

EIGHTH MEETING OF THE PACIFIC METEOROLOGICAL COUNCIL

PMC-8

Nuku'alofa, Tonga • 10, 11, 14 September 2026

Eighth Meeting of the Pacific Meteorological Council (PMC-8)

Weather Ready for a Secured and Sustainable Pacific

10, 11, 14 September 2026 | Nuku'alofa, Tonga

Agenda Item 13.1: PIMOS Panel Progress Updates

Purpose:

1. To inform Pacific Meteorological Council (PMC) on the updates from the Pacific Islands Marine and Ocean Services (PIMOS) Panel.
2. To seek endorsement from PMC on PIMOS recommendation towards strengthening ocean prediction and monitoring services.

Objectives:

1. To update PMC on the activities of the PIMOS Panel since the last PMC meeting, including meetings convened, membership changes, and progress of task teams.
2. To report to PMC on the implementation of recommendations from PMC 7.
3. To inform PMC of the outcomes of the Regional LiDAR Consultation and their role in guiding regional LiDAR prioritisation, investment planning, partnerships, and long-term data management to support coastal adaptation and early warning systems across Pacific Island Countries and Territories
4. To update PMC of the progress in strengthening ocean prediction and monitoring.
5. To inform PMC of the activities and achievements of the Pacific Islands Global Ocean Observing System (PIGOOS).

Background:

The Pacific Island Marine and Ocean Services (PIMOS) Panel was established by the Third Meeting of the Pacific Meteorological Council (PMC-3) in Nuku'alofa, Tonga in 2015 to serve in the capacity of an advisory committee to the Pacific Meteorological Council (PMC) on marine and ocean services matters in the Pacific region. The purpose of the PIMOS Panel is to provide technical advice to the PMC on matters related to marine and ocean services, with an emphasis on oceanography and marine meteorology, to strengthen coastal multi-hazard early warning systems (Coastal MHEWS), national preparedness and maritime safety support mechanisms at the national and regional level, as prescribed in the Pacific Islands Meteorological Strategy 2017-2026 and other international and regional frameworks such as the Sendai Framework for Disaster Risk Reduction.

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1. PIMOS Update:

1.1. Meetings

Since PMC-7, the PIMOS Panel has convened five times: 17 May 2025 (in person), 12 September 2025 (hybrid), 9 July 2026 (virtual), 18 August 2026 (virtual) and 7 September 2026 (in person). In addition, the PIMOS Coastal Inundation Task Team met in person in April 2026 to progress actions arising from PMC-7 and advance the development of a feasibility study for a cost-effective regional coastal inundation forecasting capability.

1.2. Leadership and Terms of Reference.

No changes have been made to the Panel leadership and Terms of Reference (ToR) since PMC-7. Director of Tuvalu Meteorological Service, Tauala Katea continues to serve as Chair, with Herve Damlamian from SPC serving as Vice-Chair.

2. Implementation of recommendations from PMC-7

2.

2.1. Implementation of SOLAS Guidance-Status: Ongoing

Following PMC-7, implementation support for the SOLAS Guidance was provided in nine Pacific Island countries and territories by SPC through COSPPac and CISPAC-5 workshops: Solomon Islands, Nauru, Kiribati, Palau, Tonga, Niue, FSM, Cook Islands and American Samoa. This work supports countries in strengthening maritime safety information arrangements ahead of the second cycle of the IMO Member State Audit Scheme (IMSAS) commencing in 2027. To date, MOUs between NMHSs and maritime administrations have been established in Solomon Islands and Palau, while draft agreements are under development in the Cook Islands, Tonga, and Tuvalu. Implementation support will continue in Vanuatu, Samoa and Tokelau in 2026, and Tuvalu, Papua New Guinea (PNG) and the Republic of Marshall Islands (RMI) in 2027.

An indicative IMO Member State Audit Scheme (IMSAS) audit schedule for relevant Pacific Member States is provided in Annex-1 to support planning and prioritization of SOLAS implementation support. **Kiribati, PNG** and **Vanuatu** are scheduled to undergo IMSAS audit next year. These countries are encouraged to engage early with their Maritime Administration, if this engagement has not already commenced.

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2.2. Regional Standard Operating Procedure (SOP) Templates for Ocean Observations-Status: ongoing (*Two SOPs; wave buoy –completed and temporary tide gauge -draft*).

PMC-7 requested PIMOS to support the development of regional guidelines and standard operating procedure (SOP) templates for ocean observations to strengthen the sustainability, consistency, and operational effectiveness of ocean monitoring services across the Pacific. In response, two series of SOP templates have been developed:

- SOP templates for the operation of lightweight wave buoys was developed through the CIS-Pac5 project in partnership with the Niue Meteorological Service and has subsequently been endorsed by the PIMOS Panel. These SOPs establish a standardised framework for wave buoy deployment, routine and corrective maintenance, recovery operations, and decommissioning, thereby supporting the reliability, continuity, and long-term sustainability of ocean observation infrastructure and services.
- SOP template for temporary tide gauge operations has been developed under CO-SPPac, with the PIMOS Panel endorsement to follow. The template is available online for members to review and provide comments. The template provides a standardised approach to tide gauge installation, geodetic referencing, calibration, routine monitoring, maintenance, data quality control, and decommissioning. The SOPs support the collection of accurate, traceable, and comparable sea level observations, strengthening the reliability, continuity, and long-term sustainability of sea level monitoring services across the Pacific.

These templates are living documents to be improved through national and regional field testing. Building on these achievements, additional SOP templates covering other ocean observing systems and equipment are planned for development.

Links to the new SOP templates are available in Annex-4.

