Intergovernmental Oceanographic Commission of UNESCO

World Meteorological Organization

D A T A B U O Y C O O P E R A T I O N P A N E L

RECOMMENDATIONS/ACTIONS OF THE FIFTH PACIFIC ISLANDS TRAINING WORKSHOP ON OCEAN OBSERVATIONS AND DATA APPLICATIONS (DBCP-PI-5)

26-27 May and 09-10 June 2021, Virtual Session

DBCP Technical Report No. 62

– 2021 –

PI-5 Participants

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Organized by
World Meteorological Organization and Secretariat of the Pacific Community

Virtual session

DBCP Technical Report No. 63

2021

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Workshop Report

PI-5 is a Workshop in a Series of IOC/WMO JCOMM PANGEA Workshops:

- 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
- 4th Typhoon Capacity Building Workshop for the North Pacific Ocean and Marginal Seas
- 2nd Pacific Islands Training Workshop on Ocean Observations and Data Applications

- 5th Typhoon Capacity Building Workshop for the North Pacific Ocean and Marginal Seas
- 3rd Pacific Islands Training Workshop on Ocean Observations and Data Applications and 5th JCOMM marine instrument workshop for Asia-Pacific region
- 4th Pacific Islands Training Workshop on Ocean Observations and Data Applications

Fifth Pacific Islands workshop (PI-5) was organized by the WMO/IOC Data Buoy Cooperation Panel (DBCP), and the Pacific Community (SPC). The composition of the Organizing Committee is provided in Annex 8. Due to COVID-19 pandemic related global travel restrictions, workshop was held in virtual format over ZOOM platform.

Workshop was organized in two parts with a break in between where participants were given an assignment to complete and report back during the second part. The first part of the workshop took place on 27th and 28th May and the second part on 10th and 11th June, 2021 for three hours each day. Workshop consisted of an opening with keynote speeches and nine focused sessions. About hundred and sixty-one (161) participants from forty-one (41) countries registered for the workshop (see list of participants in Annex 2).

The following PI-5 sessions took place (see complete agenda in Annex 1):

1. Workshop opening (with 3 keynote speeches)
2. Session 1: Global Ocean Observing System,
3. Session 2: Country reports (from Pacific Island countries)
4. Session 3: Ocean observations for decision-making in the Pacific,
5. Session 4: Ocean Outlooks
6. Session 5: Learning from sector engagement,
7. Session 6: Sensor solutions for Pacific Islands
8. Session 7: Ocean data accessibility and sharing
9. Session 8: Quality Control and Quality Assurance
10. Session 9: Next steps for the Pacific and the UN Ocean Decade

Opening Session was led by Ms. Champika Gallage from the WMO Secretariat. Welcome speech was made by Ms Qiu Jiang (Rachell), the chair of the DBCP Task Team on Capacity Building (TT-CB). Reverant James Sri Bhagwan delivered an opening devotion with a word of prayer to bless the virtual meeting.

Three keynote speeches were made by Mr. Lars Peter Riishojgaard, Director of Infrastructure at WMO on WMO Global Basic Observing System (GBON) and Systematic Observations Financing Facility (SOFF); Mr. Boris Kelly-Gerreyn, the Chair of the DBCP, provided an overview and new developments of DBCP and Mr. Cameron Diver, Deputy Director General of SPC spoke about SPC and the Pacific Community Centre for Ocean Science (PCCOS). Mr Riishojgaard explained the plan to integrate ocean observations onto the GBON. Challenge is the observational remit of high seas which may be able to address through a global financing mechanism. Ocean in GBON has the opportunity for WMO and IOC to work together on increasing awareness and linking this to the broader global agenda – Sustainable Development Goals (SDGs), Sendai Framework on Disaster Risk Reduction (SFDRR), Paris Agreement, etc. Mr Kelly-Gerreyn highlighted the activities of DBCP including new strategic plan, network design and targets, capacity development, vandalism prevention, etc. He announced the opportunity for a selected country to receive a DBCP funded wave buoy and requested interested countries to apply following the instructions provided. Mr Diver explained the lessons learned during the COVID-19 pandemic period and how PICs were able to maintain uninterrupted services during this time. The dynamics of Pacific coastal ocean and deep ocean are amongst the least observed and the most poorly understood across the planet. He mentioned that you simply can't manage what you don't monitor and in the Pacific there's a lot of room to grow. There have been many improvements to the ocean observations in Pacific region but lot more to do.

Workshop overview was provided by Ms Qui (Rachel) Jiang. She reviewed the status of the recommendations came out from PI-4 session in Honolulu, HI in 2019. Status of PI-4 recommendations are provided in Annex 5. She elaborated the objectives of PI-5 workshop which are listed below;

- Continue to build capacity within the PI region to apply ocean observing data for enhanced weather and climate forecasting capabilities y;
- Demonstrate the role of ocean observations for understanding and predicting regional weather, ocean state and climatology;
- Demonstrate the societal and economic benefits of delivering enhanced ocean observing system data for better informed decision making;
- Enhance the capacity of quality control of marine observation, data processing and ecology recovering and island protection;
- Increase awareness of the importance of the ocean, scientific understanding and traditional knowledge, and how marine processes affect the lives of Pacific Islanders;
- Learn practical implementation aspects of ocean observing systems.
- Evaluate data gaps within the region and how they can be addressed;
- Encourage cooperation with and support for existing monitoring programmes such as the Argo programme and the Global Drifter Program;
- Hands on training of instruments, including pre-deployment, deployment, and post-deployment activities;
- Advance the design and coordination of ocean observing in the Pacific Islands.

Session 1 focused on Global ocean observing system and presentations were made on UN Decade of Ocean Sciences for Sustainable Development (UN Decade), GOOS 2030 strategy, OceanOPS and on TPOS2020 and RAMA array. This session highlighted the contribution of individual, well established as well as emerging networks to the Global Ocean Observing System (GOOS); GOOS contribution to the UN Decade under 3 programmes (ocean observing co design, observing together, and integrating towards the coast-CoastPredict). It also talked about the services and tools available through OceaOPS for GOOS observing networks (Argo, DBCP, OceanSITES, ocean

gliders, High Frequency Radars/HFRs, GLOSS, etc.), particularly for the PICs. The role of Indian & Pacific Ocean observations in monitoring the Madden-Julian Oscillation (MJO) to improve sub-seasonal to seasonal (S2S) Forecasts was presented with lessons learnt from RAMA array and TPOS 2020. PICs are requested to get involved in and support the TPOS 2020 implementation activities.

Country reports were presented during Session 2. Due to the time limitation, only PICs had the opportunity to provide verbal presentations. Countries provided presentations on new instruments acquired in 2019 and planned instruments, ocean science capacity since 2019, and the expected outcome of the workshop. Cook Island, Fiji, Kiribati, Republic of Marshall Islands, Federated Sate of Micronesia, Solomon Islands, Tuvalu, Vanuatu, Palau, Samoa, Niue, Papua New Guinea made oral presentations while Myanmar and Sri Lanka provided a written report. PICs reported that few new instruments (wave buoys, tide gauges) were deployed, and very few countries got new staff and training opportunities since 2019. A few more wave buoys are planned to be deployed in near future. A summary of the national presentations is provided in Annex 3.

Session 3 was dedicated to discussing how ocean observations assist decision making in the PICs. Discussion also continues on how local communities use information for wave buoys, partnerships in buoy deployments, tide gauges and DART buoys for sea level measurements, water quality monitoring, wave buoy applications for hazard monitoring, current profiler deployments and applications, engagement with maritime sector for vessel observations, and ocean acidification and temperature sampling in support of coral reef monitoring and health.

Ocean outlook was presented in detail during session 4. Development of the outlook, information it contains, information shared, feedback received, and examples of the outlook informing sector decisions were discussed. A closer look at Tuvalu and Fiji ocean outlooks was presented.

At the end of the first part of the workshop on May 28, participants received following assignment to work on and report back during part 2 (10 June) of the workshop

Interim Assignment;

PICs participants were invited to reach out to at least 1 new ocean stakeholder from government, NGO or private sector (e.g., fisheries, shipping/maritime, tourism, conservation, NDMO, communities) to discuss:

1. What ocean data they regularly use and how they get that information?
2. What ocean data they need that they don't have and what would be the ideal format/ frequency for getting this information?
3. If private sector, would they be willing to pay for that information?
4. To what extent do they rely on traditional knowledge? Could they provide a few examples of times when they have used complementary scientific knowledge and traditional knowledge to support a decision?
5. What is one tangible 'next step' they can agree to take with the stakeholder (e.g. provide data, develop a product, schedule a routine meeting etc.)?

If feasible, explore what data may be available on PacIOOS Voyager and/or Pacific Ocean Portal.

Real time questions and answers were carried out via mentimeter throughout the workshop. The results of the mentimeter exercises are provided in Annex 6.

Part 2 of the workshop started on June 9th with session 5 where participants reported back with the results of interim assignment "Learning from Sector Engagement". Repots included what they have learned from the stakeholder engagement, ocean data used by the stakeholder, data gaps, willingness to pay for the information, use of traditional knowledge, and future plans. Participants had consulted range of stakeholders; tourism, maritime safety, fisheries, search and rescue, maritime regulators, reef explorers. Observations used by those stakeholders primarily included Sea surface temperature (SST), sea surface salinity (SSS), winds, waves, currents, sea surface height (tides), bathymetry. Most of them identified data gaps in these specific observations in

the region and also mentioned that purchasing the data is not a viable solution for them. PICs has rich traditional knowledge base which is also contributes to the weather and climate forecasts. Summary of the reports from interim assignment is provided in Annex 4.

Session 6 discussed the sensor solutions for PICs. Tide gauges, global navigational satellite system (GNSS), wave buoys, current profilers, High Frequency Radar (HFR), and SMART cables were discussed. Presentations were focused on relative strengths/weaknesses of different sensors, relevance to Pacific user needs for data, and provide examples of where they are being used/could be deployed in the Pacific.

Climate and Oceans Support Program in the Pacific (COSPac) (with delivery partners; Bureau of Meteorology Australia (BOM), Geoscience Australia (GA), Pacific Community (SPC), Secretariat of the Pacific Environmental Programme, (SPREP)) installed tide gauges across the Pacific Ocean which provide data to generate annual tidal predictions, an accurate long-term sea level record for the Pacific region, and information about the variability of extreme tidal events in the Pacific. In response to concerns of global warning on climate and sea levels in the Pacific, there are 14 sea level monitoring stations, which are datum controlled to a dedicated GNSS stations established under South Pacific Sea Level and Climate Monitoring Project (SPSLCMP).

Ocean wave monitoring service in PICs is expected to be significantly strengthened over the coming years. It is expected to play a major role in improving ocean prediction services (early warning system, navigational safety etc). However, there is a need to overcome the various challenges (i.e. regular maintenance) that would impede the sustainability of these systems. It also offers an opportunity for National Meteorological and Hydrological Services (NMHS) to strengthen their partnerships with communities, maritime sector, fisheries and private sector (e.g. tourism). If sustained, the wave buoys could also be used as a regional early detection warning system.

HFR provides surface currents and wave measurements and currently has 3 types of networks with 3 resolutions. As the sensors are located on land, maintenance is easier compared to ocean deployed instruments. Currently there are HFR sites in Hawaii and Palau. Pacific Islands Ocean Observing System (PacIOOS) is in the process of expanding HFR coverage in Guam and Commonwealth of the Northern Mariana Islands (CNMI).

Pacific Partnership on Ocean Acidification is managed through the Pacific Islands Global Ocean Observing System (PIGOOS). Global Ocean Acidification Observing Network (GOA-ON) Observing Network document the status and progress of ocean acidification (OA); understand the impacts of OA; support forecasts of OA. Over 580 data sets measuring carbonate chemistry is included in GOA-ON where there are few from PICs.

