reported that the moored buoy networks are being maintained by USA (NOAA<sup>1</sup> / PMEL<sup>2</sup> for the RAMA<sup>3</sup> array), and China (SOA<sup>4</sup> and CMA<sup>5</sup>), India (NIOT<sup>6</sup>), Japan (JAMSTEC<sup>7</sup>), Korea (KHOA<sup>8</sup>) for their National Ocean Buoy Observation Network.

The moored buoy network in the Indian Seas had been established by NIOT/India. Currently

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1 NOAA: National Oceanic and Atmospheric Administration

2 PMEL: Pacific Marine Environmental Laboratory

3 RAMA: Research Moored Array for African-Asian-Australia Monsoon Analysis and Prediction

4 SOA: State Oceanic Administration

5 CMA: China Meteorological Agency

6 NIOT: National Institute of Ocean Technology

7 JAMSTEC: Japan Agency for Marine-Earth Science and Technology

8 KHOA: Korea Hydrographic and Oceanographic Agency



19 moored buoys are working in Northern Indian Ocean region comprised of four coastal buoys and one CALVAL buoy for satellite data validation. Data are transmitting through GPRS/INSAT telemetry. 12 buoys have meteorological and oceanographic sensors up to 500m depth transmitting data in real time through INMARSAT. The data return is more than 93%. In addition, 7 tsunami buoys are moored at sea out of which 4 are from Indian Tsunami Buoy System ITBS.

India has deployed a mooring in Svalbard Arctic and collected data continuously for 2 years from 2014 to 2016 and new mooring with biogeochemical and pCO<sub>2</sub> sensors are deployed. For this work in Arctic, team received prestigious National Geoscience award from President of India. India has developed moored buoys system Prakruti to transmit 106 parameters in real time.

The Panel acknowledged the importance of tsunami monitoring a decade after the 2004 tsunami in South Asia, and noted that the technological advancement and preparedness level in this region have improved. The Tsunami buoy monitoring network is being maintained by Australia, USA, Chile, Ecuador, Colombia, Russia Fed., India, China, Thailand, Malaysia and Japan. Most of these countries are making data available through the National Data Buoy Center (NDBC) of NOAA.

National Marine Environmental Forecasting Center (NMEFC)/ SOA of China is responsible for operating the tsunami warning and mitigation system in China. It is the host center of South China Sea Tsunami Advisory Center (SCSTAC) under the framework of Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS). Two tsunami buoy and coastal seismic stations have been maintained by SOA to detect earthquakes that may trigger local tsunamis. Efforts have been made to re-deploy the tsunami buoy and keep it in stable service since June 2014. It is noted that the vandalism on data buoys remains a severe problem in the region.

As one of WMO-IOC Centre for Marine Meteorological and Oceanographic Climate Data, Tianjin, China (CMOC/China), NMDIS/SOA has been actively seeking the potential cooperation with DBCP. At the First CMOC/China Workshop (28 August- 1 September 2016, Tianjin, China), the pilot study on integrating the DBCP drifter data with metadata was discussed. The conversation with related DACs and GDACs are expected to be established to smooth the data and metadata flow and generate integrated datasets with the potential added value for further quality control and met-ocean study.

The Panel also recalled its Capacity Building activities of interest to the Asia Pacific region undertaken during the last intersessional period. This included the Fourth Capacity Building Workshop of the WMO/IOC Data Buoy Cooperation Panel (DBCP) for the North Pacific Ocean and Its Marginal Seas (NPOMS-4), which was held during 2-4 November 2014, in Busan, Republic of Korea. Through the effective communication the Fifth NPOMS workshop (NPOMS-5) is scheduled to be held in Tianjin, China, early 2017. China and Thailand reported participation of Second DBCP Pacific Islands Training Workshop on Ocean Observations and Data Applications (PI-2), Nouméa, New Caledonia, 24-27 May 2016.

India reported that collaboration in the region is growing and gaining importance. The ongoing Indo-US, Indo-UK and Indo-South Africa collaborations are progressing well.

The vice-Chairperson for Asia's report concluded by reporting on a productive and interactive year in Asia. Observational activities together with expertise in this region have improved in

recent years due to increased interaction and collaboration.

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## ANNEX VI

### Technical Developments to the various moored buoy systems and networks during the year

Brazil: No input received.

Canada: Beginning in 2016, Environment and Climate Change Canada (ECCC) Marine Networks was tasked by Senior Executives to conduct a comprehensive review of the moored buoy network in the Pacific and Atlantic Coasts. The aim of the project is to deliver a cost effective network that is tailored to the needs of its primary users. The project will focus on technology refresh, community best practices, review of data management practices and in-depth analysis of user requirements. In addition, a Request for Information will be posted in October to solicit interest for ship tendering services from private industry.

The project will leverage an ECCC developed Geo-spatial Needs Index tool that considers various factors affecting the requirement for where monitoring stations are located and needed most, which will be used to determine the best location for moored buoys in the Atlantic and Pacific Coast. In addition a similar AVOS needs index tool has been developed that leverages the needs index tool and will assist in the recruitment and suitability of new ships to ECCC's AVOS program.

ECCC Marine Networks has procured a SV3 Waveglider and is in the process of developing a test plan to understand the efficacy of the technology in Canadian waters. ECCC will be looking to partner with Dalhousie University and Department of Fisheries and Oceans to learn more about this emerging technology. In addition, a 3M Triaxys spectral wave system is presently in operation in the Halifax Harbor, currently data is not transmitted to the GTS, but is stored locally on an onboard SD card.

ECCC will continue the commitment to the METAREAS II project and with the cooperation from other Government of Canada Departments and Academia will deploy 10-15 drifter buoys in the Canadian Arctic to increase atmospheric monitoring.

France: During the intersessional period 2 FR moored buoys were replaced so that all the FR MB (Antilles - 4100300, Côte d'Azur - 6100001, Lion - 6100002) are now equipped with a new AWS system and transmit, through Iridium, hourly messages following the BUFR Template 315008 (no more TAC messages for these buoys). Lion is equipped since one year and everything is working well. Raw data of these buoys are available on the website: <http://www.meteo.shom.fr/real-time/> .

France: All the buoys are equipped with: standard meteorological sensors plus: 1 global and 1 infrared radiation sensors, 1 salinity sensor (SBE37), and 1 omnidirectional waverider. For Lion: 2 salinity sensors are added alongside the mooring line (depth: 120 and 200m). Two sensors must be added by -10m and -50m. For Côte d'Azur: a nitrate sensor is added, in cooperation with LOV (Laboratoire d'Océanographie de Villefranche-sur-Mer), at a depth of 40m. For the 2 moored buoys in the Mediterranean Sea area: subsurface sensors are installed on the mooring lines: 20 sea surface probes (SP2T) from a depth of 6m to 260m.

France: Next service on Lion (by the end of September or October 2016) will be the

opportunity to reinstall the autonomous directional waverider (TRIAXYS) using the new compressed format and to compare both waveriders installed on the buoy.

UK: Further deployments of new design moored buoys (Hydrosphere/Mobilis hulls) with spectral wave capability to replace legacy designs have been made. Presently there are 4 new design systems in operation alongside 4 legacy systems. During the year the moored buoys at Aberporth (to be replaced by a waverider) and Turbot Bank were decommissioned as funding was withdrawn. Evaluation of moored buoy wave measurements is continuing as a contribution to the PP-WET, with 3 months of collocated data from a legacy Balmoral buoy (with heave sensor) and a waverider at Aberporth, and also 5 months of data from a Hydrosphere/Mobilis buoy with both Triaxys and MOSE sensors fitted, for 2 of these months there is also collocated waverider data. A limited further evaluation of the 'AutoNaut' ASV carrying a Met Office AMOS (Autonomous Marine Observing System - as used on ships) has also been carried out; this identified a number of technical problems that are being addressed by the AutoNaut manufacturers with further trials planned for autumn 2016.

India: India has deployed a mooring in Svalbard Arctic and collected data continuously for 2 years from 2014 to 2016 and new mooring with biogeochemical and pCO<sub>2</sub> sensors are deployed. For this work in arctic team led by Dr. R Venkatesan received prestigious National Geoscience award from President of India. India has developed moored buoy called "Prakruti" to transmit 106 parameters in real time. Under Indo-US and Indo-UK collaboration, observational tools Gliders, Argo floats, Ship board measurements were conducted in the Bay of Bengal. MoU will be signed between JAMSTEC Japan for observation studies. Under Indo-South Africa collaboration, staff from Department Environmental Authority, South Africa had been exposed to moored buoy observation and data collection and further collaboration MoU is being signed. Reliability analysis of mooring is conducted and paper is published in MTS Journal. Issues with connectors and cables are being faced. Standardization of oceanographic sensor need to be undertaken to ensure reliable performance of sensors considering cost involved in ship time and valuable data.

US (PMEL): In the past year PMEL's T-Flex mooring systems replaced legacy ATLAS moorings at 5 RAMA and 3 PIRATA sites. Additional T-Flex replacements are planned for the coming year. Hourly T-Flex data are reported on the GTS in BUFR format with Bulletin Header IOBX08 KPML. WMO numbers for T-Flex moorings take the 7-digit analog of the 5-digit code for the previous ATLAS system at the same site. For example, the WMO number for the first T-Flex mooring implemented (4°S 81°E in RAMA) is 2300010 (vs 23010 for the previous ATLAS moorings at that site). During the past year PMEL supported 5 cruises in the Indian Ocean to service PMEL RAMA moorings, 3 cruises in the Atlantic to service PIRATA moorings, and 2 cruises in the Pacific to service Ocean Climate Stations (OCS) moorings. The draft of the First Report on the Tropical Pacific Observing System (TPOS) 2020 was posted to the TPOS 2020 website: <http://www.tpos2020.org> in August 2016 and is available for download, review, and comment.

US (Ocean Observatories Initiative-OOI): New ocean observing platforms, including very capable moorings, are on line now as part of the U.S. National Science Foundation's Ocean Observatories Initiative (OOI). Four high latitude sites in the open ocean are occupied: the Gulf of Alaska, the Irminger Sea, the Argentine Basin, and a South Pacific Site at 55°S, 90°W. At each site a surface mooring is paired with a nearby taut subsurface mooring with profilers to make observations from the sea surface to the sea floor. Two taut, subsurface moorings are deployed at the other two corners of a triangle, with sides roughly ten times the water depth.

Up to five ocean gliders add to the spatial sampling capabilities and to observing the vertical structure near the surface. Thus, the surface forcing and the response and variability of the full water column as well as the mesoscale variability are observed. A multidisciplinary suite of sensors, real-time delivery of data, and high bandwidth, two-way communication are further features of these new observatories. All data are freely available, and annual cruises are made to service the sites. More information is available at <http://oceanobservatories.org>.

US (NOAA/NDBC): The National Data Buoy Center (NDBC) is deploying a sophisticated new Self-Contained Ocean Observing Payload (SCOOP) in its operational buoy network as a technology refresh initiative. The legacy payloads are labor intensive to build and difficult to deploy successfully. SCOOP is a smaller, lower cost, more reliable, modular payload that is easier to build, deploy and reduces the life cycle cost of maintaining the buoy array. SCOOP also increases observational capabilities, reduces reporting latency, extends the range of some measurements, and improves the accuracy of others. Details of these enhanced capabilities will be provided in the presentation. NDBC has extensively tested SCOOP including bench testing, shock and vibration testing, and field testing of three prototypes in the Gulf of Mexico over a one-year period. In 2015, NDBC deployed six SCOOP payloads in the Atlantic, Caribbean and Gulf of Mexico near existing moorings. Based on the quality of the SCOOP payload data compared to adjacent mooring, NDBC proceeded to deploy seven SCOOP payloads as operational stations. NDBC expects to replace all legacy weather buoys with SCOOP over the next five years.

US (USACE): The USACE in collaboration with NOAA/NDBC, Environment Canada and AXYS Corporation continue to collect wind-generated wave spectra (and Fourier directional parameters) at the Buoy Farm located in Monterey Canyon, CA. A 6N buoy equipped with three NOAA/NDBC sensors (inclinometer, HIPPY, and 3DMG-motion sensor), a Triaxys Next Wave II Wave Sensor, and an AXYS Watchman, and payload packages. Also deployed is a NOAA/NDBC 3D buoy with dual sensors (HIPPY and 3DMG), and a Datawell Directional Waverider buoy. The data sets are being analysed as part of an intra-measurement evaluation, and documented as part of the DBCP-ETWCH Joint Pilot Project on Wave Measurement Evaluation and Testing. Also, studies are being conducted at two dual sensor buoy sites in the Atlantic and Pacific and a foam buoy intra-measurement evaluation. Planning is underway for an extensive testing of the NOAA/NDBC SCOOP buoy system as part of a collaborative effort between the USACE and NOAA/NDBC to be conducted in 2017.

## ANNEX VII

### Satcom Forum Report

Satcom2016 was the first formal session of the WMO-IOC International Forum of Users of Satellite Data Telecommunication Systems (Satcom) following its establishment under Resolution 31 of the Seventeenth Session of the World Meteorological Congress (Res.31, Cg-17) in 2015. Participation was by voluntary self-registration and by invitation through WMO and IOC processes.

The meeting was held at IFEMA – Feria de Madrid, in Spain as a side event of the Meteorological Technology World Expo 2016 (Meteo Expo), 27-29 September 2016 hosted by Spain. Meteo Expo also included CIMO TECO 2016 and the "Metrology for Meteorology and Climate, 2nd conference" (MMC-2016).

Satcom2016 was also supported by the Association of Hydro-Meteorological Equipment Industry (HMEI) and UKIP Media Events. The meeting was chaired by Dr Michael Prior-Jones (UK) and co-chaired by Mr Johan Stander (South Africa). Secretariat support was provided by WMO.

Satcom is trying to help scientific users bring the right data, in the right format, to the right people, at the right time, for the right price. It's a big challenge, but the forum has a lot of willing people who are keen to make it happen, and a lot of good connections into the industry, which is hoped to strengthen as the Forum begins its work in earnest.

The work plan included an information sharing stage, that included two sessions each of "satellite communications service providers", "equipment manufacturers" and "users". It also had three formal stages, one being the opening, one the elections of the Satcom executive committee (annex 2) and the other being review the working arrangements and deliverables based on discussions from this meeting and from the report on the first Ad hoc International Forum of Users of Satellite Data Telecommunication Systems (Paris, France, 03-04 October 2013), and setting up a prioritized work plan. The forum considered eight submissions from Satcom network providers, three from equipment manufacturers and three from users.

The meeting had two sessions on Satcom Network Providers. Eight presentations were considered and summary can be provided if requested. There were several discussions, mostly involving clarifications. The meeting noted the success of satcom operators in fulfilling WMO requirements for making information available through the WMO information system, in particular the World Weather Watch Global Telecommunications Network (GTS). This included the incentive of Eumetsat by providing the services for free to non Eumetsat members if platform owners agree to make their data available in WIS. It further noted that Argos and Iridium, as stated by JouBeh, have provided data successfully to the GTS for many years. Some issues that would need following up, included the following:

- The meeting noted that the operators had different ways of managing stations that ceased to transmit or stations that drifted off frequency or time.
- It noted that de-allocating slots was difficult for some operators even when stations have been silent for a long period.
- It agreed that utilizing time from GPS component helped avoid time drift.
- The meeting agreed that Satcom should look further into these issues and
- address the need for guidance on how to handle silent, obsolete or other problematic stations.

The importance of radio frequency allocation and management to data collection systems was highlighted. It was emphasized that spectrum management was a long process managed by ITU with much of the necessary coordination taking place in the mission planning stage.

Participants raised the question of whether Satcom should interact with frequency allocation bodies either directly or through established groups such as the WMO Steering Group on Radio Frequency Coordination (SG-RFC), the CGMS or the Space Frequency Coordination Group (SFCG) and if so how? and investigate if Satcom should concern itself with spectrum management issues and if so what would this involve and how should Satcom go about this?

The meeting held two sessions on equipment manufacturers. Three presentations from industry were considered and summaries available if required. The very fitting presentations included: How the satcom networks can best serve scientific equipment manufacturers; Telemetry meets Water: Reliable Data for Measuring and Monitoring Tasks in Early Warning Systems (Surface Water, Groundwater, Water Quality); and Satellite M2M communication service.