2.3. Regional Coastal Inundation Forecasting Feasibility Study -Status: *Completed*

PMC-7 tasked PIMOS to undertake a feasibility study on a regional approach to coastal inundation forecasting and strengthen inundation warning services across the Pacific. With support from the Climate Risk and Early Warning Systems (CREWS) funded Scale-up Inclusive Early Warning and Action in the Pacific (SIEWAP) Project, SPC convened a regional

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workshop in Suva, Fiji, from 15-17 April 2026. The workshop brought together PIMOS members including national, regional and international experts from National Meteorological and Hydrological Services (NMHSs), regional organisations and development partners to assess technical requirements, governance arrangements, service delivery models and investment needs for a regional coastal inundation forecasting system.

The feasibility study has now been completed and endorsed by the PIMOS Panel. The study concludes that a regional coastal inundation guidance capability is technically, operationally, institutionally and financially feasible as a basis for further design and investment planning. The study identifies an enhanced regional coastal inundation guidance capability as the preferred pathway and minimum meaningful regional ambition for strengthening impact-based forecasting and warning services across the Pacific.

The proposed approach combines multi-driver coastal hazard forecasting, locally relevant guidance, observations, validation, event documentation and performance reporting within a common regional framework designed to improve progressively over time.

The study recommends the establishment of a coordinated four-year regional implementation programme to develop and operationalise the capability and concludes that SPC is best placed to lead programme implementation, technical coordination and long-term stewardship, working in close collaboration with NMHSs, PIMOS members and regional partners.

It is being submitted to PMC-8 for consideration and endorsement as a framework for strengthening regional coastal hazard forecasting and supporting risk-informed decision-making and early warning services.

A link to the feasibility study report and associated PIMOS workshop report can be found in Annex-4.

3. Progress in Ocean Predictions, Monitoring and Services

3.1. Regional Enabling Initiatives

The Regional LiDAR Consultation Outcomes

The Regional LiDAR consultation, convened by SPC in Nadi, Fiji on 20 April 2026 and funded by SPREP through the Weather Ready Pacific programme, brought together representatives from National Meteorological and Hydrological Services (NMHSs), National Disaster Man-

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agement Offices (NDMOs), Lands and Survey Departments, regional organisations and development partners to strengthen coordination and define a pathway for scaling LiDAR investment across the region. The consultation responded to growing regional recognition of LiDAR data as a priority capability, reflected in recent outcomes of the Pacific Regional Disaster and Emergency Managers Meeting (PRDEMM), the Pacific Geospatial and Surveying Council (PGSC), and the Regional Dialogue on Climate Security convened by PIFS and SPREP.

The consultation benefited from participation by senior government officials, including director-level representatives from disaster management and surveying agencies. Participants reviewed and validated the UNDP-supported regional LiDAR prioritisation framework, ensuring that the approach reflects country priorities and provides a stronger basis for future investment planning and resource mobilisation.

The consultation noted important progress in expanding LiDAR coverage across the region in 2026. Through the UNDP/GCF-funded Tonga Coastal Resilience Project, the Weather Ready Pacific programme, and the MFAT-funded Strengthening Manit for Addressing Loss and Damage in the Republic of the Marshall Islands project, partners are supporting the acquisition of high-resolution elevation data in key low-lying areas of Tonga and the Marshall Islands. These investments represent important milestones towards establishing the foundational datasets required for climate adaptation, disaster risk reduction, coastal inundation early warning systems and sustainable development across the Pacific.

This cross-sectoral consultation confirmed a clear regional message that LiDAR is no longer a specialist technical dataset, but critical national infrastructure supporting climate resilience, disaster risk reduction, early warning systems, infrastructure planning and sustainable development.

Participants agreed that existing global elevation datasets are insufficient for many Pacific contexts and can significantly underestimate exposure and vulnerability in low lying coastal areas. Limited and fragmented LiDAR coverage, together with challenges related to governance, data accessibility, technical capacity, standards and limited sustainable financing, continue to constraint uptake. The findings support a shift from ad hoc, project-based LiDAR acquisition towards a coordinated regional approach covering the full LiDAR value chain, including acquisition, processing, quality assurance, governance, data management, access, application and long-term maintenance. These outcomes, together with

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feedback received on the UNDP-led prioritisation framework, are now informing the development of a regional LiDAR prioritisation guideline and associated investment case to support country-led decision-making, coordinated investment, partnerships and resource mobilisation across the Pacific.

A link to the LiDAR consultation can be found in Annex-4.

Marine forecaster competency and Marine Forecast Manual.

The COSPPac team has provided introductory support to strengthen regional awareness and understanding of the WMO Marine Forecast Competence Framework and associated toolkits. This initial work has helped NMHSs to become familiar with the framework, consider current capability and identify possible training needs. In addition, marine forecast manual was also developed that align with the SOLAS convention and WMO Marine guidance. Initial support has focused on Kiribati, FSM, Nauru and Palau during North Pacific Ocean Science to Service workshop in Palau in April 2026, with further assistance planned through regional training, mentoring and partner support.

3.2. Ocean Information System and Data Accessibility

Pacific Ocean Portal- Update

In 2025, COSPPac has launched the new Pacific Ocean Portal as an upgraded regional platform for ocean information and services. The Portal builds on the original system developed under COSPPac phase 1 and provides a shared regional asset for NMHSs, partners and ocean stakeholders. It brings together global, regional and national datasets, including real-time monitoring, forecasts, historical information and sector-relevant ocean products, and is used operationally by NMHSs to support the development of national ocean outlooks. The upgraded Portal also includes monitoring of ocean climate change indicators, supported through Jupyter Notebook-based workflows that allow users to analyse, visualise and communicate long-term ocean changes. The upgraded Portal provides infrastructure that partners can use to develop and host new ocean products, supporting improved accessibility, sustainability and coordination of ocean services across the Pacific.