Seafloor measuring devices are primarily providing temperature and pressure measurements autonomously or through wired systems are mounted on the sea floor. Advantages of seafloor measurements are easy to deploy, low cost, less prone to vandalism, provide high frequency data and able to measure multiple parameters. These also have disadvantages such as data is not real time and it requires scuba divers to deploy the instruments. Seafloor pressure provides both swell and wind waves, infragravity waves, tsunamis and tides in expose areas which cannot be captured from tide gages or wave buoys. Smart Cables is a new technology

Where sensors would “piggyback” on the power and communications infrastructure of a million kilometres of undersea fiberoptic cable and thousands of repeaters, creating the potential for seafloor-based global ocean observing. Initial sensors would measure temperature, pressure, and seismic acceleration which will primarily contribute to tsunami warnings.

Global Drifter Programme (GDP) is the primary contributor to the global array of surface drifting buoys to meet the needs of in-situ observations from the sea surface i.e. surface currents, SST, atmospheric pressure, and salinity. The new Directional Wave Spectra Drifters (DWSD) developed by Lagrangian Drifter Laboratory (LDL) at the Scripps Institution of Oceanography (SIO) measures

3-D spectra wave which is increasingly supporting the DBCP-Global Drifter Array via the NOAA-funded Global Drifter Program. DWSD has a one-year life with 3hrs reporting frequency. This wave buoy can be moored in costal deployments. The data is available free and without restrictions through the Global Telecommunication System (GTS) and SIO/LDL server.

Petral gliders, developed by Pedigree Development, China can work in depths between 200m-11,000m. Currently, Petrel gliders have completed more than 50,000 task profiles in total, with a total voyage of more than 150,000 km. These gliders carry a sensor package including CTD, Dissolved Oxygen, ADCP, hydrophone, turbidity, chlorophyll, radiometer optical backscatter sensors electromagnetic sensors to name some. Petral glider has completed missions in many areas of the global ocean including Arctic.

Session 7 was dedicated to ocean data accessibility and sharing where presentations were made on Centre for Marine Meteorological and Oceanographic Climate Data (CMOC), China[1], PacIOOS Voyager[2], Pacific Ocean Portal. CMOC which is part of Marine Climate Data System (MCDS) provides aggregated products on number of ocean variables with high level quality-controlled data. PacIOOS Voyager is part of IOOS and provides a web-based tool to freely access data and visualize products. Pacific Ocean Portal is based on open source and provides improved access to ocean information primarily for PICs with a focus on sustainability. Data from Pacific Ocean Portal can be accessed with low bandwidth.

Quality control (QC) and quality assurance (QA) was discussed at session 8. Specific topics covered in the session are, ocean best practices and laboratory calibration of wave buoys. Ocean best practices system (OBPS) provides guidance to select the best practises out of wide range of best practises, create new best practises, endorsement of best practises and elevating best practises to standards. National Center of Ocean Standard and Metrology (NCOSM), China presented the information on how laboratory calibration of the gravitational acceleration wave buoy is performed together with wave inter-comparisons and in-situ calibration of GPS wave buoys.

Final session of the workshop was dedicated to discussing next steps for the PICs and the engagement and contribution of PICs in UN decade. The vision, mission implementation plan and the action framework of the UN decade was briefly discussed. A PICs flagship project around Pacific solutions to save oceans was submitted and endorsed. The focus of the project is to support the implementation of national ocean policies. It will provide a joined approach to integrate ocean management providing the tools and the knowledge to find the balance between economic and development while preserving long term health of the ocean. It also will improve the decision-making support systems with best scientific information and technology and culture including traditional knowledge. The Pacific Community Centre for Ocean Science (PCCO) is working on three initiatives with the aim to help Pacific Island Governments and communities easily access the ocean science and expertise to make informed decisions and to protect and sustainably manage ocean resources. The three initiatives are; (1) establishing a regional training hub for ocean acidification in the Pacific; (2) building regional ocean science capacity; and (3) the use of the research vessel RV Tangaroa for seafloor survey, una ecosystem cruises and floating university. SPC was confirmed as a regional training centre of Ocean Teacher Global Academy (OTGA) in late 2020.

In closing the session Ms Gallage from WMO Secretariat recognized with sincere gratitude support from SPC team lead by Ms Molly Powers and Mr Zulfikar Begg, all the presenters, organizing team and all the participants. Ms Gallage further mentioned that the presentations and the workshop report will be available on the workshop website and requested all participants to

[1] www.cmoc-china.cn

[2] http://pacioos.org/voyager

provide their feedback through the post workshop survey[3]. Mr Zulfikar Begg from SPC also thanked all who involved and mentioned the importance of tracking the success of the workshop and resulted actions more frequently. Workshop was concluded on 10th July 2021 at 23:30 UTC.

The workshop documents and presentations are available at www.goosocean.org/DBCP-PI-5. Recommendations of the workshop are provided in Annex 7.

[3] https://forms.office.com/r/KK1CWjcmXg

Annex 1

AGENDA

Fifth Data Buoy Cooperation Panel (DBCP) Pacific Islands Training Workshop on Ocean Observations and Data Applications (DBCP-PI-5)

Organizers: World Meteorological Organization (WMO)
Secretariat of the Pacific Community (SPC)
Virtual Session
26-27 May & 09-10 June 2021

Day 1: Thursday 27 May 2021 (Fiji time; UTC+12)

Time(FJ)	Session	Presenter/ Speaker	Moderator
9.30	*Meeting set up and sound test ZOOM Meeting Introduction & Housekeeping*	Zulfikar Begg- host	
10.00	**Workshop Opening**		**Champika Gallage**
	Welcome	Rachel Jiang (Chair DBCP-TT-CB, NCOSM)	
	Opening Devotion	Rev. James Shri Bhagwan	
10:10	Keynote speaker 1- WIGOS/ GBON/SOFF	Lars Peter Riishojgaard (Director, WMO)	
10:20	Keynote speaker 2- DBCP	Boris Kelly-Gerreyn (DBCP chair BOM)	
10:30	Keynote speaker 3- SPC/ PCCOS	Stuart Minchin (Director General SPC)	
10.40	**Workshop Overview-** Reflecting on/reviewing outcomes/discussions from PI-4 in Honolulu, HI 2019	Rachel Jiang, (Chair DBCP-TT-CB, NCOSM)	
10.50	**Introductions** **Individual Objectives (via SliDO)** **Group Photo**	Zulfikar Begg (SPC)	
	Session 1: Global Ocean Observing System		**Boris Kelly-Gerreyn**
11.00	The Global Ocean Observing System Overview - UN Decade /, GOOS 2030 strategy	Albert Fischer (Director, GOOS Secretariat, IOC)	
11.15	OceanOPS, formerly JCOMMOPS (DBCP, OceanSITES, etc.)	Long Jiang (OceanOPS)	
11.30	TPOS2020 and Lessons from RAMA Array	Cheyenne Stienbarger, Sidney Thurston (NOAA)	
11.45	*Questions and Discussion*		
12.00	*Virtual Break*		
	Session 2: Country Reports		**Molly Powers**

12.10	4 minutes per country Verbal reports and/or 1 slide presentation, pre-filled template identifying: - New instrumentation since 2019 (in the water or in the pipeline) - New staff and/or capabilities developed in oceanography or ocean observing	Cook Islands (Mr Arona Ngari) Fiji (Mr Stephen Meke) Federated State of Micronesia (Mr Sosten Sos) Kiribati (Mr Thomas Zackious) Niue (Ms Rossy Motoepo)) Palau (Ms Ikelau Otto) Papua New Guinea (Mr peter Warupi) R. of Marshall Islands (Mr Lee Jacklick) Samoa (Mr Silipa Mulitalo) Solomon Islands (Mr Max Sitai) Tonga (Mr Laitia Fifita) Tuvalu (Mr Nikotemo Iona) Vanuatu (Mr Allan Rarai)	(template for country ppt)
13.00	**Day 1 Closing** Brief review and looking ahead to tomorrow	Zulfikar Begg	

Day 2: Frida 28 May 2021 (Fiji time; UTC+12)

Time(FJ)	**Session**	**Presenter/ Speaker**	
9.30	*Meeting set up and sound test ZOOM Meeting Introduction & Housekeeping*	Zulfikar Begg- host	
10.00	**Day 2 Opening** Review of Day 1 discussions Overview of Day 2	Zulfikar Begg	
	Session 3: Ocean Observations for Decision-Making in the Pacific		**Zulfikar Begg**
	These case studies should demonstrate how ocean observations are being applied to meet user needs in a variety of sectors		
10.00	How local communities use information from the wave-rider buoy	Lee Jacklick (RMI Weather Service)	
10.10	Deployment of sofar wave buoy and partnership with Fisheries	Mauna Eria (Kiribati Met)	
10.20	DART Buoy and/or new tide gauges through NIWA project	Laitia Fifita (Tonga Met)	
10.30	Water quality monitoring thru Marine Resources	(Cook Islands Rep.)	
10:40	*Questions/ Discussion*		
11.00	Experience with wave buoy sustainability, partnerships, awareness, and applications for hazard monitoring	Stephen Meke (Fiji Met)	
11.10	Current profiler deployment and application	Semi Bolalailai (Coastal Monitoring Unit, Mineral Resource Dept.)	
11.20	Engagement with maritime sector to integrate vessel observations	Danny Shadrech (Solomon Islands Met)	

11.30	Ocean acidification and temperature sampling in support of coral reef monitoring and health	Ms Ikelau Otto (Palau International Coral Reef Centre)	
11.40	*Questions/ Discussion*		
12.00	*Virtual Break*		
	Session 4: Ocean Outlooks		**Rachel Jiang**
	How the outlook was developed, what information it contains, how it is shared, what feedback (if any) is received, any examples of the outlook informing sector decisions.		
12.10	Tuvalu Ocean Outlook	Tavau Vaaia (Tuvalu Met Service)	
12.20	Fiji Ocean Outlook and Video	Shweta Shiwangni (Fiji Met)	
12.30	*Questions/ Discussion*		
12.45	**Day 2 Closing** Outline of interim assignment Brief review and looking ahead to tomorrow	Zulfikar Begg	

Interim Assignment

Reach out to at least 1 new ocean stakeholder from government, NGO or private sector (e.g., fisheries, shipping/maritime, tourism, conservation, NDMO, communities) to discuss:

1. What ocean data they regularly use and how they get that information?
2. What ocean data they need that they don't have and what would be the ideal format/ frequency for getting this information?
3. If private sector, would they be willing to pay for that information?
4. To what extent do they rely on traditional knowledge? Could they provide a few examples of times when they have used complementary scientific knowledge and traditional knowledge to support a decision?
5. What is one tangible 'next step' they can agree to take with the stakeholder (e.g. provide data, develop a product, schedule a routine meeting etc.)?

