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**INTERGOVERNMENTAL OCEANOGRAPHIC
COMMISSION (OF UNESCO)**

DATA BUOY COOPERATION PANEL

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REPORT BY THE TASK TEAM ON CAPACITY-BUILDING (TT-CB)

(Submitted by Sid Thurston (USA), Chair, TT-CB)

SUMMARY AND PURPOSE OF DOCUMENT

This document contains the report by the chairperson of the Data Buoy Cooperation Panel (DBCP) Task Team on Capacity Building (TT-CB), and provides details on the outcome of DBCP Capacity Building activities during the last intersessional period, including: 1) Outcomes and Recommendations from 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 at Korea Maritime and Ocean University (KMOU) in Busan, Republic of Korea (See also DBCP Technical Document 55, 2015), 2) Outcomes and Recommendations of the "Second Pacific Islands Training Workshop on Ocean Observations and Data Applications" (PI-2) Noumea, New Caledonia 24-27 May, 2016 2) 3) Discussions underway for NPOMS-5 and PI-3 in 2017.

ACTION PROPOSED

The Meeting is invited to note the information contained in this document when discussing how it organizes its work and formulates its recommendations.

Appendices:

- A.** Report by the Task Team on PANGEA Capacity Building Activities for 2016
- B.** Terms of Reference of the DBCP Task Team on Capacity Building
- C.** Proposed goals for DBCP Capacity Building activities in 2017

DISCUSSION

-A- DRAFT TEXT FOR INCLUSION IN THE FINAL REPORT

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. 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 The meeting agreed on the following:

- To convene the “Fifth DBCP in-Region North Pacific Ocean and Marginal Seas 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 2017. 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*);

7.3.3 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.

APPENDIX A

REPORT BY THE TASK TEAM ON CAPACITY-BUILDING (TT-CB)

Partnerships for New GEOSS Applications (PANGEA)

During November 4-11 2009, the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology ([JCOMM](#)) Third Session held in Marrakesh Morocco endorsed the Partnership for New GEOSS Applications ([PANGEA](#)) concept. PANGEA provides for in-country practical applications training of ocean data to large and diverse groups of regional participants and fostering partnerships between developed and developing countries to realize the socio-economic benefits of ocean observing systems. Since the inception of PANGEA, a series of workshops has been convened by the DBCP as part of their contribution to the PANGEA concept:

- [1st Western Indian Ocean Capacity Building Workshop](#)
- [2nd Western Indian Ocean Capacity Building Workshop](#)
- [3rd Western Indian Ocean Capacity Building Workshop](#)
- [4th Western Indian Ocean Capacity Building Workshop](#)
- [1st In-Region Capacity Building Workshop for Asian Countries](#)
- [2nd Typhoon Workshop for the North Pacific Ocean and Marginal Seas \(NPOMS-2\)](#)
- [5th Western Indian Ocean Capacity Building Workshop](#)
- [3rd Typhoon Capacity Building Workshop for the North Pacific Ocean and Marginal Seas](#)
- [1st Pacific Islands Training Workshop on Ocean Observations and Data Applications](#)
- [Second Pacific Islands Training Workshop on Ocean Observations and Data Applications \(PI-2\)](#)

I. Outcomes and Recommendations of the “Fourth North Pacific Ocean and Marginal Seas” ([NPOMS-4](#)) Capacity Building Workshop in Busan, South Korea 2-4 November 2015.

As agreed at DBCP-31, the DBCP convened its Fourth North Pacific Ocean and Marginal Seas (NPOMS-4), "Application of Regional Ocean Observations for Increasing Society's Understanding and Forecasting of Typhoons", 2-4 November 2015 generously hosted by Korea's Maritime and Ocean University as continuation of the Task Team's fruitful [NPOMS-3](#) Typhoon Workshop in Kyoto Japan October 2014 at the University of Kyoto Graduate School in Advanced Integrated Studies (GSAIS) Co-Hosted by Japan's Disaster Prevention Research Institute (DPRI).