National Ocean Portals

Under the UNEP CIS-Pac5 project, National Weather Services in collaboration with University of Hawaii and local partners progressed the establishment of national Ocean Portals in

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both Palau and the Republic of the Marshall Islands (RMI). The Palau Ocean Portal is now complete and provides a centralized platform for accessing ocean and climate information relevant to national and local decision-making. For RMI, a draft Ocean Portal has been developed and is currently being refined based on stakeholder input.

Regional Tide App - Update

The new version of the Pacific Tide App has been completed and will be launched at PMC-8. Key enhancements include near real-time data display, expanded coverage to additional locations across the Pacific, and a redesigned user interface that delivers an improved look and user experience.

Regional LiDAR data management system

SPC has launched a geospatial data management system strengthening data discovery and accessibility of geospatial datasets. As a priority first step, all LiDAR datasets held by SPC have been integrated into the system and are now discoverable, with metadata currently available for access. Other datasets are now being integrated into the system. The data management system is housed within the Pacific Ocean Portal to ease user accessibility.

3.3. Ocean Prediction Services

Ocean Circulation Forecasting

Ocean current forecasting services are already available across parts of the North Pacific through the Pacific Islands Ocean Observing System (PacIOOS). Since 2023, PacIOOS has operated a regional ocean circulation forecasting system providing regular forecasts for Palau, the Federated States of Micronesia (FSM), Guam and the Commonwealth of the Northern Mariana Islands (CNMI). These forecasts complement existing weather, wave, sea-level and coastal hazard services and demonstrate the growing role of ocean current information in supporting marine operations and decision-making.

Building on these advances, the UNEP CIS-Pac5 project is supporting the development of high-resolution national ocean current forecasting systems for Niue, Tuvalu and the Cook Islands. The Niue forecasting system is currently undergoing testing and validation, while development of the Tuvalu and Cook Islands systems remains ongoing.

Ocean current forecasting has the potential to significantly expand the range of ocean services available to Pacific Island Countries and Territories. In addition to supporting maritime

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navigation and safety, ocean current information can strengthen search and rescue operations, fisheries management, marine spatial planning, pollution tracking, drift modelling, and broader integrated ocean management. As these systems mature, they will provide new opportunities for the development of tailored ocean services that respond to national priorities and user needs.

Wave and Inundation Forecasting

The UNEP CIS-Pac5 project is supporting the strengthening of coastal inundation early warning capabilities in Niue, RMI, Palau, the Cook Islands and Tuvalu (system upgrade).

To date, the project has completed high-resolution, national-scale wave forecasting systems for Niue and the Cook Islands, together with a national-scale coastal inundation forecasting and guidance system for the Cook Islands. The Cook Islands system combines detailed inundation hazard predictions for the capital island with a customisable, threshold-based warning framework for outer islands, where forecast performance will continue to improve as additional inundation observations become available for validation.

The inundation forecasting system for Niue is currently undergoing final validation prior to operationalisation, while the upgrade of the Tuvalu system is underway. PacIOOS has initiated the development of a 6-day wave-driven inundation forecast for East Babeldaob, Palau. The initial field deployment enabling calibration and validation of the numerical model under Palau's unique coastal conditions has been successfully completed.

Building on the PARTneR project's risk modelling tools and strengthened regional risk modelling capacity, forecast systems for Niue, Tuvalu and Cook Islands are designed not only to predict inundation hazards but also to provide estimates of potential impacts, supporting more risk-informed decision-making and tailored response.

The modelling framework has also been applied to complete a probabilistic coastal inundation hazard assessment for Rarotonga, including the projected effects of sea-level rise. Similar assessments are currently being developed for Niue and Palau. The PacIOOS team released a new [Wave-Driven Flooding with Sea Level Rise Viewer](#) for East Babeldaob, Palau to the public for beta testing.

3.4. Ocean Observation and Monitoring

Ocean observation capacity continued to be strengthened across Pacific Island Countries through activities supported by COSPPac, CIS-Pac5, ClimSA, with a focus on sea-level

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monitoring, wave observations, marine water quality monitoring, and improved access to real-time ocean information.

Ocean waves and sea level observation

The regional wave observation network was expanded through the deployment and maintenance of wave monitoring systems providing real-time observations. Over the reporting period, wave buoys were deployed or supported in Solomon Islands (Bokona Bay), Niue, Tuvalu (Funafuti, Niulakita and Nanumaga), the Cook Islands, Samoa, Kiribati and Palau. These observations contribute to improved understanding of wave climate and coastal hazards and support forecasting, coastal risk assessments, and operational decision-making.

Support for sea-level monitoring continued through COSPPac, including maintenance of the regional tide gauge network and deployment of temporary tide gauges in national priority locations. A total of eight temporary tide gauges were deployed in four countries (Wairiki, Ellington, Taveuni and Malau in Fiji; Ollie port in Palau; Jaliut and Milli Atoll in RMI; and Savaii in Samoa).

Observational data generated through these activities are made available through the Real-Time Ocean Dashboard within the Pacific Ocean Portal, improving access to wave, sea-level, and oceanographic information for National Meteorological and Hydrological Services, marine agencies, disaster management authorities, researchers, and other users across the Pacific. Data are also accessible through the Pacific Data Hub to support regional data sharing and collaboration.

Despite these efforts, the regional wave observation network remains highly fragile. Most assets continue to depend on short-term project funding for deployment, maintenance, replacement, and technical support. Sustaining and expanding ocean observing systems will require a more coordinated and long-term investment approach focused on network resilience, lifecycle maintenance, national ownership, and operational sustainability.

Ocean Acidification and Marine Water quality

Ocean acidification threatens Pacific coral reefs, fisheries, aquaculture, food security and coastal livelihoods. Through the Pacific Islands Ocean Acidification Centre (PIOAC), an SPC-led partnership involving USP, ESNZ and the University of Otago, the Pacific region is working towards strengthening long-term monitoring and technical capacity to establish national baselines and support ocean management.

