

20 July 2010

RG 9/1

Mr Russell Howarth

Director

SOPAC

Suva

FIJI

Dear Mr Howarth,

Re: TSUNAMI WARNING CENTRE IN THE SOUTHWEST PACIFIC

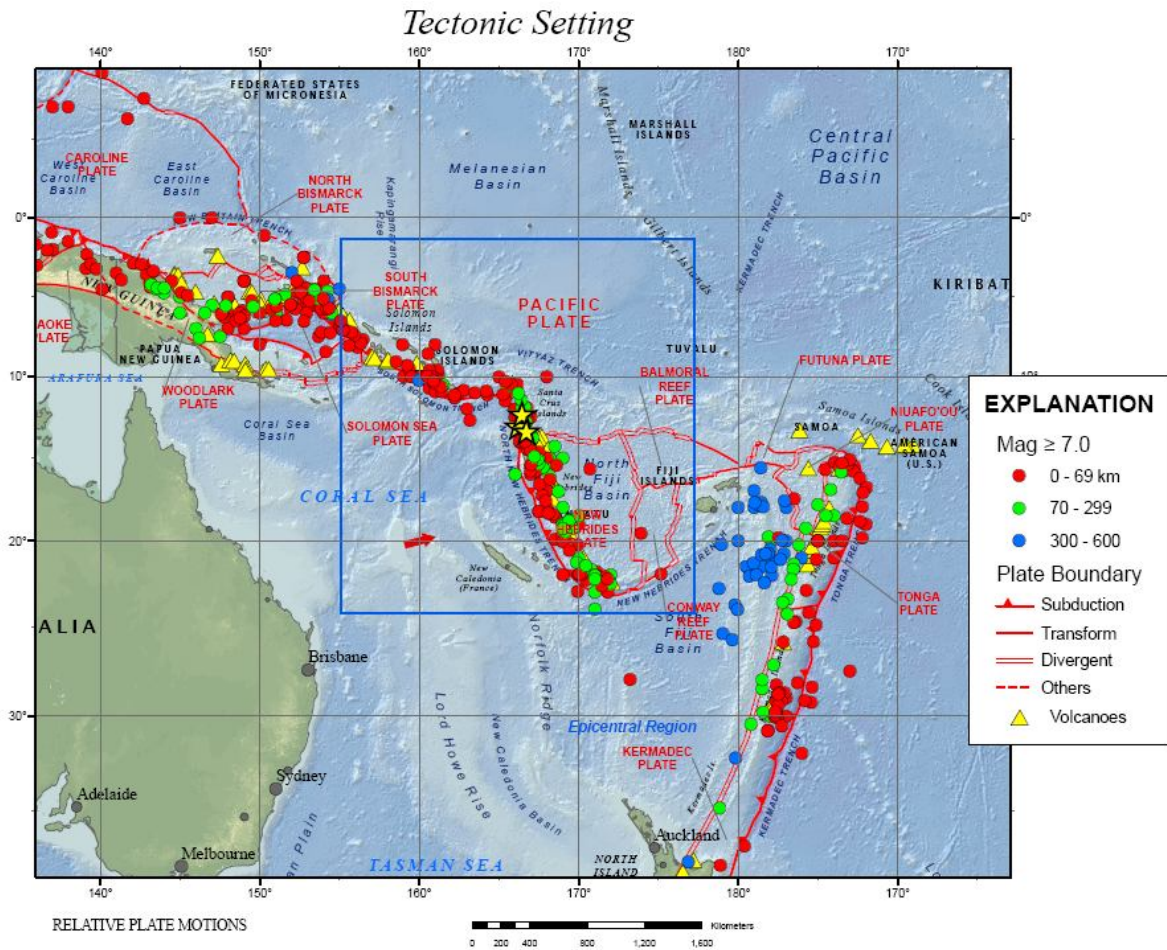
The activeness of the “Ring of Fire” in the last two decades, let alone, the activities in the previous 2 years, have most Members of the above workshop ponder over the reduction in the urgent dissemination of an early warning for the region. These events, Itape in Papua New Guinea in 1998 and the recent one last year in 2009 that affected Samoa, American Samoa and Tonga, just to name a few, is an indication of the lack of urgency in some warning centre to issue such warnings. Considering that the southwestern part of the fault line are close to all of the Melanesian Island States that also includes Tonga and the Samoas, participants from the workshop are proposing to SOPAC, a project that will take into account an early warning system that alert the communities close by of any threat by tsunamis, an efficient and effective monitoring system that can contribute to the early detection of these local faults and thus creating an early warning system.

