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SIXTH MEETING OF THE PACIFIC METEOROLOGICAL COUNCIL (PMC-6) THIRD PACIFIC MINISTERIAL MEETING ON METEOROLOGY (PMMM-3)

● [HTTPS://WWW.PACIFICMET.NET/PMC-6-2023](https://www.pacificmet.net/PMC-6-2023)

## Sixth Meeting of the Pacific Meteorological Council (PMC-6)

Sustaining Weather, Climate, Water and Ocean Services for a Resilient Blue Pacific

14-16 August 2023, Sofitel Fiji Resort and Spa, Denarau, Nadi, Fiji

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### Agenda item [11.4]: [Update on the Pacific Tsunami Warning and Mitigation Systems (PTWS)]

#### Purpose:

1. To inform the meeting on progress of the ICG/PTWS Pacific Island Countries and Territories Working Group on Tsunami Warning and Mitigation System (WG-PICT)
2. Inform the meeting on the activities of the Oceania Seismic Regional Network (ORSNET) and the continued effort in ensuring the availability of seismic data for earthquake, volcano and tsunami early warning within the region

#### Background:

1. Under the Pacific Islands Meteorological Strategy 2017-2026, PRIORITY 2: DISASTER RISK REDUCTION, PACIFIC KEY OUTCOME (PKO) 4: Strengthened NHMSs capacity to implement Multi-Hazard Early Warning Systems (MHEWS) for tropical cyclones, coastal inundation and tsunamis.
2. In June 2021, the IOC Assembly approved, through IOC Decision A-31/3.4.1(III) (Warning Mitigation Systems for Ocean Hazards), the development of an IOC Ocean Decade Tsunami Programme (ODTP) in the framework of the United Nations Decade of Ocean Science for Sustainable Development (2021–2030).
3. ODTP is a progress actions envisioned particularly in the fields of rapid tsunami detection, measurement and forecasting capabilities, implementation of Tsunami Ready communities and related capacity development efforts, specifically targeting SIDS and LDCs.
4. ODTP was presented at the 9<sup>th</sup> Meeting of the UNESCO/IOC ICG/PTWS WG-PICT met on 03 February, 2023 and its Task Team on Capacity Development met on 02 February, 2023 in Nadi, Fiji following the first Regional Training on UNESCO/IOC Tsunami Ready Programme on 30<sup>th</sup> January – 1<sup>st</sup> February 2023.
5. The ICG/PTWS Working Group 2 Task Team Seismic Data Sharing in the Southwest Pacific met on 20<sup>th</sup> October, following the Seventh meeting of the Oceania Regional Seismic Network on 17<sup>th</sup> -19<sup>th</sup> October, 2022 in Nuku'alofa, Tonga. ORSNET collates seismic data from 47 National stations in 7 PICTs.

6. Following the [2022, HTHH Volcano and Tsunami](#), support have gained momentum in strengthening national seismic and tidal gauge networks. The Tonga national seismic network is back online via ORSNET and Fiji upgraded its national seismic network after 10years operations.
7. In 2023, for the first time the Kingdom of Tonga will host the [XXX Session of the ICG/PTWS](#)

#### **Objectives:**

1. To inform the meeting on PTWS response to the Hunga-Tonga Hunga Ha'apai
2. To highlight challenges and barriers in strengthening PTWS among PICTs
3. To inform PMC on the Ocean Decade Tsunami Programme (ODTP)
4. Inform PMC on the outcomes of the 9<sup>th</sup> meeting of PTWS WG-PICT in January 2023 and 8<sup>th</sup> ORSNET meeting in October 2022 Nukualofa, Tonga.
5. Encourage PMC to strengthen tsunami activities within the PIMOS Panel and support the increase of resource mobilization towards strengthening PTWS among PICTs.

#### **1. PTWS response to the Hunga-Tonga Hunga Ha'apai Volcano/Tsunami**

The PTWS WG 2 developed an [interim Tsunami SOP](#) specifically on the Hunga Tonga Hunga Ha'apai Volcano and Tsunami. The interim SOP was tested by PICT at [the Exercise Pacific Wave 2022 \(PacWave23\)](#) using communication mode redundancy. Following months of response coordination, Geoscience Australia supplied 8 portable seismic stations to Tonga to support Seismic Observations along the Tonga Trench and the HTHH Volcano. In October 2022, Tonga Seismic Network resumed connectivity with the Pacific Tsunami Warning Centre and the Oceania Regional Seismic Network after lapse of 5 years