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Nine GOA-ON in a Box monitoring kits have been provided to Pacific institutions. Since 2023, five national and regional training activities have strengthened monitoring capacity across Fiji, Kiribati, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tuvalu and Vanuatu. These included regional training at Solomon Islands National University and an ocean acidification dialogue at Pacific Islands Ocean Conference (PIOC) in September 2025. PIOAC has also supported countries with SDG indicator 14.3.1 reporting and participation in GOA-ON events. Long-term financing remains essential for equipment, laboratory analysis, data management and national capacity.

Marine water quality monitoring capacity has also been strengthened through CIS-Pac5 support for national marine water quality monitoring programmes in Niue, Tuvalu and the Cook Islands, including training, technical assistance, and operational monitoring activities.

3.5. Tailored Ocean Services and Products

The production and dissemination of COSPPac tide calendars have significantly increased (by 180%) since PMC-7. The project now supports the delivery of Tide Calendars in 70 locations across the region, instead of 25 locations in 2025. Tide calendars continued to provide accessible tidal information to support navigation, coastal operations, and community planning.

Marine heat wave products have been successfully integrated into the Pacific Ocean Portal:

- The Marine heatwave information from NOAA Coral Reef Watch supports monitoring of ocean warming and related risks to marine ecosystems and climate-sensitive sectors.
- The marine heatwave forecast developed by the Bureau of Meteorology (BOM) provides forward-looking guidance to complement near-real-time and historical marine heat stress information from daily global satellite sea surface temperature data.

Marine heatwave monitoring and forecasting are being incorporated into COSPPac Ocean Science to Service training to strengthen NMHS use of this information in ocean outlooks, coral bleaching alerts and advisory services.

Significant work is underway through ClimSA, UNEP CIS-Pac5 and COSPPac to support National Meteorological Services in developing new tailored ocean services and products. Several key service delivery milestones are expected during the next reporting period.

3.6. Regional Ocean Observing Coordination (PIGOOS)

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Pacific Islands Global Ocean Observing System (PIGOOS) Update

Since PMC-7, PIGOOS has strengthened its role in coordinating and supporting regional ocean observations through improved data curation, the launch of the PIGOOS webpage, establishment of the Global Ocean Observing System (GOOS) Tropical Cyclone Exemplar project, support to Pacific Fishing Vessel Observing Network (FVON), and increased Pacific engagement in GOOS and Global Climate Observing System (GCOS) activities. Key challenges remain, including limited national investment and technical capacity, fragmented data management arrangements, and low regional representation within GOOS mechanisms. Future priorities include strengthening ocean observing networks and data systems, expanding regional observing partnerships, improving data accessibility, mobilising resources for sustained observations, and encouraging countries to establish GOOS and Argo National Focal Points to strengthen Pacific engagement in GOOS initiatives. Annex-3 provides a detailed PIGOOS report.

Argo Program

The international Argo Program, a global array of more than 4,000 autonomous floats providing freely available, near-real-time ocean temperature, salinity, and biogeochemical data, is a critical contributor to Pacific climate analysis, weather and ocean forecasting, marine safety, and resource management.

Earth Sciences New Zealand (ESNZ) is preparing a 2026 western tropical Pacific Argo deployment voyage, undertaken with international partners including NOAA, Scripps Institution of Oceanography, the University of Washington, CSIRO, and GOOS, and supported by the Pacific Community. Marine Scientific Research (MSR) permit applications for Argo deployments have, in some cases, faced delays where foreign affairs channels are unfamiliar with the Program and its distinction from surveillance activity, and where national jurisdictions have requested fees, inconsistent with UNCLOS. To strengthen engagement, PIMOS seeks the Council's encouragement for PICTs to nominate National Argo Focal Point through the national IOC coordinating body, UNESCO National Commission, or Permanent Delegate to UNESCO, and proposes requesting SPC, through PIGOOS, to explore appropriate regional mechanisms to support Argo deployments.

4. Research and Innovation Supporting Ocean Services

Research undertaken by PIMOS members and partners continues to strengthen the evidence base underpinning marine heatwave services, coastal inundation forecasting, sea-level rise adaptation planning and ocean prediction. Recent studies demonstrate the value of integrating ocean observations, numerical modelling, and risk assessment to support impact-based forecasting, coastal resilience planning, and climate adaptation investments

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across the Pacific. Examples include work on marine heatwave forecasting, national-scale coastal flood assessments, and high-resolution wave modelling. Detailed references are available upon request. Recent papers are listed in Annex-5.

5. Tsunami Warning Capacity Development

In 2023, the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS) approved the Minimum Competency Levels Framework for National Tsunami Warning Centre (NTWC) Operations Staff, including the minimum competencies, competency framework, and associated training requirements necessary for effective tsunami warning operations. This framework was developed through the PTWS Working Group 2 Task Team on Minimum Competency Levels and subsequently endorsed by PTWS Member States.

To operationalize the framework, the Task Team on Capacity Development under the PTWS Regional Working Group for Pacific Island Countries and Territories (WG-PICT), in collaboration with the International Tsunami Information Centre (ITIC), initiated the development of a Minimum Competency Training Course (MCTC) for NTWC personnel and watchkeepers. The objective is to establish a standardized training pathway that equips tsunami warning staff with the scientific knowledge, operational skills, and decision-making competencies required to meet the PTWS minimum competency standards.

ITIC engaged a team of international experts and consultants to design and develop the MCTC. The training programme adopts a progressive learning approach, consisting of self-paced online modules, hybrid learning components, and advanced hands-on training. As a prerequisite, participants are required to successfully complete the UNESCO-IOC Tsunami Awareness and UNESCO-IOC Tsunami Ready courses delivered through the OceanTeacher Global Academy (OTGA) before advancing to the competency-based training modules.