If you are able, explore what data may be available on PacIOOS Voyager and/or Pacific Ocean Portal

(form to be provided, filled and sent back before second session, to inform discussion)

Day 3: Thursday 10 June 2021 (Fiji time; UTC+12)

Time(FJ)	Session	Presenter/ Speaker	Moderator
9.30	*Meeting set up and sound test ZOOM Meeting Introduction & Housekeeping*	Zulfikar Begg- host	
	Session 5: Learning from Sector Engagement		**Molly Powers**
10.00	5 minutes per country Verbal reports and/or 1 slide presentation, pre-filled template identifying: – Who they met with? – What they learned? – What are planned next steps?	Cook Islands (Mr Arona Ngari) Fiji (Mr Stephen Meke) Federated State of Micronesia (Mr Sosten Sos) Kiribati (Mr Thomas Zackious) Niue (Ms Rossy Mitiepo)	

		Palau (Ms Ikelau Otto) Papua New Guinea (Ms Kisolel Posanau) R. of Marshall Islands (Mr Lee Jacklick) Samoa (Mr Silipa Mulitalo) Solomon Islands (Mr Max Sitai) Tonga (Mr Laitia Fifita) Tuvalu (Mr Nikotemo Iona) Vanuatu (Mr Allan Rarai)	
11.00	*Questions/ Discussion*		
11.10	*Virtual Break*		
	Session 6: Sensor Solutions for PICs		**Sidney Thurston**
	Presentations to focus on relative strengths/weaknesses of different sensors, relevance to Pacific user needs for data, and provide examples of where they are being used/could be deployed in the Pacific		
11.20	Tide gauges and GNSS observations	Jeff Aquilina (BOM)	
11.30	SPC experience with ocean observations (wave buoys, current profilers)	Herve Damlamian (SPC)	
11.40	Strategic Plan for Pacific wave buoy network	Melissa Iwamoto (PacIOOS)	
11.50	*Questions/ Discussion*		
12.00	HF Radar in PICs	Hugh Roarty (Rutgers University)	
12.10	Ocean Acidification monitoring in PICs	Duncan McIntosh (SPREP)	
12.20	Seafloor sensors: reef temp and smart cables	Jerome Aucan (SPC)	
12:30	Global Observations of Open Ocean Waves with Drifters	Luca Centurioni (SIO) (pre-recorded)	
12:40	Technology and application of petrel gliders	Wei Ma (Tianjin University)	
12.50	*Questions/Discussion*		
13.00	**Day 3 Closing** Brief review and looking ahead to tomorrow	Zulfikar Begg	

Day 4: Friday 11th June 2021 (Fiji time; UTC+12)

Time(FJ)	Session	Presenter/ Speaker	
9.30	*Meeting set up and sound test ZOOM Meeting Introduction & Housekeeping*	Zulfikar Begg- host	
	Session 7: Ocean Data Accessibility & Sharing		**Long Jiang**
	Presentations to focus on data access and data sharing sites and portals		
10.00	Centre for Marine Meteorological and Oceanographic Climate Data- China (CMOC)	Julia Yu (NMDIS)	

10.15	PacIOOS Voyager	Jim Potemra (PacIOOS)	
10.30	Pacific Ocean Portal	Zulfikar Begg (SPC)	
10.45	*Questions/ Discussion*		
	Session 8: Quality Control and Quality Assurance		**Rachel Jiang**
11.00	Ocean Best Practices	Juliet Hermes (NRF, SA)	
11.10	Laboratory calibration of wave buoy and research on in situ comparison	Jianqing Yu (NCOSM)	
11.20	*Questions/Discussion*		
11.30	*Virtual Break*		
	Session 9: Next steps for the Pacific and the UN Ocean Decade		**Champika Gallage**
11.40	What the UN Ocean Decade Means for the Pacific Islands?	Jens Kruger (SPC)	
11.50	Identifying opportunities and actions – Reviewing gaps identified from PI-5 – Identifying pipeline projects (e.g. GCF) – Identifying other opportunities for Integrated Ocean Management	Molly Powers/ Katy Soapi (SPC) (use of SliDO)	
12.20	**Day 4 Closing** Review outcomes	Zulfikar Begg (SPC) Champika Gallage (WMO)	

Annex 2
LIST OF PARTICIPANTS

Matt BLACKA	Australia
Boris KELLY-GERREYN	Australia
Robert MCINTOSH	Australia
Grant SMITH	Australia
Abu Sayed Mohammad DELOWAR RAHMAN	Bangladesh
Md. Ilias MIAH	Bangladesh
Tobias FERREIRA	Brazil
MAIDAAWE HADJATI PULCHÉRIE	Cameroon
Kyle MACINNIS	Canada
juan CABALLERO	Chile
Juan Pablo JORQUERA	Chile
Lifan CHEN	China
WANG CHUNFANG	China
Fan JIANG	China
Wenjun LI	China
Chuyong LIN	China
Jian LIU	China
Yiming LIU	China
Lancy LUO	China
xiao QING	China
Chen WENQIN	China
fang XIAORONG	China
Weidong YU	China
Jingjing YU	China
Dongbin ZHANG	China
Arona NGARI	Cook Islands
SORO YAYA	Côte d'Ivoire
Mohamed ABDELAZIZ	Egypt
Tafesse Regassa GURMU	Ethiopia
Arieta BALEISOLOMONE	Fiji
Zulfikar BEGG	Fiji
Semi BOLALAILAI	Fiji
Jasneel CHANDRA	Fiji
Rajendra CHARAN	Fiji
Herve DAMLAMIAN	Fiji
Antonio ESPEJO	Fiji
Judith GIBLIN	Fiji
Merana KITIONE	Fiji
Jens KRUGER	Fiji
Ashnil KUMAR	Fiji
Aakeshey KUMAR	Fiji
Andrick LAL	Fiji
Gary LEE	Fiji
Merelita LEWABETE	Fiji
Vincent LINCOLN	Fiji
Stephen MEKE	Fiji
Raymond MOHAMMED	Fiji
Adrien MOINEAU	Fiji
Saula MULE	Fiji
Amori NABAINIVALU	Fiji
Molly POWERS	Fiji
Bipen PRAKASH	Fiji
Laisenia RAWACE	Fiji
Ana SEREILAGI	Fiji
Shweta SHIWANGNI	Fiji
Jaidip SHYAMAL	Fiji
Katy SOAPI	Fiji
Dana TIGAREA	Fiji
Apisalome VUATALEVU	Fiji
Varanisese VUNIYAYAWA	Fiji
Sakeasi WAIBUTA	Fiji
Jiuta KOROVULAVULA	France
Tijani BOJANG	Gambia
Chi-Kin CHOW	Hong Kong
Raja ACHARYA	India
vengatesan GOPAL	India
SUNDAR RANGANATHAN	India
Dava AMRINA	Indonesia
Rismanto EFFENDI	Indonesia
Yosafat Donni HARYANTO	Indonesia
Feriomex HUTAGALUNG	Indonesia
Bayu Edo PRATAMA	Indonesia
Khafid PRATAMA	Indonesia
Nelly RIAMA	Indonesia
Shou SHIMAMURA	Japan
Mauna ERIA	Kiribati
Kairoronga IABETI	Kiribati
Tebatibunga KAONGOTAO	Kiribati
Thomas ZACKIOUS	Kiribati
Lee Z. JACKLICK	Marshall Islands
Nover JURIA	Marshall Islands
Sosten SOS	Micronesia (Federated States of)
Jamal CHIOUA	Morocco
Younes EL AZZOUZI	Morocco
Zineb EL OUEHABI	Morocco
Bessa ISMAIL	Morocco
Htay LWIN	Myanmar

Than NAING	Myanmar
Jerome AUCAN	New Caledonia
Aitana FORCEN-VAZQUEZ	New Zealand
Steve KNOWLES	New Zealand
Rossy MITIEPO	Niue
E. Ikelau OTTO	Palau
Kisolel POSANAU	Papua New Guinea
Nathan SIVE	Papua New Guinea
Peter WARUPI	Papua New Guinea
EDUARDO ALONSO	Peru
Giancarlo CHUQUILLANQUI	Peru
Yessica DEBO MONTERO	Peru
Gerardo RAMIREZ	Peru
Myriam TAMAYO INFANTES	Peru
Rita ESTEVES	Portugal
Inês MARTINS	Portugal
Maccarios Samuelu AUVAE	Samoa
Taumeasina FOMAI	Samoa
Vailoa IEFATA	Samoa
Silipa MULITALO	Samoa
Katie POGI	Samoa
Sunny SEUSEU	Samoa
Manu Jr SOLOMONA	Samoa
Tessa TAFUA-SO'O	Samoa
Henry TAIKI	Samoa
Saliou FAYE	Senegal
Tung Yee W	Singapore
Danny SHADRECH	Solomon Islands
Danny SHADRECH	Solomon Islands
Max Norman SITAI	Solomon Islands
H.M.N.B. EKANAYAKA	Sri Lanka
Gayana HENDAWITHARANA	Sri Lanka
Kathaluwa Weligamage INDIKA	Sri Lanka
Jeewan W. KARUNARATHNA	Sri Lanka
M. M. P. MENDIS	Sri Lanka
Channa RODRIGO	Sri Lanka
Champika GALLAGE	Switzerland
Long JIANG	Switzerland
Nuttida CHANTHASIRI	Thailand
Siriyotha PAWAT	Thailand
Anucha SRERURNGLA	Thailand
Laitia FIFITA	Tonga
Elifaleti ENE	Tuvalu
Iona NIKOTEMO	Tuvalu
Leiti SETEFANO	Tuvalu
Tavau SIMEONA	Tuvalu
Simoea TIUTE	Tuvalu
Sebastien BOULAY	United States of America
Candice HALL	United States of America
Verena HORMANN	United States of America
Melissa IWAMOTO	United States of America
Fiona LANGENBERGER	United States of America
James POTEMRA	United States of America
Hugh ROARTY	United States of America
Emily SMITH	United States of America
Cheyenne STIENBARGER	United States of America
Raymond TANABE	United States of America
Sidney W. THURSTON	United States of America
Susan WEST	United States of America
Ann-Christine ZINKANN	United States of America
Juan CABALLERO	Uruguay
Angus BANI	Vanuatu
June BRIAN MOLITAVITI	Vanuatu
Nigel DAVID	Vanuatu
Grace JOHNOLSON	Vanuatu
Ellen LUKE	Vanuatu

Franky PETER	Vanuatu
Allan RARAI	Vanuatu
Nastasia SHING	Vanuatu
Do DUONG	Viet Nam

Duan PHAN	Viet Nam
Nguyen THUY	Viet Nam
Tran TRU	Viet Nam

Annex 3
SUMMARY OF NATIONAL PRESENTATIONS

COUNTRY	New Instrument since 2019	Instrument in the pipeline	Ocean Capacity since 2019
Cook Islands *Mr Arona Ngari*	None	Service of an USV to gather and summarise ocean information Environment buoys 4 wave buoys 6 water quality loggers	No new staff with the ocean portfolio No ocean science/oceanography training completed by staff: 1 staff on study leave?
Fiji *Mr Stephen Meke*	**Wave Buoy off the Coral Coast** Monitor Southern Ocean Swell Support validation of wave Forecast Provide insight on TC wave (e.g. TC Harold) **Three Pressure Sensors along the Coral Coast** Monitor water level at the shore Validate and improve inundation forecast	**Deployment of Wave Buoy off Suva** Support Suva Port Authority and Shipping industry Research and possibly way forward for the region Compare SoFar and SCRIPPS light weight wave buoys	Ocean Outlook including on video High Resolution Wave Forecast for the Southwest Fiji Waters (CIFDP project) High Resolution Inundation Forecast for the Coral Coast areas (CIFDP Project) Training under CIFDP Currently FMS has one of its senior forecaster doing MSc in TC Wave modelling in Japan
Kiribati *Mr Thomas Zackious*	Wave buoy are ready to be deployed	Three wave buoys to be installed in 2021	Climate staff utilized to provide ocean product – update on SST, coral bleaching, upwelling, tide predictions, sea level. 1 staff has BSc in Marine Science. No staff trained specifically in ocean science/oceanography at the moment.
Republic of Marshall Islands (RMI) *Mr Lee Jacklick*	None	3 waverider buoys funded by the Government of Japan under the "UNDP Enhancing Disaster and Climate Resilience (EDCR) Project."	The scheduled Pacific International Training Desk Cohorts for 3 WSO staff was postponed due to COVID19 pandemic travel restriction.
Federated States of Micronesia (FSM)	USGS, NOAA, USAID support early warning systems for earthquakes,	USGS is working to install new equipment.	NOAA has trained more than 200 weather forecasters and emergency managers from PI countries.