The manufacturers' presentations and use cases had provided a useful insight into the range of services used by a wide range of application areas. The meeting noted the manufactures recommendations on the future requirements for satcom systems and the lessons learned which fully aligned with discussions in the user sessions. It was agreed that one of the actions of Satcom should be to work with industry and users to put together some use cases that demonstrate the needs of users and the likely scale or uptake of services as well as involve manufactures in the development of use cases demonstrating the user requirements and potential uptake.

The meeting noted the significant relevance of involving the Commission for Hydrology and the Commission for Agricultural Meteorology in the Satcom forum in addition to JCOMM. It noted the common requirements for low data volumes and suitable packages that would facilitate the implementation of early warning systems.

The meeting had two sessions on Satcom users. Both sessions were chaired by Mr Johan Stander (South Africa), vice-chair of Satcom, Co-President of JCOMM and representative of EC-PORS. The session included a statement from the Assistant Secretary General of WMO, Dr Wenjian Zhang while the following presentations were fitting and seeks further investigation. "The challenges of accessing Antarctic meteorological data in near real-time, Development of the Global Cryosphere Watch (GCW) Support to now-casting and real time reporting".

Mr Stander noted that, as indicated by the equipment manufacturers, many countries cannot cope with the pricing models for satcom services. He emphasized that this would be worse for least developed countries, small island developing states and small land locked countries and that supporting such countries should be a priority for Satcom and therefore Satcom should pay special attention to LDCs, SIDS, etc. with an aim to facilitating their use of satcom systems.

The meeting noted that observing systems deployment and operation is driven by the needs of the services and research activities that use them. It agreed that, there is a real need to identify telecommunications necessary to meet observation system requirements with an aim to fully develop flexible pricing models that better match the users' needs. Satcom services should also take into consideration other user requirements identified by equipment manufacturers and users. These included the different needs for: simplex and duplex communications, short burst and low volume data requirements, latency metrics, automatic and delayed activation of systems (including on demand or random activation for alerting systems). It also noted that some needs could be addressed by the equipment and terminal manufacturers such as robustness for operating in extreme environments, ability for basic I/O

and programming of terminals and use of off the shelf solutions that can be applied across networks.

Satcom should work with satcom providers with an aim to introducing more flexible and focused access plans enabling greater use of satcom systems to facilitate new services.

The meeting decided that for suppliers to be able to address the above, Satcom should take the lead in identifying use cases that show the range of needs and applications as an initial priority. This should involve two components. First a survey of WMO and IOC members and building on the information call for case studies.

Conduct a market survey. The chair will coordinate with the vice-chair, WMO and IOC secretariats to prepare the survey, circulate this to the Satcom executive council for review and then distribute through WMO and IOC channels. For WMO, this will be the WIS Focal Points.

The meeting noted a common need among manufacturers' users and the users participating in Satcom2016 and recognized the importance of early warning systems as a part of the climate adaptation strategies being put in place. It noted that Eumetsat has a special channel to support such activity and that Inmarsat has within its terms of reference (annex 3) a role in supporting emergencies at sea. It agreed that all satcom providers should be made aware of this societal need and to seek their support in establishing a special package under the WMO disaster risk reduction programme.

Explore the possibility of establishing a "WMO branded disaster alerting tariff" considering hydrological community (flood warnings) as a test case and find candidate projects. Establish contacts with networks at senior level (use WMO brand) and try and build a consensus.

The meeting noted that many of the identified needs of users were available from some providers but the users were not aware of these services or simply did not know how to go about accessing them. This was typified by the slow uptake of Eumetsat's high data rate services and by the availability of special channels for alerting systems. The meeting agreed that the chair should update the Satcom Buyers Guide as it would be very beneficial. It noted that the Guide could be published as a formal WMO numbered publication and could be accompanied by a web page containing more dynamic and recent information.

The meeting unanimously elected Dr Michael Prior-Jones (UK) as the Chair of Satcom and Mr Johan Stander (South Africa) as the vice-chair.

The chair presented the list of candidates, noting that with the retirement of Mr Tom Gross from IOC of UNESCO, that he was unable to fill the IOC secretariat position at this time. The meeting reviewed the list of candidates, including three positions proposed by the chair (B. Hodge representing Australia, S. Burns representing CGMS and D. Meldrum representing the wider user community).

The meeting noted the close link between the work of the Joint Tariff Agreement (JTA) and the goals of Satcom and the importance of representation of the JTA on Satcom.

The Satcom Forum adopted the following recommendations:

- (i) Involve manufactures in the development of use cases demonstrating the user requirements and potential uptake.
- (ii) Satcom should pay special attention to LDCs, SIDS, etc. with an aim to facilitating their use of satcom systems.
- (iii) The meeting unanimously elected Dr Michael Prior-Jones (UK) as the Chair of Satcom and Mr Johan Stander (South Africa) as the vice-chair.



- (iv) The meeting agreed to having JTA as a sub-programme of Satcom and a representative on the executive committee (annex 2)
- (v) The meeting agreed to the membership of the Satcom Executive Committee as per Annex 2 noting that IOC secretariat will provide someone for the ICO secretariat position later.
- (vi) Update the Terms of Reference of the Satcom Executive Committee and Membership as proposed in Annex 3.
- (vii) Current membership of Satcom will be those who registered for Satcom2016. Future registrations can be online or via normal WMO/IOC notification processes.

The Satcom Forum decided on the following action items:

- Action1 Address the need for guidance on how to handle silent, obsolete or other problematic stations.
- Action2 Investigate if Satcom should concern itself with spectrum management issues and if so what would this involve and how should Satcom go about this?
- Action3 Operators to provide a brief statement on future plans, bandwidth and capacity to the Chair of Satcom.
- Action4 Monitor the potential pros and cons of utilising small satellites as a part of future solutions and service systems.
- Action5 Prof. Byong-Lyol Lee (President CAgM) to brief CAgM management group on Satcom and their potential participation
- Action6 Mr Johan Stander (Co-president JCOMM) to brief president of CHy on Satcom and their potential participation.
- Action7 Satcom should work with satcom providers with an aim to introducing more flexible and focused access plans enabling greater use of satcom systems to facilitate new services.
- Action8 Conduct a market survey. The chair will coordinate with the vice-chair, WMO and IOC secretariats and Mr Simon Van Dries to prepare the survey, circulate this to the Satcom executive council for review and then distribute through WMO and IOC channels. For WMO, this will be the WIS Focal Points. Mr Stander will liaise with IOC.
- Action9 Identify case studies on satcom requirements, draw up call for case studies and example template and send out via official channels and via personal contacts
- Action10 Explore the possibility of establishing a "WMO branded disaster alerting tariff" considering hydrological community (flood warnings) as a test case and find candidate projects. Establish contacts with networks at senior level (use WMO brand) and try and build a consensus.
- Action11 The chair to review and update the Satcom Buyers Guide. Satcom will investigate web hosting options (WMO to host, IOC to link or mirror)
- Action12 Mr Johan Stander will liaise with JTA inviting them to formally confirm participation in Satcom as a sub-programme
- Action13 Investigation of a mechanism to allow random activation
- Action14 Look into training and outreach, starting with a standard set of slides and help desk contact.

## ANNEX VIII

### Iridium operations and developments

Under this agenda item, Prof D Meldrum reviewed the current status and future plans for the Iridium 2-way satellite communications system, which was now well established within most parts of the data buoy and environmental observation community for reasons of continuous availability, data throughput and timeliness, ease of implementation, energy efficiency, future availability and cost.

The current Block-I 66-satellite constellation, now nearly 20 years old, was said by Iridium to be healthy but a wide body of anecdotal evidence existed to suggest that the system was under increasing age-related stress. Overall, the constellation was in a slightly healthier state than had been predicted some years ago, and was expected (as a result of a number of independent studies) to remain operational beyond the commencement of the rollout of the replacement constellation in 2017. In financial terms, revenue continued to grow, and data services, such as Short Burst Data (SBD) service used by buoy operators, were enjoying a huge increase in traffic compared with some years ago.

The replenishment constellation, called Iridium NEXT, was fully funded and built by prime contractors Thales. The rollout schedule, involving launching 10 satellites at a time on board the new Falcon-9 vehicle, had been indefinitely delayed again following the Falcon-9 explosion on 1 September, and the first deployment of two satellites might now be completed using a Russian launcher. The new constellation 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. A new company, AIREON, had earmarked some of this payload space to develop a truly global aviation monitoring and control service. A number of satellites would also carry an AIS package for ship tracking.

Iridium was also engaged with many partners in the development of new products and services, including higher-bandwidth services that would allow it to challenge the supremacy of Inmarsat in the shipping sector. Of particular interest to the environmental observation community were new and smaller modems, such as the 9603N. There were also indications that the geolocation algorithm and call set-up delays could be improved if commercially viable. In due course, these enhancements, if delivered, would be exploited by many observational communities, including animal trackers.

Nonetheless, Prof Meldrum reported that the 2-way architecture of Iridium of necessity dictated that the platform engages in a dialogue, lasting several seconds, with the constellation as a preamble to data transfer. This could adversely affect communication success in situations of signal disruption, as might be encountered in rough seas and by marine mammals. In such situations, 1-way systems such as Argos-2 and Argos-3 in 'pseudo-ack' and 'random' mode might be preferable.

Prof Meldrum also reported 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 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. The Panel was concerned that the existence of multiple data processing centres could potentially affect data integrity and uniformity, particularly for climate applications, and restricted the TC's ability to monitor all parts of the data chain. Nor was this user community currently in any position to exert influence over future Iridium pricing policy: a situation that diverged from the current Argos JTA arrangements.

More recently, the US DISA had offered Iridium services through the US DoD gateway to US government agencies. These very inexpensive services were now available to US users through a provisioning arrangement at NOAA-PMEL. It remained to be seen how efficient and financially sustainable this arrangement might be, but it had already stimulated a marked increase in the migration rate of the US buoy community to Iridium. Prof Meldrum reported that the DISA services might also be available to Australia, Canada, New Zealand and the UK through existing collateral arrangements.

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## ANNEX IX

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

The Panel commended JCOMMOPS for the firm establishment of the office in Brest, an ocean worldwide pole, with closer connection to research and operational European communities. The Panel thanked the continuous support provided by Collecte Localisation Satellites (CLS) and Ifremer to the infrastructure.

In particular CLS is now providing by contract (80 k€/ year) a complete support for I.T. requirements (office, and operational), and Ifremer (Centre Bretagne) is providing office space and general means in Brest for the staff, at no cost for the office. M. Belbeoch recalled that it was agreed within JCOMM OCG to share this cost equally amongst networks.

The Panel noted that JCOMMOPS, has achieved many important results for the benefit of the ocean observing networks, during the last year, thanks to the work of a consolidated and dedicated Team, including:

- Implementation of a new information system with links to metadata sources operationalized
- Development of an ambitious website for each network and for an integrated perspective (see appendix A)
- Operationalization of core services such as monthly maps production
- Development of harmonized Key Performance Indicators
- Improved internal organization and efficiency through regular team meetings and workplan tracking

In particular, the Panel noted with appreciation the new monitoring tools made available for the DBCP perspective.

The Panel noted that the extra funding provided by the 3 Brittany local authorities allowed JCOMMOPS to:

- i) finalize the new website through an external audit performed by ALTRAN Company and fund the work of the IT subcontractor in Toulouse, and
- ii) recruit Emanuela Rusciano (PhD Physical Oceanography) as "Coordinator, Science and Communication". (see Appendix B for the spending plan for Brittany support approved by JCOMM OCG).

The Science and Communication Coordinator was internally trained on JCOMMOPS environment and tools; the Team worked with TC to enhance productivity to panels with a physical oceanographer eye. Mathieu Belbéoch commended E. Rusciano for the work done during the last 12 months that were extremely successful showing clear benefits for the:

- JCOMMOPS Internal organization
- JCOMMOPS production (e.g. monthly maps and reports)
- Administration (IOC/WMO/CLS)

- Education, Bibliography, Brochures, meeting reports
- Communication (local, COP21, articles promoting the networks, writable poster sent to 200 contact points in the world, etc.)

The Panel thanked the JCOMMOPS Team for having assembled the JCOMMOPS writable poster, providing an up-to-date and consolidated view on the global ocean observing systems. The panel found it useful to promote these networks and to sketch some implementation plans.

Mathieu Belbéoch recalled that JCOMM OCG tasked JCOMMOPS to establish on the medium run (about 2017) a new position for regional and coastal observing systems (mainly gliders, GLOSS, marine mammals, and various platforms). The recent discussions within WIGOS regional initiatives encouraged JCOMMOPS to monitor more coastal platforms, including e.g. HF radars.

Panel noted as well that JCOMMOPS was consulted to provide support to the development of a PCO2 surface observing network.

Following up on D. Meldrum suggestion, JCOMMOPS is assembling the historical metadata required to monitor the drifter contribution to SST observations.

The Panel noted that JCOMMOPS will be funded by AtlantOS and MedOS to adapt some of the tools and services to these regional perspectives. It recognized that these European efforts to structure and rationalize the obs./ system implementation will benefit as well for the global perspective.

The Panel noted the work plan set up for the JCOMMOPS staff for 2015-2017 and was invited to provide further inputs and guidance (see DBCP-32 Doc. 12.1 Appendix C), in particular through the regular OCG roundtables.

The Panel noted that since September 2015 JCOMMOPS was doing weekly meetings and providing reports and tracking of key actions items (from all sources) on line (see see DBCP-32 Doc. 12.1 Appendix D).

The Panel noted the summary on staff time per programme provided by JCOMMOPS (see DBCP-32 Doc. 12.1 appendix E) and in particular the value added of the synergetic nature of the office, providing 1.5 FTE for DBCP, 0.7 FTE for SOT and 0.7 FTE for OceanSITES.

M. Belbéoch noted that the development of dedicated web based services for mooring metadata management (proposed at last session) could not be funded by the Panel and proposed to anyway address this important requirement during next inter-sessional period.

He recalled at the same time that the transition of SOT metadata management from ESURFMAR to JCOMMOPS database (suggested and encouraged by ESURFMAR) was under discussions and we will be addressed as well.

Secretariats reported on JCOMMOPS budget (see Appendix F), and Panel thanked the working group for this important step forward in the clarification of the complex JCOMMOPS budget and encouraged the team to continue the effort with 2015 analysis, and 2016 anticipated budget.

M. Belbéoch thanked C. Gallage for her excellent work within JCOMMOPS. He was sorry to see her leave the office and congratulated her for the new appointment at the WMO. He mentioned however to the Panel that when JCOMMOPS had finally solid foundations with a full, productive

and qualified staff to address its mandate, it must again invest significant time and effort in welcoming a new DBCP/OceanSITES TC. Even if the JCOMMOPS team and system are strong enough today to absorb this turnover and keep going forward minimizing the gap for the Panel, it will impact the team efficiency.

Thus M. Belbéoch stressed the Panel and secretariats to minimize this gap as far as possible and start the new recruitment procedure quickly.

To strengthen further the teamwork between Technical Coordinators and the synergies between networks, he suggested thinking about clarifying some DBCP TC position duties for JCOMMOPS as a whole, beyond DBCP and OceanSITES specific duties.

M. Belbéoch suggested to the Panel members to reserve a small proportion (3%) of their buoys to develop cooperation (beyond bilateral agreements), as a number of countries have applied for donor programmes. On its hand, JCOMMOPS is seeking actively sponsoring to fund instruments, a key to start up such programmes. With a few units available each year, JCOMMOS could achieve a lot for developing cooperation and outreach, while keeping in touch with operations

Belbéoch recalled that JCOMMOPS Cruise management tools are now operational. Ship operators, schedulers, PIs and others can submit and update cruise information to JCOMMOPS very easily. If wished (in particular for security reasons), these data are shared with other parties only to a certain limit / degraded character. Such data can be submitted manually, or machine-to-machine (successfully tested with e.g. UNOLS).