The development and pilot implementation of the MCTC is being undertaken during the 2024–2027 period with financial support from the Government of the United States through the U.S. Department of State. The pilot programme will be tested with NTWC personnel from Fiji, Nauru, Samoa, Solomon Islands, Tonga, and Vanuatu, allowing participating countries to validate the training approach, provide lessons learned, and contribute to the refinement of the final competency-based curriculum for broader PTWS implementation.

The MCTC represents a significant milestone in strengthening operational capacity across Pacific Island tsunami warning systems by promoting consistent competency standards, improving readiness and response capabilities, and supporting the long-term sustainability of national tsunami warning services throughout the Pacific region.

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6. Forward look (Activities Supporting PIMOS Priorities 2026-2027).

Annex-2 summarises planned activities for 2026–2027 delivered through regional projects and partnerships in support of PIMOS priorities. It outlines key activities, lead organisations and the advisory and coordination role of the PIMOS Panel across priority areas including ocean observations, ocean forecasting, coastal inundation forecasting, LiDAR, marine services, tsunami warning competency and PIGOOS.

7. Recommendations:

The Meeting is invited to:

PIMOS update:

- I. **Recognise** the significant progress of the PIMOS Panel since PMC-7 in implementing PMC-7 recommendations, including the implementation of SOLAS guidance, strengthening ocean observing standards, establishment of partnerships between NMHSs and maritime administrations and delivering on the feasibility study.

LiDAR

- II. **Note** the outcomes of the Regional LiDAR Consultation and **Recognise** LiDAR as a critical national geospatial dataset supporting early warning systems.

Regional inundation forecasting capability

- III. **Endorse** the proposed regional coastal inundation forecasting and guidance capability as the preferred pathway and minimum meaningful regional ambition for strengthening coastal inundation forecasting and warning services across Pacific Island Countries and Territories.
- IV. **Endorse** the evidence-based approach to developing locally relevant guidance through observations, validation, event documentation and performance reporting.
- V. **Endorse** the principle that National Meteorological and Hydrological Services (NMHSs) retain ownership of forecasts, warnings and operational decision-making, with regional systems providing technical guidance, tools and support that strengthen national warning capabilities.
- VI. **Endorse** SPC as the regional lead for programme implementation and technical co-ordination of the proposed capability, while long-term governance arrangements are developed for future PMC consideration.
- VII. **Encourage** partners to align future investments with 4-year regional implementation programme and **Support** the establishment of sustainable governance and financing arrangements.

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PIGOOS and ARGO

- VIII. **Note** the progress of PIGOOS in strengthening regional ocean observing coordination, technical collaboration and Member engagement, and in supporting Pacific Island Countries and Territories to contribute to and benefit from the Global Ocean Observing System (GOOS).
- IX. **Encourage** Members to coordinate with their respective IOC Focal Points, UNESCO National Commissions or Permanent Delegations to UNESCO in nominating GOOS National Focal Point and Argo National Focal Point to strengthen regional engagement in the Global Ocean Observing System.
- X. **Note** the importance of Argo Program for regional climate monitoring and weather forecasting, and **request** SPC (PIGOOS) to explore appropriate regional mechanism to support Argo deployments in the region.

Tsunami Capacity

- XI. **Endorse** the implementation of the PTWS Minimum Competency Framework for National Tsunami Warning Centre (NTWC) Operations Staff as the regional standard for strengthening tsunami warning and response capabilities across Pacific Island Countries and Territories.
 - XII. **Encourage** National Meteorological and Hydrological Services and NTWCs to participate in the competency-based training pathway, including completion of the UNESCO-IOC Tsunami Awareness and Tsunami Ready courses offered through the OceanTeacher Global Academy (OTGA) as prerequisites for the Minimum Competency Training Course (MCTC).
 - XIII. **Support** the pilot implementation and future regional rollout of the MCTC, and encourage Member States and partners to contribute lessons learned, technical expertise, and resources to strengthen long-term operational capacity for tsunami warning services in the Pacific.
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Annexes

Annex-1: Indicative IMSAS Audit Schedule for Pacific Member States

The following table provides an indicative schedule for the second cycle of IMSAS audits, which will run over nine years, for selected Pacific Member States to assist with planning, co-ordination and prioritisation of SOLAS implementation support.

Member State	Group	Scheduled Audit Period	Remarks
Kiribati	Group 1	July 2027	Specific month determined
Vanuatu	Group 1	September 2027	Specific month determined
Papua New Guinea	Group 1	October 2027	Specific month determined
Fiji	Group 2	July 2029 – June 2031	Specific sequence/month TBD*
Palau	Group 2	July 2029 – June 2031	Specific sequence/month TBD*
Samoa	Group 2	July 2029 – June 2031	Specific sequence/month TBD*
Solomon Islands	Group 2	July 2029 – June 2031	Specific sequence/month TBD*
Tonga	Group 2	July 2029 – June 2031	Specific sequence/month TBD*
Tuvalu	Group 2	July 2029 – June 2031	Specific sequence/month TBD*
Cook Islands	Group 4	July 2033 – June 2035	Specific sequence/month TBD*
Nauru	Group 4	July 2033 – June 2035	Specific sequence/month TBD*

*TBD refers to the specific sequence or month of audit, which is still to be determined.

See: <https://www.imo.org/en/ourwork/msas/pages/audit-schedule.aspx> for more.

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Annex-2: Activities Supporting PIMOS Priorities (2026-2027)

This annex summarises planned activities for 2026-2027 delivered through regional projects, national agencies and partner organisations in support of priorities identified by the PIMOS Panel. It also outlines selected advisory, coordination and reporting functions of the PIMOS Panel that support implementation, knowledge sharing and regional coordination.

