UNESCO
INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (IOC)
ICG/PTWS WORKING GROUP ON TSUNAMI WARNING AND MITIGATION
IN THE SOUTHWEST PACIFIC OCEAN

Working Group Meeting
Conference Room, Level 6
Development Bank of Samoa Building
Apia, Samoa
13 February 2009

Timetable

09:00-10:15 am Session I, 1-4
10:15-10:45 am Morning Tea
10:45-12:15 pm Session II, 5-6, ITIC
12:15-01:30 pm Lunch
01:30-03:00 pm Session III, 7-8
03:00-03:30 pm Afternoon Tea
03:30-05:00 pm Session IV
05:00 pm Finish

Agenda and Minutes

Session I

1. Welcome and Introduction – Ken Gledhill, Chairman

The Chairman opened the meeting at 9:15 am. He introduced the Vice-Chairs, Filomena Nelson, Samoa, and Lasarusa Vuetibau, Fiji, and welcomed the attendees to the Working Group on Tsunami Warning and Mitigation in the Southwest Pacific Ocean (SWP-TWG). He informed the Group on the addition of a presentation by the International Tsunami Information Center (ITIC) on Tsunami Warning Decision Support tools that will take place just before lunch.

He introduced the purpose of the meeting and briefed the Group on the last SWP-TWG meeting in Honiara and its recommendations. He identified the general challenges, highlighting that telecommunications, especially of alerts, was the most challenging. He noted the need for consistency and interoperability of the tsunami warning services, the importance of identifying and then acting on gaps in tsunami-related observations (seismic and sea level), and that for an end-to-end system the important and critical roles that disaster management and emergency response agencies have to play in saving lives from tsunami. He asked the Group to use these ideas as a framework for discussions and recommendations that would come out of today’s meeting.

2. Report on PTWS-XXII and associated meetings

The Chairman gave a brief report on the outcomes of PTWS-XXII (Ecuador, September 2007, see document on CD). He highlighted the establishment of the Steering Group to guide intersessional activities. He reviewed the Report of the Sessional SWP-TWG held
at the PTWS-XXII. He encouraged the Group to participate actively during the meeting. New Zealand Civil Defence and Emergency Management (CDEM) encouraged the Group to focus equally on the emergency management component since the SWP-TWG terms of reference include both warning and mitigation.

3. Report on the Informal SW Pacific tsunami meeting held during the November 2007 SOPAC meeting in Tonga

Filomena Nelson gave a report on the Ad-Hoc Regional Tsunami Working Group meeting held in conjunction with the 2007 SOPAC meeting in Tonga (see document on CD) in November 2007 prior to the SOPAC Annual Session. Australia highlighted issues of data availability especially for sea level data. Data is available by the GTS and by the Internet for those without access to the GTS. For Australia data, registration is necessary and some countries have already signed up by contacting Australia Bureau of Meteorology (BOM, Rick Bailey). Several sites exist for Pacific data in addition to BOM, including from the Univ of Hawaii Sea Level Center, the PTWC-supported Tide Tool (to be demonstrated by ITIC), the IOC Sea Level Monitoring Facility, and others.

4. Update on the AusAID-funded GA-SOPAC collaboration on tsunami hazard in the SW Pacific (20 min followed by 15 min discussion)

Phil Cummins, Geoscience Australia (GA), gave a progress report on the AusAID funded tsunami hazards project. Large local tsunamis are the greatest hazard to this region, an example of which was the 2007 Solomon Islands tsunami. He described the motivation of the project; Phase 1 and 2 are completed, and Phase 3 will be proposed and focus on the development of tools and pilots in cooperation with SOPAC. He described the results of the probabilistic tsunami hazard study (see document on CD), which considered all SOPAC countries; offshore tsunami heights were used as the indicator of potential hazard. Maximum magnitude earthquakes were considered from all potential sources, including subduction zones where earthquakes have not yet occurred; this may the worst-case scenario, but it is not known. He showed the results for Samoa, showing the mean return period, maximum amplitude and percentage weighted contribution (depicting which source location contributes the greatest hazard).