#### **2. Highlight challenges and barriers in strengthening PTWS among PICTs**

- Limited human resources and capacity to support Tsunami Watch Operations
- Limited number of Qualified Seismologist, technicians, tsunami watch keepers
- Our 24/7 Tsunami Watch Operations staff have limited access to formal competency training
- limited national seismic and sea-level stations among PICTs to improve observations
- High cost of maintenance for remote stations including spare parts for existing stations
- Security of seismic stations from vandalism
- High cost of data Telemetry
- Ensuring that our coastal communities are tsunami ready at all times

In 2023, USGS secured USAID funding and is closely working with Fiji and Tonga to install long-term stations

#### **3. To inform the meeting on the Ocean Decade Tsunami Programme (ODTP)**

- SMART CABLE INITIATIVE
- Scientific Review of New Hebrides and New Britain Trench
- UNESCO/IOC Tsunami Ready Recognition Programme

#### **4. Inform PMC on the outcomes of the 9th meeting of PTWS WG-PICT in January 2023 and 7th ORSNET meeting in October 2022 Nukualofa, Tonga.**

The main recommendations of the 9th meeting of PTWS WG-PICT in January 2023 including the use of a World Meteorological Organization (WMO) dissemination method through the Global Telecommunication System (GTS) and Common Alert Protocol (CAP) in order to share national tsunami warnings between countries can be found on the [meeting website](#).

ORSNET collates seismic data from 47 National stations in 7 countries. The main recommendations of the 7th ORSNET meeting in October 2022 Nukualofa, Tonga is outline on ANNEX 1 below. In 2023, ORSNET intends to finalize and endorse the draft ORSNET Strategic Roadmap to guide its operations, programmes and resource allocation.

**5. Encourage PMC to strengthen coordination of tsunami activities within the PIMOS Panel and support the increase of resource mobilization towards strengthening PTWS among PICTs.**

The PIMOS Panel TOR states;

- a) Support for national and regional tsunami monitoring, early warning systems, and standard operating procedures, competency of national operational centers and develop relevant awareness programs, including support for and coordination with the IOC/PTWS Pacific Islands Countries and Territories Regional Working Group on Tsunami Warning and Mitigation System.

However, coordination of tsunami activities is limited to coastal multi-hazard EWS. More effort is needed to address tsunami activities within the PIMOS Panel.

In 2023, through the World Bank/SPC Project supported the procurement of 5 mobile stations to be deployed to ORSNET countries when formally requested for research or to support national seismic network. This support includes the completion of the following activities;

- Upgrade of Seismic Observation Software from SeisComP4 to SeisComP5 across the 7 ORSNET countries
- Installation of Two new Regional Servers in New Caledonia and Vanuatu
- Regional SeisComP5 user training;
- Procurement of 5 portable seismic stations for rapid deployment by ORSNET members during earthquake/tsunami or volcanic eruption;
- Development of ORSNET Strategic Roadmap

**Recommendations:**

The Meeting is invited to:

- **Recommend** PMC to increase sustainable financial assistance **through Weather Ready Pacific Decadal Programme of Investment** and other financing programme facility toward the PTWS among PICTs including the Oceania Regional Seismic Network (ORSNET) and [UNESCO/IOC Tsunami Ready Recognition Programme \(TRRP\)](#) under the [Ocean Decade Tsunami Programme \(OTDP\)](#).
- **Consider Weather Ready Pacific Decadal Programme of Investment** to support mutually beneficial areas between tsunami and weather ready programme among PICTs.
- **Encourage** PIMOS Panel to dedicate a Task Team on PTWS WG-PICT and ORSNET activities

- **Note** the recommendations of the [9<sup>th</sup> Meeting of WG-PICT](#) on 2<sup>nd</sup> January, 2023 in Nadi, Fiji and [7<sup>th</sup> ORSNET Meeting on 17-19<sup>th</sup> October, 2022 in Nuku'alofa, Tonga](#).
- **Note and recognize** the Draft ORSNET Strategic Roadmap
- **Encourage** participation of PICTs at the [XXX Session of ICG/PTWS on 11-15<sup>th</sup> September, 2023 in Nukualofa, Tonga](#).