JCOMMOPS helped setting up deployments in difficult ocean regions, such as off Somalia, where operations have reached an operational status with now bi-weekly opportunities. The sailing community contributed again in the Southern Ocean between New Zealand and Cape Horn, and new partnership agreements for sustained operations have either been signed in the meantime (IMOCA, at COP21) or are underway (Volvo Ocean Race).

Following a JCOMM OCG recommendation, JCOMMOPS recently launched a community survey aiming to estimate the need for volunteer ships in the future, in terms of numbers, region and ship type. Based on this survey, a meeting with IOC, WMO, IMO and community members from all observing panels will take place at the end of the next SOT session. The aim is organizing a ship owner forum hosted by IMO later in 2017 or 2018, focusing on integrated operations with volunteer ships at company level, under a joint umbrella and name.

Regarding deployment missions with chartered ships, JCOMMOPS prepared a proposal with RV Lady Amber for the SPURS2 project. Eventually Lady Amber was chartered for the project, but through a different agreement. The proposal however is a god framework for likewise operations, which JCOMMOPS can organize as suggested before.

M. Belbéoch concluded that JCOMMOPS had some exciting challenges for the next inter-sessional period:

- release officially the JCOMMOPS integrated website (currently under review)
- develop integrated monitoring tools and KPIs (EOVs oriented)
- add editorial content on the website(s) (core informational documents and links)

- develop and release an API to share further website content through machine to machine interoperable mechanisms
- Improve DBCP historical metadata database
- improve metadata management and monitoring tools for a number of networks (e.g. GO-SHIP/SOOP cruises, moorings, ships)
- further develop targets and KPIs for some network and for the integrated perspective
- prepare a transition plan to sustain its staff (in particular the Science & Communication Coordinator) when Britany budget will end.
- welcome and train a new DBCP/OceanSITES TC, with the hope to stabilize the position for more than 2 years.
- Start to monitor a number of coastal / regional stations
- Develop further international cooperation through donor programmes

And

- Continue to address Panel members and OCG community requests through a reactive team.

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**ANNEX X**

**ACTION LIST / WORKPLAN**

**DBCP WORKPLAN FOR THE NEXT INTERSESSIONAL PERIOD (2016-17)**

*(Ongoing actions as well as Recommendations from this and past Panel Sessions are now included in the Operating Principles)*

<b>No.</b>	<b>Ref. item</b>	<b>Action item</b>	<b>By</b>	<b>Deadline</b>	<b>Update</b>
	<b>DBCP-32:</b>				
1	5	Populate new JCOMMOPS database with historical data and metadata	JCOMMOPS	DBCP-33	
2	5	DBCP members should continue to look for deployment opportunities in SOBP region	DBCP members	On-going	
3	5	TAO network, Tsunameter network, Arctic buoy network and Antarctic buoy network communities to review and provide feedback on performance indicator	Network leads	On-going	
4	5	JCOMMOPS to integrate moored buoy metadata into the JCOMMOPS database	JCOMMOPS	DBCP-33	
5	5	Buoy Operators to provide deployment and platform metadata information to DBCP	Buoy operators	On-going	
6	5	DBCP members should upload deployment information to the new website in timely manner	DBCP members, TC	On-going	
7	5	DBCP members to submit publications information in the format identified on the DBCP website under Bibliography.	DBCP members, TC	On-going	



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<b>No.</b>	<b>Ref. item</b>	<b>Action item</b>	<b>By</b>	<b>Deadline</b>	<b>Update</b>
8	6	IPAB members from SA, Australia, NZ, USA and Brazil should have regular webex and the principles meet during the DBCP sessions	Boris Kelly-Gerreyn, Petra Heil, Pablo Clemente-Colon, Ignatius Rigor	DBCP-33	
9	8.1	Consider the proposal to establish a Task Team on Wave Measurement (TT-WM) as a focal point within DBCP for in situ wave measurement discussion, with a Terms of Reference and Year 1 Work Plan to be developed, as shown in Appendices 1 and 2	DBCP Executive Board, PP-WET co-chairs, Secretariat	November, 2016	
10	8.1	Assess interest and feasibility of convening a DBCP workshop on in situ wave measurement issues, including review of user requirements, measurement evaluation, best practices and emerging technologies, and develop a workshop proposal for consideration	Chair of TT-WM (if approved), Chair DBCP, Secretariat	December 2016	
11	8.2.1	The TT-MB USV group to investigate the interest and feasibility of establishing a Pilot Project for USV, and report to next DBCP-33.	TT-MB USV	DBCP-33	
12	8.2.2	Reinstate PP-HRSST, without budget. Prof. Meldrum to act as interim chair, revise ToRs, draft workplan and suggest PP-HRSST membership.	D. Meldrum	DBCP Exec Board	
13	9.2	To continue to deploy Iridium drifting buoys in areas where delays are greater than 120 minutes	DBCP members	On-going	

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<b>No.</b>	<b>Ref. item</b>	<b>Action item</b>	<b>By</b>	<b>Deadline</b>	<b>Update</b>
14	9.2	DBCP continue to perform regular (every 6 months) assessments with CLS of the global data buoy timeliness by comparing JCOMMOPS delay maps with Argos Data Mean Disposal Time Maps	CLS and TC DBCP	On-going /Semestrial)	
15	9.2	To investigate timeliness of the moored array and determine the best way to represent these in the reports	TC DBCP	DBCP-33	
16	9.3	DBCP to encourage representatives from WMO Data Management Group and Observation Coordination Group look at the problem of, better map and recommend how to address the MCDS by the next Management Group meeting in May 2017.	DBCP EB	May 2017	
17	9.5	Drifter buoy operators to upload new deployment information and drifter buoy metadata using new JCOMMOPS website tools.	Panel members	On-going	
18	9.5	Provide moored buoy metadata in CSV format following DBCP approved template to TC.	Panel members	Asap	
19	9.5	JCOMMOPS to develop tools to view and upload moored buoy metadata in new JCOMMOPS website.	JCOMMOPS	Asap	
20	10.1	DBCP Members to submit any relevant news items to the DBCP TC	Panel members	On-going	
21	10.1	DBCP Members to provide feedback on new JCOMMOPS web application for any issues to the DBCP TC	Panel members	On-going	

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<b>No.</b>	<b>Ref. item</b>	<b>Action item</b>	<b>By</b>	<b>Deadline</b>	<b>Update</b>
22	10.1	DBCP Members to enter new deployment information to the JCOMMOPS database through new JCOMMOPS web application	Panel members	On-going	
23	10.1	Add a new section to the DBCP Country report template to collect DBCP related publication information.	Secretariat	Dec. 31 2016	
24	10.1	There is a need to update the AI Wallace retrospective regularly by the EB.	EB	Regularly	
25	10.2	DBCP WG on Vandalism to submit draft action plan in outline form for presentation to WMO-EC in May 2017, noting that documentation is due in Feb. 2017. Full action plan to be presented to JCOMM V.	WG on Vandalism	Feb. 2017	
26	11.1	DBCP to participate in Satcom Forums and report to DBCP on future Satcom forums.	Panel members, DBCP EB	future Satcom Forums	
27	12.1	Panel members are requested to engage with the chair of OCG and make themselves available for these positions. Ensuring that we adhere to the JCOMM Man succession plan, we strongly recommend that members be sensitive with respect to regional representation as well as gender balance.	Panel members	DBCP-33	
28	12.1	It is recommended that this Panel present some of its work at the JCOMM-V S&T workshop.	Panel members	JCOMM-V	

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<b>No.</b>	<b>Ref. item</b>	<b>Action item</b>	<b>By</b>	<b>Deadline</b>	<b>Update</b>
29	12.1	The Panel requested its members to promote the execution of the WMO-EC decisions (As presented by WMO and IOC secretariats) and promote such activities at the national level	Panel members	DBCP-33	
30	12.1	Panel members are requested to seriously consider possible joint project with WMO CAS on GHG measurement techniques and consider nominating experts.	Panel members	DBCP-33	
31	12.2	Plan representation of the DBCP and IPAB, to explore deployment opportunities offered by the IIOE-2 at IIOE-2 meeting Jan. 2017 Perth	Boris Kelly-Gerreyn, Shaun Dolk	Jan 2017 IIOE-2 Perth	
32	12.2	Australia would like to offer aid in the form of example to member states developing a WIGOS implementation plan. Provide a presentation concerning WIGOS implementation plans.	Australia	DBCP-33	
33	13.1	The EB invites the panel to discuss, through correspondence, innovations for the meeting in anticipation of adaptations for the next session	panel and EB	Dec. 31 2017	
34	13.1	EB to compose language for the OP concerning appointments of Chair and vice-Chairs.	EB	DBCP-33	
35	13.2	EB to investigate the inclusion of in-kind contributions as part of National Reports templates and make appropriate recommendations before the next session.	EB	DBCP-33	

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No.	Ref. item	Action item	By	Deadline	Update
36	13.3	Panel to review the draft DBCP Implementation Strategy (available from the web <sup>1</sup> ) and to forward any comments to the Chairperson.	Panel Members	Dec. 31, 2016	
37	13.3	The Executive Board to propose how the implementation strategy could be reviewed by selected Panel members	DBCP EB	ASAP	
38	13.4	<p>Secretariat to implement these suggestions for the Operating Principles:</p> <ul style="list-style-type: none"> <li>• Cease to include OP in meeting reports</li> <li>• Publish standalone document on web, under a simple title, with permanent URL. (<a href="http://jcomm.info/DBCP-OP">http://jcomm.info/DBCP-OP</a> , <a href="http://jcomm.info/DBCP-IS">http://jcomm.info/DBCP-IS</a> )</li> <li>• Remove OP appendices TORs of the various Task Teams, Lists of key personnel.</li> <li>• Publish latest TORs of Task Teams, and Lists of key personnel separately. (Previous versions could be retained on-line.)</li> <li>• Remove appendix of on-going actions and recommendations, as these are detailed actions, and not principles.</li> <li>• Publish new separate document for the purpose of maintaining the on-going actions. Consider using Google Docs for continuous editing of status of actions. To be maintained by Secretariat.</li> </ul>	Secretariat	DBCP-33	

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[1 DBCP-32 Doc. 13.3 Draft Implementation Strategy](#)

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<b>No.</b>	<b>Ref. item</b>	<b>Action item</b>	<b>By</b>	<b>Deadline</b>	<b>Update</b>
39	13.4	Panel to review the draft DBCP Operating Principles (available from the web ) and to forward any comments to the Chairperson.	Panel Members	Dec. 31, 2016	
40	13.5	DBCP requested that EB review current actions and streamline appropriately.	EB	DBCP-33	
41	14	DBCP members who had not submitted National Reports to submit their input to the Secretariat before the end of the year.	Panel Members	Dec. 31, 2016	
42	14	To publish National Reports with the Panel's Annual Report.	Secretariat	Early-2017	

## ANNEX XI

### OPERATING PRINCIPLES OF THE DATA BUOY CO-OPERATION PANEL (DBCP)

(as adopted by DBCP-32)

(<http://www.jcomm.info/DBCP-OP> )

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#### 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 the operational and research communities.
- 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 II](#).

#### 2. PANEL MEMBERS AND PARTICIPANTS

- 2.1 The Terms of Reference for the DBCP are approved by the WMO and IOC Executive Bodies through proposition by JCOMM; the Panel reports 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.
- 2.3 A number of ongoing tasks and activities have been identified by the Panel for its members to undertake. They should:
1. 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);
  2. take the recommendations from the IOC XXVII Assembly and the WMO 16th Congress and WMO EC-65 into account when developing their activities in support of the Panel;
  3. address user requirements and particular observing systems deficiencies as expressed in the JCOMM Statement of Guidance for Ocean Applications;
  4. review the DBCP Implementation Strategy document at <http://www.jcomm.info/DBCP-IS> and to forward any comments to the Chairperson by the end of November each year;
  5. continue their voluntary budgetary contributions to the Trust Fund in a timely manner;
  6. comply with the WMO Quality Management Framework (QMF) and quality management principles;
  7. make use of the barometer drifter upgrade scheme (see <http://www.jcommops.org/dbcp/platforms/barometer.html>) by purchasing barometers for GDP-funded SVP drifters and negotiating their deployment positions with AOML;
  8. provide GDP/AOML with manufacture dates for all drifting buoys built within the last 5 years, as well as with barometer/SLP data;
  9. provide instrument/platform metadata regarding the buoys they deploy to JCOMMOPS, using the recommended mechanisms (paying particular attention to SST and SSS data); to comply with buoy metadata collection scheme;
  10. notify all new drifter and moored buoy deployments to DBCP TC and eventually via a notification webpage on the new JCOMMOPS web;
  11. 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 annual planning, ship schedules, national plans, national contact points etc. Panel members also subscribe on the list and systematically post their deployment opportunities on the [ships@jcommops.org](mailto:ships@jcommops.org) mailing list as well;
  12. provide info/materials for DBCP/JCOMMOPS websites (news, brochure);
  13. maintain systems for record keeping for instrument calibration, replacement and validation that conform to ISO recommended specifications;
  14. review best practices prior to drifter purchase for safety, and GTS data processing purposes;



15. follow the best practices and standards eventually proposed under WIGOS, and in particular, to provide the buoy platform/instrument metadata to JCOMMOPS;
  16. use the WMO-IOC Regional Marine Instrument Centres (RMIC) facilities as appropriate, and participate at future workshops;
  17. encourage other centres to act as Principal Meteorological and Oceanographic Centre Responsible for Quality Control of Buoy Data (PMOC) and existing centres to invest more resources in the implementation of DBCP Quality Control (QC) guidelines;
  18. contribute to feeding the JCOMM database extreme wave events when such events are observed by data buoys and are recorded by Panel Members.
- 2.4 Similarly, the buoy and equipment manufacturers have been invited to participate on an ongoing basis to DBCP activities as following:
1. to collaborate with buoy operators and JCOMMOPS
  2. investigate participating in the Association of Hydro-Meteorological Equipment Industry (HMEI - <http://www.hydrometeoindustry.org/>) as a way to be represented at JCOMM meetings;
  3. enhance buoy safety through improved design and keep the Panel informed about related changes.

Specifically, the drifter manufacturers will:

4. submit through JCOMMOPS their instrument/platform metadata, including description of drifter models, using the recommended mechanisms (paying particular attention to SST and SSS data); to comply with the drifting buoy metadata collection scheme;
5. provide Service Argos with list of most used drifting buoy models and for drifters that transmit through Argos the formats they operate.

### **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 chairs 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 III](#) 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 4 of this document, and the Terms of Reference of the Technical Co-ordinator are given in [Appendix IV](#).

- 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 Within one month of the conclusion of the annual session, the Chair reviews the, programme, prioritises tasks, establishes working priorities and discusses execution details with the technical coordinator as agreed at the previous Session.
- 3.8 The Technical Coordinator shall then undertake the tasks as proposed by the Chair and, report at the next Panel Session.
- 3.9 The Chair will also finalise updates to the DBCP Implementation Strategy including reference to the Capacity Building efforts being undertaken by the Panel after seeking feedback from Panel members.
- 3.10 The Technical Coordinator will maintain close links with the Ship Observations Team (SOT) Coordinator so that support on deployment opportunities can be obtained from the Ship of Opportunity Programme (SOOP) Implementation Panel (SOOPIP) and the Voluntary Observing Ship (VOS) Panel (VOSP) of the SOT.
- 3.11 The Secretariat is maintaining a list of national contact points for the DBCP and within other relevant bodies with potential for involvement in DBCP activities.
- 3.12 The current membership and contact details for the DBCP Executive are listed at [http://www.jcomm.info/index.php?option=com\\_oe&task=viewGroupRecord&groupID=146](http://www.jcomm.info/index.php?option=com_oe&task=viewGroupRecord&groupID=146).

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

- 4.1 The following routine tasks of the Technical Co-ordinator (TC) comply with his/her Terms of Reference ([Appendix IV](#)).
- 4.2 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.
- 4.3 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 lifetimes. 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).

