

Second Meeting of the Pacific Meteorological Council (PMC-2)

1-5 July 2013
Nadi
Fiji Islands

Agenda Item 6.5.1: PTWS-PTWC Enhanced Products

Purpose

- i. Brief the meeting on IOC Pacific Tsunami Warning & Mitigation System (PTWS) proposed new PTWC products & services, the present implementation schedule and implications for Pacific countries.
- ii. Seek comments/feedback on understanding and appropriateness of the new products to Pacific Island countries and training requirements in this regard.
- iii. Obtain clear direction including timeline from the countries in terms of their readiness to accept and implement PTWS changes at national level.

Background

1. The Pacific Tsunami Warning Center (PTWC), operated by the United States National Oceanic and Atmospheric Administration's National Weather Service (NOAA/NWS), has served since 1965 as the operational tsunami warning center for Member States of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS). The ICG/PTWS is a subsidiary body of UNESCO's Intergovernmental Oceanographic Commission (IOC), and the IOC's Tsunami Unit oversees the coordination of the global tsunami warning and mitigation system. The ICG/PTWS, which began as an international response after the 1960 M9.5 Chile earthquake and tsunami, is the oldest of the four regional tsunami systems. Systems in the Indian Ocean, Caribbean and Adjacent Seas, and Northeastern Atlantic and Mediterranean were established after the 2004 Indian Ocean Tsunami.
2. The suite of text tsunami products issued by PTWC to countries around the Pacific in support of this mission has evolved over time as seismic and sea level data, analysis methods, computational capabilities, and communications have all improved. With order of magnitude increases in data availability and quality over the last 10 years enabling reliable real-time earthquake source characterization and more timely, detailed tsunami monitoring, and with better numerical models providing more accurate forecasts of tsunami impacts in real time, it is now time to enhance and evolve the existing PTWC products to provide countries with more informative and useful tsunami threat assessments to their coasts.
3. Accordingly, the Twenty-third Session of the ICG/PTWS (2007) started the process of improving the PTWS international alert products, starting first with the products of the PTWC. The Twenty-fifth Session of the ICG/PTWS (May, 2011) approved PTWC's

Enhanced Tsunami Products proposal and asked them to proceed with their development. Exercise Pacific Wave 2011 (November) introduced those products and the PTWS Steering Committee met in May 2012 to review the feedback and approve the final implementation timeline. Exercise Pacific Wave 2013 has recently been conducted to validate the products. At the Twenty-fifth Session of the ICG/PTWS (9-11 September 2013, Vladivostok, Russia), Member States will be asked to approve the final products and agree on a changeover date.

New PTWS-PTWC Products

4. PTWC's New Enhanced Products are described in *IOC Technical Series 105: User's Guide for the PTWC Enhanced Products for the Pacific Tsunami Warning System*. The issuing of the new products has already commenced (started on 15 April 2013) in order to familiarize recipients - primarily the designated national Tsunami Warning Focal Points (TWFPs) -- with the new products' timing and content. Note, however, that the highest priority activity at PTWC will continue to be the issuance of the existing operational products. As a consequence, the new products may lag somewhat behind existing products at the beginning of an event and may also be issued on a different schedule. This introduction and familiarization period will also provide lead time for training on the new products and for countries to incorporate the necessary changes to their TWFP and National Tsunami Warning Centre (NTWC) Standard Operating Procedures (SOPs).
5. The PTWC Enhanced Products have also been familiarized through two international exercises involving the NTWCs and NDMOs. Exercise Pacific Wave 2011 and 2013 introduced and evaluated the PTWC Enhanced Products, and PTWS countries, including Pacific Island Countries, provided feedback on the usefulness, understanding, readiness, and training needs for the new products.
6. Additionally, the International Tsunami Information Center and IOC, along with PTWC and New Zealand, will conduct regional tsunami training and consultation workshops on the PTWC Enhanced Products for Pacific island Countries from 12 to 16 August 2013 (Wellington, New Zealand). Countries are invited to attend this training to become better prepared and provide further feedback to the PTWS Enhanced Products Task Team that will conduct the consultation.
7. There are important differences between PTWC's existing and its new enhanced products. Existing products use terminology that describes a level of alert for each country. Specifically, a country is currently designated by PTWC as being under a *Tsunami Watch* or a *Tsunami Warning* depending upon the tsunami threat presented by the event, as well as the time remaining until tsunami impact. Over the last several years, however, use of the *Warning* and *Watch* terms have caused confusion when the PTWC-designated levels of alert conflict with a country's independently-derived levels of alert. As each country is sovereign and thus responsible for the safety of its own population, the PTWC new products will change to avoid using the *Warning* and *Watch* terms, and instead provide forecast levels of impact along coasts.
8. The levels of expected impact will be provided as expected wave amplitudes within four categories, which are
 - i. waves '< 0.3 m',
 - ii. waves '0.3 to less than 1 m',
 - iii. waves '1 m to 3 m', and
 - iv. waves 'over 3 m';
 A fifth category will be 'not threat computed' to reflect locations where a forecast has not yet been made.
9. With this, the designation of Alert levels, such as a Tsunami Warning, will then become the sole responsibility of the NTWCs. A list of countries and country sub-jurisdictions for which PTWC will provide forecasts is given in Appendix III of IOC TS-105, and the list of