He introduced a multi-stage approach to assess tsunami hazard, whose end goal will be to focus on a particular island’s hazard. He illustrated this for Tongatapu, which is currently the only study completed at the local scale. One gap highlighted was the need for good bathymetry capable of resolving good inundation. Satellite multispectral data (for example Quickbird imagery, 2.4 m horizontal resolution), however, has allowed usable results to be obtained. When the imagery is combined/draped over shallow bathymetry, this gives more information on the nature of the near-shore bathymetry. Preliminary inundation maps were created for several scenarios (M8.25, M8.75); one simple implication is that the low-lying nature of the island will mean that tsunami inundation mitigation should consider vertical evacuation. Other studies are being undertaken. The post-tsunami survey field data from 2007 Solomon Islands tsunami is being used to validate the model and approach.
Phase 3 was described. Support tools will focus on providing data in a GIS type of application that allows different data layers to be displayed. He described the next steps planned as a written proposal completed in May or June. He asked Pacific Island Countries (PIC) to express their interest to their government, and stated that this would be essential for successful funding. He also emphasized the importance of collecting fundamental datasets, such as topography and bathymetry, as these can be shared and used for other analyses.

Australia highlighted a need to also consider the risks to different infrastructures, such as for ports and harbors where the provision of the expected tsunami currents would be useful for response planning.

Samoa asked about SOPAC’s work in collecting bathymetry in the 0-50 m interval, and stated that these should be included in the analysis.

The Chair asked the Group to comment on how emergency managers should interpret and act given that the current modelling stops ‘offshore’. GA could not give good rules of thumb, such as ‘multiply the offshore height by 3 to estimate the onshore height’ which has been informally mentioned in the past, cautioning also that any prediction could vary greatly depending on the local conditions. It was again noted that inundation modelling is very useful, but it has inherent uncertainty due the assumptions made by the model which decision-makers need to consider. The Chair suggested that fine details of modelled wave heights might not be needed by emergency managers since their decisions need to be more broad-based and directed towards evacuation decisions.

NZ CDEM shared their experience at the local level, where they were working with the local community to develop plans. NZ has developed guidance for evacuation wherein communities can proceed depending on the amount of information / modelling is available. This and other emergency management documents are included in the CD.

NZ indicated that emergency managers need and want to know the risk level for a particular area; for example, XX m wave height is expected at this time. With this information, emergency managers will be able to take action.

The Chair asked the Group to provide input on the need for a Phase 3.

**The WG agreed:**

- **Phase 3 is of the hazards assessment for the SW Pacific was important, especially from the Emergency Management perspective. This type of information is needed for planning and response, and it is in generally not available.**
- **GA will be submitting the Phase 3 to seek support this year. Stakeholders of interested countries are recommended to express interest to high levels in their country in order to maximise the chance of successful funding through national advocacy.**
- **Phase 3 is requested to investigate the use of available data to provide at least initially ‘rules of thumb’ for estimating coastal impact using Phase 2 results.**
- **A briefing paper should be provided by GA summarizing the proposal in order to assist WG members in expressing their support and need to decision-makers in their countries.**
Tonga agreed that each WG member must go back to their country and express this need if they would like to have the support and/or pilot.

PTWC informed the WG that from PTWS-XXII, there is some plan for a pilot of PTWC with Chile on the development of customer-useful forecast. A similar pilot could be done for the SW Pacific, so that useful information could be provided from PTWC using the SIFT tool.

5. **Status of the AusAID funded project lead by the Bureau of Meteorology (with SOPAC and EMA) to assess SOPAC Member Countries capacity to receive and respond to Tsunami warnings**

Cherrie O’Brien reported on the status of the AusAID funded study of SOPAC Member Countries capacity to respond to Tsunami Warnings (see document on CD). The outputs for each country are National Country Reports, including recommendations, a Consolidated Report for the region, and the sharing of the results with potential donors.

All SOPAC member countries were assessed. Five more countries are still to be completed in 2009, with 64% done to date. The methodology is similar to that which was done under the IOC lead in the Indian Ocean. Multi-disciplinary teams comprised the missions, which took place over 2-3 days. In addition to answers to the general questionnaire, worked out in consultation with the country, a case study of a recent event is discussed. She summarized the report review process. She provided examples from different countries on the information collected and then the following recommendations on the different topics.