- 4.4 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 identifies sources of buoy data not currently reported on the GTS and determines the reason for non-availability, (particularly for the Arctic Buoys IABP). The TC regularly contacts buoy programme managers of existing and new programmes in order to: (i) promote data exchange and GTS distribution of the data in real-time, (ii) invite them, and possibly convince them, if useful, to authorise GTS distribution of their buoy data; (iii) offer technical assistance for that purpose if needed; (iv) collect information on buoy programmes, and the deployed buoys, including metadata; and (v) 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.
- 4.5 The Technical Co-ordinator provides information and assists as appropriate buoy data users for accessing data and platform/instrument metadata.
- 4.6 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.).
- 4.7 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.
- 4.8 Upon request, the Technical Co-ordinators also provides the WMO and IOC Secretariats with status maps, statistical information and graphs, and documentation.
- 4.9 The Technical Co-ordinator maintains the DBCP list of buoy manufacturers and provides it on the DBCP website.
- 4.10 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.
- 4.11 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.
- 4.12 The Technical Co-ordinator undertakes the tasks as proposed by the Chair during the intersessional period as a matter of priority as prioritised and reports at the next Panel Session.
- 4.13 The Technical Co-ordinator supports, as required, existing DBCP action groups, and

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

provides assistance on request to other internationally coordinated buoy programme developments.

- 4.14 The Technical Co-ordinator coordinates with the Indian Ocean Panel (IOP) implementing strategy for the Indian Ocean Observing System as far as data buoys are concerned.
- 4.15 The Technical Co-ordinator produces on a yearly basis prior to Panel Session, a table of national commitments in the Southern Ocean, and seeks additional commitments for barometer upgrades, and deployment opportunities in the Southern Ocean to achieve a level of 300 buoys south of 40S.
- 4.16 The Technical Co-ordinator maintains a catalogue of existing ongoing ocean data buoy programmes, and provides information to Panel members or on its website, about where inventories of buoys are held, to aid in deployment planning.
- 4.17 The Technical Co-ordinator implements the JCOMMOPS work-plan – particularly with respect to Deployment opportunities.
- 4.18 The Technical Co-ordinator maintains a summary of requirements for buoy data to meet expressed needs of the international meteorological and oceanographic communities.
- 4.19 The Technical Co-ordinator coordinates the operations of DBCP Quality Control guidelines.
- 4.20 The Technical Co-ordinator to collect statistics and information on actual vandalism occurrences, and maintain relevant information on the DBCP website.

## 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 V](#).

## 6. TASK TEAMS

- 6.1 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 Chairs and Co-Chairs of the Task Teams should not be in a situation of conflict of interest. The list of current Task Team, their Terms of Reference and Membership are given at <http://www.jcommops.org/dbcp/overview/taskteams.html>.
- 6.2 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. The present list of Pilot Projects and background information is given at <http://www.jcommops.org/dbcp/overview/pilots.html>.

## 7. IMPLEMENTATION STRATEGY

- 7.1 The Panel defines its Implementation Strategy ([http://www.jcommops.org/doc/DBCP/DBCP\\_Impl\\_Strategy.pdf](http://www.jcommops.org/doc/DBCP/DBCP_Impl_Strategy.pdf)) and reviews 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.

## **8. WORKPLAN**

- 8.1 The Panel establishes and reviews the overall Workplan for itself and the Technical Co-ordinator at its regular sessions, for the following intersessional period.
- 8.2 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.

## **9. FUNDING**

- 9.1 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 contributions to secure employment and activities of the Technical Co-ordinator, through IOC and WMO.
- 9.2 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 VI](#). The Trust Fund at IOC follows the Financial Regulations of the IOC Special Account that are reproduced in [Appendix VII](#) (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.
- 9.3 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 VIII](#).
- 9.4 Through the present arrangement, the Technical Co-ordinator is recruited by IOC or WMO, and the employment, activities and logistical support of the Technical Co-ordinator depend on the dedicated Trust Funds in IOC and in WMO.
- 9.5 Timely contributions from Panel members are 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.
- 9.6 The arrangements for logistical support of the DBCP Technical Co-ordinator and JCOMMOPS will be formalized with an MoU between IOC, WMO and supporting partners in late 2015.
- 9.7 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.
- 9.8 The WMO Secretariat shall 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 pay all related expenses from the IOC.
- 9.9 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.

- 9.10 The joint Secretariats and the DBCP financial advisor will work together to prepare and distribute the final statement of the DBCP/SOT Trust Fund for the previous year to the Panel members as soon as the IOC and WMO Final Statement of Accounts for that year are finalized. On the basis of the IOC and WMO Final Statements and the advice of the DBCP Executive Board, the financial advisor will also prepare a revised budget estimate for the following 2 years. The IOC and WMO Final Statements and the final statement for the DBCP/SOT Trust Fund are then included in the DBCP Annual report.
- 9.11 The DBCP financial advisor will request IOC and WMO to provide an Interim Statement of Accounts over the period 1 January - 31 July for the preparation by the Secretariat and the Financial Advisor of an interim statement of the DBCP/SOT Trust Fund, to be presented to the DBCP members at the following DBCP Session.

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

- 10.1 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 a wider range of information exchange and cooperation.
- 10.2 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.
- 10.3 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.

## **11. INFORMATION EXCHANGE AND REPORTING**

- 11.1 The Technical Co-ordinator maintains a website on behalf of the Panel. The URL for the website is: <http://dbcp.jcommops.org/> .
- 11.2 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.
- 11.3 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.
- 11.4 The Panel members who represent DBCP at various events should use a standard Powerpoint presentation template. The template is developed and maintained by the Technical Co-ordinator, and available from the DBCP website.
- 11.5 The Technical Co-ordinator also maintains a document describing the Panel's

achievements since its establishment.

- 11.6 The Panel maintains series of DBCP Technical Publications that are issued by the WMO Secretariat. These publications can be in 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 (see <http://www.jcommops.org/dbcp/community/documents.html>). The actual costs of editing, publishing, and distributing the DBCP Publications are recovered from the DBCP Trust Fund.
- 11.7 At its regular sessions, the Panel receives annual reports on activities during the intersessional period, from:
- the Executive Board;
  - the Technical Co-ordinator;
  - the Action Groups,
  - the Pilot Projects, and
  - the Member Countries.
- 11.8 The annual reports by Action Groups and the Member Countries are also to be included in the DBCP Annual Report. Members who had not submitted written National Reports for the year YYYY at the regular Panel Sessions shall submit their input to the Secretariat before the end of the year YYYY. The Annual Report shall be provided by the Secretariat during the year following the year of the report.
- 11.9 The Panel's regular session report shall be provided by the Secretariat within 3 months after the last day of the session and 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.
  - b. A 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;
    - 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.

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

11.11 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.

11.12 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.

11.13 The National Focal Point shall annually check the DBCP list of National Focal Points for logistical facilities and report discrepancies, changes, or additions to the WMO Secretariat.

## **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.



## APPENDIX I

### Terms of Reference of the Data Buoy Co-operation Panel

*(as approved by the JCOMM Co-Presidents on behalf of the Commission, 24 July 2012, per Resolution 3 (JCOMM-4))*

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;

1. Co-ordinate activity on existing programmes so as to optimize the provision and timely receipt of good quality data and metadata 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, GCOS, GFCS, WIS, and WIGOS;
4. Encourage the initiation of national contributions to data buoy programmes from countries which do not make them;
5. Promote data exchange, including the insertion of all available and relevant platform data and metadata into the Global Telecommunication System, and the submission of data and metadata to the appropriate archives;
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

## **DBCP DATA POLICY**

*(as adopted at DBCP-25 and revised at DBCP-30)*

### **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>2</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. 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.

### **Data archiving**

3. Drifter data inserted on the GTS are routinely archived by Marine Climate Data System (MCDS) Global Data Assembly Centres (GDACs) (Canada, and France). The AOML Data Assembly Centre (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. . For moored buoy data there is no dedicated GDAC, as there is for drifter data. All drifter and moored buoy data should ultimately be incorporated into ICOADS (the International Comprehensive Ocean-Atmosphere Data Set) which is the primary dataset used for marine climate research.

### **Instrumental Metadata**

4. 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 for both drifting and moored buoys and is a contribution to the Marine Climate Data System (MCDS).

### **Quality control**

5. 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>3</sup>).

### **More information :**

- WMO data policy Resolution 40<sup>4</sup>
- IOC Oceanographic Data Exchange Policy<sup>5</sup>
- CLIVAR data policy<sup>6</sup>

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2 : <http://www.jcommops.org/DBCP/1qtsinfo.html>

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

4 : [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)

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

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

### APPENDIX III

#### Terms of Reference of the DBCP Executive Board

(as approved at DBCP-28)

##### **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. Considering the dynamic nature of the DBCP Operating Principles, in consultation with Panel members, assist the Chairperson in proposing updates to these principles on an annual basis;
6. Assist the Chairperson with regard to continuing the arrangements (including finance) to secure the services of a technical coordinator;
7. 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;
8. Assist the Chairperson, and liaise with the Financial Advisor for updating the interim financial report with the most accurate and current information by end of each year;
9. 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;
10. Conduct meetings annually, following an agenda drawn up by the DBCP Chairperson;
11. Consult with Panel members and the Chairpersons of the DBCP Task Teams during the intersessional period if required;
12. 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 (current members are listed in the Annual Session Reports, and the on-line web site):

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

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.

**APPENDIX IV**

**Terms of Reference for the Technical Co-ordinator of the DBCP**

*(as approved by the JCOMM Co-Presidents on behalf of the Commission, 24 July 2012, per Resolution 3 (JCOMM-4))*

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 relevant observing platforms;
3. Assist in setting up suitable arrangements for notifying the appropriate user communities of changes in the functional status of relevant operational observing platforms;
4. Assist in the standardization of relevant observing platform 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~~ relevant observing platforms operators;
7. Assist in promoting the insertion of all available and relevant observing platform 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 relevant observing platform data into appropriate permanent archives.

## APPENDIX V

### 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.

## APPENDIX VI

### Draft Terms of Reference for the DBCP Trust Fund at WMO

(as adopted at DBCP-28 and further agreed by way of exchange of letters between the WMO Secretary General<sup>7</sup> and the DBCP Chairperson<sup>8</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>9</sup>, 9.8<sup>10</sup> and 9.9<sup>11</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 Chairperson may authorize in writing the WMO Secretariat 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, as long as these are consistent with the DBCP Operating Principles. The Chairperson may also authorize to commit any expenditure exceeding these maximum amounts, or unplanned DBCP expenditures with the approval from the DBCP Executive Board, under its Terms of Reference;
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 / MemberStates;
  - (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 12.2<sup>12</sup> (Resolution 37, Cg-XV); and

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

8: Letter from David Meldrum dated 5 January 2009

9: 9.7: Trust funds, reserve and special accounts may be established by the Secretary-General and shall be reported to the Executive Council.

10: 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.

11: 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.

- (v) Miscellaneous income.
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:

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12: 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.



- (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.

## APPENDIX VII

### 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.

## APPENDIX VIII

### Current DBCP budget line items

(as approved at DBCP-29)

The DBCP budget includes the following line items:

1. Contract for the DBCP Technical Co-ordinator<sup>13</sup>;
2. Provision for termination / transition of the Technical Co-ordinator;
3. JTA<sup>14</sup>, including Chairperson's contract, Executive Board, and Secretariat support;
4. Consultancy;
5. JCOMMOPS logistical support<sup>15</sup>;
6. JCOMMOPS Data/Development<sup>16</sup>;
7. JCOMMOPS information system migration<sup>17</sup>;
8. SOT<sup>18</sup>;
9. SOT Ship Coordinator's position<sup>19</sup>;
10. Travel of DBCP Chairperson<sup>20</sup>;
11. Travel for the DBCP Technical Co-ordinator<sup>20</sup>;
12. Travel of DBCP Representatives<sup>20</sup>;
13. Travel for the ship coordinator's position<sup>21</sup>;
14. Technical developments and evaluations<sup>22</sup>;
15. Implementation support to address regional system deficiencies;<sup>23</sup>
16. Outreach and publication activities<sup>24</sup>;
17. Capacity-Building<sup>25</sup>;
18. Collaborative Arrangements<sup>26</sup>;
19. Bank charge and support cost<sup>27</sup>;
20. Contingency.

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13: Includes the salary and benefits;

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

15: 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;

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

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

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

19: Includes the salary and benefits;

20: Missions on behalf of the Panel;

21: Expenses to be decided by the OPE Chair in consultation with the chairs of programmes contributing to JCOMMOPS;

22: For example, the DBCP Iridium Pilot Project;

23 : For example, improving data timeliness in areas where system weaknesses are identified, Iridium, SLP;

24: DBCP and JCOMMOPS brochures and DBCP Publications;

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

26: 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

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

## ANNEX XII

### ACTION GROUP SUMMARIES

- (i.) **GDP**: Global Drifter Programme
- (ii.) **E-SURFMAR**: Surface Marine programme of the Network of European Meteorological Services, EUMETNET;
- (iii.) **IABP**: International Arctic Buoy;
- (iv.) **IBPIO**: International Buoy Programme for the Indian Ocean;
- (v.) **IPAB**: WCRP-SCAR International Programme for Antarctic Buoys;
- (vi.) **ISABP**: International South Atlantic Buoy Programme;
- (vii.) **NPDBAP**: DBCP-PICES North Pacific Data Buoy Advisory Panel;
- (viii.) **TIP**: Tropical Moored Buoys Implementation Panel;
- (ix.) **ITP**: International Tsunameter Partnership.

**GDP**  
**GLOBAL DRIFTER PROGRAMME**

<b>Name of Action Group</b>	Global Drifter Program
<b>Date of report</b>	15 September 2016
<b>Overview and main requirements addressed</b>	Global Drifter Program (GDP). Goals: 1. Maintain a global 5x5° array of ~1300 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>	Global ocean
<b>Type of platform and variables measured</b>	Lagrangian drifters measuring surface velocity, SST; some drifters also measure sea level pressure, wind, salinity, and/or sub-surface temperature profiles
<b>Targeted horizontal resolution</b>	5 degree x 5 degree (~1300 units)
<b>Chairperson/Managers</b>	Dr Rick Lumpkin, NOAA/AOML, USA Dr Luca Centurioni, SIO/CIMEC, 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/">http://www.aoml.noaa.gov/phod/dac/</a>
<b>Meetings</b> <i>(meetings held in 2015/2016; and planned in 2016/2017)</i>	DBCP; Climate Observations Division review of Global Drifter Program (22 October 2016, La Jolla, CA)
<b>Current status summary</b>	Annual size of array was 1411 drifters. Current size as of 12 September 2016 is 1398 drifters.
<b>Summary of plans for 2016-2017</b>	Maintain array at ~1300 drifters

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**E-SURFMAR**  
**Operational Service of the Network of European Meteorological Services, EUMETNET**

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<b>Name of Action Group</b>	<b>Operational Service of the Network of European Meteorological Services, EUMETNET (E-SURFMAR)</b>
<b>Date of report</b>	31 August 2016
<b>Overview and main requirements addressed</b>	The EUMETNET operational service E-SURFMAR is an optional programme involving 19 out of the 31 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 Expert Team-Data Buoy (ET-DB). E-SURFMAR ET-DB 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), the Mediterranean Sea and a part of the Arctic. In 2015, E-SURFMAR started to extend its activities in the North of the South Atlantic (from 20S to 10N) in the frame of AtlantOS project (April 2015- March 2019).
<b>Type of platform and variables measured</b>	<u>Drifting buoys</u> : air pressure, SST <u>Moored buoys</u> : air pressure, wind, air temperature, SST, waves (directional spectra), relative humidity.
<b>Targeted horizontal resolution</b>	E-SURFMAR: 250 km x 250 km, >100 drifting buoys, 4 moored buoys for satellite calibration/validation. AtlantOS: a network of 13 drifting buoys.
<b>Chairperson/Managers</b>	E-SURFMAR Operational Service Manager: Mr Pierre Blouch, Météo-France Expert Team-Data Buoy (ET-DB), Outgoing Chairperson: Mr Jon Turton, UK Met Office
<b>Coordinator</b>	E-SURFMAR Data buoy Manager: Mr Gilbert Emzivat, Météo-France
<b>Participants</b>	Belgium, Croatia, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, The Netherlands, Norway, Portugal, Serbia, Spain, Sweden, Switzerland, and the United Kingdom.
<b>Data centre(s)</b>	CORIOLIS as French trial GDAC for drifting buoys DFO/OS as Canadian trial GDAC for drifting buoys NOAA/AOML for DBCP/GDP
<b>Website</b>	<a href="http://www.eumetnet.eu/">http://www.eumetnet.eu/</a> , <a href="http://esurfmar.meteo.fr">http://esurfmar.meteo.fr</a> (restricted working area web site for E-SURFMAR participants)
<b>Meetings</b>	ET-DB meets once a year. ET-DB13 in Hambourg, 12-15 April 2016
<b>Current status (mid-2016)</b>	148 E-SURFMAR drifting buoys in operation (all Iridium including 14 AtlantOS, 17 MF and 51 SVP-B upgrades) + 23 others reporting AP.



