



Data Buoy Cooperation Panel (DBCP)
Training Workshop on Ocean Observations for Weather Forecast and Climate Prediction
(focusing on the western Pacific and the Indian Ocean regions)

06 to 08 August 2024
West Java and Jakarta, Indonesia

Version 1.0



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NOTES

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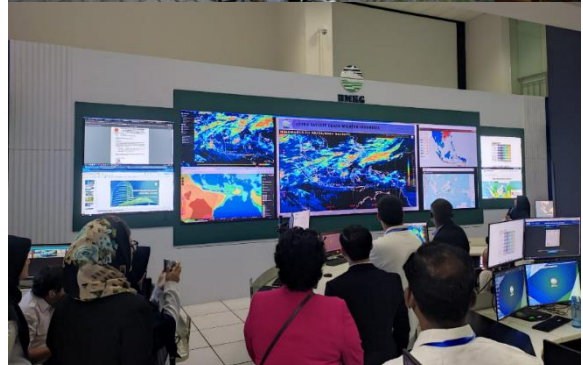


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Data Buoy Cooperation Panel (DBCP)

Training Workshop on Ocean Observations for Weather Forecast and Climate Prediction

SUMMARY

The Annual Data Buoy Cooperation Panel (DBCP) Training Workshop, held from August 6-8, 2024, was conducted at the Regional Training Center of the Agency for Meteorology, Climatology, and Geophysics of the Republic of Indonesia (BMKG) in Citeko, West Java, and at the BMKG Headquarters in Jakarta. This workshop, organized by BMKG in collaboration with the Data Buoy Cooperation Panel (DBCP) Task Team on Capacity Development, the World Meteorological Organization (WMO), and the Intergovernmental Oceanographic Commission (IOC) of UNESCO, focused on advancing ocean observations for weather forecasting and climate prediction in the western Pacific and Indian Ocean regions.

The workshop was inaugurated by key speakers, including Prof. Dwikorita Karnawati, Permanent Representative of Indonesia with WMO and Head of BMKG, Ms. Champika Gallage from the WMO Secretariat, Dr. Nelly Riama, Chair of DBCP, and Ms. Qiu (Rachel) Jiang, Chair of the Capacity Development Task Team of DBCP. These speakers underscored the critical role of ocean observations in enhancing weather and ocean predictions, climate monitoring, and research, all of which are essential for societal benefits. They also emphasized the increasing need for observations related to extreme weather events and the global initiative for "Early Warning for All."

The workshop saw the participation of 47 individuals onsite, including 39 trainees and 8 speakers from 27 countries, while approximately 200 participants joined online. Notably, 35% of the participants were female. Participants list is provided in Annex 2. Financial support from DBCP enabled 27 trainees to attend in person, with BMKG providing local logistics, including accommodation and meals.

The workshop aimed to improve ocean observations for weather forecasting and climate prediction in the Indian and western Pacific Oceans. Key themes included ocean data requirements, access and management, application in forecasting and climate prediction, and fostering regional cooperation. The workshop Agenda is provided in Annex 1.

The first two days of the workshop were held at BMKG Training Center in Citeko, West Java, focusing on data requirements, management, and access. Participants gained insights into Indonesia's Marine Meteorology Services (MMS) Project, the WMO's Integrated Global Observing System (WIGOS), Global Basic Observing System (GBON), WMO Information System 2.0 (WIS2.0), and the Systematic Observations Financing Facility (SOFF). The session also covered practical topics like metadata management, the challenges of maintaining ocean observation infrastructure, and the importance of wave buoys in oceanic wave transformation measurement. The significance of accurate data in improving weather models, especially in predicting extreme weather events like cyclones, and typhoons were also discussed. In-depth discussions on the Madden-Julian Oscillation (MJO), which is vital for this region, identified the need for more comprehensive and accurate observations of boundary layer parameters, especially Sea Surface Temperature (SST) and Relative Humidity (RH), to improve weather models, understanding air-sea interactions, identifying biases in climate models and re-analysis data, particularly for extreme weather events.

The second day was dedicated to exploring data applications in forecasting. Participants learned from experts about various ocean data applications, including the use of RAMA/TRITON/TAO buoy data, internal wave detection, rip current observations, oil spill modeling, and methods for tropical cyclone prediction. The session also covered global ocean carbon and acidification monitoring and its impact on tropical oceans, as well as the use of satellite oceanography for operational predictions.