Some common recommendations were found, including the following preliminary needs and priorities:

- Redundancy in communications, e.g., on a 7x24 basis and/or another agency
- Last mile communications to communities
- Clear Roles and Responsibilities of the different agencies and their staffing
- Comprehensive SOPs that are shared amongst stakeholder response agencies
- Finalization of draft plans, such as for Emergency Operation Centers
- Development of tsunami warning and response competencies of involved agencies
- Agency cooperation to build and sustain warning and mitigation

She emphasized Australia’s commitment to work with the country to finalize the outputs and distribute the reports to relevant and interested organizations. She outlined the plans to complete the project, including the remaining visits, the national reports, and the consolidated report.

The USA emphasized the need to coordinate so as to minimize conflicts with regional meetings.

Samoa commented to make sure that the report is tabled in the most advantageous way to ensure greatest success for getting the report recommendations implemented. He asked for planned mechanisms at the regional level. The Project invited suggestions as the most effective mechanism. She mentioned several mechanisms, including the SOPAC Disaster Management meeting and Pacific Disaster Network Partnership.
The IOC suggested that National Reports be made available through the PTWS and for example, its web site, and also through the World Meteorological Organization (WMO). The IOC commented that the regional assessments are essential for benchmarking. In hindsight, the IOC assessment’s shortcoming was that it was not more effectively communicated throughout the region in order to maximize its potential utility.

Australia agreed and indicated that sharing of commonalities in approaches, plans, and mechanisms amongst countries, rather than duplicating efforts, was good. The gaps identification should be tabled and widely shared, with the permission of each country.

The IOC inquired as to the extent and involvement of schools in tsunami disaster risk reduction. She responded that it is included in the questionnaire.

Papua New Guinea (PNG) suggested that it might be more effective to place tsunamis in a larger context, either with other hazards or generally across agencies. Australia responded that they have tried to encourage this, but noted that the funding had been specific to tsunamis.

Samoa noted that few countries submitted completed questionnaires and asked what might have been the reason. He indicated that it was daunting to complete the entire questionnaire. Australia responded that it was the intent to complete the questionnaire in country working together.

The ITIC provided a brief history of the questionnaire that started in 2004 as input to the South Pacific Tsunami Awareness Workshop help in Fiji with SOPAC. A brief questionnaire was circulated and the results compiled, and many of the same participants and countries to this WG meeting also participated to the 2004 workshop. The IOC and ITIC used this as the starting point for building a comprehensive questionnaire in cooperation with the WMO, ISDR, and IFRC. The questionnaire, with some customizations, was used in the Indian Ocean, the PTWS, and the Caribbean.

The Cook Islands commented that a big benefit was for experts to come to the country to be able to work together with the country’s stakeholders assess the country’s progress. Tsunami focus also is good but also it brings attention.

The Chair asked whether New Zealand and Australia had filled out the questionnaire. New Zealand indicated it had completed the PTWS survey.

The WG agreed:

- To recommended that countries review their draft National Reports as soon as possible for finalization and dissemination.
- That the Project Results be shared widely throughout the region.
- Suggested that following forums, at a minimum:
  - Next SWP-WG meeting
  - Annual NDMO Meeting
  - SPREP RMSD Meeting
- Recommended that regional organizations and donors be invited to attend these meetings.
Cook Islands highlighted the need to make sure decision-makers (directors, financial officials, etc) attended some of the meetings.

The IOC suggested inviting regional organizations to be permanent observers of this WG.

6. Status of plans to enhance sea level observations in the SW Pacific

Reports, information and discussion on plans to enhance sea level observations in the SW Pacific region were provided. This included the status of any gaps analysis that has been undertaken and planned new installations and upgrades by different organizations and countries.

The Chair asked that this be a participative exercise, where each country contributes their present activities and plans. Australia, as the PTWS SL WG 1 Chair, provided a brief summary and overview. He noted the instrumentations available and/or planned for upgrade (coastal and deep ocean), and emphasized the importance of interoperability and data sharing.

He gave a short summary of existing information from countries, including Australia (new and upgraded stations and optimization of sites) and its contributions to tsunami monitoring in PICs. New stations have been or will be installed to densify the monitoring. BOM makes these available through a secure web site. Tsunameters are being deployed for the SW Pacific by Australia and USA.