Mr Sosten Sos	tsunamis, tropical cyclones and volcanos		NOAA will increase efforts to train Pacific officials to locate earthquakes and assess potential for destructive tsunamis.
Solomon Islands *Mr Max Sitai*	Spotter buoy	Installation of marine weather instruments on vessels	No new staff No training for staff No staff on study leave
Tuvalu *Mr Nikotemo Iona*	No new instruments	Working via CREWS project installation of 2 wave buoys	New communications officer recruited in 2021 Looking forward to more training
Vanuatu *Ms Ellen Luke* *Mr Allan Rarai*	None	3 wave buoys installing this year Instruments in one or two marine reserves - marine data	Ocean Science CD since 2019 - online trainings (a few attended) & inhouse training - via Govt No new staff
Palau *Ms Ikelau Otto*	Spectrophotometer Metrohm Titrator	New OA lab being set up at PICRC New alkalinity titration machines	No new staff No ocean science/oceanography training No staff on study leave
Samoa *Mr Silipa Mulitalo*	None Two tide gauges – COSPPac and Japan-funded No new sensors installed since 2013	Ocean Acidification Project (Republic of Korea) Pacific Resilience Program PREP (World Bank) Weather Ready Pacific	Support from American Samoa PACIOOS (data) Opportunities from Pacific partners eg. SPC
Niue *Ms Sean Tukutama*	Water temperature sensor and cable replaced in Sept 2019 Relocate the anemometer mast closer to the hut (When the tide gauge was operational) Tide gauge destroyed during TC Tino in January 2020	Restore the tide gauge in Niue	No training since 2019
Papua New Guinea *Ms Kisolel Posanau*	No	Not as yet	New staff – Two since 2019 for Oceanography and Fisheries. Training – one staff member attended an Oceans Workshop No staff with certifications and/or on study leave.

Annex 4
SUMMARY OF THE REPORTS ON INTERIM ASSIGNMENT

COUNTRY	Met with?	Learned?	Planned next steps?
Cook Islands (Arona)	Private Sector	Storm surge warnings SST No private sector skill Negative experience (islands) - social media highlighted Official forecasting - to avoid misinformation Traditional knowledge - elders use for livelihood and travel Manihiki - experiences Safety at sea	
Fiji (Shweta)	Reef Explorer Fiji (via email) NGO, private sector Research - coral bleaching, sustainable management	Remotely acquired sea surface temperature data acquired free from NOAA's Coral Reef Watch Program Sea water temperature data acquired from their in-situ loggers Wave/swell height and direction forecast for free from magicseaweed.com surf forecast. **Ocean data they don't have:** Dissolved oxygen, solar irradiance, and wave height data (hourly) would be helpful from sites where they work, though those data are not things that could be obtained without in situ equipment. They are looking to cover the costs of the equipment required to obtain those data into a research grant. They use traditional knowledge in many facets of their work, but not for ocean data – they require quantitative data for those parameters of interest.	They are working to establish a seawater temperature monitoring program across reef habitats at various sites around the Fiji archipelago as they have established on the Coral Coast. This data will be used to model bleaching predictions based on remotely acquired SST data, among other things. Currently they are collaborating with FNU on parts of this effort. Once their modelling is done, they will be able to share this information with other stakeholders.
Kiribati (Mau**na**)	Search and Rescue Focus on part of Kiribati - mostly from Tarawa (face-to-face discussions, call, emails)	Wind and currents data, from the models. Frequency - 6 hourly basis Daily weather forecast Have not used traditional knowledge.	

PNG (Kisolel)	National Maritime Safety Authority (NMSA)	**NSMA uses data from:** Tide Data from the Australian Government Bureau of Meteorology, AusTides by the Australian Hydrographic Office and the NMSA Geonica Tide Gauge System. Bathymetric Data from Hydrographic Surveys conducted by the Royal Australian Navy Shipwreck Data from NMSA Hydrography Department Offshore Aids to Navigations from NMSA Hydrography Department Ocean Wind Velocity from the Australian Government Bureau of Meteorology Ocean Currents from the Australian Government Bureau of Meteorology Oil spill and other Pollutions from NMSA Marine Environment Protection Department. **Data the NMSA needs:** Sea Level, Sea Surface Temperature (SST), Sea Surface Salinity (SSS) and Wave Height and Velocity Data. Ideal formats would be in CSV, MS Excel and NETCDF. **Traditional Knowledge:** NMSA Field Engineers and Technicians rely on traditional knowledge especially with the weather and climate and ocean currents to assist with their operations. E.g. using scientific combined with traditional knowledge of how ocean winds are generated in particular areas to assist in positioning vessels and boats for offshore works and to avoid wind generated currents and waves. Another example is to cause little to no disturbance in Sacred Masalai (Totem) areas of the sea while carrying out offshore operations or to avoid operations in such areas.	National Weather Service to create a product that can provide NMSA with their needs as per the format and frequency of ocean data and more research with regards to traditional knowledge. To provide regular meetings or updates especially when there are severe weather warnings out at sea.

Samoa (Katie)	Reached out to 3 stakeholders One response Fisheries Other stakeholders contacted: Tourism and Conservation	Ocean data - FADs deployed in selected areas CTD - conductivity temperature and depth - temp changes over time (not currently used) SST - seatemperature.org Needs: Scanner Windy.com and Met Office Govt entity - some private companies do pay They do not formally use traditional knowledge for any decisions they make Not in conjunction with scientific data	Regular meetings specifically on ocean data
Solomon Is (Max)	Tourism	Wind data sourced from websites. Purpose – surfing. **Ocean data needed:** coastal wave height and wind. **Format type:** Pamphlet – wave height and wind prediction for specific locations. **Traditional knowledge:** Seasons of the year and local climate – specific locations.	Provide pamphlets for certain locations requested by the tourism sector.
Tuvalu (Tavau)	Fisheries (first option no response) Funafuti Fishermen Association	Ocean related info currently used - daily weather forecast and Tide Calendar Would like - SST predictions; sea surface salinity predictions Seasonal products (Rainfall, Ocean and TC outlooks) They are willing to pay for the TC, a small contribution for TMS and regional and international organisation. Request for local language info Traditional knowledge - sharing of this is an issue.	Add to Ocean outlook dissemination and strengthen the relationship with them.
Vanuatu (Ellen)	Maritime	Regularly checking the VMGD website for any marine warning and post on	Organise awareness or workshop for mariners, fishing

		Maritime Facebook page for ship owners and captains to be aware of it. Some fishing boat owners who are updated with technology are using the Vanuatu Ocean Outlook and other ocean data websites. They would like: daily updates on SST and chlorophyll areas. Ability to pay for information. They use traditional knowledge and marine weather via radio - to support with planning and decision making	boat owners and fishermen to update them with the marine and ocean products available and how to access these products. Provincial climate centres will help in providing Vanuatu Ocean Outlook to local fishing boat owners in all Vanuatu provinces

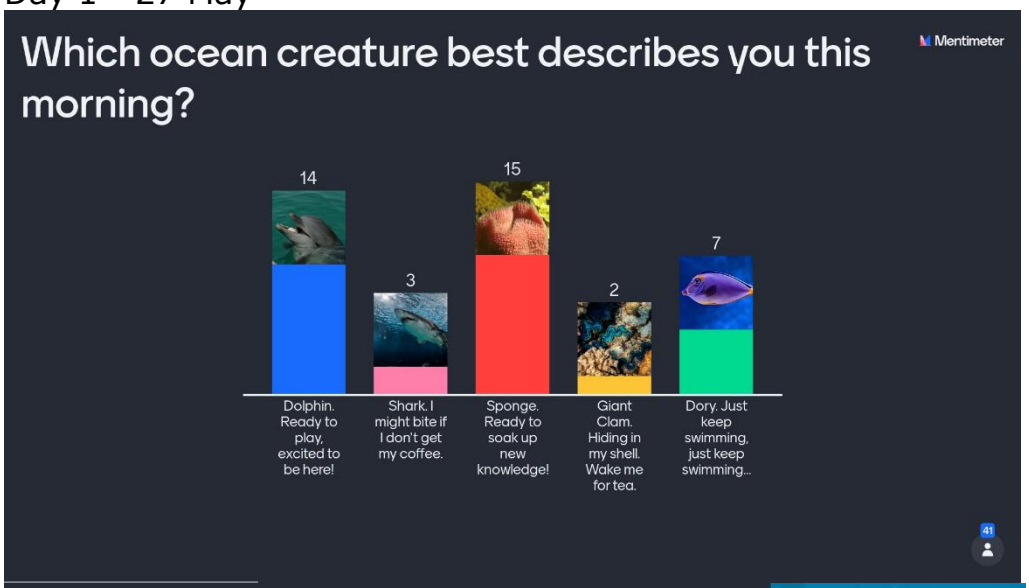
Annex 5

Status of PI-4 workshop recommendations

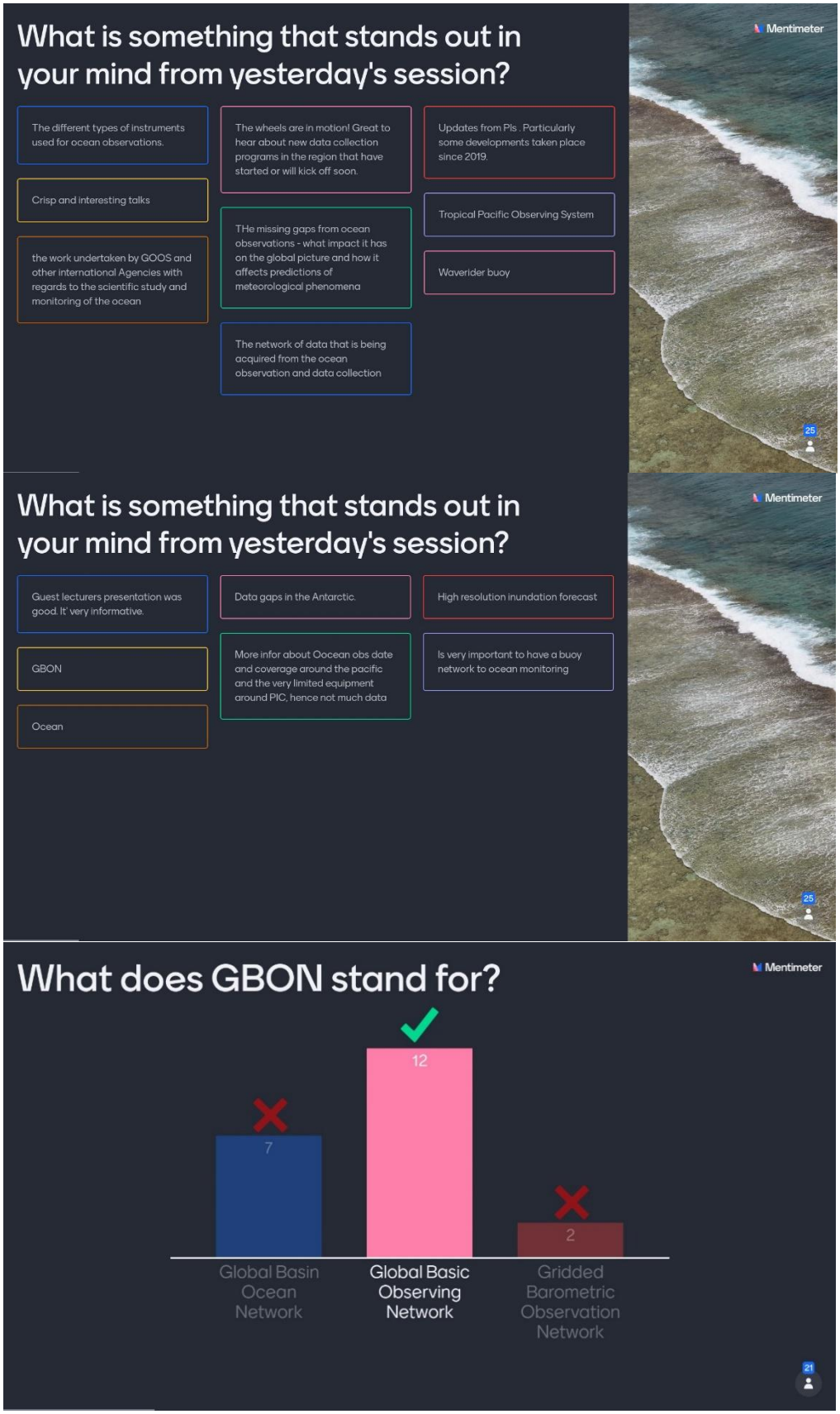
	Recommendation	Actions
1.	PacIOOS and PI-GOOS should have opportunities to better collaborate and mutually benefit. Therefore, suggested to increase opportunities for better coordination and collaboration between the two groups.	PacIOOS and PI-GOOS enhanced the communication for better coordination and collaboration.
2.	JCOMM observation coordination group (ocg) networks i.e. DBCP, SOT, ARGO, GLOSS, etc., are requested to make a list of available instruments and related information make it available and accessible.	Oceanops maintains the list of 28 manufactories and will update the information of 120 sensors. You may find the information form the link as below. Http://www.ocean-ops.org/board?t=dbcp&groupid=3001
5.	Pi countries (in need) requested WMO to assist them with data policy development, data sharing, and data quality control.	WMO communication plan on the new WMO unified data policy will have regionally focused sessions to increase the awareness and support to the regions. In addition, individual networks continue to assist the regional and national data sharing and quality control as appropriate.
6.	Requested the pi members to share their documentation on vandalism prevention with DBCP-TC to make it widely available through the DBCP website.	During the discussion of PI-5, looking forward to hear the voices about the exactly problems or situations of vandalism, which will help us to work with WMO and ocean best practices for shaping the document.
8.	Pi countries are requested to cooperate with GDP in deploying the drifters in the region by offering ship-time and person power.	Some development has taken place in this area with GDP and PacIOOS (i.e. Wave buoys deployed in the pi region). In addition, at the moment dbcp is in the process of launching a project related to this matter. More information will get from Sidney's and Luca's presentation.