PIMOS Priority Area	Planned Activities (2026-2027)	PIMOS Role	Lead Organisations
SOLAS implementation and maritime safety	Continued implementation support in Vanuatu, Samoa, Tokelau, Tuvalu, PNG and RMI. Support development and operationalisation of NMHS-Maritime Administration MoUs and preparation for IMSAS audits. Planned activity under COSPPac	Promote coordinated implementation of SOLAS guidance, monitor regional progress, share lessons learned and support alignment of partner activities with PMC recommendations.	SPC, NMHSs, Maritime Administrations
Regional coastal inundation forecasting capability	Subject to PMC endorsement, progress programme design, partnership development and resource mobilisation for implementation of the preferred regional capability identified through the feasibility study.	Provide strategic oversight and technical guidance, facilitate regional coordination and promote alignment with agreed principles and recommendations.	SPC, PIMOS Coastal Inundation Task Team, NMHSs, partners

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Regional LiDAR prioritisation and investment planning	Finalise the regional LiDAR prioritisation guideline and associated investment case following regional consultation outcomes. Planned supporting activity under WRP	Review and provide advisory input, strengthen regional coordination and support engagement between countries, development partners and technical agencies.	UNDP, SPC, SPREP, national agencies, partners
Ocean observation guidelines and SOPs	Extend SOP templates and operational guidance to additional ocean observing systems as opportunities arise. Maintain and refine existing wave buoy and temporary tide gauge SOPs through field testing.	Review and endorse SOPs, promote adoption, share lessons learned and support regional consistency in observing practices.	PIMOS, SPC, NMHSs, partners
Pacific Ocean Portal and data accessibility	Continue enhancement of the Pacific Ocean Portal, improve user guidance and documentation, integrate new products and strengthen accessibility of ocean and geospatial information. Planned activity under COSPPac	Provide strategic advice on portal development and explore opportunities for improved interoperability and integration of national systems.	SPC, University of Hawai'i, NMHSs, partners
National Ocean Portals	Further development and refinement of national ocean portals, including completion of the RMI Ocean Portal. Planned activity under UNEP CIS-Pac5	Provide advice and facilitate sharing of good practices and lessons learned among participating countries.	University of Hawai'i, national weather services, UNEP
Marine heat-wave services	Operationalise marine heatwave monitoring and forecasting products and strengthen incorporation into ocean outlooks and decision-support services. Planned activity under COSPPac	Review progress, provide advice and promote uptake of marine heatwave information within NMHS services.	SPC, BOM, NOAA, NMHSs
Marine fore-caster competency	Continue awareness raising and support for the WMO Marine Forecast Competency Framework and associated training activities. Planned activity under COSPPac	Promote regional coordination, identify common needs and support sharing of training opportunities.	WMO, SPC, Fiji Meteorological Service
Ocean observations and monitoring	Continued deployment, operation and maintenance of wave buoys,	Monitor regional progress, identify gaps and provide strategic advice on sustainability, resilience and	SPC, SPREP, PACIOOS, NMHSs, partners

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	tide gauges and other observing systems through regional projects and partnerships. Planned activities under ClimSA, UNEP CIS-Pac5 and COSPPac	national ownership of observing systems.	
Ocean acidification and marine environmental monitoring	Continued strengthening of monitoring networks, technical capacity development, SDG reporting and regional coordination activities. Planned activities under PIOAC	Promote collaboration, share lessons learned and provide advice on regional priorities and sustainability.	SPC, USP, ESNZ, University of Ontario, national monitoring institutions
PIGOOS and GOOS engagement	Strengthen regional ocean observing coordination, support resource mobilisation, improve data management and encourage GOOS and Argo focal point nominations.	Provide strategic oversight, facilitate engagement with PMC and support regional coordination and advocacy.	PIGOOS, GOOS, SPC, partners
Tailored ocean services	Continued development and delivery of tide calendars, fisheries bulletins, marine heatwave products and navigational safety services. It includes planned activities under ClimSA, UNEP CIS-Pac5 and COSPPac	Promote sharing of successful service models and provide strategic advice on user-focused service development.	SPC, SPREP, NMHSs, partners
Tsunami warning competency development	Pilot implementation and evaluation of the NTWC Minimum Competency Training Course and support future regional rollout.	Promote implementation of competency standards and support knowledge exchange between participating countries.	UNESCO/IOC, ITIC, NTWCs, NMHSs

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Annex-3: Progress report on the Pacific Islands Global Ocean Observing System (PIGOOS)

Purpose and Overview

This summary covers the Pacific Islands Global Ocean Observing System (PIGOOS) progress report for the period from PMC-7 to present, prepared for the Pacific Island Marine and Ocean Services (PIMOS) Panel and onward reporting to the Pacific Meteorological Council (PMC).

Governance

Established in 1998, PIGOOS is one of 14 GOOS Regional Alliances and is hosted by the Pacific Community (SPC). It reports to the PMC through the PIMOS Panel, a pathway that links ocean observing priorities to regional meteorological governance and demonstrates effective collaboration between UNESCO-IOC and the World Meteorological Organisation (WMO) at the regional level. Since PIGOOS's 2023 reinvigoration, it no longer reports to a separate Advisory Committee, instead, it operates through existing regional mechanisms, reducing duplication and administrative burden for members and partners.

GOOS itself is undergoing a comprehensive reform of its mission, scope and structure, aiming for streamlined governance, stronger Member State engagement and clearer accountability under a proposed dual IOC–WMO sponsorship. A draft proposal is due for review in 2026, with final approval expected at the 2027 IOC Assembly and WMO Congress. PIGOOS will continue engaging in the review process to ensure Pacific priorities are reflected in these reforms.

To improve regional visibility and coordination, PIGOOS has launched a dedicated webpage (spc.int/pigoos) as a central access point for information, resources and links on Pacific ocean observations, complementing rather than replacing existing information sources. The platform is expected to expand over time to include additional tools, dashboards and data services.