The final day of the workshop took place at BMKG headquarters in Jakarta, focusing on data application in climate prediction and regional cooperation. Discussions included the Marine Climate Data System, seasonal ocean predictions for tropical areas, and the role of the Indonesian Throughflow (ITF) in climate conditions. Participants learned the best practices used in strengthening the capacity of Indonesian weather and marine services from observation to the development of the threeway coupled atmospheric-ocean-wave model (InaCAWO). Participants also had the opportunity to visit and learn from BMKG's operational centers for Meteorological Early Warning System, Climate Early Warning System, and Tsunami Early Warning System, further solidifying their understanding of the practical applications of the knowledge gained during the workshop.

Presentations by participating countries highlighted the varying levels of ocean observation infrastructure across nations, with some relying on partnerships with neighboring countries to maintain their systems.

Discussion during the workshop resulted in 10 recommendations, which are provided in Annex 3.

The workshop concluded with a certificate presentation by Prof. Karnawati, who emphasized the importance of buoy data in service delivery and the need for strengthened regional collaboration.

A post-workshop survey was conducted to gather feedback, with 102 participants completing the survey. A summary of the survey results is provided in Annex 4.

**Annex 1
Workshop Agenda**

Day 1: 06 August 2024 (Citeko, Indonesia)

Local Time (UTC+7)	Subject	Lead
Registration		
09.00 - 09.30	<ul style="list-style-type: none"> - Opening Remarks and Objectives by DBCP Chair - Opening Remarks by WMO - Opening Remarks by DBCP-TT-CB Chair 	Dr. Nelly Florida Riama Champika Gallage Qiu (Rachel) Jiang/Remote
09.30 - 09.40	Group Photo	
09.40 - 10.00	Coffee break	
10.00 - 10.10	Logistic Information	Anni Arumsari Fitriany
Session 1: Requirements for Data (Moderator: Asteria Handayani)		
10.10 - 10.40	1. BMKG Strengthening Capacity on Marine Data Observation	Riris Adriyanto (BMKG-Indonesia)
10.40 - 11.10	2. GBON Ocean Integration and WIS 2.0	Champika Gallage (WMO)
11.10 - 11.40	3. GTS and WIS2.0 Pilot	Lancelot Braasch (UCSD)/Remote
11.40 - 12.00	4. GOOS Update incl. Data Strategy	Emma Heslop (IOC)/Remote
12.00 - 13.00	Lunch break	
Session 2: Data Management and Access (Moderator: Muhammad Arief Rahman)		
13.00 - 13.15	Welcoming Speech by Permanent Representative of Indonesia with WMO	Prof. Dwikorita Karnawati
13.15 - 13.45	5. OceanOPS and DBCP Metadata	Long Jiang (OceanOPS)/Remote
13.45 - 14.45	6. Establishment of a national coastal wave buoy network in Australia	Jeff Hansen (UWA)

14.30 - 15.00	7. Updates of Solomon Island Wave Drifter Pilot	Max Sitai (Solomon Island)
15.00 - 15.30	Coffee Break	
15.30 - 16.30	8. Application of the moored buoy data to monitor and predict the extreme disasters associated with cyclone/typhoon and Madden-Julian Oscillation crossing over the maritime continent	Weidong Yu (Sun Yat-Sen University)
16.30 - 17.00	9. International Comprehensive Ocean-Atmosphere Data Set (ICOADS)	Huai-Min Zhang (NOAA)/Remote
17.00 - 17.30	National Reports	Participants
18.30	Welcome Dinner	BMKG

Day 2: Wednesday, 07 August 2024 (Citeko, Indonesia)

Local Time (UTC+7)	Subject	Lead
Session 3: Data Application in Forecasting (Moderator: Furqon Alfahmi)		
08.30 - 09.00	10. Application of RAMA/TRITON/TAO buoys	Michael McPhadden (NOAA PMEL)/Remote
09.00 - 10.00	11. Discerning subseasonal pulses in the Indo-Pacific warm pool and Gulf Stream system	Kandaga Pujiana (NOAA AOML)/Remote
10.00 - 10.30	12. Wave Data Sources along the US Coastline	Candice Hall (USACE)/Remote
10.30 - 11.00	Coffee break	
11.00 - 11.30	13. Detection of internal wave and the impact for vessel or submarine safety	Nining Sari Ningsih (ITB-Indonesia)
11.30 - 12.00	14. Rip current observations and implementation warning for society	Wahyudi Citrosiswoyo (ITS-Indonesia)
12.00 - 12.30	15. Oil spill and drifting modeling for marine emergency response applications	Jiangling Xu (NFDMC of MNR)/