NPOMS-4 Co-Sponsors are the DBCP, KMOU and NOAA's Office of Climate Observation (OCO).

The Following Recommendations reflect the needs of this NPOMS-4 Workshop and of the long-term Ocean-Climate Monitoring Capacity for Regional Cyclogenesis and Forecasting:

NPOMS-4 WORKSHOP RECOMMENDATIONS

1. Workshop participants and Members/Member States of the NPOMS region are invited to participate in the DBCP activities, establish partnerships, and build on potential synergies (sharing observing platforms and instruments, deployment opportunities, training opportunities). The Technical Coordinator Champika (cgallage@jcommops.org) is acting as a focal point between all actors involved in buoy activities, and can provide technical assistance and support upon request.
2. Members making relevant ocean observations are urged to comply with existing WMO and IOC data policies ([WMO resolution 40, Cg 12](#)) and share the data in realtime on GTS. In particular, efforts should be made in the NPOMS region to augment the “973 Typhoon Array” met/ocean observing array (of China) with contributions from other countries, and to share the data in real-time (including “973 Array” data). Particularly important variables to measure are Sea Level Pressure (SLP) and upper ocean heat content. Additional variables to measure include air relative humidity, sub-surface currents, and waves.
3. Members in the NPOMS region are encouraged to make use of (i) the **DBCP barometer upgrade scheme** (details below) and (ii) the [DBCP-VOS drifter donation programme](#) (drifter with SLP reporting from the deck of a ship) (the Technical Coordinator of the DBCP can provide technical assistance on how to benefit or participate).

4. NPOMS supports the DBCP efforts to make **wave observations from drifters**. The guidance of drifter communications should be provided. (Note: CMA offered to add additional comments for this recommendation). This can be expanded to all platforms.
5. NPOMS recognizes the importance of training on met/ocean observations requirements and met/ocean observing systems implementation, and **supports the establishment of the NPOMS Training Centre at the Busan National University**, Republic of Korea.
6. **NPOMS support the development of TPOS-2020** project, and is inviting it to take into account the observational user requirements for typhoon prediction.
7. Consider inviting representatives of the data buoy business sector in NPOMS-5.
8. Include a scientific framework in future NPOMS Workshops for risk impacts (risk assessment and economic impacts).
9. KMA has experience with operational ocean models, and marine observations. Korea can assist other countries for setting up infrastructure (e.g. storm surge model), and for training on marine observations. Interested countries in the NPOMS region are invited to use this opportunity. **KMA is invited to contribute to these important initiatives and participate in NPOMS-5.**
10. NPOMS is inviting National Meteorological Services in the NPOMS Region, and KMA in particular, to make use of the DBCP **SVPB drifter barometer upgrade [scheme](#)**.
11. The [Ocean and Climate Platform](#), working with the IOC to start addressing Capacity building for empowering vulnerable states to engage in ocean observing activities. **It is also recommended that the platform should advocate the making of more ocean observations**, and their use to address mitigation of high impact weather events.
12. **NPOMS-4 recommends merging NPOMS activities with the North Pacific Data Buoy Advisory Panel ([NPDBAP](#)) DBCP Action Group**, in order to better build on potential synergies between buoy deployment activities of NPDBAP, and capacity building and network design activities of NPOMS, and assure better continuity and **national representation** of NPOMS countries in all these activities.
13. An important scientific question emerged from NPOMS-4, how important is stratification in the NPOMS region to TC development? To answer this question, more strategic observations are required, to include upper ocean heat content. Observations can also help assessing the impact of warm and cold eddies on intensification of typhoons. **A centralized data centre** should be established to collect data of interest for impact studies. Impact of data should be assessed e.g. through OSEs, hindcast sensitivity studies can also be made, and efforts made to assimilate more of existing impactful data.
14. An in-depth **inventory** of available observing systems should be made (pre-requisite before designing the required observing system). For example, the research community has data, e.g. in the biological community. **NPOMS National Focal points** (Korea, Japan, China, Taiwan-Province of China, Indonesia, Thailand, Philippines and others) are needed for investigating feasibility of such an inventory and coordinating the gathering of initial information. Information should also be collected on possible barriers for sharing the data; and strategies identified for removing such barriers.
15. Members are encouraged to engage and use the [WMO Rolling Review of Requirements \(RRR\)](#) model. Reach out to WMO Commission for Basic System, [WMO Tropical Cyclone Programme](#), and JCOMM Expert Team on Operational Ocean Forecasting Systems ([ETOOFS](#)) to address some important and identified science questions for typhoon prediction. Feedback to then be provided to NPOMS.
16. **More communications and cooperation between countries in the region is needed** (e.g. Korea, Japan, China) for better typhoon forecasting and observing systems addressing the corresponding requirements. Members in the NPOMS region are encouraged to **organize a “[Fanape typhoon](#)” workshop** looking at the different models used, existing data, impact of data, stratification issue, etc. in the view to make recommendations on how to improve the observing system and data assimilation. **A central Training Centre could play a constructive role in promoting such activities**, and assist developing countries to develop their own typhoon prediction capacity in a way consistent with the requirements of the region. Identify Target Storms to focus the training for modellers.