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Contribution to GOOS and Regional Engagement

GOOS provides the global framework for sustained ocean observation, analysis and modelling, coordinated across 13 established networks (including Argo, the Data Buoy Cooperation Panel, GO-SHIP and the Global Sea Level Observing System) and four emerging networks. Within this framework, PIGOOS serves as the Pacific's regional coordination mechanism, raising awareness, supporting implementation, and connecting regional needs with global observing frameworks. It has also increased Pacific participation in GOOS and GCOS expert processes, including work on Essential Ocean and Climate Variables and inputs to the 2027 GCOS Status Report and Implementation Plan, helping ensure Pacific priorities are reflected in global standards.

A GOOS National Focal Point (NFP) is each country's designated link to GOOS, representing national priorities internationally and coordinating domestic stakeholders. Currently, only the Cook Islands has an active NFP in the region. PIGOOS is actively engaging with the PMC members to assist countries in identifying candidates and completing nomination.

Ocean Observing Programmes and Initiatives

PIGOOS supports a range of observing programmes relevant to the Pacific:

- The Pacific Sea Level and Geodetic Monitoring (PSLGM) network, funded through COSPPac, comprises 14 tide gauges and co-located GNSS geodetic stations across 13 PICTs. It is a key regional contributor to the Global Sea Level Observing System (GLOSS), with data shared near-real-time via the IOC Sea Level Monitoring Facility to support tsunami warning, complemented by PacIOOS's tide gauge network across the U.S. Pacific Islands and the Freely Associated States. Many nationally operated tide gauges, however, remain outside these international data-sharing systems, which PIGOOS is working towards strengthening while respecting country ownership and data sovereignty.
- Argo, the global array of autonomous profiling floats underpinning ENSO, marine-heatwave, cyclone, sea-level and fisheries applications, comprised around 4,376 active floats globally as of July 2026, but roughly half the programme depends on a single country's funding, creating a critical vulnerability. Only Cook Islands from the region has a designated national Argo Focal Point, which has delayed some Marine Scientific Research clearances for float deployment. PIGOOS is working with GOOS to help facilitate designation of Argo National Focal Points in the region to assist the Argo Program.
- The Tropical Pacific Observing System is essential for weather, climate and ENSO prediction, but major gaps remain in the western equatorial Pacific, where most moorings west of 165°E have not been re-stored, posing risks to forecasting and research. PIGOOS is supporting efforts to strengthen the system through support for the deployment of Surface UNcrewed (SUN) Fleet in the western Pacific "Big Data Hole," and support to the complementary initiatives such as TEPEX and the GO-SHIP P15S research voyage.
- The Fishing Vessel Observing Network (FVON), established by SPC in 2025 with the tuna industry, member governments, the University of New South Wales and PIGOOS, uses fishing vessels as low-cost observing platforms. It has expanded to 40 vessels across six PICTs (Fiji, Papua New Guinea, Solomon Islands, Samoa, French Polynesia and New Caledonia), with a goal of 70 by end-2026, directly supporting cyclone, heatwave and seasonal forecasting.
- Under the GOOS Co-Design Tropical Cyclone Exemplar, PIGOOS established a Pacific pilot site in 2025 to improve cyclone forecasting through better use of sub-surface ocean observations, working with SPC,

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NOAA, Rutgers University and the University of New South Wales. A regional stakeholder consultation survey is currently open to guide future project activities.

- Through GO-SHIP's 2026 Western Pacific (P15S) hydrographic survey, Pacific Early Career Ocean Professionals were offered berths under the NF-POGO-SPC-CSIRO Shipboard Training programme, building regional capacity in full-depth ocean sampling.
- The region is also engaging with CoastPredict and the GlobalCoast Network on coastal observing and forecasting, with an Adaptation Fund concept note being developed for ten South Pacific countries covering coastal risk assessment, LiDAR/bathymetric surveys and early warning services.
- Three Pacific Port Meteorological Offices (PMOs) are planned, in Vanuatu, Tuvalu and Solomon Islands, providing a standing national link between meteorological services and the shipping community to recruit and support Voluntary Observing Ships, maintain instruments, and train ships' crews.

Data Management

With UNESCO-IOC funding, PIGOOS has supported the revamp of the Pacific Ocean Portal and development of SPC's Oceanographic Data Management System (DMS), which standardises datasets into CF-compliant formats and improves metadata management, quality control and archiving. The revamped portal now provides centralised access to real-time and historical observations, including wave buoys, tide gauges and DART buoys, with future work focused on expanding coverage and supporting data exchange through WMO WIS 2.0.

Gaps and Challenges

The principal regional gap is the mismatch between the size and vulnerability of the Pacific Ocean domain and the limited scale and continuity of in situ observations, underpinned by insufficient national investment and heavy reliance on project-based work. Coordination across ocean, meteorological, fisheries and disaster-risk sectors remains limited, as does national capacity to sustain equipment, compounded by the high cost of instruments and satellite communications for small-volume purchasers.

Data management and interoperability remain constrained by fragmented, poorly curated datasets, though work through the Pacific Ocean Portal and SPC's Oceanographic DMS is addressing this. Standardisation and quality assurance also need strengthening beyond the wave buoy Standard Operating Procedure currently in development.

Limited regional awareness of GOOS constrains national engagement, with only the Cook Islands holding an active NFP, while Marine Scientific Research clearance delays for Argo deployments remain a practical barrier to sustaining the observing network.