	4 E-SURFMAR supported moored buoys in operation, plus a further 30 others operated by members.
<b>Summary of plans for 2017</b>	Maintain : <ul style="list-style-type: none"> <li>- a network of 100 drifting buoys in North Atlantic,</li> <li>- a network of 13 drifting buoys in South Atlantic,</li> <li>- and the 4 reference moored buoys in operation.</li> </ul>

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**IABP**  
**International Antarctic Buoys Programme**

<b>Name of Action Group</b>	International Arctic Buoy Programme (IABP)
<b>Date of report</b>	17 Sep 2016
<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>	
<b>Website</b>	<a href="http://iabp.apl.washington.edu/">http://iabp.apl.washington.edu/</a>
<b>Meetings</b> <i>(meetings held in 2015/2016; and planned in 2016/2017)</i>	Annual meetings spring or early summer in the Northern Hemisphere. 25th Annual Meeting of the International Arctic Buoy Programme [IABP], hosted by the Korean Polar Research Institute (KOPRI) to coincide with KOPRI's International Polar Science Symposium in May, 2016. IPAB participants also reported.  We are considering to hold the next IABP participants meeting in coordination with IPAB during the IGS/IACS/CIIC 2017 Cryo Symposium in Wellington, NZ, during the week 12–17 February 2017.
<b>Current status summary</b> <i>(mid-2016)</i>	142 buoys were reporting in May 2016 (Figs. 1 and 2).

<b>Summary of plans for 2016/17</b>	<p>Summer is the primary deployment season in the Arctic.</p> <p>Participants will deploy 70+ 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.</p> <p>A broad overview map of our deployments plans is shown in Fig. 3. Details may be viewed at <a href="http://iabp.apl.washington.edu/overview_deploymentplans.html">http://iabp.apl.washington.edu/overview_deploymentplans.html</a>. Plans for future years will be similar.</p>
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**IBPIO**  
**International Buoy Programme for the Indian Ocean**

<b>Name of Action Group</b>	<b>International Buoy Programme for the Indian Ocean (IBPIO)</b>
<b>Date of report</b>	31 August 2016
<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 (130°E in the North of Australia)
<b>Type of platform and variables measured</b>	Drifting buoys: Air pressure, SST, (wind) Moorings: air pressure, wind, air temperature, SST, waves, relative humidity, radiation, rainfall, SSS, subsurface temperature and salinity, current...
<b>Targeted horizontal resolution</b>	500 km x 500 km
<b>Chairperson/Managers</b>	Mr Shaun Dolk, NOAA/AOML, USA – Chair Mr Johan Stander, SAWS, South Africa – Vice Chair
<b>Coordinator</b>	Mr Gilbert Emzivat, Météo-France
<b>Participants</b>	Australia (ABOM), France (Météo-France), India (NIO, NIOT, INCOIS), Kenya (KMD), Mozambique (EMU), South Africa (SAWS), TIP (Tropical Moored Buoy Implementation Panel), USA (GDP, Navoceano).
<b>Data centre(s)</b>	CORIOLIS as French trial GDAC for drifting buoys DFO/OS as Canadian trial GDAC for drifting buoys NOAA/AOML for DBCP/GDP
<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 19 in La Jolla (USA) in October 2016
<b>Current status (mid-2016)</b>	212 drifters (120 with Air Pressure) 53 moored buoys (35 for RAMA, 76% of the planned 46 site)

	array)
<b>Summary of plans for 2017</b>	Maintain a network of 150 drifters at least. Maintain or expand the moored buoy arrays.

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**IPAB**  
**WCRP/SCAR International Programme for Antarctic Buoys**

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<b>Name of Action Group</b>	WCRP/SCAR International Programme for Antarctic Buoys (IPAB)
<b>Date of report</b>	11 Sep 2016
<b>Overview and main requirements addressed</b>	The Participants of the WCRP/SCAR International Programme for Antarctic Buoys (IPAB) work together to maintain a network of drifting buoys in the Southern Ocean, in particular over sea ice, to provide meteorological and oceanographic data for real-time operational requirements and research purposes. The IPAB was established in 1994 and 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>	Ice buoys measuring the following: <u>Minimum variables:</u> Buoy position <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 speed and direction, snow accumulation, other sea-ice properties and oceanographic variables
<b>Targeted horizontal resolution</b>	500 km x 500 km
<b>Chairperson/Managers</b>	Dr Petra Heil, AAD and ACE CRC, Hobart, Australia
<b>Coordinator</b>	Dr Christian Haas, York University, Toronto, Canada; and: Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany Dr. Ignatius Rigor, University of Washington, Seattle, USA
<b>Participants</b>	<ul style="list-style-type: none"> <li>- Alfred Wegener Institut, Germany</li> <li>- Australian Antarctic Division, Australia</li> <li>- Bureau of Meteorology, Australia</li> <li>- British Antarctic Survey, UK</li> <li>- Finnish Institute for Marine Research, Finland</li> <li>- GI, University of Alaska Fairbanks, USA</li> <li>- IARC, University of Alaska Fairbanks, USA</li> <li>- National Ice Center, USA</li> <li>- National Snow and Ice Data Center NSIDC, USA</li> <li>- ISDM/MEDS, Dept. of Fisheries and Ocean, Canada</li> <li>- Meteorological Service NZ LTD, New Zealand</li> <li>- Norwegian Polar Institute, Norway</li> <li>- Polar Science Center, Univ. of Washington, USA</li> <li>- National Institute of Polar Research, Japan</li> <li>- JAMSTEC, Japan</li> <li>- Programma Nazionale di Ricerche in Antartide, Italy</li> <li>- DAMTP, UK</li> <li>- SAMS, UK</li> <li>- York University, Toronto, Canada</li> <li>- CLS/Service Argos, France</li> <li>- South African Weather Service, South Africa- Meteorological Office, UK</li> <li>- CRREL, USA</li> </ul>

<b>Data centre(s)</b>	Alfred Wegener Institute for Polar and Marine Research, Germany: <a href="http://www.pangaea.de/search?q=ipab">http://www.pangaea.de/search?q=ipab</a> National Snow and Ice Data Center NSIDC, USA: <a href="http://nsidc.org/data/docs/daac/nsidc0084_ipab_antarctic_buoys.gd.html">http://nsidc.org/data/docs/daac/nsidc0084_ipab_antarctic_buoys.gd.html</a>
<b>Website</b>	<a href="http://www.ipab.aq/">http://www.ipab.aq/</a>
<b>Meetings</b> <i>(meetings held in 2015/2016; and planned in 2016/2017)</i>	IPAB participants reported during the annual meeting of the International Arctic Buoy Programme IABP in Incheon, Korea, on May 12 and 13, 2016. It is considered to hold the next IPAB participants meeting during the IGS/IACS/CliC 2017 Cryo Symposium in Wellington, NZ, during the week 12–17 February 2017
<b>Current status summary</b> <i>(mid-2016)</i>	7 snow depth buoys, 9 IMBs, 7 SVPs and 3 AWSs were deployed on sea ice floes during AWI Polarstern cruise PS96/01 in the Eastern and Southern Weddell Sea, contributed by AWI. 11 SVP-B buoys with drogues were deployed in open water by USIPAB from the Polar Star in January 2016 on its trek from McMurdo to Punta Arenas.  The South African National Drifting Weather Buoy Programme deployed 12 NOAA weather buoys during the 2015/16 period, north of the ice edge. The Meteorological Services Australia and New Zealand continue to operationally deploy numerous SVP's in the Southern Ocean, primarily north of the sea ice edge.
<b>Summary of plans for 2016/17</b>	USIPAB will deploy several SVPs in the Ross & Amundsen Sea. AWI will deploy few buoys in the Weddell Sea. South African Weather service plans to deploy 15 X drifters for 2016/17

**ISABP**  
**International South Atlantic Buoy Programme**

Name of Action Group	ISABP
<b>Date of report</b>	17 August 2016, submitted by Mayra Pazos, NOAA/AOML/GDP
<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 ( 90° W to 30° E)
<b>Type of platform and variables measured</b>	Lagrangian drifters with Argos and Iridium transmitters, measuring sea level pressure, SST, salinity and sea-surface velocity
<b>Targeted horizontal resolution</b>	5 degrees x 5 degrees
<b>Chairperson/Managers</b>	Felipe Santos, DHN, Brazil
<b>Coordinator</b>	Mayra Pazos, NOAA/AOML, USA
<b>Participants</b>	Countries interested in the region (Brazil, US, Argentina, South Africa, Tristan Is.)
<b>Data centre(s)</b>	Historical drifter data are assembled, quality controlled at AOML, Miami, USA then sent to MEDS (Canada, GDAC for drifters) for archival and further distribution. Real time data is also archived at MEDS. GTS quality control is handled by AOML GDP for both Argos and Iridium and disseminated to the GTS by SIO GDP for Iridium drifters and by CLS-America for Argos drifters
<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/">http://www.oceanlan.org/isabp/en/</a>
<b>Meetings</b> <i>(meetings held in 2015/2016; and planned in 2016/2017)</i>	Starting in 2014, ISABP meetings are held during DBCP. Last Meeting took place on October 20, 2015 during DBCP-31 in Geneva, Switzerland. A similar meeting is planned this year during DBCP-32 in San Diego, Ca., USA
<b>Current status summary</b> <i>(mid-2016)</i>	As of August 8, 2016, there were a total of 222 drifters in the S.A. Region, 32 more than last year at this same time, (64 SVP of which 4 are Iridium, 156 SVPB of which 45 are Iridium, and 2 salinity. Of the total, 22% are Iridium, compared to 12% iridium last year. (Figure 1)
<b>Summary of plans for 2017</b>	Continue to address observational gap areas, increase the number of SVPB drifters in the region and transition from all Argos to Iridium drifters.

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**NPDBAP**  
**DBCP-PICES North Pacific Data Buoy Advisory Panel**

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<b>Name of Action Group</b>	<b>DBCP-PICES North Pacific Data Buoy Advisory Panel (NPDBAP)</b>
<b>Date of report</b>	16 September 2016
<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: Dr. Rick Lumpkin, NOAA, United States Co-Chairperson for the NW Pacific: Dr. BG Lee, Jeju National University, South Korea
<b>Coordinator</b>	Mr Shaun Dolk, NOAA / AOML
<b>Participants</b>	Rick Lumpkin, BG Lee, Shaun Dolk, Ignatius Rigor, Champika Gallage, Mayra Pazos, Erik Valdes, Jooyoung Lee, Etienne Charpentier, Mathieu Ouellet, Serge Hagan-Deschamps, Myungwon Park, Sang Kill Park,
<b>Data centre(s)</b>	Drifter Data Assembly Centre (DAC) Integrated Science Data Management (ISDM), Canada
<b>Website</b>	<a href="http://dbcp.jcommops.org/npdbap/">http://dbcp.jcommops.org/npdbap/</a>
<b>Meetings</b>	Yearly meetings usually held in conjunction with DBCP meetings. Next meeting planned 18 October, 2016 in La Jolla, California.
<b>Current status summary</b>	From 01 September 2015 to 31 August 2016, 62 drifters were deployed in the North Pacific Ocean. Of the 62 drifter deployments, 53 units were equipped with barometer sensors and the remaining 9 drifters were standard SVP type drifters.
<b>Summary of plans for 2017</b>	The goal for 2017 is to deploy 75 drifters, of which, 50 drifters will be equipped with barometer sensors.

**TIP**  
**The Tropical Moored Buoy Implementation Panel**

<b>Name of Action Group</b>	<b>The Tropical Moored Buoy Implementation Panel (TIP)</b>
<b>Date of report</b>	15 September 2016
<b>Overview and main requirements addressed</b>	<p>The Tropical Moored Buoy 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>	<p>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.</p> <p>Pacific Ocean: 8°N to 8°S; Atlantic Ocean: 20°N to 10°S; Indian Ocean: 15°N to 25°S.</p>
<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. Also, biogeochemical measurements, including CO<sub>2</sub> and O<sub>2</sub> on select moorings. Some moorings also have specialized instruments to measure turbulence dissipation and listening devices for tracking marine animals.</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: 68 moorings; Tropical Atlantic Ocean: 19 moorings ; Tropical Indian Ocean: 45 moorings
<b>Chairperson/Managers</b>	Dr. Mike McPhaden, PMEL, USA, Chairman Dr. Kentaro Ando, JAMSTEC, Japan, Vice-Chairman
<b>Coordinator</b>	Mr. Kenneth Connell, 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 (<i>JAMSTEC</i>)</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), Indian National Institute</p>

	of Oceanography (NIO), the Indonesian Agency for the Assessment and Application of Technology (BPPT), the Indonesian Meteorological, Climate, and Geophysical Agency (BMKG), the Chinese First Institute of Oceanography (FIO), Bay of Bengal Large Marine Ecosystem (BOBLME) program, and University of Tasmania.
<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> <a href="http://tao.ndbc.noaa.gov/">http://tao.ndbc.noaa.gov/</a>
<b>Meetings</b> <i>(meetings held in 2015/2016; and planned in 2016/2017)</i>	<ul style="list-style-type: none"> <li>• PREFACE-PIRATA-CLIVAR Tropical Atlantic Conference, Cape Town, South Africa, 25-27 August, 2015</li> <li>• CLIVAR Pacific Ocean Panel 10th session, Santiago, Chile, 10-11 October, 2015</li> <li>• TPOS2020 Steering Committee 2nd meeting, Hobart, Australia, 14-17 October, 2015             <ul style="list-style-type: none"> <li>• International Symposium on the Indian Ocean, Goa India, 30 November – 4 December 2015</li> </ul> </li> <li>• CLIVAR GOOS Indian Ocean Panel 12th session, IndOOS Resource Forum, Goa, India, 5-9 December, 2015</li> <li>• AMS 96th Annual Meeting, New Orleans, LA, 9-14 January 2016</li> <li>• Ocean Sciences, New Orleans, LA, 21-26 February, 2016</li> <li>• OceanSITES 8th Data Management Team Meeting, Southampton, UK, 25-29 April, 2016</li> <li>• GCOS-COOS-WCRP Ocean Observations Panel for Climate, 19th Session, Esporles, Spain, 6-8 April 2016</li> <li>• Asia Oceania Geosciences Society 13th Annual Meeting, Beijing, China, 31 July – 5 August, 2016</li> <li>• CLIVAR Pacific Ocean Panel 11th session, Qingdao, China, 17-18 September 2016</li> <li>• CLIVAR Open Science Conference, Qingdao, China, 19-23 September 2016</li> <li>• PREFACE-PIRATA-CLIVAR Tropical Atlantic Conference, Paris, France, 28 Nov-2 Dec 2016</li> <li>• Fall AGU Meeting, San Francisco, CA 12-16 December 2016</li> <li>• AMS 97th Annual Meeting, Seattle, WA, 23-26 January 2017</li> <li>• CLIVAR GOOS Indian Ocean Panel 13th session and 7th session of the IndOOS Resource Forum, Perth, Australia, 30 Jan-3 Feb 2017</li> <li>• GCOS-COOS-WCRP Ocean Observations Panel for Climate, 20th Session, Woods Hole, MA, 14-17 March 2017</li> <li>• EGU General Assembly, Vienna, Austria, 23-28 April 2017</li> </ul>
<b>Current status summary</b> <i>(August 2016)</i>	TAO/TRITON: 51 of 55 TAO, 8 of 8 TRITON surface moorings reporting data. PIRATA: 15 of 18 surface moorings reporting data. RAMA: 16 of 28 surface moorings reporting data.
<b>Summary of plans for 2017</b>	TAO/TRITON: Maintain 63 mooring array. (11 of 13 original TRITON/ADCP moorings retired.) PIRATA: Maintain 19 mooring array RAMA: Maintain 30 sites, including 1 new site.