Annex 6
DBCP PI-5 MENTIMETER RESULTS

Day 1 - 27 May



Day 2 - 28 May



Which of the following does not contribute data to OceanOPS?

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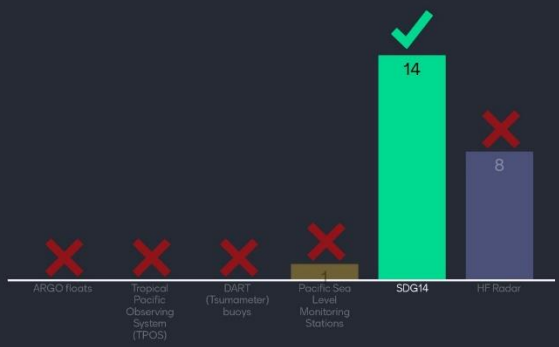

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What network primarly helps to monitor the MJO?

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What of the following was not an ocean observing challenge highlighted by Pacific Islands yesterday?

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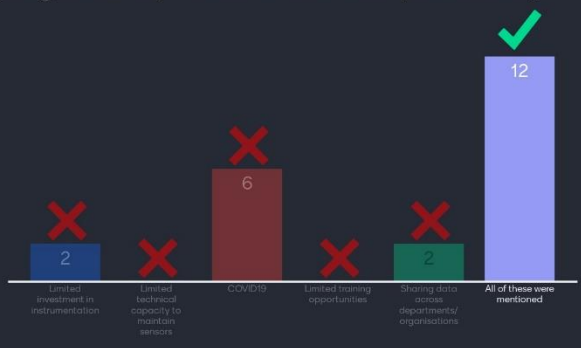

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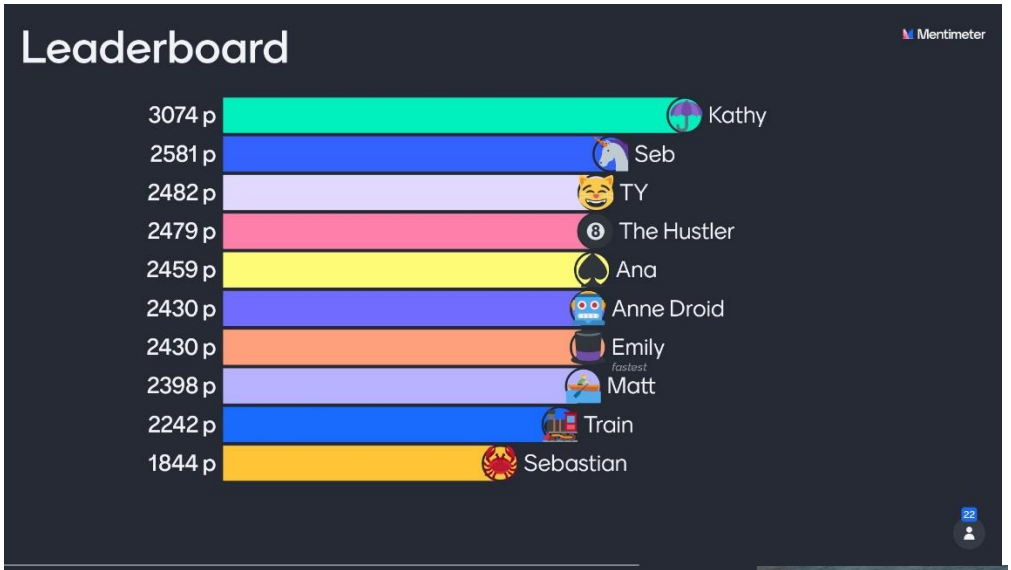
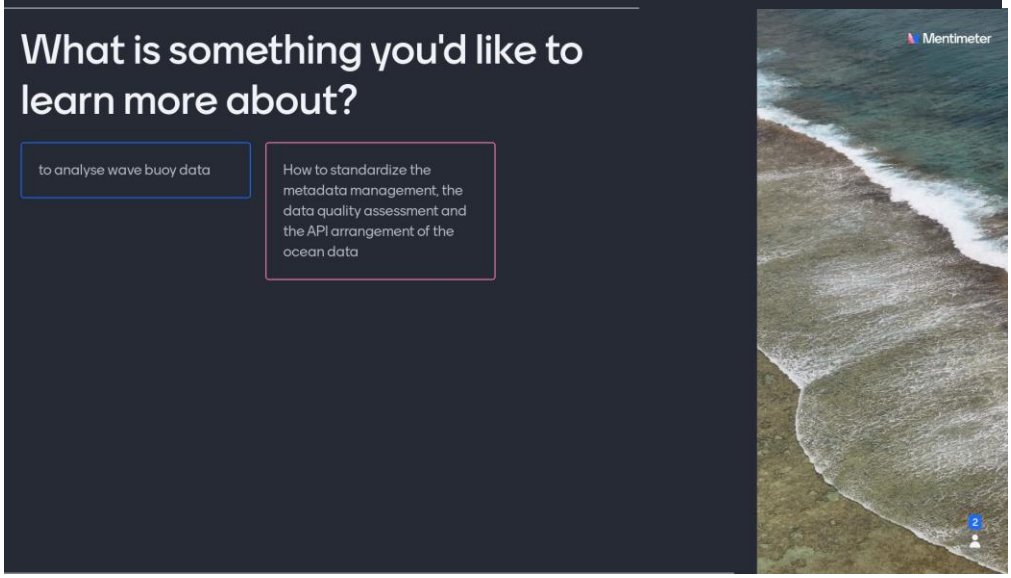
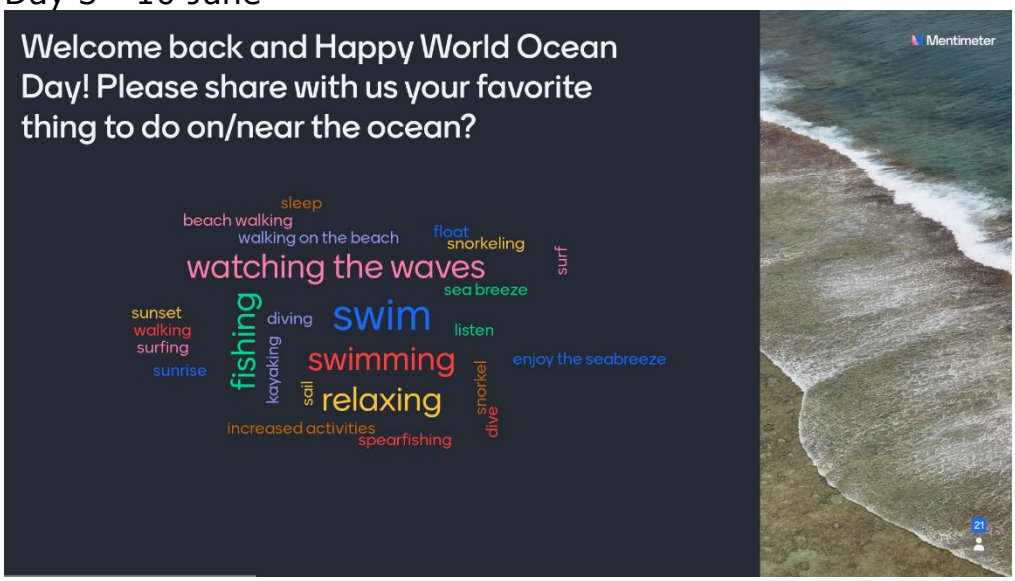


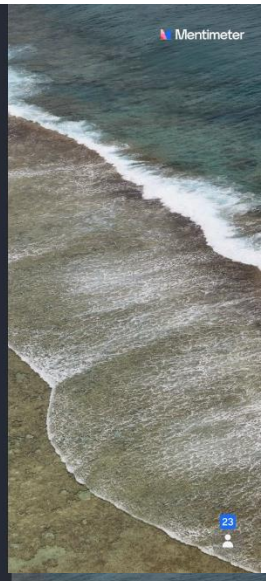


Day 3 - 10 June



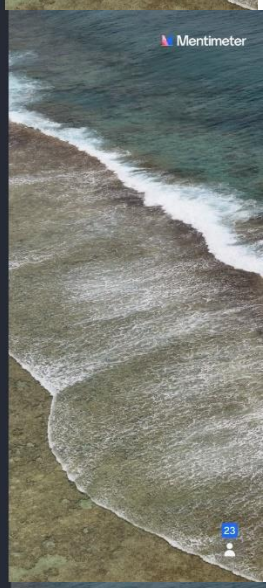
What is something that stands out in your mind from the first week of DBCP PI-5?

- ocean data
- country reports
- A lot of new instruments deployments in the region.
- The various uses of the Ocean
- DBCP sponsored wave buoys
- Different tools available for ocean monitoring/observations
- Importance of having coverage of ocean data across the globe
- far reach of local data
- Instruments used to collect ocean data



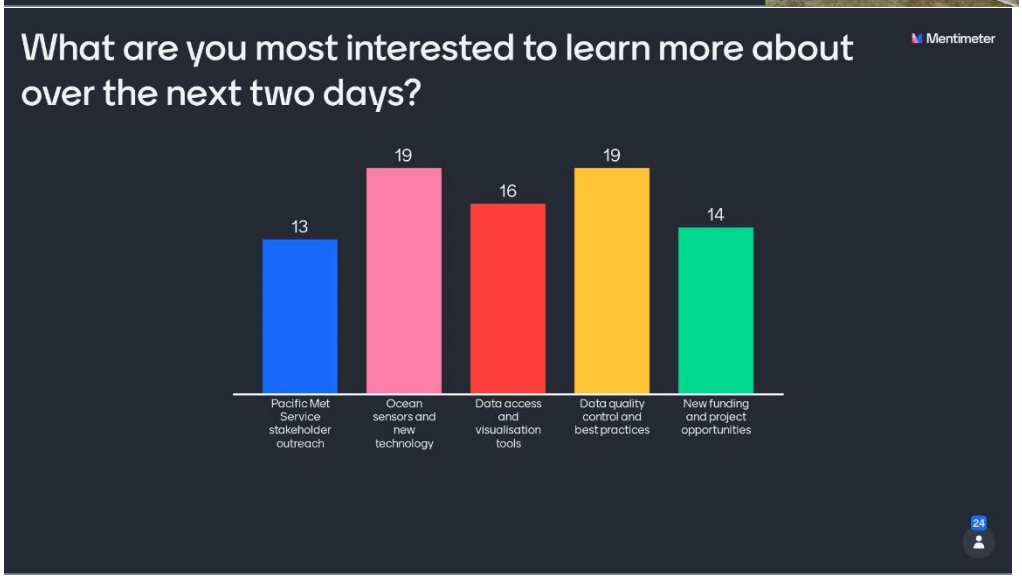
What is something that stands out in your mind from the first week of DBCP PI-5?