PTWC forecast polygons that divide extended coasts into segments or that surround particular island groups is given in Appendix IV of that document. During the trial period, countries are asked to review the list and recommend changes if needed.

10. Further, present PTWC procedures for designating levels of alert in the existing products are extremely conservative and most places that come under a warning alert usually do not finally experience a destructive tsunami. This was in large part due to PTWC's reliance on limited historical data, and at the time the criteria were conceived and approved by the ICG/PTWS, and the lack of numerical model forecasting for the Pacific in real time. There is also the issue of lack of high resolution coastal bathymetry and elevation data needed for coastal inundation forecasting.
11. While numerical forecasts provided in the new product suite will continue to still be conservative, the provision of forecast information should nonetheless significantly reduce over-warning. In addition, by providing an expected level of impact, it is expected that national and local authorities will now be able to determine and enable more appropriate levels of response. For example, the distribution of forecast values along a coast may provide justification for national or local authorities to evacuate only a part of the coast or to only clear beaches and harbours because a smaller tsunami is expected in these zones.
12. The PTWC new products will consist of both improved text products, and graphical products (examples in Appendix II of IOC TS-105). The text products include improvements in the order and type of information provided, and in its readability. The graphical products are expected to provide more information and at a much greater level of detail than will be possible using only text products. These include maps that show the forecast directionality of the tsunami energy, the forecast position of the initial wave through time, as well as the expected maximum wave amplitudes offshore and at the coast. The graphical products may also be helpful for communicating the threat quickly and clearly when time is of the essence.

Implication of PTWS-PTWC New Products and Service Change for Pacific Countries

13. Once the new products become official with appropriate service change from PTWS-PTWC on a date still to be determined, PTWC will cease to issue *warnings* and *watches* for any of the countries and instead provide advisory and model guidance products as briefly mentioned above and described further with examples in IOC TS-105.
14. As implied in Para. 9 above, all countries will be required to solely decide on their tsunami warning status using, if they wish, forecasts and guidance products provided by the PTWC and Japan NWPTAC, and subsequently issue their own warnings through their respective NTWCs and NDMOs. It should be noted that the decision for issuing national warnings has always been a country responsibility. The change will further enforce the need for NTWCs to be functional with adequate resources for 24/7 operations.

Discussion/Recommendations

15. The Meeting is invited to:
 - i. **Note** the information on the new PTWS-PTWC products and services outlined above and contained in more detail in IOC TS-105: *User's Guide for the PTWC Enhanced Products for the Pacific Tsunami Warning System (2013)*, and to encourage all countries to take appropriate measures to adopt and implement the change at national level.
 - ii. **Provide comments/feedback** on
 - a) Understanding and appropriateness of the new products, and suggestions for improvement.

- b) Training requirements for implementation of new products/services at country level.
 - iii. **Elaborate** upon the Exercise Pacific Wave 2013 post-exercise evaluation submissions, including clear direction and a timeline from the countries in terms of their readiness to accept and implement PTWS-PTWC changes at national level.
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Reference

- IOC TS-105: User's Guide for the PTWC Enhanced Products for the Pacific Tsunami Warning System

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