**ITP**  
**International Tsunami Partnership**

Doc. ID: 03910/2017, ver. 1.0, dep. OBS- WIGOS/OSD

Name of Action Group	International Tsunami Partnership (ITP)
Date of report	3 September 2016
Overview and main requirements addressed	Activity since last report (DBCP-31): status of Tsunameters; (appendix A); issues/enhancements to data sharing, technological developments, challenges, other
Area of interest	<p>Discussion Topic 1: Develop a forum for a coordinated dialogue between IOC TOWS and JCOMM DBCP to promote a global sensing strategy for tsunamis, which identifies gaps and promotes collaboration to meet these gaps. DBCP ITP can serve as a technical collaborator in the dialog and provide a link between TOWS and DBCP</p> <p>Discussion Topic 2: the year's progress in partnerships -- e.g. US/Chilean discussions to enhance sensing in the Southern Chilean Trench.</p>
Type of platform and variables measured	Surface expressions (buoys and autonomous vehicles) and deep ocean water level recording devices
Targeted horizontal resolution	<p>IOC Tsunami Programme: <a href="http://www.ioc-tsunami.org/index.php?option=com_content&amp;view=featured&amp;Itemid=93&amp;lang=en">http://www.ioc-tsunami.org/index.php?option=com_content&amp;view=featured&amp;Itemid=93&amp;lang=en</a></p> <p>Promotes a coordinated but regionalized approach to awareness, risk assessment, observation networks and early warning systems</p>
Chairperson / Managers	Venkatesan; Stephen G. Cucullu
Coordinator	Champika Gallage
Participants	DBCP Representatives
Data centre(s)	Various
Website	<a href="http://www.jcomm.info/index.php?option=com_oe&amp;task=viewEventRecord&amp;eventID=1792">http://www.jcomm.info/index.php?option=com_oe&amp;task=viewEventRecord&amp;eventID=1792</a>
Meetings (meetings held in 2015/2016; and planned in 2016/2017)	<p>31st session of the DBCP, Geneva 2015</p> <p>25 - 26 Feb 16, 9th session of Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG), Paris cedex 07, France. <b>Annexure – 3</b> <a href="http://www.ioc-unesco.org/index.php?option=com_oe&amp;task=viewDocumentRecord&amp;docID=17045">http://www.ioc-unesco.org/index.php?option=com_oe&amp;task=viewDocumentRecord&amp;docID=17045</a></p> <p>Regional Marine Instrumentation Center; Region IV Meeting; March 3, 2016 Bay St. Louis Mississippi. US National Tsunami Hazard Mitigation Program (NTHMP) Annual Meeting February 1 – 5, 2016. US NTHMP Annual Meeting; Portland Oregon; January 30 – February 3, 2017</p>
Current status	Refer to section 2.1.
Summary of plans for 2017	Refer to Section 2.2.

## ANNEX XIII

### REPORT FROM THE EXECUTIVE BOARD MEETING

*(La Jolla, USA, 18 October 2016)*

#### Participants:

DBCP EB members:

- Jon Turton (Chair, not present)
- Shannon McArthur (vice-Chair, NA)
- Johan Stander (vice-Chair, SH)
- Ting Yu (vice-Chair Asia) not present
- Sid Thurston (chair, TT-CB)
- Champika Gallage (WMO Secr.)
- Denis Chang Seng (IOC Secr.)
- Tom Gross (Consultant Secr.)

Other invited participants:

- Albert Fischer (IOC, representing GOOS) by telephone
- David Legler (USA, OCG)
- Bob Weller (, representing OceanSITES)
- Eric Locklear (financial advisor, USA)
- David Meldrum (invited expert)

#### Discussion:

##### 1. Membership of the EB

The Board recommended keeping the current membership of the Executive Board.

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

Candidates:

Chair: Jon Turton (UK) for 3<sup>rd</sup> term

Vice-Chair Asia: Ting YU, (China) for 2<sup>nd</sup> term

Vice-Chair North America: Shannon McArthur (USA) for 3<sup>rd</sup> term

Vice-Chair Southern Hemisphere: Johan Stander (South Africa) for 2<sup>nd</sup> term

##### 3. OceanSites interaction with DBCP

Bob Weller, co-chair of OceanSITES, explained that the OceanSITES welcomes direct interaction with DBCP through representation at the DBCP sessions. However, the return on effort for DBCP collaboration for technical issues may not be sufficient. Dr Weller emphasized that the problem is too heavy reporting requirements.

OceanSITES does not see itself as an action group task team or pilot project of DBCP, but as a peer observation network. The JCOMM OCG has agreed with OceanSITES declaring themselves to be a 'stand-alone' group and not an Action Group of DBCP. OceanSITES will continue to report within OCG. The EB agreed with the OceanSITES needs and will remove explicit agenda items from future sessions requiring reporting by Ocean SITES. Ocean SITES will continue to interact with DBCP as they see fit to retain linkages for mutual benefit.

##### 4. Panel Session format

##### How to Reduce the length/frequency of DBCP meetings

The EB considered the WMO request to shorten the DBCP session and use a biennial schedule. The EB agreed that the Science and Technical workshop is effective. The day for side meetings of the Task Team, Pilot Projects, and Action Groups is also effective although the time required for some side meetings could be adjusted. The EB considers the length of business meeting to be appropriate to required work. Less frequent meetings would compromise the momentum and pace of intersessional work. However, methods might be considered to lessen the burden on secretariat and TC support.

The EB did not think that shortening the sessions would be advisable at this time, as the sessions are very effective and have recently been limited to only a two-day business meeting. However, the EB recognizes that a different way of working may be advisable, which focuses on specific items, reduces reporting and encourages substantive discussions.

**Action:** The EB will during the intercessional period discuss the possibility to restructure the agenda ensuring it is more forward looking and reduce time on reporting.

**5. Technical Coordinator’s position, ToR and recruitment**

The EB commended C. Gallage for her work as TC and welcomed her to her new position as WMO Scientific Officer for Marine and Ocean Meteorological Observations and Data Management (MAR) unit, which includes responsibility for WMO’s input to the DBCP. The recruitment will be led by the WMO and the TC will be recruited by the WMO. EB must begin preparation for recruitment of replacement TC. The TC will be part of the JCOMMOPS team which provides services as a whole to the DBCP and OceanSITES. The ToR should be amended to reflect this fact. The IOC and WMO have been in communication concerning the problems with the joint administration of JCOMMOPS and are in mutual agreement of the need to designate single administrative responsibility.

**ACTION:** EB to draft revised DBCP OceanSITES TC ToR (if needed), prepare post description for WMO recruitment process, and obtain approval from WMO to designate EB representatives for search committee (Action: DBCP EB, WMO Secretariat; ASAP)

**6. DBCP Budget and contributions**

**6.1 Status of the Trust Fund**

The financial consulted reported on the status of the DBCP and JCOMM WMO Trust Funds.

**6.2 Proposed maximum expenditures for next year**

The EB, after reviewing the financial situation, agreed to the expenditures as per table 1 and panel members were requested to seek extraordinary budget. However, the EB will be tasked with considering Capacity Building proposals.

<b>2017 Basic Budget</b>	
<b>DBCP TC (JCOMM TF)</b>	<b>\$120,000</b>
<b>DBCP Chair &amp; DBCP TC Travel</b>	<b>\$22,000</b>
<b>SOT</b>	<b>\$10,000</b>
<b>JCOMMOPS IT Support Costs</b>	<b>\$26,000</b>

<b>IOC Secretariat Support</b>	<b>\$10,000</b>
<b>Argos JTA Travel</b>	<b>\$10,000</b>
<b>WMO Indirects</b>	<b>\$18,000</b>
<b>Capacity Building</b>	<b>\$10,000</b>
<b>TOTAL</b>	<b>\$226,000</b>
<b>\$120,000 from JCOMM TF, \$106,000 from DBCP TF</b>	

## 7. Implementation Strategy and Operating Principles

Chair has suggested that simplifications in the presentation and on-line availability of the IS and OP should be made:

- Cease to include OP in meeting reports
- Publish standalone document on web, under a simple title, with permanent URL. (<http://jcomm.info/DBCP-OP> , <http://jcomm.info/DBCP-IS> )
- Remove OP appendices TORs of the various Task Teams, Lists of key personnel.
- Publish latest TORs of Task Teams, and Lists of key personnel separately. (Previous versions could be retained on-line.)
- Remove appendix of on-going actions and recommendations, as these are detailed actions, and not principles.
- Publish new separate document for the purpose of maintaining the on-going actions. Consider using Google Docs for continuous editing of status of actions. To be maintained by Secretariat.<sup>67</sup>

Johan: There could be a few extra items in the OP which concern him:

Under the TF paragraph should be reviewed again. 9.1

Item 3.The length of terms of vice and chair.

Action: Further changes by the EB will be proposed for the OP. Revisions will be made available for review and comment, to be confirmed by the EB Dec. 31, 2016.

## 8. Other issues

- No other issues were presented

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67 . Recall that last year Etienne noted that "The ongoing actions and recommendations can constitute excellent source materials when reviewing and updating WMO Technical Regulations or when identifying recommendations to be made to the JCOMM higher level or the executive bodies of the WMO and IOC. Perhaps a new separate document should be maintained by the Panel for the purpose of maintaining the ongoing actions. The burden is essentially on the Secretariat anyway".

**ANNEX XIV:**

**DBCP ANNUAL REPORT FOR 2015 AND INTERIM REPORT FOR 2016,  
FINANCIAL STATEMENTS AND INFORMATION**

Doc. ID: 03910/2017, Ver. 1.0, dep. OBS-WIGOS/OSD

**1) STATEMENTS OF ACCOUNT**

Note: IOC DBCP Trust Fund is not reported as it has been inactive since 2012 and has negligible balance.

TABLE 1: WMO Final Statement of Account for the DBCP Trust Fund for the period 1 January 2015 to 31 December 2015

TABLE 2: WMO Interim Statement of Account for the DBCP Trust Fund for the period 1 January 2016 to 31 July 2016

TABLE 3: WMO Final Statement of Account for the JCOMM Trust Fund for the period 1 January 2015 to 31 December 2015

TABLE 4: WMO Interim Statement of Account for the JCOMM Trust Fund for the period 1 January 2016 to 31 July 2016

**2) NATIONAL CONTRIBUTIONS FOR 2017**

TABLE 5: Proposed National Contributions for 2017

**3) BUDGET FOR 2015 AND BEYOND**

TABLE 6: Final Summary of Statement for the 2015 - 2016 DBCP Trust Fund

TABLE 7: Final Summary of Statement for the 2015 JCOMM Support Trust Fund

TABLE 8: Draft 2017 DBCP Budget

**4) ARGOS JOINT TARIFF AGREEMENT (JTA) BUDGET**

TABLE 9: Argos Joint Tariff Agreement (JTA) Executive Committee budget



**TABLE 1: WMO Final Statement of Account for the DBCP Trust Fund for the period 1 January 2015 to 31 December 2015**

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

Weather • Climate • Water  
 Temps • Climat • Eau

**DATA BUOY CO-OPERATION PANEL**  
**Final Statement of income and expenditure**  
**For the period 1 January to 31 December 2015**  
 Amounts in United States dollars

1. Balance brought forward , 1 January 2015		153,908
2. Contributions <sup>a/</sup>		94,348
3. Total available funds during reporting period		248,256
4. Expenditure		
4.1 Direct project costs		
4.1.1 Travel	127,557	
4.1.2 Consultant - DBCP TC (Wallace)	20,500	
4.1.3 Payment to CLS 2013-2014 Logistical Support to JCOMMOPS/DBCP and SOT)	20,000	
4.1.4 DBCP Indium Pilot Project (IPP)	13,119	
4.1.5 DBCP Capacity Building Workshop for NPOMS-3	2,000	
4.1.6 Credit in 2015 relating to difference between accrued expenditure in 2014 and actual expenditure in 2015 : Support to the Marine Observations Systems	(6,953)	
4.1.7 Credit in 2015 relating to reversal of 2014 accrual of Purchase Order 151807 (DBCP Capacity Building Workshop for NPOMS-3)	(20,000)	
4.1.8 Total direct costs		156,223
4.2 Indirect project costs		
4.2.1 Realized loss on currency exchange	10,321	
4.2.2 Support costs at 3%	4,687	
4.2.3 Write-offs	1,674	
4.2.4 Unrealized loss on currency exchange	554	
4.2.5 Bank charges	253	
4.2.6 Total indirect costs		17,489
4.3 Total project expenditure		173,712
5. Balance of fund at 31 December 2015		74,544
6. Less outstanding obligations		23,753
7. Unobligated balance at 31 December 2015		50,791

<sup>a/</sup> Contributions	
Bureau of Meteorology, Australia (EUR11,700)	13,765
Meteo France (EUR40,000)	44,893
CLS/Service Argos, France	25,578
South African Weather Service (SAWS) (EUR4,000)	4,408
Meteorological Services of New Zealand (EUR1,800)	1,897
BSH,M22/SOOP, Germany (EUR3,600)	3,809
Total contributions	94,348



The financial statement has been prepared on the accrual basis of accounting in accordance with the International Public Sector Accounting Standards (IPSAS)

Certified correct:  
  
 Luckson Ngwira  
 Chief, Finance Division  
 29 February 2016

Additional outstanding obligations should include those owed to the IOC accounts for salary support of the DBCP Technical Coordinator

**TABLE 2: WMO Interim Statement of Account for the DBCP Trust Fund for the period 1 January 2015 to 31 July 2016**

Doc. ID: 03910/2017, ver. 1.0, dep. OBS-WIGOS/OSD

		<b>WMO OMM</b> World Meteorological Organization Organisation météorologique mondiale Organización Meteorológica Mundial Всемирная метеорологическая организация المنظمة العالمية للأرصاد الجوية 世界气象组织	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
<b>DATA BUOY CO-OPERATION PANEL</b> <b>Trust Fund 421309</b> <b>Statement of income and expenditure</b> <b>For the period 1 January to 31 July 2016</b> <i>Amounts in United States dollars</i>			
1.	Balance brought forward , 1 January 2016		74,544
2.	Income: Contributions a/		105,674
3.	Total available funds during reporting period		180,218
4.	Expenditure		
4.1	Direct project costs		
4.1.1	Travel	34,488	
4.1.2	DBCP Support to JCOMMOPS IT Hosting	21,000	
4.1.3	Total direct costs		55,488
4.2	Indirect project costs		
4.2.1	Support costs at 3%	1,665	
4.2.2	Realized loss on currency exchange	2,680	
4.2.3	Unrealized loss on currency exchange	1,221	
4.2.4	Bank charges	284	
4.2.5	Total indirect costs		5,850
4.3	Total project expenditure		61,338
5.	<b>Balance of fund at 31 July 2016</b>		<b>118,880</b>
a/			
Contributions			
	E-SURFMAR (EUR 48,000)	54,115	
	CLS/Service Argos, France (for JTA)	29,457	
	Bureau of Meteorology, Australia (EUR11,700)	12,690	
	National Institute of Ocean Technology, India (CHF 5,091)	5,026	
	South African Weather Service (SAWS) (EUR4,000)	4,386	
	Total contributions		<u>105,674</u>
<i>The financial statement has been prepared on the accrual basis of accounting in accordance with the International Public Sector Accounting Standards (IPSAS)</i>			
Certified correct:  Luckson Ngwira Chief, Finance Division 5 October 2016			

**Note:** The Canadian contribution for 2015 was accounted for in the 2011 financial statement of the DBCP Trust Fund (see statement in the DBCP Annual Report for 2011, DBCP Technical Report No. 44). According to the International Public Sector Accounting Standards that WMO follows, pledges are accounted for when there is a signed agreement with the Donor, which was the case for Canada in 2011. Additional outstanding obligations should include those owed to the IOC accounts for salary support of the DBCP Technical Coordinator. (\$127,265 + 5/12 127,265 = \$180,292) (see IOC Financial Statement).