- ocean monitoring
- Different ways the Pacific countries are reaching out to stakeholders
- Challenges
- wave buoy deployment
- Different Stakeholders outreach
- data gaps
- ocean tools for monitoring and verification of our ocean products
- how to work together to better master the ocean
- Ocean observation networks and limitations

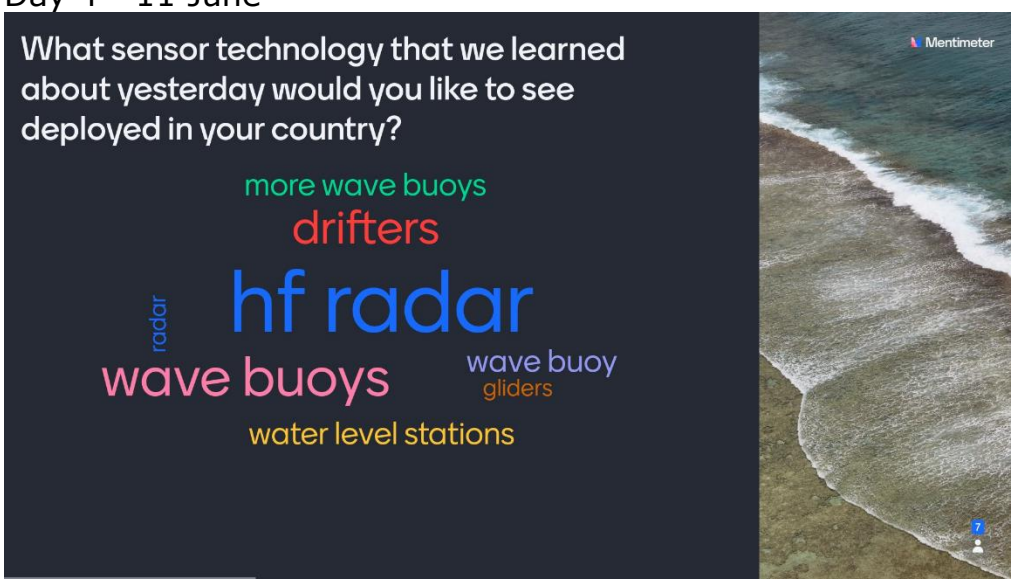


What is something that stands out in your mind from the first week of DBCP PI-5?

- Ocean Outlooks
- who to contact for assistance
- Informative
- Informative
- getting new friends



Day 4 - 11 June



What do you find the most effective ways of engaging stakeholders?

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What sites or sources do you refer to for ocean data?

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- copernicus
- Pacific Ocean Portal
- Download direct from source instruments, other nwp portals, ocean data portal
- Ocean portalNOAABOM
- Download directly from the source
- Pacific Ocean Portal
- NOAAPacloosPacific Ocean Portal
- Windy
- HF radar

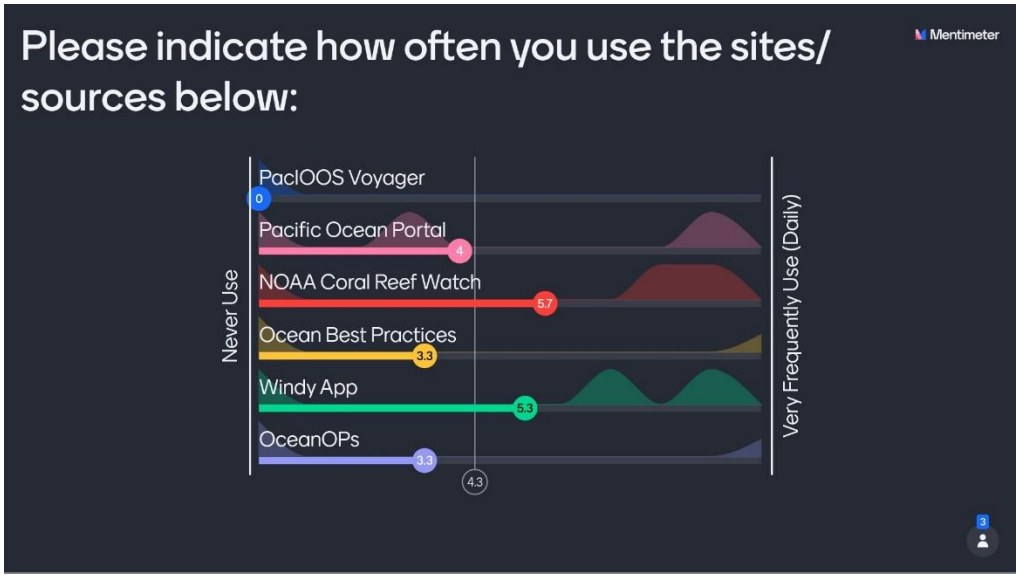
10

What sites or sources do you refer to for ocean data?

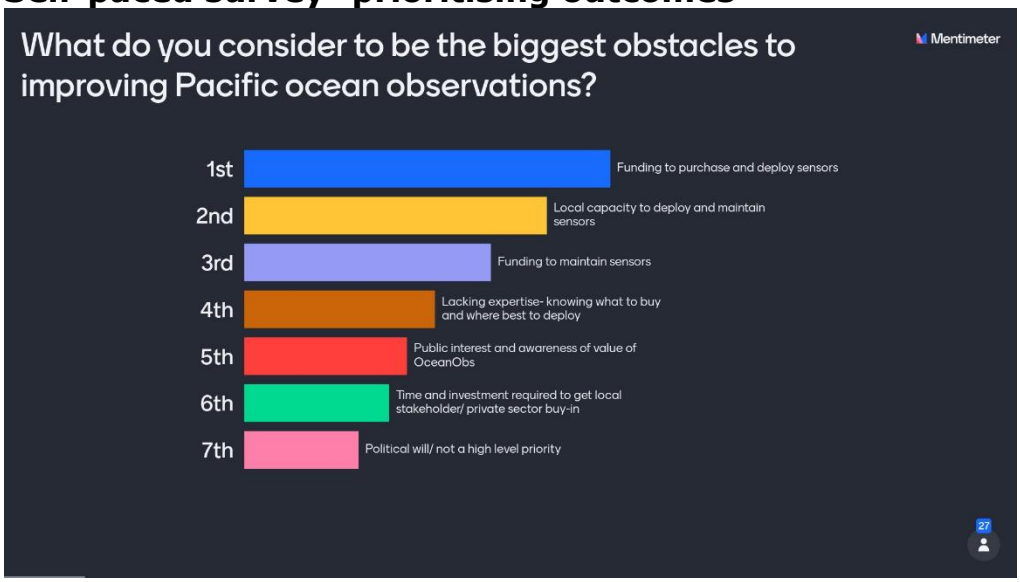
Mentimeter

- Direct from site

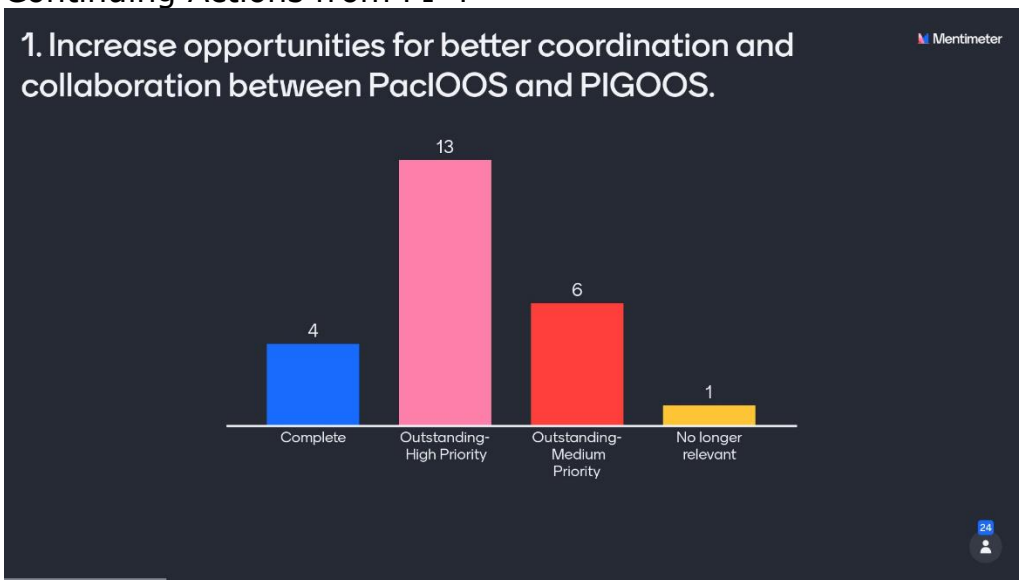
10



Self-paced survey- prioritising outcomes

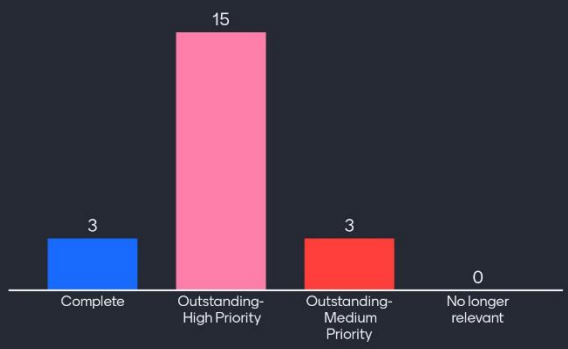


Continuing Actions from PI-4



2. Encourage Pacific island ocean observers to share data via WMO GTS.

Mentimeter



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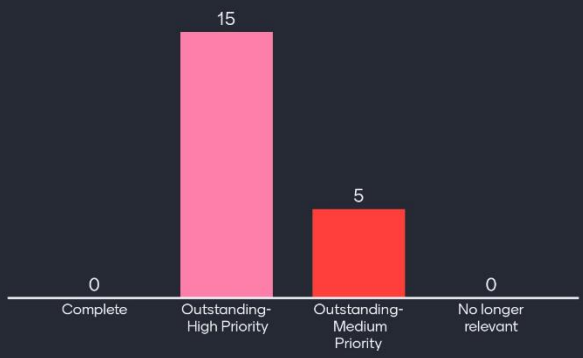
3. Encourage Pacific island ocean data providers to standardise data formats (e.g. ERDDAP).

Mentimeter



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4. OCG to develop a resourse on available instruments and related info (specs, vendors, cost) and share widely.