New Zealand is sharing sea level data from its national network through the GTS (1 min data) and can also make it available through seismic protocols (SEEDLINK) at 10 Hz sampling.

France reported on its supported sea level network, including plans for new stations. These include six stations in New Caledonia (1 already exists) and two in Wallace and Fortuna. He noted their concern especially in bays and rivers, as tsunamis were observed there from 2007 Solomon Islands and 1933 tsunamis. In November 2006 Kuril tsunami, tsunami bores were recorded. The gauges will be used for tsunami warning, hazard assessment so as to be able to record as many tsunamis as possible locally and from distance sources to help with numerical modelling, and monitoring when destructive waves have subsided (emergency response and public safety). A few stations outside of these French territories are planned. In total, 15 stations are planned, with some in cooperation with other countries. 1-min data will be transmitted frequently (to be determined) from two sensors (pressure and radar). French financial support is confirmed, and the next stage is to confirm the implementation/installation arrangements. France requested improvement in the transmission frequency available, in this case by the GOES satellite. PTWC reported that 5-min transmission interval frequencies are available and being coordinated through UHSLC and with PTWC; prioritization would be based on station location and proximity to the tsunami source.

The WMO GTS Expert Group Chair informed the Group that the CREX format has been endorsed by the WMO Commission on Basic Systems (CBS). It was recalled that the format was also endorsed by the PTWS SL WG at PTWS-XXI.
Samoa reported that Japan is helping to support two stations, one on Savaii and one on Upolu.

PTWC provided a map summarizing the available stations and transmission frequency, and these should be updated and improved upon. As updates occur, the availability of the new sea level data should be ‘efficiently’ informed to all Member States. A mechanism is needed, but it has to be a continuous effort.

**The WG agreed:**
- The region’s sea level network is improving and tsunami monitoring gaps are being filled.
- That the appropriate PTWS technical working groups review how the commissioning of new sea-level stations is communicated and makes recommendations for improvements.

**Addition to Agenda: Tsunami Warning Decision Support Tools**

ITIC provided a short demonstration of three tools which warning centers and other agencies responsible for tsunami mitigation may find useful. These and other tools are described in a handout (document on CD), and the tsunami travel software is freely distributed to agencies involved in tsunami mitigation. The highlighted tools are CISN, a real-time earthquake display developed and supported by the USGS and NOAA, Tide Tool, a warning center sea level decode and display developed and supported by NOAA PTWC, and TTT, a tsunami travel time calculation and display package used by the PTWC. The CISN and Tide Tool require only a low-bandwidth Internet connection, and will automatically update and display earthquake epicentres and sea level station records in real time. TTT has been packaged to include simple-to-use scripts for making tsunami travel time maps and outputting tsunami travel time and arrival times at use-selected locations.

During the WG meeting, the audible alarm of the CISN sounded indicating an earthquake, including a M5.4 off Loyalty Islands, New Caledonia.

**LUNCH**

**Session III**

7. **Status of plans to enhance seismological observations in the SW Pacific**

This Session was participatory by all countries. Reports, information and discussion were shared on plans to enhance seismological observations in the SW Pacific region. This will include the status of any gaps analysis which has been undertaken and planned new installations and upgrades.

CPPT provided an overview of recent improvements in telecommunication of seismic data across French Polynesia. Data are arriving continuously in real time by 3 VPN transmission links from islands. These are supplemented by about 40 stations (3 component VH channel), sampled at 1 Hz, from the global seismic network through IRIS by SEEDLINK. Mwp, Mm, E/Mo (slowness of earthquakes), and CMT are calculated using an in-house developed GUI for interactive and automated processing and summary.
CPPT also reported on its tsunami monitoring capabilities. For sea level monitoring, the number of stations has increased three times to a total of 37 stations. Transmission frequencies are variable. In the future, the plan is to install 2 new stations; they are still waiting for a header and would like to have more frequent transmissions (currently 1 hr). In the future, their warning forecast will use the DART data in conjunction with a pre-computed library of numerical simulations, the automated inversion of PDFM in order to carry out detailed simulations to support warning operations.

New Zealand asked on the availability of seismic data. Papeete (CTBT, IRIS) and Taoe are available (IRIS through Geoscope).