We fully understand the role that some partners are playing in the region and we are grateful for the assistance. The Pacific Tsunami Warning Centre and the Australian Tsunami Warning Centre would fall into this category. We are mindful also however that there is a delay in some of the information that are getting to them in order for them to issue warnings for us in this unique part of the world. It is this factor that we are trying to minimize in order to save people in our own backyard.

We feel now that while the momentum is here with the presence of the German Research Centre for Geosciences, GFZ, and the capability they have shown in their extra-ordinary equipment and software, this could be an opportunity for SOPAC to create a partnership with them, among other prospect partners, in formulating a proposal to cover this specific need. Although some of the Island States are less vulnerable to these hazards, the commitment from each and everyone is nevertheless essential in ensuring for a continuous and integrated monitoring station that allow Members to share data for the benefit of the region.

Participants of the Tsunami Workshop with GFZ

Improved Seismic Hazard and Tsunami Early Warning Capability in the Pacific Region.



Concept Note

(Countries represented: Cook Islands, FS Micronesia, Fiji, Nauru, New Caledonia, Papua New Guinea, Samoa, Solomon Islands, Tuvalu, Tonga, Vanuatu, New Zealand, Australia)

Background

The Pacific has had its fair share of devastating earthquakes and tsunamis as highlighted by the 2009 Samoa and the 1998 Aitape events. The recent 2009 earthquake of magnitude 8.3 on the Richter Scale originated 190 kilometers southwest of Apia at a depth of 10 kilometers was a wake-up call for all the Pacific Islands. There were more than 200 deaths recorded in Samoa, American Samoa and Tonga with more than a thousand patients, seven are still missing, thousands traumatized and damages exceeding half a billion US dollars. Insufficient warning time due to outdated tsunami warning equipment and mechanisms contributed to the effects.

The seismically active Pacific Rim of Fire will continue to produce devastating earthquakes and tsunami hazards event hence an urgent need for something to be done to prevent future catastrophies like the above.

Although a number of seismic monitoring and GPS stations and tide gauges have been installed around the Pacific region they are not enough to generate good reliable timely data for large earthquakes and tsunami hazards warning. Timely and more accurate warning is a product of much input information from seismic stations, tide gauges, landbase GPS stations and GPS buoy and the availability of improved hazards, seismic and tsunami models. Due to lack of resources and human capacity the Pacific Island nations will never be able to address the urgency of this need.

Current Instrumentation Status of the Pacific Island Countries

The status of each country represented at the Suva workshop is stipulated in Table 1 below in terms of the sensors that can be used to monitor and detect earthquakes and tsunamis. It is apparent from this table that there are some equipment around the region that can contribute to the monitoring and detecting earthquakes and tsunamis.

In collaboration with other partners in the region in utilizing the same equipment, there is a tendency for these partners to offer assistance through file-sharing and metadata sharing and thus closing the gaps in some areas that might need a major investment. Although there is a different types of equipment that is brought into the region by these partners, the participants in the workshop found out that the common goal is ensure that a specific software can be provided to make each and equipment compatible. It is this compatibility that partners are encouraged to formulate their own strategic plans on a national basis but to also consider this project as enhancing the regional capability to provide services to their own people and thus play a major role in the development of the region.

Partners that has been indentified currently in the region are from Australia, China, European Union, France, Germany, Japan, New Zealand and the United States of America, just to name a few.

Country	No. of seismic stations		No of GPS stations		No. of Tide gauges	Stations under construction
	Working	Not working	Working	Not working		
Cook Islands	1		1		1	Nil
Federated State of Micronesia						
Fiji	3	2	0	0	2	4
Kiribati						
Nauru						
New Caledonia	2					7
Palau						
Papua New Guinea	3 (2Aus) (1 GFZ)	3	0	0	0	
Samoa	1	0	1	0	1	6 seismic 3 tide gauges
Solomon Islands						
Tuvalu	1	1	0	0	1	0
Tonga	3	0	1	0	1	3 seismic
Vanuatu	5 France	3	1(Van)	1(Aust)	2	1 seismic GFZ

Table 1. Status of the Countries that were represented at the Workshop in Suva, Fiji

This table is incomplete due to the non-attendance of some members invited to the workshop. This does not however hold the proposal back as we sit fit that a system ought to be put into place as soon as possible.