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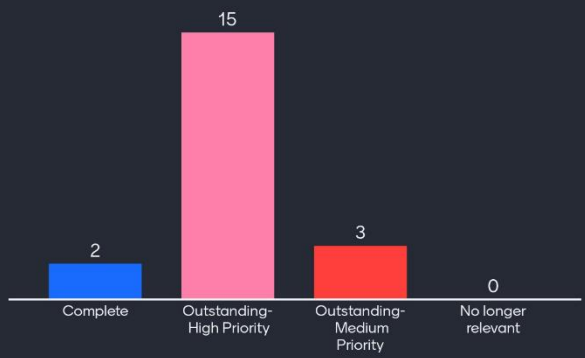

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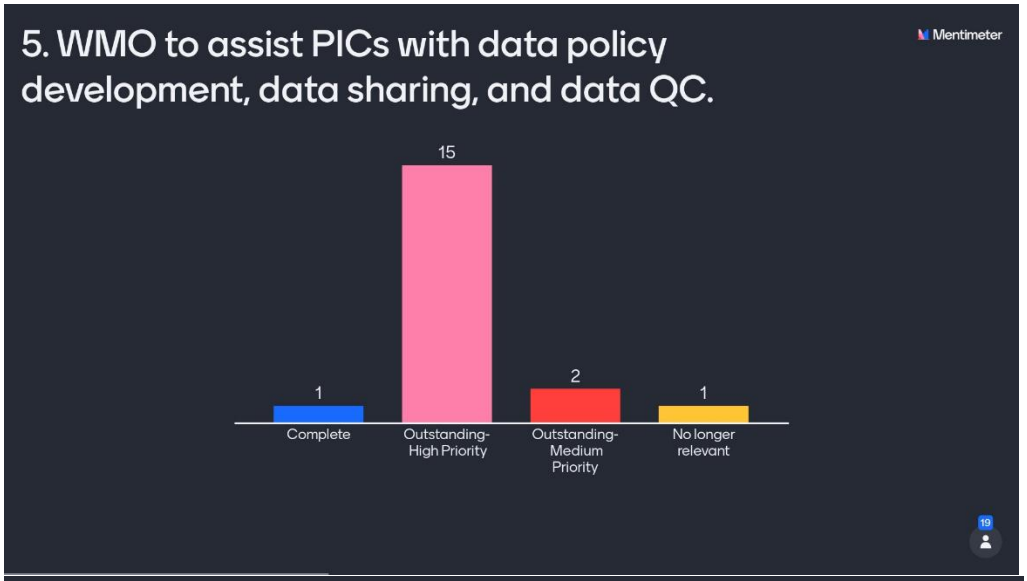

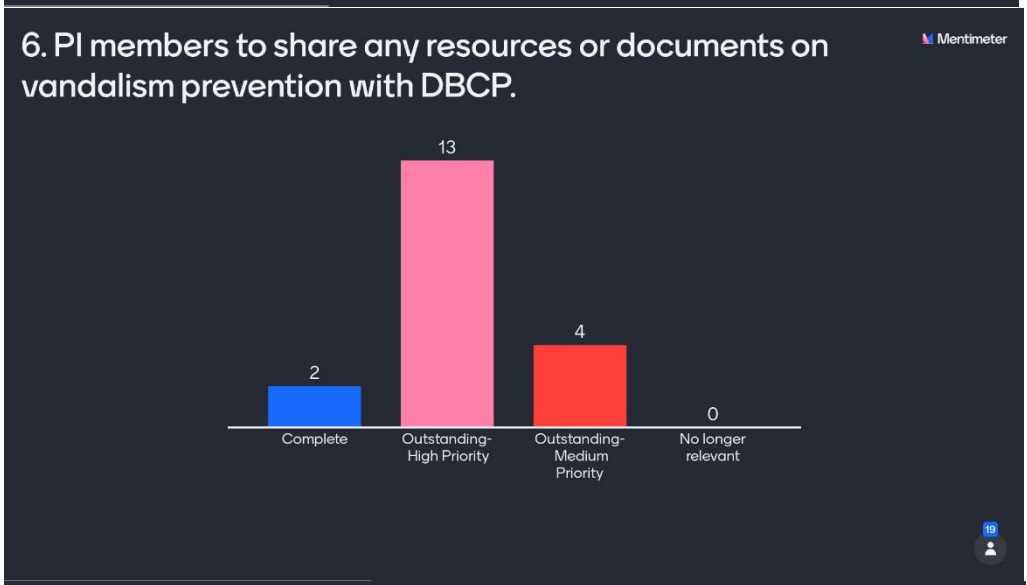

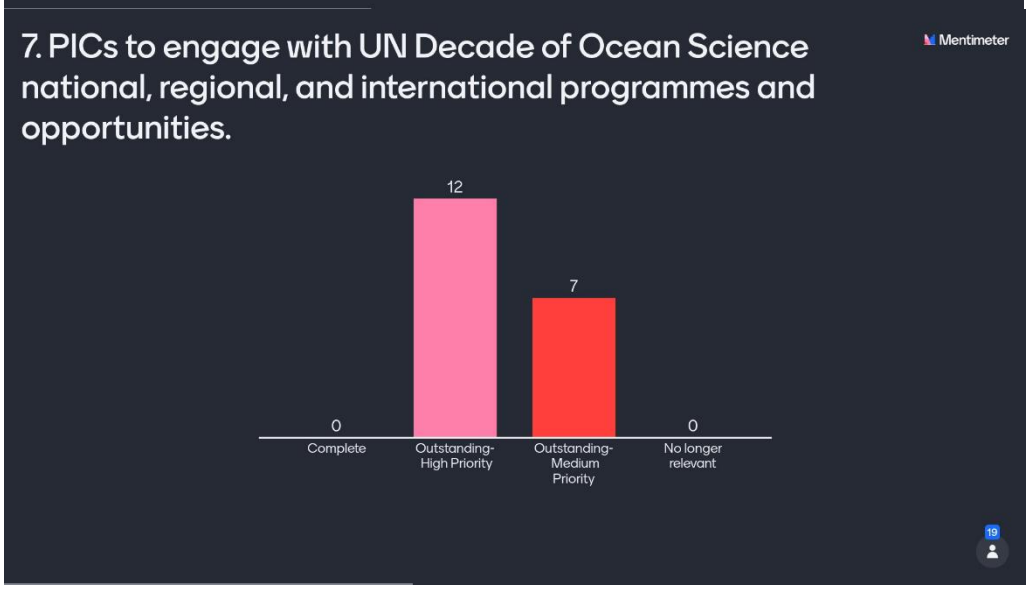

New Actions/ Recommendations

1. PIC members to join the DBCP Task Team on Capacity Building.

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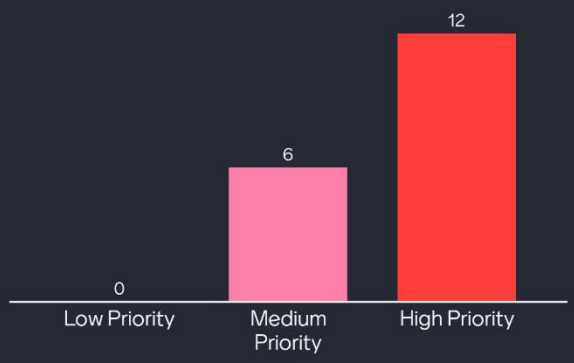

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2. PICs to advocate for Systematic Observations Financing Faciltiy (SOFF) at upcoming UNFCCC.

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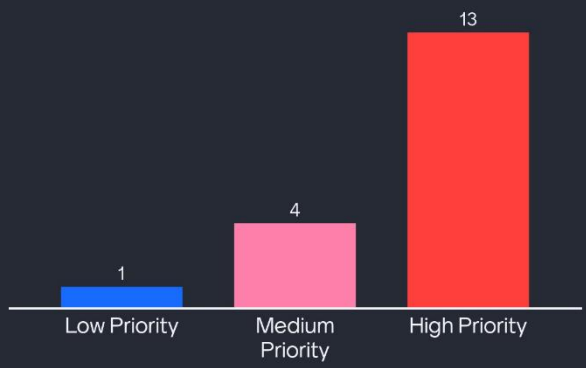

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3. PICs requested to engage in and support global ocean observing efforts by assisting networks (e.g. Drifters, ARGO, SOT/VOS).

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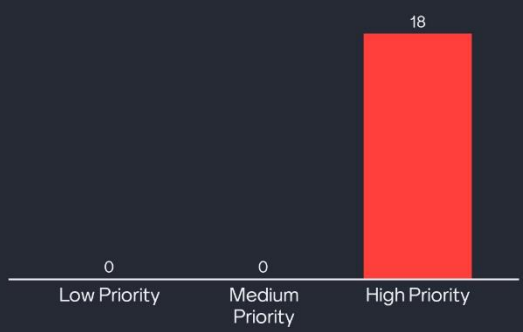

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4. PIC ocean observers encouraged to engage in implementation of TPOS2020.

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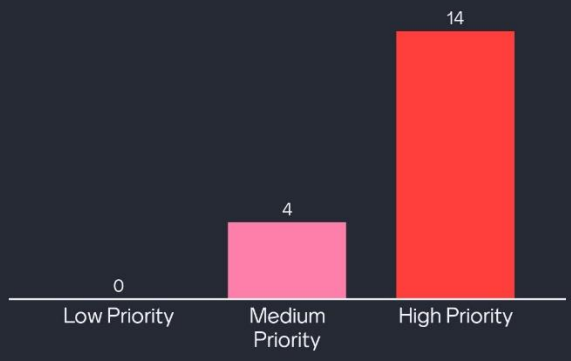

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5. PICs encouraged to enroll national ships in Voluntary Observing Ship (VOS) Panel.

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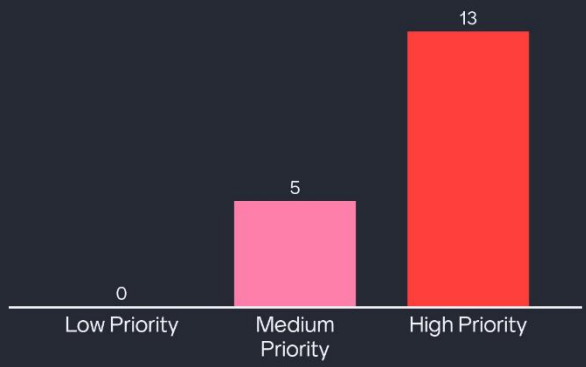

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6. DBCP-CD-TT and PIMOS Panel to organise a PI focused information session on VOS implementation for potential new members.

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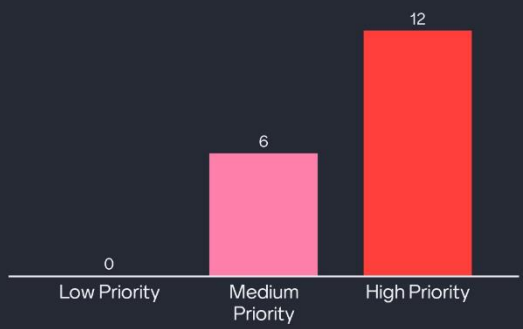

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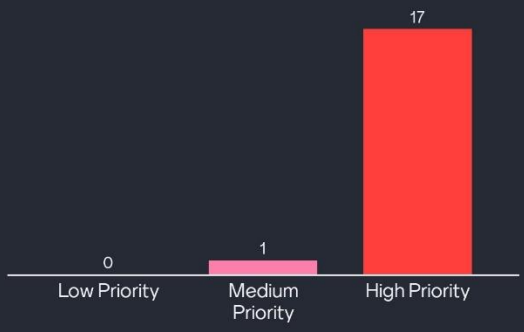
7. DBCP-CD-TT to provide support to PICs on development of an ideal network design to optimize limited resources within the region.

Mentimeter



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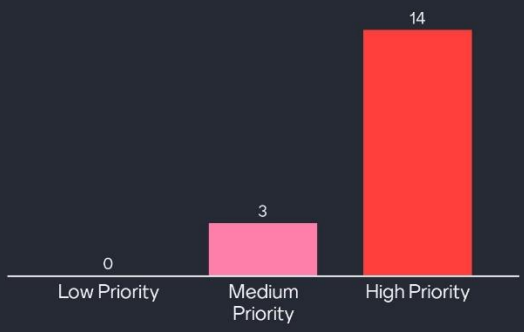
8. As an OceanTeacher Global Academy RTC, SPC to help identify and circulate relevant courses (online/in person) to PICs.

Mentimeter



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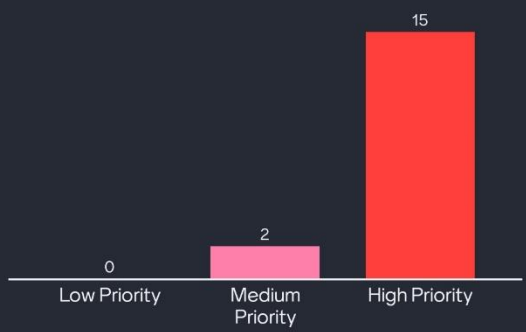
9. PIC ocean observers encouraged to engage with relevant UN Ocean Decade programmes e.g. CoastPredict, Observing Together, Pacific Solutions.