Fiji and Tonga, under the JICA program, are currently upgrading their system, replacing short period with broadband instrumentation. Three are planned in Fiji and a similar number in Tonga. The systems will be compatible, and should be done by June 2008. Fiji reported that all JICA projects will use the same hardware and software and be available through SEED format. The plan, once running, will be to share the data within PTWS and Australia.

Japan provided more information on JICA projects. He emphasized the importance of sharing data and information since this is essential for establishing a sub-regional TWS. He gave the example of Indonesia, which was the most affected country from the 2004 IO tsunami; although there have been many donors; each had their own system so it has taken some time. He reported that Germany’s SeiscomP3 now is able to ingest BMG’s different seismic data formats.

The Chair emphasized the need to have freely-available software that offers capabilities that are useful for all countries. He noted that SeiscomP3 looks to be a very good system, but that is it still developing and improving.

Samoa reported that currently they only have one working station, and are upgrading other stations from analog to digital. In the future, they plan seven stations (four Short Period and three Long Period) that will be contributed by the Chinese government.

Tonga reported that China is doing similar activities into the Pacific, such as in Fiji, Samoa, Vanuatu, and possibly others. For this, the software and processing would be similar so that the data can be easily shared.

Samoa agreed and emphasized that data needs to be available in formats for easy sharing.

The Chair suggested that the WG can help to facilitate the sharing and so allow PICs, and PTWC and NWPTAC, to better monitor the region. PTWC informed the Group that with the current network, it takes about 15 min and that this is not fast enough to provide a warning for local tsunamis. The SWP is the weakest monitored region for the Pacific, in addition to South America.

Vanuatu reported that China and Vanuatu signed a MOU in 2007 that China would provide five BB and five SP. Vanuatu has provided a proposal to China detailed what they would like and is waiting for a response.
CPPT recommended a standard format to be miniSEED, and recommended that the countries and their networks join and follow the standards of the FDSN. France noted that countries should and can specify to Nanometrics and donors exactly what is desired.

Samoa emphasized that formats should be standard and compatible, so that support can be provided by many (due to its common use).

The IOC informed the group on the recent activities of the CTBTO to make their services more practical. Recent changes include making their software open source. The Chair noted that the CTBT data format is presently onerous and not easy to use and incorporate into existing data acquisition and processing systems.

Australia GA reported that now Niue is available through the IRIS Data Management System (DMS), two new vaults are planned in PNG. These stations and others are available from either the IRIS DMS via SEEDLINK.

PNG reported that stations are being upgraded to have a 10-station network of strong motion, BB, SP instruments. Data will be sent (possible by telephone) to PMGO. He indicated that two of the 10 might be shared, but that it has not been decided. SOPAC is serving as a project manager and funding is from the EU, with completion by end of 2009. They requested technical assistance with NZ/GA, facilitated through SOPAC. Currently, they only have one (GSN) station. AusAID is also supporting the volcano monitoring aspect of earthquakes.

NZ reported that there over 40 BB stations, one is a GSN station and two are part of the CTBTO auxiliary seismic network. Data are available publicly through a SEEDLINK server. Of note and useful is Chatham Islands, which is offshore and so can improve azimuthal coverage. NZ plans to install a station on Raoul island – there is already an IRIS GSN station on Raoul, but he noted that there is often an data delay since this is also a CTBTO site and so the GSN transmission is of lower priority.

The Chair summarized the session, highlighting that this region continues to need improvement in station density in order for timely earthquake source characterization that can support tsunami warning. He commended the efforts of all the countries to improve their networks in cooperation with the many contributors and donors. He requested that countries work together and share data and information in order to work towards a good sub-regional tsunami warning capability.

The WG agreed:
- To emphasize the importance of data sharing in formats that are standard and commonly available, e.g., MiniSEED
- To adopt the standards and recommendations endorsed by the PTWS-XXII as recommended by the PTWS Seismic Working Group

8. Experiences and feedback on Pacific Wave 08 Exercise

Chip McCreery, PacWave08 Task Team Chair, provided a summary of the exercise and the preliminary results. The preliminary draft report is available on the CD. Feedback from the WG will be incorporated in the final report. He reported on the participation,
which was similar in 2008 as in 2006, but more post-exercise evaluations were returned. He reviewed the core objectives. He reported that the planning and conduct were satisfactory. He noted that training of TWS agencies was still requested. The conduct of the exercise in real time was much preferred as it was more realistic. Downstream improvement on alerting, notification, and evacuation is still needed and disaster management agencies are encouraged to develop and finalize their plans. Communications problems continue to be a very large challenge.