**Links:**

1. [Ninth Meeting of the PTWS Regional Working Group on Tsunami Warning and Mitigation for Pacific Island Countries and Territories \(WG-PICT\)](#)
2. [Report of the PTWS WG-2 Task Team Seismic Data Sharing in the Southwest Pacific including ORSNET.](#)
3. [Thirtieth Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System](#)
4. <https://oceandecade.org/actions/the-ocean-decade-tsunami-programme/>
5. [UNESCO-IOC Tsunami Ready Recognition Programme](#)
6. [15 January 2022, Hunga-Tonga Hunga-Ha'apai Volcanic Eruption and Tsunami](#)
7. [PTWC Interim Procedures and PTWS Products for Tsunamis from the Hunga Tonga – Hunga Ha'apai Volcano](#)
8. [Exercise Pacific Wave 22 - Pacific Island Countries and Territories \(PICT\)](#)

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**ANNEX 1:**

**Outcomes**

**9th Meeting of the PTWS Pacific Islands Countries and Territories Regional Working Group (WG-PICT)**

**Nadi, Fiji**

**03 February, 2022**

The meeting was attended by representatives of Australia, Cook Islands, Fiji, French Polynesia, Kiribati, Nauru, New Caledonia, New Zealand, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu as well as the Intergovernmental Oceanographic Commission of UNESCO (UNESCO/IOC), IOC International Tsunami Information Centre (ITIC), United Nations Office for Disaster Risk Reduction (UNDRR), Plan International and the Pacific Community (SPC). The meeting convened experts from national seismic observatories, national tsunami warning centers, national meteorological services, geohazards, tsunami scientists and disaster risk management community.

The meeting noted:

- the complex structure of the PTWS and acknowledged the importance of being involved in the technical working groups and task teams and being able to monitor progress of implementing tsunami warning and preparedness activities
- the Chair's progress report and updates on the tsunami detection, warning & response and mitigation activities in the region by the leads of the WG-2 Task Team Seismic Data Sharing of the South West Pacific and WG-PICT Task Team on Capacity Development.
- the aspirations and target of the UN Ocean Decade for 100% of coastal at-risk communities to be tsunami ready by 2030 and reiterated support of the Tsunami Ready programme
- the report from the Exercise Pacific Wave 2022 - PICT Regional Exercise and the value of non-tradition communication platforms like WhatsApp, HF Radio and listserv for regional NTWC/NDMO tsunami information sharing
- the reports by countries on World Tsunami Awareness Day and National Disaster Awareness Week
- in terms of partnerships and collaboration, opportunities were presented by the Pacific Community, UNDRR and Plan International/Australian Humanitarian Partnership to support countries in progressing early warning and preparedness priorities and interventions
- and commended the efforts of New Caledonia and Vanuatu to install SMART cables between their countries supporting regional tsunami early warning
- and commended the Government of New Zealand in providing open data access to the NZ DART network given its importance in providing timely detection of tsunami and evaluating tsunami risk with more accuracy.

The meeting recommended

- Greater coherence across the efforts (activities, ToR) of the task teams, working groups and its members.
- The Secretariat develop a matrix to track implementation of recommendations and provide quarterly updates of progress to member states
- Members update Tsunami National Contact (TNC) and Tsunami Warning Focal Points (TWFP) and National Tsunami Warning Centre (NTWC) to ICG/PTWS (*Secretariat to share details*)
- members formalise their intent to implement the UNESCO/IOC Tsunami Ready Recognition Programme to ITIC (*ITIC to share details*) and encourage members to incorporate it into national tsunami ready programmes
- guidelines be developed on the use of non-traditional platforms like WhatsApp to be used for unofficial communication during exercises and tsunami warning operations noting the need for differentiation of official and shared content for operations (*consider the establishment of a task team. Lead – FP supported by SB*)
- Establishment of a Task Team to be chaired by French Polynesia and Solomon Islands. Members of the Task Team: New Caledonia, New Zealand, Solomon Islands, Australia, Fiji, French Polynesia, Tonga and ITIC. The Task team to meet online before the next ICG/PTWS to define the following;
  - Terms of Reference (TOR)
  - Title for the Task Team.

- WG-PICT to keep and re-name the PICT Regional Exercise WhatsApp Group
  - to maintain both WhatsApp group;
  - to Include operation staff in the PICTs WhatsApp Group
- the Secretariat facilitate monthly testing of non-traditional communication systems eg HF radio, WhatsApp, satellite phones between countries
- Request PTWC to extend first bulletin to report (forecast and ETA) to 6 hrs. (not 3 hrs.').
- that members to continue to explore options in relation to a communications strategy in order to enhance national tsunami warning systems
- Secretariat facilitate the completion of the tsunami warning and capacity assessment of members within 2023 for inclusion in the next national report to ICG/PTWS, in order to guide interventions of countries and support from partners
- the submission of the remaining national PacWave2022 evaluation forms by the 10 FEB for inclusion in the PacWave 2022 Summary report
- the sharing of educational materials between members for tsunami preparedness activities
- lessons and learnings from HTHH are shared and considered in the revision of standard operating procedures for tsunami warning by PICTs
- the use of a World Meteorological Organization (WMO) dissemination method through the Global Telecommunication System (GTS) and Common Alert Protocol (CAP) in order to share national tsunami warnings between countries. This will be piloted by Solomon Islands and Tonga

## **ANNEX 2:**

### **Outcomes**

#### **7th Meeting of the Oceania Regional Seismic Network**

##### **Nuku'alofa, Tonga**

**17 - 19 October, 2022**

The 7th Meeting of the Oceania Regional Seismic Network was convened in Nuku'alofa, Tonga from 17th - 19th October 2022 as a hybrid meeting and was hosted by the Government of Tonga.