Mentimeter



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10. Encourage PICs ocean observers to keep DBCP partners updated on plans and share lessons learnt

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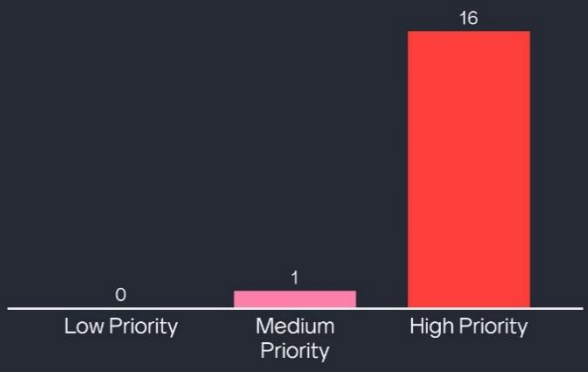

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11. PacIOOS, PCCOS, DBCP, PI-GOOS, IMOS, SOFAR and others to coordinate and develop a regional strategic plan to strengthen ocean obs network.

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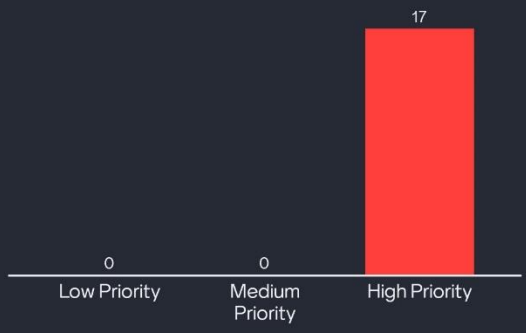

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12. PIC members encouraged to join GOA-ON Pacific Islands TOA.

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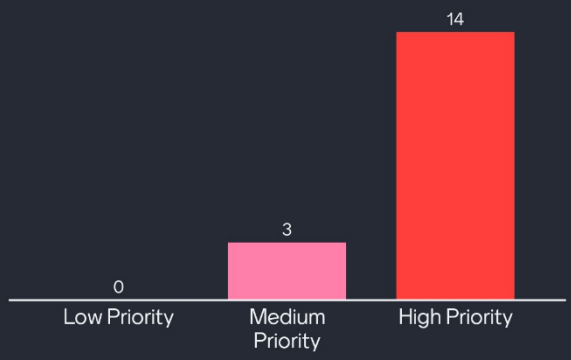

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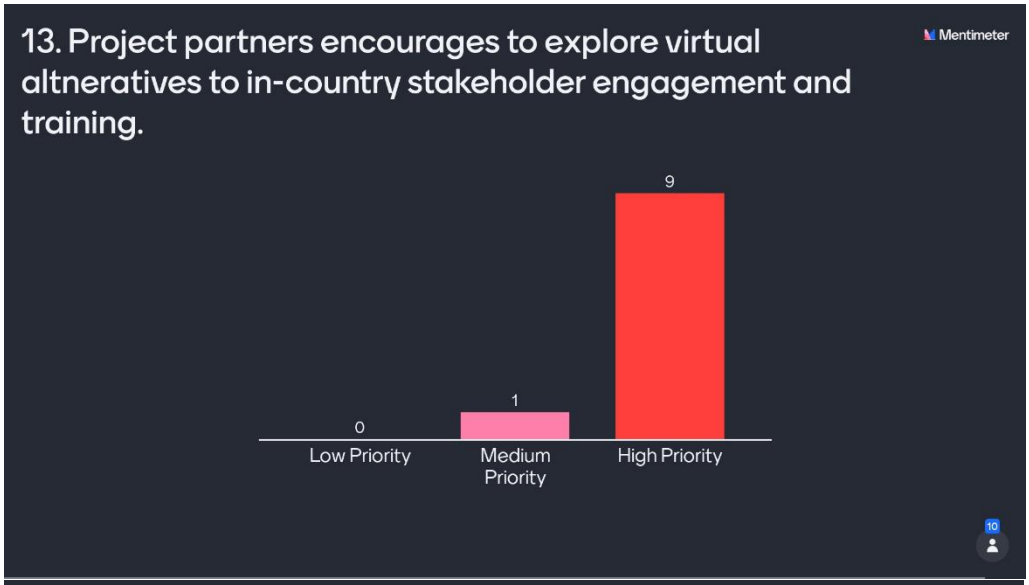

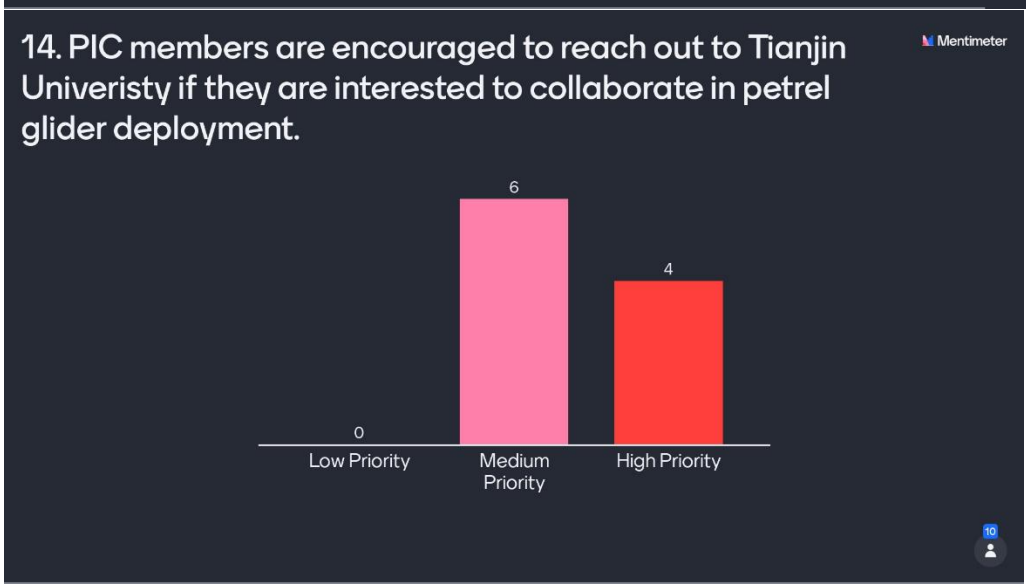

Annex 7

PI-5 WORKSHOP RECOMMENDATIONS

1. Under the vision of more resources, cooperation and dimensions; DBCP task team on Capacity Building (TT-CB), designs the needs-oriented workflow, to better service the needs from Members and Member States while focusing on innovative ways of delivering their mandate. Pacific Island Countries (PICs) can benefit from direct engagement in the TT-CB. Therefore, requested the PICs members to join the TT_CB to benefit from the work and also to contribute towards the TT-CB activities.
2. The Systematic Observations Financing Facility (SOFF) will support countries to generate and exchange basic observational data critical for improved weather forecasts and climate services (i.e. implementation of WMO Global Basic Observing Network).WMO is requested to table SOFF at upcoming UNFCCC and PICs are requested to advocate and support SOFF at UNFCCC.
3. PICs are requested to engage in and support the global ocean observing efforts by assisting ocean observing networks. Here are some of those opportunities
    a. Assist in deploying drifter buoys and consider barometer upgrades
    b. Engage in Argo floats deployments
    c. Enroll ships in the region to SOT/VOS programme
4. PIC ocean observers encouraged to engage in implementation of TPOS 2020.
5. PICs encouraged to enroll national ships in Voluntary Observing Ship (VOS) programme. PICs planning to start ship observing programmes are requested to engage with VOS Panel. VOS Panel provides assistance (i.e. Port Meteorological Officers Buddy Programme) to new countries starting up with ship observing programmes.
6. DBCP-CD-TT and PIMOS Panel to organize a PICs focused information session on VOS implementation to potential new Members.
7. There is little understanding of ideal observing network for PICs. Recommended DBCP -TT-CD to provide support to PICs to develop an ideal observing network which will help to optimize the observing efforts in the region with available limited resources.
8. DBCP will fund one moored directional wave buoy- including all costs for 1 year. Recipient will take responsibility for ongoing maintenance. Applications are called from all eligible countries. PICs are invited to apply before 1 August 2021.
9. PICs ocean observers encouraged to engage with relevant Decade Programmes, e.g. CoastPredict, Observing Together, and Pacific Solutions. GOOS and PCCOS to facilitate this outreach.
10. As an Ocean Teacher Global Academy (OTGA) Regional Training Centre (RTC), SPC to help identify and circulate relevant online courses to this community.
11. Encourage PICs ocean observers to keep DBCP updated on plans and share lessons learnt on deployments, maintenance, vandalism, etc.
12. PacIOOS, PCCOS, DBCP, PI-GOOS, IMOs, SOFAR and others to coordinate and develop a regional strategic plan to strengthen the Pacific Ocean observing network.
13. PIC members are encouraged to join GOA-ON Pacific Islands TOA.
14. PICs Project partners encouraged to explore virtual alternatives to in-country stakeholder engagement and training.
15. PIC members are encouraged to reach out to Tianjin University if they are interested to collaborate in petrel glider deployment.
16. PIC members encouraged to join the Pacific Early Career Ocean Professionals network: https://bit.ly/3gbrmQM

Annex 8

PI-5 ORGANIZING COMMITTEE

1. Qiu Jiang - National Center of Ocean Standard and Metrology (NCOSM) of MNR, China
2. Fan Jiang - National Center of Ocean Standard and Metrology (NCOSM) of MNR, China
3. Molly Powers - Pacific Community (SPC), Fiji
4. Zulfikar Begg – Pacific Community (SPC), Fiji
5. Sidney Thurston – NOAA Climate Program Office, USA
6. Champika Gallage - WMO Secretariat, Geneva, Switzerland
7. Long Jiang –OceanOPS, Geneva, Switzerland

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Annex 9

ACRONYMS

ADCP	Acoustic Doppler Current Profiler
BOM	Bureau of Meteorology Australia
CMOC	Centre for Marine Meteorological and Oceanographic Climate Data
CNMI	Commonwealth of the Northern Mariana Islands
COSPac	Climate and Oceans Support Program in the Pacific
CTD	Conductivity, Temperature, and Depth
DBCP	Data buoy Cooperation Panel
DWSD	Directional Wave Spectra Drifters
GA	Geoscience Australia
GBON	Global Basic Observing System
GDP	Global Drifter Programme
GNSS	Global Navigational Satellite System
GOA-ON	Global Ocean Acidification Observing Network
GOOS	Global Ocean Observing System
GTS	Global telecommunications System
HFR	High Frequency Radar
IOC	International Oceanographic Commission of UNESCO
LDL	Lagrangian Drifter Laboratory
MCDS	Marine Climate data System
NCOSM	National Center of Ocean Standard and Metrology
NMHS	National Meteorological and Hydrological Services
OA	Ocean Acidification
OTGA	Ocean Teacher Global Academy
PacIOOS	Pacific Islands Ocean Observing System
PCCO	Pacific Community Centre for Ocean Science
PCCOS	Pacific Community Centre for Ocean Science
PI	Pacific Islands
PICs	Pacific Island Countries
PIGOOS	Pacific Islands Global Ocean Observing System
QA	Quality Assurance
QC	Quality Control
RAMA	Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction
RTC	Regional Training Center
SDGs	Sustainable Development Goals
SFDRR	Sendai Framework on Disaster Risk Reduction
SIO	Scripps Institution of Oceanography
SOFF	Systematic Observations Financing Facility
SPC	Pacific Community
SPREP	Secretariat of the Pacific Environmental Programme,
SPSLCMP	South Pacific Sea Level and Climate Monitoring Project
TPOS	Tropical Pacific Observing System
TT-CB	Task Team on Capacity Building (of DBCP)
UN Decade	UN Decade of Ocean Sciences for Sustainable Development
WMO	World Meteorological Organization