**TABLE 3: WMO Final Statement of Account for the JCOMM Trust Fund for the period 1 January 2015 to 31 December 2015**

Doc. ID: 03910/2017, ver. 1.0, dep. OBS-WIGOS/OSD



**WMO OMM**  
World Meteorological Organization  
Organisation météorologique mondiale  
Organización Meteorológica Mundial  
Всемирная метеорологическая организация  
المنظمة العالمية للأرصاد الجوية  
世界气象组织

Secrétariat  
7 bis, avenue de la Paix – Case postale  
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

**Trust Fund for JCOMM support - Sub award no. A101189**  
**Trust Fund 421306**  
**Final Statement of income and expenditure**  
**For the period 1 January to 31 December 2015**  
*(amounts in US Dollars)*

1. Income			
1.1 Voluntary contribution (listed below)			504,000.00
1.2 Gain in currency exchange			4,388.38
1.3 Total Income			508,388.38
2. Expenditure			
2.1 Direct project costs			
2.1.1 Technical Coordinator, OOPC - Ms Hill	147,512.95		
2.1.2 Payment to CLS for Logistical Support to JCOMMOPS	64,041.45		
2.1.3 Technical Coordinator, Argo Information Centre - Mr M. Belbeoch	59,164.99		
2.1.4 Technical Coordinator, Ship time - Mr Kramp	9,660.96		
2.1.5 Total Direct project costs		280,380.36	
2.2 Indirect project costs			
2.2.1 WMO overhead (7%)	19,626.63		
2.2.2 Bank charges	325.68		
2.2.3 Total indirect costs		19,952.31	
2.3 Total expenditure			300,332.67
<b>3. Balance of fund at 31 December 2015</b>			<b>208,055.71</b>

<b>Voluntary contribution from Woods Hole Oceanographic Institute</b>	
<b>Date</b>	<b>in US Dollars</b>
28 April 2015	504,000.00
	504,000.00

Certified correct:



Luckson Njwiru  
Chief, Finance Division  
23 June 2016

**Note:** The JCOMM Trust Fund normally includes the US contribution to the DBCP and other programmes (Argo, SOT, OceanSITES, Go-SHIP, JCOMMOPS, GCOS). All JCOMM TF expenses in 2015 were for (i) the Argo Technical Coordinator's salary and benefits, and (ii) the WMO contract for the SOT Technical Coordinator (individual consultancy honorarium). There was no direct DBCP expense from the JCOMM TF in 2015.

**TABLE 4: WMO Interim Statement of Account for the Trust Fund for JCOMM support for the period 1 January 2016 to 31 July 2016**

Doc. ID: 03910/2017, var. 1.0, dep. OBS-WIGOS/OSD

WEATHER CLIMATE WATER  
TEMP CLIMAT Eau



**WMO OMM**  
World Meteorological Organization  
Organisation météorologique mondiale  
Organización Meteorológica Mundial  
Всемирная метеорологическая организация  
المنظمة العالمية للأرصاد الجوية  
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**Secrétariat**  
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CH 1211 Genève 2 – Suisse  
Tél: +41 (0) 22 730 81 11  
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**Trust Fund for JCOMM support - Sub award no. A101189**  
**Trust Fund 421306**  
**Interim Statement of income and expenditure**  
**For the period 1 January to 31 July 2016**  
(amounts in US Dollars)

1. Balance of fund at 1 January 2016		208,055.71
1.1 Voluntary contribution (listed below)		504,000.00
1.2 Interest		116.43
1.3 Total Income		<u>712,172.14</u>
2. Expenditure		
2.1 Direct project costs		
2.1.1 Technical Coordinator: Argo Information Centre, Mr M. Belbeoch	90,853.19	
2.1.2 JCOMMOPS IT Hosting in 2016	60,000.00	
2.1.3 JCOMMOPS IT Hosting in 2015	60,000.00	
2.1.4 JCOMMOPS Development in 2015	38,000.00	
2.1.5 Technical Coordinator: DBCP-SOT, Ms Gallage Dona	41,357.44	
2.1.6 Total Direct project costs		<u>290,210.62</u>
2.2 Indirect project costs		
2.2.1 WMO overhead (7%)	20,314.74	
2.2.2 Loss in currency exchange	2,497.92	
2.2.3 Bank charges	18.47	
2.2.4 Total indirect costs		<u>22,831.13</u>
2.3 Total expenditure		<u>313,041.76</u>
3. Balance of fund at 31 July 2016		<u><u>399,130.38</u></u>

**Voluntary contribution from Woods Hole Oceanographic Institute**

<b>Date</b>	<b>in US Dollars</b>
21 March 2016	504,000.00
	<u>504,000.00</u>

Certified correct:

Luckson Ngwira  
Chief, Finance Division  
12 October 2016

Note: The JCOMM Trust Fund normally includes the US contribution to the DBCP and other programmes (Argo, SOT, OceanSITES, Go-SHIP, JCOMMOPS, GCOS). All JCOMM TF expenses during the period 1 January to 31 July 2016 were for (i) the Argo Technical Coordinator's salary and benefits, (ii) the WMO contract for the SOT Technical Coordinator (individual consultancy honorarium), and (iii) GCOS.

**2) PROPOSED NATIONAL CONTRIBUTIONS FOR 2017**

**TABLE 5: Proposed National Contributions for 2017**

<b>Budget</b> <b>Country</b>	<b>JCOMMOP S (JCOMM TF)</b>	<b>DBCP (DBCP TF)</b>	<b>OceanSITES (JCOMM TF)</b>	<b>SOT (JCOMM TF)</b>	<b>JTA (DBCP TF)</b>	<b>COMMENT</b>
<b>Australia</b>	EUR 11,700		USD 5,000			JCOMMOPS: including DBCP (50%) and SOT (50%)
<b>Canada</b>	CAD 30,000					JCOMMOPS, including DBCP and SOT
<b>CLS</b>					USD 50,000	USD 30,000 for the JTA-Executive Committee 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				In support of DBCP Pilot Activities
<b>India</b>		USD 5,000				
<b>New Zealand</b>	EUR 1,800					JCOMMOPS, including DBCP (50%) and SOT (50%)
<b>South Africa</b>		EUR 4,000				
<b>USA</b>	USD 300,000	USD 70,000	USD 30,000	USD 100,000		Contribution to TC-DBCP and SOT made to WMO as of 2012. TC-DBCP-US\$75,000, JCOMMOPS-US\$34,000

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						SOT contribution includes SOT TC (USD 45,000), Ship Coordinator (USD 55,000), and GO-SHIP Coordination (USD 10,000)
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**3) BUDGET FOR 2015 - 2018**

These are finalized accounts prepared by Eric Locklear and are based on statements in tables 1, 2, and planned income/expenditures for 2015, and 2016, as agreed at DBCP-31.

**TABLE 6: Final Summary of Statement for 2015 – 2016 DBCP Trust Fund, based on WMO Financial Information as of 31 December 2015 and DBCP-31 & DBCP-32 decisions (budgets for 2015 and 2016 updated accordingly) #'s Reported in USD\$**

Doc. ID: 03910/2017, Ver. 1.0, dep. OBS-WIGOS/OSD

	Actual			Estimate					Estimate				
	2015			2016					2017				
	Receipts	Obligations	Balance at 31 Dec	Receipts	DBCP Budget	Obligations		Balance at 31 Dec	Receipts	DBCP Budget	Obligations		Balance at 31 Dec
						Jan - July	Aug - Dec				Jan - July	Aug - Dec	
1	Carried over from previous year	153,908		50,791					-165,883				
2	Contributions	94,348		105,674					105,674				
3	Adjustments												
4													
5	<b>Expenditure</b>												
6	TC Contract (DBCP TF) (1)				119,998		119,998			70,000			
7	TC Transition (2)												
8	JTA (Chair, EC, Secr. Support) (3)				25,000	5,128	19,872			10,000			
9	Consultancy (4)				7,000		7,000						
10	JCOMMOPS Logistical Support (5)		20,000							26,000			
11	JCOMMOPS Data Development (6)				50,000	21,000	29,000						
12	JCOMMOPS info sys mig. (7)												
13	SOT (8)				12,000	2,099	9,901			10,000			
14	SOT Ship Coordinator's Position (9)												
15	Travel DBCP Chairperson (10)									8,000			
16	Travel DBCP TC (11)				27,500	6,391	21,109			7,000			
17	Travel DBCP Reps (12)		127,557		32,000	11,224	20,776			7,000			
18	Travel for the Ship Coordinator (13)												
19	Technical Developments & Evals (14)												
20	Implementation Support (15)		13,119										
21	Outreach and Publication Activities (16)												
22	Capacity Building (17)		2,000		30,000	9,646	20,354			10,000			
23	Collaborative Arrangements (18)		20,500							10,000			
24	Bank Charges & Support Costs (19)		(9,464)			5,850				18,000			
25	Contingency (20)				13,000		13,000						
26													
27													
28	<b>Total DBCP</b>	<b>248,256</b>	<b>173,712</b>	<b>156,465</b>	<b>316,498</b>	<b>61,338</b>	<b>261,010</b>		<b>-60,209</b>	<b>176,000</b>			
29	Outstanding Obligations		23,753										
30	<b>Balance of DBCP Trust Fund</b>		<b>50,791</b>						<b>-165,883</b>				<b>-60,209</b>
31													
32	<b>Carried over</b>		<b>50,791</b>						<b>-165,883</b>				<b>-60,209</b>

**TABLE 7: Final Summary of Statement for the 2015 Trust Fund for JCOMM support, based on WMO Financial Information as at 31 December 2015 and DBCP-31 and DBCP-32 decisions (budgets for 2015 and 2016 updated accordingly) #'s Reported in USD\$**

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DBCP	2015			2016				2017					
	Receipts	Obligations	Balance at 31 Dec	Receipts	DBCP Budget	Obligations		Balance at 31 Dec	Receipts	DBCP Budget	Obligations		Balance at 31 Dec
						Jan - July	Aug - Dec				Jan - July	Aug - Dec	
1 Carried over from previous year	TBD			208,055					279,129				
2 Contributions	504,000			504,000					504,000				
3 Adjustments	4,388			116									
4													
5 <b>Expenditure</b>													
6 TC Contract (DBCP TC) (1)					120,000		120,000			120,000			
7 TC Contract (OOPC) (1)		147,513											
8 TC Contract (Argo Info Ctr) (1)		59,165				132,211							
9 TC Transition (2)													
10 JTA (Chair, EC, Secr. Support) (3)													
11 Consultancy (4)													
12 JCOMMOPS Logistical Support (5)		64,042				120,000							
13 JCOMMOPS Data Development (6)						38,000							
14 JCOMMOPS info sys mig. (7)													
15 SOT (8)													
16 SOT Ship Coordinator's Position (9)		9,661											
17 Travel DBCP Chairperson (10)													
18 Travel DBCP TC (11)													
19 Travel DBCP Reps (12)													
20 Travel for the Ship Coordinator (13)													
21 Technical Developments & Evals (14)													
22 Implementation Support (15)													
23 Outreach and Publication Activities (16)													
24 Capacity Building (17)													
25 Collaborative Arrangements (18)													
26 Bank Charges & Support Costs (19)		19,952				22,831							
27 Contingency (20)													
28													
29 <b>Total DBCP</b>	<b>508,388</b>	<b>300,333</b>		<b>712,171</b>	<b>120,000</b>	<b>313,042</b>	<b>120,000</b>		<b>783,129</b>	<b>120,000</b>	-	-	
30 Outstanding Obligations													
31 <b>Balance of DBCP Trust Fund</b>			<b>208,055</b>					<b>279,129</b>					<b>783,129</b>
32													
33 <b>Carried over</b>			<b>208,055</b>					<b>279,129</b>					<b>783,129</b>



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4) Argos Joint Tariff Agreement (JTA) budget

TABLE 9: Argos Joint Tariff Agreement (JTA) Executive Committee budget (based on WMO financial statements as of 31 July 2015)

Argos Joint Tariff Agreement (JTA) budget within DBCP Trust Fund (as of 1 Oct. 2014, estimates in blue)											
Year	Item	Income & Expenditure		1 CHF	Income & Expenditure		Income & Expenditure for JTA	JTA balance	Income & expenditure for WMO	WMO balance	Comment
		CHF	USD		USD	USD	USD	USD	USD	USD	
<b>2010</b>	<b>Initial JTA balance</b>							0		0	
	CLS Contribution to DBCP TF at WMO (2010)				55,000	45,000	45,000	10,000	10,000	10,000	
	Mission, J. Stander, JTA-EC, Sydney, 04/2010				-4,273	-4,273	40,727	0	10,000	10,000	
	Mission, E. Charpentier, JTA-EC, Sydney, 04/2010				-3,321	-3,321	37,406	0	10,000	10,000	
	Mission, J. Stander, JTA-30, Oban, 10/2010				-2,402	-2,402	35,004	0	10,000	10,000	
	Mission, Greg Reed, IPET-DMI, 4/2010				-1,823	0	35,004	-1,823	8,177	8,177	
	Frank Grooters JTA contract (SSA), 10/2010				-15,437	-15,437	19,567	0	8,177	8,177	
<b>2011</b>	<b>CLS Contribution to DBCP TF at WMO (2011)</b>				<b>35,269</b>	<b>25,269</b>	<b>44,836</b>	<b>10,000</b>	<b>18,177</b>	<b>18,177</b>	
	Mission, J. Stander, JTA-EC, Miami, 4/2011				-1,224	-1,224	43,612	0	18,177	18,177	
	Mission, D. Meldrum, RMIC2, Tianjin, 7/2011				-3,247	0	43,612	-3,247	14,930	14,930	
	Mission, S. Issara, RMIC2, Tianjin, 7/2011				-3,829	0	43,612	-3,829	11,101	11,101	
	Mission J. Trinanes, IPET/DRC, Melbourne, 9/2011				-1,638	0	43,612	-1,638	9,463	9,463	
	Mission ROC Botswana, JTA-31, Geneva, 9/2011				-4,051	-4,051	39,561	0	9,463	9,463	
	Mission J. Stander, JTA-31, Geneva, 9/2011				-3,781	-3,781	35,780	0	9,463	9,463	
	Frank Grooters JTA contract (SSA), 10/2011				-15,000	-15,000	20,780	0	9,463	9,463	
	Mission, E. Charpentier, Toulouse, 12/2011				-2,178	0	20,780	-2,178	7,285	7,285	
<b>2012</b>	<b>CLS Contribution to DBCP TF at WMO (2012)</b>				<b>34,028</b>	<b>24,028</b>	<b>44,808</b>	<b>10,000</b>	<b>17,285</b>	<b>17,285</b>	
	Mission J. Stander, JTA-EC, Toulouse, 4/2012				-3,080	-3,080	41,728	0	17,285	17,285	
	Mission E. Charpentier, JTA-EC, Toulouse, 4/2012	-2216	1.06045		-2,350	-1,175	40,553	-1,175	16,110	50% JTA support (Satcom - JTA-EC)	
	Mission J. Stander, JTA-32, Fremantle, 10/2012	-3113	1.06045		-3,301	-3,301	37,252	0	16,110	16,110	
	Frank Grooters JTA contract (SSA), 10/2012				-15,000	-15,000	22,252	0	16,110	16,110	
<b>2013</b>	<b>CLS Contribution to DBCP TF at WMO (2013)</b>				<b>32,748</b>	<b>22,748</b>	<b>45,000</b>	<b>10,000</b>	<b>26,110</b>	<b>26,110</b>	
	IODE-22 (S. Woodruff, G. Rosenhagen)				-2,357	0	45,000	-2,357	23,753	23,753	
	JTA-EC 2013, Annapolis (J. Stander, T. Gross)				-2,379	0	45,000	-2,379	21,374	21,374	
	RMIC workshop for RA-I, Casablanca, 2013				-5,781	0	45,000	-5,781	15,592	15,592	
	Frank Grooters JTA contract (SSA), 10/2013				-15,000	-15,000	30,000	0	15,592	15,592	
	Satcom forum				-4,046	0	30,000	-4,046	11,546	11,546	
	JTA-33 (J. Stander, J. Linguanti)				-7,587	-7,587	22,413	0	11,546	11,546	
<b>2014</b>	<b>CLS Contribution to DBCP TF at WMO (2014)</b>				<b>28,342</b>	<b>18,342</b>	<b>40,755</b>	<b>10,000</b>	<b>21,546</b>	<b>21,546</b>	Invoice FIN13-352 (12/11/2013)
	JTA-EC-10, Hamburg, 6-8 May 2014				-10,108	-10,108	30,647	0	21,546	21,546	
	CLIMAR-4, Asheville, 9-12 June 2014				-4,236	0	30,647	-4,236	17,310	17,310	
	ETDMP-4, Ostend, 23-26 June 2014				-2,878	0	30,647	-2,878	14,432	14,432	
	JTA-34, Tianjin, 3-5 Nov. 2014				0	0	30,647	0	14,432	14,432	
<b>2015</b>	<b>CLS Contribution to DBCP TF at WMO (2015)</b>				<b>25,578</b>	<b>15,578</b>	<b>46,225</b>	<b>10,000</b>	<b>24,432</b>	<b>24,432</b>	
	PMO-5, Valparaiso, Chile, Jul. 2015 (trainees)		1.03		-5,000	0	46,225	-5,000	19,432	19,432	
	ETMC-5 (Woodruff, Sato)				-5,261	0	46,225	-5,261	14,171	14,171	
	JTA-EC-12 (Javed, Stander)				-3,886	-3,886	42,339	0	14,171	14,171	
	JTA-35 (Locklear, Stander, Javed)				-15,000	-15,000	27,339	0	14,171	14,171	
	OPSCOM-49 (Locklear)				-1,886	-1,886	25,453	0	14,171	14,171	
<b>2016</b>	<b>CLS Contribution to DBCP TF at WMO (2016)</b>				<b>29,547</b>	<b>19,547</b>	<b>45,000</b>	<b>10,000</b>	<b>24,171</b>	<b>24,171</b>	
	RMIC/RA-IV				-10,000	0	46,225	-10,000	14,171	14,171	
	Satcom1				-5,000	0	46,225	-5,000	9,171	9,171	