More Students are encouraged to participate at NPOMS training events and to present results at NPOMS-5.

II. Outcomes and Recommendations of the *Second Pacific Islands Training Workshop on Ocean Observations and Data Applications (PI-2) 24-27 May 2016, Noumea, New Caledonia.*

As contributions to the PANGEA concept in 2016, The DBCP and Partners supported the *Second Pacific Islands Training Workshop on Ocean Observations and Data Applications*”.

PI-2 was by generously sponsored by:

1. Institut de recherche pour le développement ([IRD](#))
2. Pacific Island Global Ocean Observing System ([PI-GOOS](#))
3. Secretariat of the Pacific Regional Environmental Programme ([SPREP](#))
4. Secretariat of the Pacific Community ([SPC](#))
5. Pacific Islands Ocean Observing System ([PacIOOS](#))
6. Tropical Pacific Observing System ([TPOS](#))
7. NOAA's Office of Climate Observation ([OCO](#))

The Pacific Islands are a region of “Large Ocean States” in which 98% of the region is ocean, and the majority of the land area is part of Papua New Guinea. The ocean is essential to Pacific Islander’s way of life, yet there is limited knowledge of the oceans in region, and limited skill in using ocean data. Currently there is a growing awareness of the importance of the oceans, highlighted most recently at the 3rd UN SIDS conference in Samoa. Oceanographic capacity is limited within the Pacific Islands region, and generally resides within local meteorological services. However, there is a strong interest in increasing capacity to collect, analyze, and communicate oceanographic data across a number of sectors such as meteorology and climate services, fisheries, marine trade, and tourism. Increasing capacity in these sectors will increase the livelihoods of Pacific Islanders, and will allow them to more effectively engage in the global ocean community.

The PI-2 Recommendations and Action Items are as follows:

1. Coordinate existing projects & proposals on inundation. Bringing all partners to report on what is being achieved. Lead: PACIOOS, Support: SPC, Status: Ongoing.
2. Create a directory of contacts for stakeholders on ocean observations. Build on JCOMM ocean experts. Lead: COSPPAC, Support: UH-SLC, Due: End of 2016.
3. PICS collaborate for more drifter deployments in the region. Lead: JCOMMOPS Support: SCRIPPS/SPREP/PIGOOS. Status: Ongoing.
4. Write a briefing note that says ocean observation are key in our region both offshore (e.g. TPOS) and in coastal areas (e.g. Ocean Acidification). Lead: PIMOS panel, Support: IRD, SPC, SPREP, CSIRO, CLIVAR Pacific panel, USP. Due: Before TC committee in August and DBCP board meeting in October
5. Create a method/mechanism of communication amongst ocean observation focal points. Lead: SPREP/PIGOOS, Support: SPC. Due: October 2016.
6. ID ocean focal points in countries. Identify different mechanism for each country. Lead: SPC, SPREP/ NMS/WMO. Due: End 2016
7. Lobby for more wave buoys and tide gauges in the region. Lead: PIMOS Panel, Support: SPC, IRD, SPREP, PACIOOS. Status: Ongoing.
8. Identify instrument calibration alternatives (China, Local). Lead: USP, Support: SPC, RMIC, IRD Due: End of 2016.
9. Create a guide/compendium of data/data products and how to access them. Lead: PIGOOS Support: SPC, PACIOOS, IRD-GOPS. Due before 3rd Pacific Islands Workshop (PI-3).
10. Hold hands-on targeted workshop on oceans, to include tides. Lead: PI-3 Host, Support:

11. Request USP to design courses on oceanography in Meteorology curriculum. Lead: USP, Support: NMS, PIETR, IRD, SPC, SPREP, PIMOS. Due: End of 2016

PI-2 Roundtable Discussion:

How Best to Serve PI Stakeholders by Strengthening Existing Ocean Observing Systems to Continue Operations and to Help Fill Identified Gaps

This discussion centered on evaluating where there are ocean observing systems and data product gaps within the Pacific Island Countries and Territories. Many initiatives and ideas for planning and coordinating a regional observational system were discussed along with what would be needed to have a more robust system.

Several areas were identified as priority areas (listed below) and had similar needs. Adequate bathymetry data is needed for all coastal priority areas, and vulnerability and gap analysis, training in the use of marine data, and improved data products are needed for all priority areas. Priority areas and needs/gaps:

- Coastal Inundation and Coastal Hazards
 - There are currently limited forecasting and early warning systems in place for coastal inundation and coastal hazards. Current needs are for adequate resolution bathymetry data and grid, metadata catalogue of what data is available, staff for data entry/analysis, and gridded data into data portals (user friendly, note that this is a onetime effort). Gaps include the need for improved tsunami monitoring and warning systems (especially in areas with locally generated tsunamis), and improved coastal inundation and hazards data products and delivery.
- Tsunami monitor systems
 - There is a gap in the coverage of deepwater tsunami monitoring systems, including the exploration of the Green Cables initiative which is looking at instrumenting telecom cables with ocean bottom seismometers, pressure sensors, etc. An additional opportunity was noted to add extra sensors to existing and new tsunami monitoring buoys for ocean and climate observing. The need for information and awareness raising in vulnerable countries, sources of additional funding, and information on countries installing telecom cables in the near future were noted. The IOC JTF on tsunamis has agreed to help pursue additional opportunities.
- Tide Gauges
 - Gaps in tide gauge coverage need to be identified, including reviewing the Sea Level Center at the University of Hawaii and Pacific Sea Level Monitoring Project (Australia Bureau of Meteorology). New tide gauges should be prioritized based on where there are coverage gaps. It was noted that there is only 1 tide gauge in FSM (Yap state), and that a second one is coming online soon in Chuuk state.
- Maritime safety and marine forecasting
 - There is a gap in the coverage of high-resolution marine forecasts, including access and coverage to HyCom, BlueLink OceanMaps, Mercator project (real time data). There is also a need for additional training, data products and delivery.
- Sea Level Pressure and Support for Meteorology
 - There are significant gaps in sea level pressure data coverage across the region, and a need to improve sensor coverage. The use of surface drifters and other autonomous platforms for low cost monitoring were noted.
- Data Products for Users (Fisheries, maritime safety, tourism, etc.)
 - There are gaps in data products for specific sectors and the need to document regionally appropriate best practices.
- ❖ Training/Capacity Building

- o There are significant capacity gaps in the region, and the need for education in oceanography, hands on training in the use and access to marine data, and distance education platforms. In the future there is the need for more participants from the region in capacity building workshops, and to invite participants from a wider range of sectors (namely fisheries, maritime safety and tourism). An additional need to have ocean focal points for all countries and territories.
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- ❖ Funding
 - o There are significant resource gaps in the region and the need for increased international and local support – both in-kind and local commitment.