On Communications, PacWave08 helped to confirm dissemination and contacts, but some may be outdated and need to be reconfirmed with the countries. In decision-making, processes were enabled and tested. Notifications were planned using the media and a variety of methods and using existing infrastructure. Countries planned to continue to use existing and introduce new technologies. The average time for notification to the public was 57 min. It was recommended to continue Pacific-wide exercises to improve on the timeliness of dissemination, and to consider additional products that would be useful and meaningful to countries. Media partnership should continue to be developed.

The Chair called for comments from countries on their PacWave08 experience and lessons learned. He asked how useful PacWave08 was and how often should Pacific-wide exercises be carried out.

France reported that its Civil Defence could not participate due to the short lead time and a previously-planned hurricane exercise.

The Solomon Islands reported that even though it was an Exercise, many took it as a real event and evacuated due to the fear after the 2007 April earthquake and tsunami. The Solomon Islands used public radio, telephones, and other means to notify the public, and it was taken seriously and acted upon.

The US noted that in some countries there is no way to alert the public, other than in a real situation, so it may not be possible to exercise with the public. NZ noted the converse, that if there were announcements that it was an exercise but a real event occurred instead, then the public may think that it is just an exercise and ignore it.

The IOC asked the Task Team Chair to comment on how the PacWave08 lessons learned would be acted upon to improve the services. He also noted the difference between the official IOC TWFP and those lists maintained as part of the operations of the different international tsunami warning centers. PTWC responded that to be safe they prefer to not delete anyone off of their cumulative lists until notified.

The ICG/IOTWS Vice Chair (Australia) noted that the outcomes and lessons learned from the Pacific exercise would be useful input to the Indian Ocean as it designs its 2009 exercise. He requested that the findings and other recommendations be provided as soon as possible. The IOC indicated that a report should be finalized and be available for the IOC Assembly in June.

The WG agreed:

- To recommend that an intersessional Task Team be formed to evaluate the PacWave08 results and make recommendations on how to take action on the various findings and recommendations.
• Suggested that the topics include activities to improve SOPs, better understand and act on warning messages, and the identification and development training and capacity building modules to help countries.

• The planned bi-annual Pacific-wide exercises were appropriate.

• Requested that the next Exercise scenario be located so that it has a regional impact in the SW Pacific and that the WG could assist in developing the scenario. This would provide an opportunity for PICs to exercise their local and regional SOPs.

The IOC reported that for the Southeast Pacific, a communication test is planned amongst the countries and this could be done by the SWP WG.

Afternoon Tea

Session IV

Disaster Management and Tsunami Warning

An additional presentation was made to share information on emergency response. David Coetzee of New Zealand CDEM made a presentation describing documents developed on the last few years to guide and improve their tsunami warning and emergency response system. Documents are included on the CD. These are:

- National Tsunami Warning Plan
- Signage Standards, based on a national and international assessment
- Evacuation Zone Guidelines
- Evacuation Planning Guideline (actual planning at community level)
- Public Alert Mechanisms (to be available in next few months; will include a tool to help in deciding which types of alerting methodology should be considered)
- General tsunami awareness brochure

Countries need to decide what it means to be successful in alerting. For example New Zealand, decided that a successful warning is when 2/3 of the public receives the warning.

9. Review and feedback on PTWC and JMA tsunami warnings/advisories

Australia introduced the topic. He identified the importance of providing an opportunity for countries to give feedback on PTWC and JMA tsunami warnings/advisories and their responses and impacts in the region.

PTWC provided informal guidance on their decision-making on when to cancel a warning. Informally, as a rule-of-thumb, they use 1-m crest-to-trough wave height as the threshold for public danger. The WG was agreed that it is wise to continue to caution the public on possible local wave height amplification and to stay on the alert even though the PTWC has cancelled a warning. There are not enough sea level gauges to be absolutely confirmed when a danger is over locally.