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Annex-4: Supporting Documents

#	Section Title	Document	Link
3.1	Regional Standard Operating Procedure (SOP) Templates for Ocean Observations-	SOP Templates for Temporary Tide Gauge	Standard Operating Procedures for Temp tide gauge_Final.docx
		SOP Templates for light-weight wave buoy	Standard Operating Procedure for Wave Buoy Deployment Maintenance Rescue and Decommission PI-MOS.docx
		Marine Forecast Manual Template for National Marine Forecast Services	Marine Forecast Manual Template subregion (1).docx
3.3	Regional Coastal Inundation Forecasting Feasibility Study	Feasibility study for a regional Coastal Inundation forecasting system.	Feasible study for the development of a Regional Coastal Inundation Forecasting System Report draft ver combined latest (1).docx
		PIMOS/Coastal Inundation Task Team workshop Report	PIMOS Coastal Inundation WorkshopDraft_WMO_v2.docx
4.1	The Regional LiDAR Consultation Outcomes	Report on the 1-day regional LiDAR consultation	Regional LiDAR Workshop Report.docx

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Annex-5 Research

Research support is also strengthening the development of marine heatwave services for the Pacific. A new Pacific marine heatwave forecast product, separate from NOAA and based on the Bureau of Meteorology's ACCESS-S seasonal forecast system, is available to Pacific NMHSs through Bureau support led by Grant Smith of BOM. This complements NOAA Coral Reef Watch monitoring by providing forward-looking guidance for ocean outlooks, coral bleaching alerts and advisory services, and is being incorporated into COSPPac Ocean Science to Service training.

A manuscript entitled "Coral Bleaching Extent Detection (C-BED): Copernicus Marine Data and Sentinel-2 spectral analyses to detect the impacts of the January 2026 marine heatwave event in Tonga and Fiji, led by Nicholas Metherall from SPC with partners including COSPPac, was submitted to the Copernicus Ocean State Report. The study demonstrates how satellite observations, marine heatwave monitoring, in-situ reef surveys, the Pacific Ocean Portal, and Digital Earth Pacific can be integrated to support coral bleaching monitoring and the development of Pacific-led early warning systems for reef ecosystems.

Paulik et al. (in review) – Extreme Sea Level Inundation Maps for Vanuatu. This paper highlights the work undertaken under the MFAT funded PARTneR project, and develops national-scale inundation maps showing areas vulnerable to flooding from extreme sea levels under

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present and future climate conditions. The study integrates sea-level rise, tides, waves and coastal topography to identify exposed communities and infrastructure. Despite being based on coarse bathymetry and topography data, the outputs support high-level evidence for climate financing initiatives. For PIMOS, it clearly demonstrates the value of high-quality baseline data and dynamic inundation modelling in ensuring actionable coastal hazard information.

Muna et al., (2026) – A 44-Year High-Resolution Wave Hindcast for the Fijian Archipelago. The first author is a PhD student at the University of New Caledonia and is co-supervised and co-hosted by IRD, USP and SPC. The study produces a high-resolution 44-year wave hindcast for Fiji, providing information on wave climate, variability and long-term trends. The dataset improves understanding of wave processes around the Fijian archipelago and supports coastal hazard assessments. It provides important evidence base for marine forecasting, coastal engineering and climate resilience planning. For PIMOS, it highlights the value of sustained ocean observations and wave modelling for ocean services.

Paulik et al. (2025) – Evaluation of Extreme Sea Level Flooding Risk to Buildings in Samoa. This paper highlights work done under the MFAT funded PARTneR project and assesses the economic risks to buildings in Samoa from extreme sea-level flooding and future sea-level rise. Leveraging on decades of national and regional investment in exposure data collection, hazard and loss modelling effort enables the quantification of potential damage and identifies areas of highest risk. The study moves beyond hazard mapping to demonstrate the socioeconomic consequences of coastal flooding. For PIMOS, it illustrates growing regional and national capacities to translate ocean hazard information into actionable impact-based forecasting and risk-informed decision-making.

Wandres et al. (2024) – A National-Scale Coastal Flood Hazard Assessment for the Atoll Nation of Tuvalu. Led by Mr. Wandres from SPC, the paper presents a probabilistic coastal flood hazard assessment for Tuvalu using high-resolution LiDAR, bathymetry, waves, tides and sea-level data. Results show that large areas of Tuvalu are already vulnerable to coastal flooding and that flood frequency will increase significantly with sea-level rise. The study provides a robust scientific basis for adaptation planning and infrastructure investment. For PIMOS, it is a flagship example of integrating observations, modelling and hazard mapping to support coastal resilience and early warning services. The study helped informed more than AUD 50 million in coastal adaptation investment to date, the 2024 update of Tuvalu national building codes and the national adaptation plan.

Singh et al. (2024) – Framing Climate Science in the Pacific Islands. Developed through the Pacific Ocean and Climate Crisis Assessment (POCCA) project, led by Dr Awnesh Singh (USP) and collaborators, this research examines the unique climate vulnerabilities of Pacific Island Countries and Territories and highlights the importance of integrating traditional

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knowledge with scientific observations to strengthen climate resilience and adaptation. The study provides a Pacific-centred perspective on climate variability and climate change impacts, while emphasising the value of locally relevant climate information for decision-making. For PIMOS, the research provides important context for understanding the increasing risks posed by marine heatwaves to coral reefs, fisheries and coastal communities and supports the development of marine heatwave monitoring, forecasting and early warning services across the Pacific region.

Lal et al. (2026) – Characterisation of Past Marine Heatwaves around South Pacific Island Countries: What Really Matters? Led by Dr Shilpa Lal and involving SPC's Oceanic Fisheries Programme and international research partners, the study examined marine heatwave characteristics across 12 Pacific Island Countries and Territories over the last three decades. The research found that marine heatwaves are becoming more frequent, covering larger areas and lasting longer, with Fiji, Tonga, Vanuatu and New Caledonia among the countries most exposed to prolonged and intense events. The study developed marine heatwave indicators tailored to Pacific stakeholder needs, distinguishing between offshore events likely to affect fisheries and coastal events affecting coral reefs and nearshore ecosystems. For PIMOS, the research provides an important scientific basis for marine heatwave monitoring, forecasting and early warning services, supporting climate adaptation and ocean resilience planning across the Pacific

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