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**ANNEX XV**

**PROPOSED TERMS OF REFERENCE FOR A  
TASK TEAM ON WAVE MEASUREMENT (TT-WM)**

**APPENDIX 1**

**TERMS OF REFERENCE OF THE TASK TEAM ON WAVE MEASUREMENT (TT-WM)**

The DBCP Task Team on Wave Measurement shall:

1. Continue to coordinate, on an ongoing basis, intercomparisons of wave measurements from different platforms, on an opportunistic basis, in particular from the Monterey buoy farm and FLOSSIE, and the GDP wave drifters
2. Continue to support the development of high quality spectral wave measurements from drifting buoys, including the SVP-Wa buoys;
3. Publish ongoing intercomparison results on the Wave Measurement and Evaluation web site;
4. Monitor technological developments for wave measurements from moored and drifting buoys;
5. Liaise with the different communities making in situ wave measurements, including OceanSITES, the Global Drifter Programme, as well as national moored buoy programmes (coastal and global);
6. Liaise with international programmes including the three Programme Areas of JCOMM (OPA, SPA, DMPA), GCOS/GOOS, OOPC, and other relevant bodies on in situ wave measurement, including user requirements, evaluation, best practices, and emerging technologies;
7. Liaise with the JCOMM Expert Team on Waves and Coastal Hazard Forecasting Systems (ETWCH) regarding the need for in situ wave observations;
8. 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;
9. Contribute to training material to educate users about appropriate wave measurement procedures and uses of the data, including the need for high quality information for all users;
10. Outreach the wave measurement developments and analyses to DBCP and other scientific fora, including the International Wave Workshop, and organize special workshops on wave measurement as appropriate and necessary.
11. Provide the DBCP Executive Board or the DBCP with technical advice needed for developing in situ wave measurement programmes, including the issues above; and
12. Report to the DBCP Executive Board and the DBCP at its biennial Sessions, with periodically updated Workplans supporting implementation.

Membership: The membership is decided at Panel Sessions and is open to all Panel members.

**APPENDIX 2**  
**PROPOSED YEAR 1 WORKPLAN (OCTOBER 2016 TO SEPTEMBER 2017) FOR TT-WM**

1. Coordinate additional intercomparisons of wave measurements from different platforms, on an opportunistic basis, in particular from the Monterey buoy farm, the new SCOOP system, and the GDP wave drifters
  2. Publish ongoing intercomparison results on the Wave Measurement and Evaluation web site;
  3. Contribute a Chapter on wave measurement to the WMO #702, Guide to Wave Analysis and Forecasting;
  4. Serve as a focal point for a Community of Practice for wave measurement issues;
  5. Organize a special wave measurement session at the 15th International Workshop on Wave Hindcasting and Forecasting (WW15, [www.waveworkshop.org](http://www.waveworkshop.org)) ;
  6. Investigate the feasibility of convening a JCOMM wave workshop on user requirements, measurement evaluation, best practices and emerging technologies, ideally in conjunction with an existing meeting (e.g. WW15);
  7. Report on results from the moored and drifting buoy wave measurement evaluations carried out during the year to the DBCP Technical Workshop at DBCP-33; and
  8. Report to the DBCP Executive Board and the DBCP at DBCP-33 on progress of the Task Team and updated workplan.
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**ANNEX XVI****ACRONYM LIST**

AAD	Australian Antarctic Division, Australia
ADCP	Acoustic Doppler Current Profiler
AG	DBCP Action Groups
AOML	NOAA Atlantic Oceanographic and Meteorological Laboratory (USA)
Argo	Argo Profiling Float Pilot Project
ASV	Autonomous Surface Vehicle
ATLAS	Autonomous Temperature Line Acquisition System
AWS	Automatic Weather Station
BOM	Bureau of Meteorology (Australia)
BSH	Bundesamt für Seeschifffahrt und Hydrographie (Germany Federal Maritime and Hydrographic Agency)
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
CAS	WMO Commission for Atmospheric Sciences
CAGM	Commission for Agricultural Meteorology (WMO)
CalCofi	California Cooperative Oceanic Fisheries Investigations
CB	Capacity-Building
CBS	Commission for Basic Systems (WMO)
CCI	WMO Commission for Climatology
CDIP	Coastal Data Information Program
Cg	Congress (WMO)
CIMO	Commission on Instruments and Methods of Observation (WMO)
CLIVAR	Climate Variability and Predictability (WCRP)
CLS	Collecte Localisation Satellites (France)
CMOC	WMO-IOC Centre for Marine Meteorological and Oceanographic Climate Data
CNES	Centre National D'Etudes Spatiales (France) / French Space Agency
COP	Conference of the Parties
CREX	Character Recognition and EXchange format (WMO)
CSV	Comma Separated Values
CTD	Conductivity Temperature and Depth
CWB	NDBC Coastal Weather Buoy network

DAC	Data Assembly Centre
DART	Deep-ocean Assessment and Reporting of Tsunami (Tsunameter)
DBCP	Data Buoy Co-operation Panel (WMO-IOC)
DCP	Data Collection Platform
DISA	Defense Information Systems Agency (USA)
DMCG	Data Management Coordination Group (JCOMM)
DMPA	Data Management Programme Area (DMPA)
DO	Dissolved Oxygen
DoD	US Department of Defense
DRR	Disaster Risk Reduction
ECMWF	European Centre for Medium-Range Weather Forecasts
EC-PORS	WMO EC Panel of Experts on Polar Observations, Research and Services
ECV	Essential Climate Variable
EOV	Essential Ocean Variable
EEZ	Exclusive Economic Zone
ESA	European Space Agency
E-SURFMAR	Operational Service E-SURFMAR of the Network of European Meteorological Services, EUMETNET
ETMC	Expert Team on Marine Climatology (JCOMM)
ETSI	Expert Team on Sea Ice (JCOMM)
ETWCH	Expert Team on Waves and Coastal Hazard Forecast Systems (JCOMM)
EUMETNET	Network of European Meteorological Services
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
EWDS	JCOMM Extreme Wave Data Set
FAO	Food and Agriculture Organization (UN)
FAQ	Frequently Asked Questions
FLOSSIE	Field Laboratory for Ocean Sea State Investigation and Experimentation
FTE	Full Time Equivalent
FTP	File Transfer Protocol
GCOS	Global Climate Observing System
GCW	Global Cryosphere Watch
GDAC	Global Data Assembly / Acquisition Centre
GDP	Global Drifter Programme
GEOSS	Global Earth Observation System of Systems
GFCS	Global Framework for Climate Services
GHG	Greenhouse Gas

GLOSS	Global Sea Level Observing System
GOOS	Global Ocean Observing System (IOC, WMO, UNEP, ICSU)
GOOS-SC	GOOS Steering Committee
GO-SHIP	Global Ocean Ship-Based Hydrographic Investigations Programme (GO-SHIP)
GPS	Global Positioning System
GRA	GOOS Regional Alliance
GTS	Global Telecommunication System (WWW)
HD-GDMSC	High Quality Global Data Management System for Climate
HRSST	High Resolution SST
HMEI	Association of Hydro-Meteorological Equipment Industry
IABP	International Arctic Buoy Programme
IAEA	International Atomic Energy Agency
IBCS	Intergovernmental Board on Climate Services (WMO)
IBPIO	International Buoy Programme for the Indian Ocean
ICSU	International Council for Science
ICT	Information and Communication Technology
ID	Identification Number
IEEE-OES	Institute of Electrical and Electronics Engineers - Oceanic Engineering Society
IFREMER	Research Institute for the Exploitation of the Sea (France)
IHO	International Hydrographic Organization
IIOE	International Indian Ocean Expedition
IMB	Ice Mass Balance (buoy)
IMO	International Maritime Organization
IMOCA	International Monohull Open Class Association
IndOOS	Indian Ocean Observing System
INMARSAT	International Marine/Maritime Satellite organization
IRSO	International Research Ship Operators
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOCCP	International Ocean Carbon Coordination Project
IODE	International Oceanographic Data and Information Exchange (IOC)
IPAB	WCRP-SCAR International Programme for Antarctic Buoys
IPET-DRMM	Inter Programme Expert Team on Data Representation Maintenance and Monitoring (CBS)
ISABP	International South Atlantic Buoy Programme
ISO	International Organization for Standardization

ITP	International Tsunameter Partnership
JAMSTEC	Japan Agency for Marine-Earth Science and Technology
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
JCOMMOPS	JCOMM <i>in situ</i> Observations Programme Support Centre
JTA	Joint Tariff Agreement (Argos)
KPI	Key Performance Indicator
LDC	Least Developed Countries
LDL	Lagrangian Drifter Laboratory
LoA	Letter of Agreement
LoI	Letters of Intent
MAN	JCOMM Management Committee
MASSMO	Marine Autonomous Systems in Support of Marine Observation
MCDS	Marine Climate Data System (in development by JCOMM)
MEDS	Marine Environmental Data Section (MEDS) of the Oceanography and Scientific Data branch of Fisheries and Oceans Canada , which replaces the branch previously known as Integrated Science Data Management (ISDM)
MMOP	Marine Meteorology and Oceanography Programme (WMO)
MoU	Memorandum of Understanding
NARA	National Aquatic Resources Research & Development Agency, Sri Lanka
NDBC	NOAA National Data Buoy Center (USA)
NetCDF	Network Common Data Form
NIOT	National Institute of Ocean Technology (India)
NMHS	National Meteorological and Hydrological Service
NOAA	National Oceanic and Atmospheric Administration (USA)
NOMAD	Navy Oceanographic Meteorological Automatic Device buoy
NPDBAP	North Pacific Data Buoy Advisory Panel
NPOMS	North Pacific Ocean and Marginal Seas
NWP	Numerical Weather Prediction
OBIS	Ocean Biogeographic Information System
OceanSITes	OCEAN Sustained Interdisciplinary Timeseries Environment observation System
OCG	Observations Coordination Group (JCOMM)
OCO	NOAA Office of Climate Observation (USA)
OOPC	Ocean Observations for Physics and Climate (GCOS-GOOS-WCRP)
OPA	Observations Programme Area (JCOMM)

OPAG ISS	Open Programme Area Group on Information Systems and Services (WMO)
OSCAR	Observing System Capability Analysis and Review Tool
OSE	Observing System Experiment
OSMC	NOAA Observing System Monitoring Center (USA)
PA	Programme Area (JCOMM)
PAR	Photosynthetic Active Radiation
PANGEA	Partnerships for New GEOSS Applications
PI	Pacific Islands
PIRATA	Pilot Research Moored Array in the Tropical Atlantic
PMEL	NOAA Pacific Marine Environmental Laboratory (USA)
PMO	Port Meteorological Officer
POES	Polar Orbiting Environmental Satellite
PP-ASV	Pilot Project Autonomous Surface Vehicle
PP-SLP	Pilot Project on the Impact of Sea Level Pressure measurements from drifters on Numerical Weather Prediction
PP-WET	DBCP-ETWCH Pilot Project on Wave measurement Evaluation and Test from Moored and Drifting Buoys
PP-WMD	DBCP Pilot Project on Wave Measurements from Drifters
PTT	Platform Transmitter Terminal (Argos)
QARTOD	
QC	Quality Control
RA	Regional Association (WMO)
RAMA	Indian Ocean Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction
RFMO	Regional Fisheries Management Organizations (FAO)
RMIC	WMO-IOC Regional Marine Instrument Centre
RNODC	Responsible Oceanographic Data Centre (IODE-JCOMM)
RNODC/DB	RNODC for Drifting Buoys
RWC	Regional WIGOS Centres
SAMS	Scottish Association for Marine Science
SAWS	South African Weather Service
SC	Steering Committee
SCG	Services Coordination Group (JCOMM)
SCOOP	Self-Contained Ocean Observing System
SCOR	Scientific Committee on Oceanic Research (SCOR)
SFSPA	JCOMM Services and Forecasting Systems Programme Area



SIDS	Small Island Developing States
SIO	Scripps Institution of Oceanography (University of California, USA)
SLP	Sea Level Atmospheric Pressure
SLSTR	Sea and Land Surface Temperature Radiometer
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)
SoG	Statement of Guidance
SOOP	Ship-Of-Opportunity Programme
SOT	Ship Observations Team (JCOMM)
SSS	Sea Surface Salinity
SST	Sea-Surface Temperature
S&T	Science and Technology Workshop
SVP	Surface Velocity Programme (of TOGA and WOCE, replaced by GDP) drifter
SVPB	SVP barometer drifter
SWOT	Strengths, Weaknesses, Opportunities and Threats
TAC	Traditional Alphanumeric Codes
TAO	Tropical Atmosphere Ocean Array
TC	Technical Co-ordinator
TC-DBCP	Technical Co-Ordinator of the Data Buoy Cooperation Panel
TDC	Table Driven Code
TF	Trust Fund
TIP	Tropical Moored Buoys Implementation Panel
ToR	Terms of Reference
TOWS	Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems
TPOS	Tropical Pacific Observing System
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-IBPD	DBCP Task Team on Instrument Best Practices & Drifter Technology Developments
TT-MB	DBCP Task Team on Moored Buoys
TT-MOWIS	JCOMM Task Team on Integrated Marine Meteorological and

	Oceanographic Services for WIS
TT-WM	Task Team on Wave Measurement
UK	United Kingdom
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	UN Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNOLS	University-National Oceanographic Laboratory System (USA)
USA	United States of America
USACE	US Army Corps of Engineers
USD	United States Dollar
USV	Unmanned Surface Vehicles
VAR	Value Added Reseller
VOS	Voluntary Observing Ship
VSF	Voiles sans Frontières
WCRP	World Climate Research Programme
WDS	WIGOS Data Standard
WG	Working Group
WHOI	Woods Hole Oceanographic Institute USA
WIGOS	WMO Integrated Global Observing System
WIO	Western Indian Ocean
WIR	WIGOS Information Resource
WIS	WMO Information System
WMO	World Meteorological Organization (UN)
XBT	Expendable BathyThermograph
YOPP	Year of Polar Prediction

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