		Remote
12.30 - 13.30	Lunch Break	
Session 3: Data Application in Forecasting (continued) (Moderator: Ratih Prasetya)		
13.30 - 14.00	16. Co-design exemplar tropical cyclone	Scott Glenn (Rutgers)/Remote
14.00 - 14.30	17. Tropical Cyclone/Hurricane and Storm surge predictions methods	Nadao Kohno (JMA)/Remote
14.30 - 15.00	18. Drifter data	Udaya Baskhar (INCOIS)/Remote
15.00 - 15.30	19. Global ocean carbon and acidification monitoring and its impact for tropical ocean	Yosuke Iida (JMA)/Remote
15.30 - 16.00	Coffee Break	
16.00 - 16.30	20. Satellite oceanography for ocean operational predictions	Johnson Lumban Gaol (IPB- Indonesia)
16.30 - 17.00	National Reports	Participants
19.30 -	Move to Jakarta, BMKG HQs (after dinner)	Anni Arumsari Fitriany

Day 3: Thursday, 08 August 2024 (BMKG HQ, Indonesia)

Local Time (UTC+7)	Subject	Lead
Session 4: Data Application in Climate Prediction (Moderator: Marjuki)		
08.30 - 09.30	21. Marine Climate Data System	Tim Boyer (NCEI/NOAA)/Remote
09.30 - 10.30	22. Global, Seasonal ocean predictions for tropical area	Francis P.A (INCOIS)/Remote
10.30 - 10.45	Coffee Break	
10.45 - 11.00	23. BMKG-RTC Report	Ratih Prasetya

		(BMKG-Indonesia)
11.00 - 11.30	24. Regional, Role of Indonesian throughflow (ITF) for climate conditions	Iskhaq Iskandar (UNSRI-Indonesia)
11.30 - 12.00	25. Indonesian weather and marine services from observation to coupling modeling - InaCAWO	Andri Ramdhani (BMKG-Indonesia)
12.00 - 13.00	Lunch Break	
Technical Visit to BMKG Operation Centre		
Session 5: Regional Requirements and Cooperation (Moderator: Samuel Adiprabowo)		
14.00 - 15.00	26. National Reports (incl. services)	All Participants
15.00 - 15.30	Coffee Break	
15.30 - 16.00	27. Preliminary results of TT-CB review	Jiang Fan (NFDMC of MNR)/Remote
16.00 - 17.00	28. Roundtable Discussion for Future Plans	Dr. Weidong Yu/Dr. Nelly Florida Riama
17.00 - 18.00	Award Certificates for Participants Closing Speech	Prof. Dwikorita Karnawati
18.00	Close of the session	

Annex 2

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Annex 3

Recommendations and Action items arising from the workshop

RECOMMENDATIONS

1. There are many ocean observation gaps in the Indian and western Pacific Regions, and the majority of members do not have the financial capacity to comply with GBON ocean requirements. Therefore, participants requested that WMO make SOFF funding available for ocean observations.
2. It is recommended that member countries adopt the FAIR and open access rules and EOV/ECV requirements to guide their observing network development.
3. Some participants faced challenges with WIS 2.0 initiation. It was apparent that not all members are familiar with where to find assistance for WIS2.0 transition. It is recommended that this information is made available in an easily accessible location. It is noted that BMKG has conducted a WIS2.0 training workshop. This material will be made available in a broader scope.
4. A number of successful regional collaborations were demonstrated that provided beneficial outcomes to all engaged parties (e.g. India – Seychelles, Indonesia – China, Indonesia-USA). Other members are encouraged to initiate such collaboration. Workshops like this facilitate the initiation of such collaborations.
5. Ocean platforms such as moored buoys help identify the model and re-analysis bias in the air-sea heat-flux during extreme events such as cyclones: ERA demonstrates the overestimated latent heat-flux, which calls for more SST, Atmospheric Temperature, RH observation.
6. Moored buoy helps clarify the role of SST and mixed layer heat content in supporting MJO crossing the Maritime continent. This emphasizes the importance of maintaining moored buoys in such critical regions. The regional cooperation is called for the enhancements of buoy observations over the Indian ocean and the western Pacific Ocean.
7. Tropical cyclone exemplar (UN Decade) project needs engagement from the nations in the region. Workshop participant countries are requested to engage in the exemplar project through applicable IOC regional alliances or WMO Regional Associations and to work towards establishing collaborations between countries primarily to acquire adequate observations from the region for better TC forecast.
8. The forecasting methods for TCs and storm surges have enormously developed over the decades and are now very reliable. However, it is recommended that member countries to collect more data (EOVs) and encourage RTCs to assist member countries in improving data analysis capacity to resolve forecast uncertainty and understanding of unknown physics, which are not explained through regular models.
9. The WMO/IOC Marine Climate Data System (MCDS) provides global climate data products that are freely available to users. There are many existing data gaps, such as Indonesian throughflow (ITF). Therefore, WMO and IOC are requested to assist the member countries in sharing their data to MCDS.
10. Encourage member countries to timely share the knowledge of disaster early warning disseminations.