In attendance were representatives from ORSNET member countries, Fiji, French Polynesia, New Caledonia, Papua New Guinea, Samoa, Solomon Islands, Tonga and Vanuatu as well as the Intergovernmental Oceanographic Commission of UNESCO (UNESCO/IOC), IOC International Tsunami Information Centre (ITIC) and the Pacific Community (SPC). The meeting was attended by experts from national seismic observatories, national warning centres, national meteorological services, information and communication technology services, tsunami scientific and disaster risk management community.

The objective of the Meeting was to strengthen ORSNET coordination, increase awareness and understanding of seismic and tsunami early warning and preparedness activities being

undertaken in Pacific Island Countries and Territories and map a sustainability strategy for ORSNET.

#### The Meeting,

1. Reaffirmed the intent of ORSNET to share expertise, experience, resources and data and the alignment of ORSNET member priorities to that of their respective national government
2. Urged members to progress the review of and finalize the Memorandum of Agreement by the 8th ORSNET Meeting prior to the 30th UNESCO IOC/ICG PTWS in Tonga in September 2023
3. Encouraged peer to peer sharing of best practice and lessons learnt, in particular, Vanuatu's methodology for local tsunami-genic earthquakes, Samoa's MHEW Policy, Tonga's Meteorological Act, Papua New Guinea's use of raspberry shakes
4. Urged members to consider integration of ORSNET products into their national MHEWS
5. Acknowledged its appreciation of the continuous support by the Institute of Research and Development (New Caledonia) in maintaining the regional data server for ORSNET and noted the backup server to be hosted by Vanuatu by June 2023
6. Recommended a regional programme of support to ORSNET which should include coordination and resourcing of activities building on the support extended by SPC to members
7. Noted the interest of ORSNET members in French Polynesia's data and expertise and invited them to consider becoming a member of ORSNET.
1. Reiterated the need for national priorities to be included in discussions and partnerships with international and regional partners

#### *Agree and recommend:*

2. Greater advocacy is needed at national and regional level to raise the profile of ORSNET to facilitate implementation and resourcing from national governments and partners
3. Develop the ORSNET Strategic and Implementation Plan by July 2023
4. Expand the objectives of ORSNET to include volcanic hazards
5. Enhance the information and dissemination interface to allow operational centres to quickly access and use ORSNET products.
6. Develop SOP and protocols for the deployment of the 5 mobile seismic stations
7. Develop a strategy to use common instrumentation, equipment and systems including a resourcing plan for financing, equipment standardization and maintenance, and staffing
8. Develop a capacity development programme to strengthen competency and capability of national tsunami warning centers, seismic and volcano observatories

including the training and support provided by ITIC, bilateral partners and peer to peer and mentoring exchanges between members

9. Strengthen the institutional arrangements for early warning including the development of legislation and policies with clearly defined responsibilities between warning centres, observatories, and disaster management
10. Review, exercise and strengthen tsunami warning and response Standard Operating Procedures (SOP), in particular for local earthquakes and tsunamis
11. Explore the use of a World Meteorological Organization (WMO) dissemination method through the Global Telecommunication System (GTS) and Common Alert Protocol (CAP) for tsunami alerts
12. Undertake a periodic stocktake of the geohazards observatories in the Pacific re: volcano, seismic and tsunami as part of strengthening MHEWS. This should include the services that support early warning such as communication, staff competencies, arrangements
13. Encourage countries to advocate for the investment in new and emerging technologies such as the Science Monitoring and Reliable Telecommunications (SMART) subsea cable systems and GNSS, to improve early warning
14. Commit to the continued education of communities and people of local geohazard threat, preparedness and evacuation procedures
15. Learning from the Hunga Tonga Hunga Ha'apai event, develop guidelines for requesting post event technical assistance to include:
  - the assessment of tsunami warning capability;
  - harmonization with disaster management protocols for the deployment of goods, personnel and services; and
  - development of National Post-Tsunami Field Survey Guide for PICTs
16. Note the need to strengthen volcanic hazard monitoring and consider data sharing of emerging technologies such as infrasound