Australia asked countries to comment on how they decide what to do when an event occurs. Fiji indicated that they depend on PTWC and do not monitor. PNG related that many PICs also rely on PTWC warnings and cancellations, and asked for guidelines they should follow after PTWC has cancelled warnings. PTWC responded that another product could be developed, but PNG noted this might add more confusion. PTWC
informed the Group that in the US another product, a low level warning, is available domestically which cautions on to stay alert for unusual wave heights and currents in ports/harbors and recommends that beachgoers leave the water.

The Japan NWPTAC reminded countries that the NWPTA bulletin does not include a cancellation but does include a wave height forecast and cautions. He reminded the Group that they, like PTWC, also are not able to provide warning (and therefore a cancellation) because not enough sea level stations are available. He also noted that when there is a destructive tsunami, it is often difficult to determine when it is safe without sea level observations (data or eyewitness) in the affected area.

CPPT shared that recently they continued their national tsunami warning after the PTWC had cancelled its international warning advisory. CPPT’s threshold for maintaining a warning is 1 m and the possibility of strong currents. CPPT will not advise to evacuate unless their prediction is a high wave height.

The Chair highlighted the need for tsunami SOPs for countries that don’t have advanced warning centers or that are just developing. There is guidance that has been developed and could be used as examples and modified by each country according to their ability and situation.

The ITIC suggested that countries refer to the PTWS Operational Users Guide (on the PTWS-XXIII web site) Annex III, Interpretation of PTWC Messages and Emergency Response Guidance, as it gives useful and practical information and advice on what to do. She also informed the Group that the IOC and ITIC has conducted a number of training courses on end-to-end tsunami warning and emergency response and the development of tsunamis SOPs over the past few years. Best practices and templates have been compiled and can be shared. Similar trainings can be conducted for the Pacific.

France provided a summary of their criteria, which depends on the location of the tsunami source and whether the response is for a local and distant tsunami (e.g., dependent on time available to prepare). They have examined different scenarios, considered the amount of time available before the first wave hits, and decided upon on the levels of warning and the feasible response actions. For the SWP, they assumed that no slow earthquakes are expected. They noted that historical data are essential for developing the rules.

Australia noted the potential for confusion when countries use different thresholds.

*The WG agreed:*
- That the appropriate PTWS technical working group discusses tsunami SOPs and provide recommendations and guidance to PICs on criteria and actions after receiving PTWC and NWPTAC messages. Reporting on warning centre progress to implement threat-based warning criteria is also requested.
- A SWP SOP workshop should be conducted in conjunction with the next SWP WG.

10. Pacific emergency communications
Filomena Nelson provided a summary of the PTWS Working Group on Pacific Emergency Communications. She reviewed the Terms of Reference that focus on the transmission and dissemination of alerts internationally and within their own countries, the identification of current and planned systems and technologies, and need to determine appropriate requirements for alert dissemination. She reviewed the composition and the current members, but reiterated that countries wishing to actively participate are welcome to join by informing her and/or the Secretariat. The WG plans to work by email.

The US informed that it is interested in helping the WG to meet in person and can contribute some resources.

France is interested in participating and will provide information on satellite-based siren systems being implemented in French Polynesia, New Caledonia and Wallace and Fortuna.

Australia indicated it will share the information gathered from its capacity assessments.

11. Working group action plan revision and adoption

The meeting reviewed the discussion and agreed on recommendations to be reported to the PTWS-XIII.

The Chair reminded the countries to formally inform the UNESCO IOC of their interest to participate through official designation from their Foreign Ministry or their UNESCO representative of their Tsunami National Contact (TNC) and Tsunami Warning Focal Point (TWFP), especially so as to receive the WG information. TNC and TWFP forms are available from the Secretariat for this.

The Chair asked about the longevity of the WG.

The WG agreed:

- The WG was of high value to its members, especially as it provided a forum to focus on tsunami activities.
- Recommended that the WG continue during the intersessional period. The Chair will report on the WGs activities, recommendations and planned actions to the PTWS-XXIII.

12. Summary and closure

The Chair thanked the participants and the host. He adjourned the meeting at 5:30 pm
### WG5: Sub-regional WG on South West Pacific Tsunami Warning System

#### Participant List

**Chair:** Ken Gledhill  
**Vice-Chairs:** Filomena Nelson (Samoa) & Lasarusa Vuetibau (Fiji)

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