Annex 4

Post-workshop survey results summary

102 participants responded to the post-workshop survey; the survey summary is provided below.

1. How satisfied were you with the workshop?

Very satisfied	75%
Somewhat satisfied	22%
Neither satisfied nor dissatisfied	0%
Somewhat dissatisfied	0%
Very dissatisfied	0%

2. How likely are you to recommend this workshop to others?

Very likely	77%
Somewhat likely	20%
Neither likely nor unlikely	1%
Somewhat unlikely	0%
Very unlikely	0%

3. Was the workshop length appropriate?

Too short	24%
Just right	69%
Too long	5%

4. Was the workshop pace appropriate for you?

Very good	52%
Somewhat good	35%
Neutral	11%
Somewhat bad	0%
very bad	0%

5. How useful was the content presented in the workshop?

Extremely useful	71%
Somewhat useful	27%
Neutral	0%
Somewhat not useful	0%
Extremely not useful	0%

6. Was the content presented in a clear and understandable way?

Very clear and understandable	54%
somewhat clear and understandable	42%
Neutral	2%
Not very clear and understandable	0%
Not at all clear and understandable	0%

7. Was the workshop relevant to your needs?

Very relevant	61%
Somewhat relevant	35%
Neutral	2%
Not very relevant	0%
Not at all relevant	0%

8. What do you like the most about the workshop?

Summary of comments:

Relevant and Useful Content: Participants found the workshop topics highly relevant, especially for their work in marine forecasting and meteorology. The content was seen as practical, informative, and applicable.

High-Quality Presentations: The presentations were praised for their clarity, organization, and depth. The expertise of the presenters was particularly appreciated.

Global Perspective and Networking: The inclusion of speakers from various countries and the discussion of global ocean observations were valued. Participants appreciated the opportunity to gain insights from other countries and enhance regional cooperation.

Practical Applications: Many participants highlighted the workshop's focus on the practical application of ocean data for weather forecasting and climate prediction.

Organizational Excellence: The workshop was well-organized, with positive feedback on logistics, venue, and the overall execution of the event.

Diversity of Topics: The variety of topics, including marine data, tropical cyclone predictions, and the use of data from buoys, was well-received.

Valuable Knowledge and Skills: Participants reported gaining new knowledge and skills, particularly in areas related to marine observations, data application in forecasting, and the latest technologies.

Positive Experience: Overall, the workshop was described as a valuable learning experience, with participants expressing satisfaction with the organization, hospitality, and the opportunity to meet international colleagues.

9. What do you like the least about the workshop?

Summary of comments:

Connection and Audio Issues: Several online participants faced audio and connection problems during the workshop, making it difficult to follow the presentations.

Short Duration: Many participants felt that the workshop was too short and that more time was needed for discussions and to fully grasp the content.

Time Management: The schedule was considered too tight, leaving insufficient time for discussions and practical sessions. Some presentations felt rushed.

Preference for Offline Events: A preference for in-person workshops was expressed, as some found it challenging to engage fully in the online format.

Lack of Practical Sessions: Participants suggested that hands-on activities or practical sessions would enhance understanding and engagement.

Logistical Issues: Some participants mentioned issues with sleeping arrangements and the distance of the event from their location.

Language Barriers: There were some difficulties in understanding discussions and presentations due to language differences.

10. How can we improve the workshop in the future?

Summary of comments:

Audio Issues: Several participants noted problems with the sound quality, particularly in Zoom, and suggested improvements in audio preparation, using noise filters, and better microphone settings.

Extend Workshop Duration: Many participants suggested extending the workshop by adding extra days or allowing more time for each session.

Practical Sessions: A desire for more hands-on, practical exercises and offline sessions was frequently mentioned.

Offline and Online Balance: There were calls for increasing the quota for offline participants and improving the experience for online attendees, including better interaction.

Varied Topics and Presenters: Participants expressed interest in including more diverse themes and technical sessions.

Improved Event Organization: While the workshop was praised for its organization, there were suggestions for increased time for Q&A, and more focus on regional collaboration and specific case studies.

Increased Networking Opportunities: Participants suggested adding open sessions, breakout groups, and more opportunities for discussion and networking.

Repetition and Expansion: Many appreciated the event and encouraged holding similar workshops more frequently, with more varied topics and international participation.

11. Overall, how satisfied are you with the training/workshop?

Very satisfied

75%

Somewhat satisfied	22%
Neither satisfied nor dissatisfied	0%
Somewhat dissatisfied	0%
Very dissatisfied	0%