APPENDIX B

**TERMS OF REFERENCE OF THE
DBCP TASK TEAM ON CAPACITY-BUILDING (TT-CB)**

(As adopted at DBCP-28)

The DBCP Task Team on Capacity-Building shall:

1. Initiate, plan and coordinate the implementation of the Training and Capacity-Building work programme including, in particular, Training Course on Buoy Programme Implementation and/or Data Management; coordinate production of relevant training materials, and identify lecturers;
2. In parallel with the organization of training programmes, keep under review existing training material (paper and electronic) and advise on updating and developing new DBCP standard material in this regard; and investigate ways to add training material from all capacity building activities to IOC/IODE OceanTeacher;
3. Review and assess national, regional, and global requirements for capacity-building and develop / improve programmes as appropriate;
4. Liaise with other capacity-building programmes in relevant areas to develop and implement integrated activities, to explore potential synergies and opportunities for efficiently using resources available; liaise in particular with the JCOMM cross-cutting Team on Capacity-Building;
5. Endeavour to mobilize the resources required for DBCP capacity-building, including those needed for the implementation of the Training Courses;
6. Make recommendations to the DBCP Executive Board and / or the DBCP for addressing the issues above;
7. Report to the DBCP Executive Board and the DBCP at its biennial Sessions;
8. Consider inviting mariners and shipping companies to the DBCP Capacity Building workshops as a way to advertise the ocean observation activities and seek their support;
9. Make sure the data buoy vandalism aspects are being addressed as part of its activities;
10. Investigate on possible cooperation with relevant Capacity Building programmes in WMO and IOC.

DBCP-TT-CB Membership:

The membership is open to all Panel members. The Chairperson¹, appointed by the Panel, has selected the following team members:

Dr. Sidney THURSTON, NOAA/OCO (TT-CB Chairperson)	Dr. R. Venkatesan, NIOT/India (TT-CB Vice-Chairperson) DBCP Technical Coordinator
DBCP Executive Board members, including	
DBCP Chairperson, Vice-chairpersons (or their Respective Deputies)	Sang Kil PARK (Republic of Korea)
Hamad Mohammed AL GHEILANI (Oman)	Mathieu BELBEOCH (JCOMMOPS)
Rick LUMPKIN (USA)	Walter FLORES SERVAT (Peru)
Djoko HARTOYO (Indonesia)	Dr. G. LATHA (India)
Byung-Gul LEE (Republic of Korea)	Kwan-Chang LIM (Republic of Korea)
David MELDRUM (UK)	John MUNGAI (Kenya)
	Lucy SCOTT (South Africa)
Adote Blim BLIVI (Togo)	
Louise WICKS (Australia)	Jean ROLLAND (France)
Representative of the IOC Secretariat	Representative of the WMO Secretariat
Juliet HERMES (South Africa)	Santjie du TOIT (South Africa)

1 The Chair and Co-Chair of the Task Team should not be in a situation of conflict of interest.

APPENDIX C

PROPOSED GOALS FOR DBCP CAPACITY BUILDING ACTIVITIES IN 2017

Two (2) DBCP TT-CB Capacity Building Workshops are being proposed to the Executive Board during DBCP-32 for their consideration in 2017 as follows:

I. The Fifth Capacity Building Workshop of the WMO/IOC Data Buoy Cooperation Panel (DBCP) for the North Pacific Ocean and Its Marginal Seas (NPOMS-5), *Application of Regional Ocean Observations for Increasing Society's Understanding and Forecasting of Typhoons*, will be advanced during DBCP-32 for the following date and location:

National Marine Data and Information Service (NMDIS)
Tianjin, China
April/May 2017.

II. During PI-2 in Noumea of May 2016, the following proposed location was offered for the DBCP's Third Pacific Islands (PI-3) Training Workshop on Ocean Observations and Data Applications. This location will be proposed at the DBCP-32 Executive Board meeting for their consideration:

Apia, Samoa (Secretariat of the Pacific Regional Environment Programme, SPREP)
June/July 2017.

Finally, Preliminary discussions are underway 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 contributing to the *Second International Indian Ocean Expedition (IIOE-2)*. Details remain to be confirmed.