Objectives

The countries represented deliberated and agreed that given the urgency of the need within a time frame of three years it is crucial:

1. To increase the number of seismic stations to at least two in every Pacific Island country.
2. To increase the number of GPS stations to at least two in every Pacific Island country
3. To increase the number of tide gauges to at least in every Pacific Island country.
4. To deploy at least twenty Buoy stations in the Pacific Ocean.
5. To improve seismic, tsunami and geological data handling and analysis capability of the Pacific Island countries.
6. To improve tsunami and volcanic eruption early warning systems and modeling.
7. To promote data sharing through user friendly software and mechanisms in the Pacific Region.
8. To establish a sub-regional tsunami early warning center within the region as the Pacific Focal Point for issuing timely tsunami messages/warnings to Pacific Island countries.

Inputs

In order to achieve the objectives above there is a need for:

- Researchers, scientists, technical people and manpower
- Detecting, Recording and Monitoring Equipment
- Tools, supplies, facilities and other relevant resources
- Integration of relevant national and international stakeholders
- Upgrade of existing mechanisms in the Pacific Islands to
- Identify and facilitate relevant Pacific Focal Point.

Activities and Duration.

It is anticipated that:

- The Pacific Focal Point be identified by the Pacific countries immediately and such a focal point be familiar with work carried out in the Pacific and has been involved with the region for more than ten years.

- The Pacific Focal Point in collaboration with Pacific Tsunami Warning Centre issues timely warning messages to Pacific Island countries.
- The Pacific Island countries provide full support to researchers, scientists and technical personnel in terms of required data and information, local manpower and logistics.
- The Pacific Focal Point seeks donor funding supports in order to meet the objectives above.
- The Pacific Focal Point collaborates with relevant International Agencies to conduct Capacity Building Workshops to address the needs above.

Output

Each Pacific Island country should be able to:

- Obtains threshold earthquake magnitudes within 5 minutes of occurrence
- Obtains up to standard Geohazards information
- Receives timely tsunami warning messages
- Quickly relays warning messages to the public before a tsunami or a volcanic eruption occurs.
- Designs their own earthquake, tsunami and volcanic hazard maps.
- Timely obtains information and relevant data from the regional network

Beneficiaries and Impacts

Such initiatives will for sure benefit the Pacific Island village communities especially those living near the coastal areas, fault lines and near active volcanoes. Many lives, properties and livelihood will be spared. On the other side the know-how and skills of staff working within the scope of Earthquake, Tsunamis and Volcanoes will be enhanced. More public awareness programs will be conducted for the benefit of schools and village communities. The region as a whole will improve its geological, seismological and tsunami data storage and handling for the wider international research and scientific communities.

The Pacific Focal Point shall also conduct planned impact assessments in all Pacific Island countries to monitor progress of earthquake, tsunami and volcano warning systems.

Partnerships in the Region

Although there is a need to increase the monitoring of the region in terms of extra equipment, it must be kept in mind that there are stakeholders in the region that have already installed specific projects for their use that can accommodate this project. An example of this is the Australian South Pacific Sea Level Monitoring Project, SPSLMP that the Bureau of Meteorology of Australia is the caretaker, in partnership with the SOPAC. Their 11 Tide gauges can assist the proposed network in enhancing their capability to monitor report on events that could trigger into a warning for the regional community. Their network is displayed in Fig 1 below.

Interesting to note that that 5th phase of the above project would be commencing soon, indicating that the maintenance of the earlier phases would be a priority for the project as it endeavours to get a respective change in the sea level after monitoring the sea level for the last 20 years or so. This quality control would ensure that the integrity of the equipment would be an advantage for the monitoring of earthquakes and tsunamis that this proposal is seeking.

The network in Fig.1. also have GPS Stations on some of the sites with a tide-gauge which once again enhances the capability and capacity of the stations for monitoring earthquakes and tsunamis.

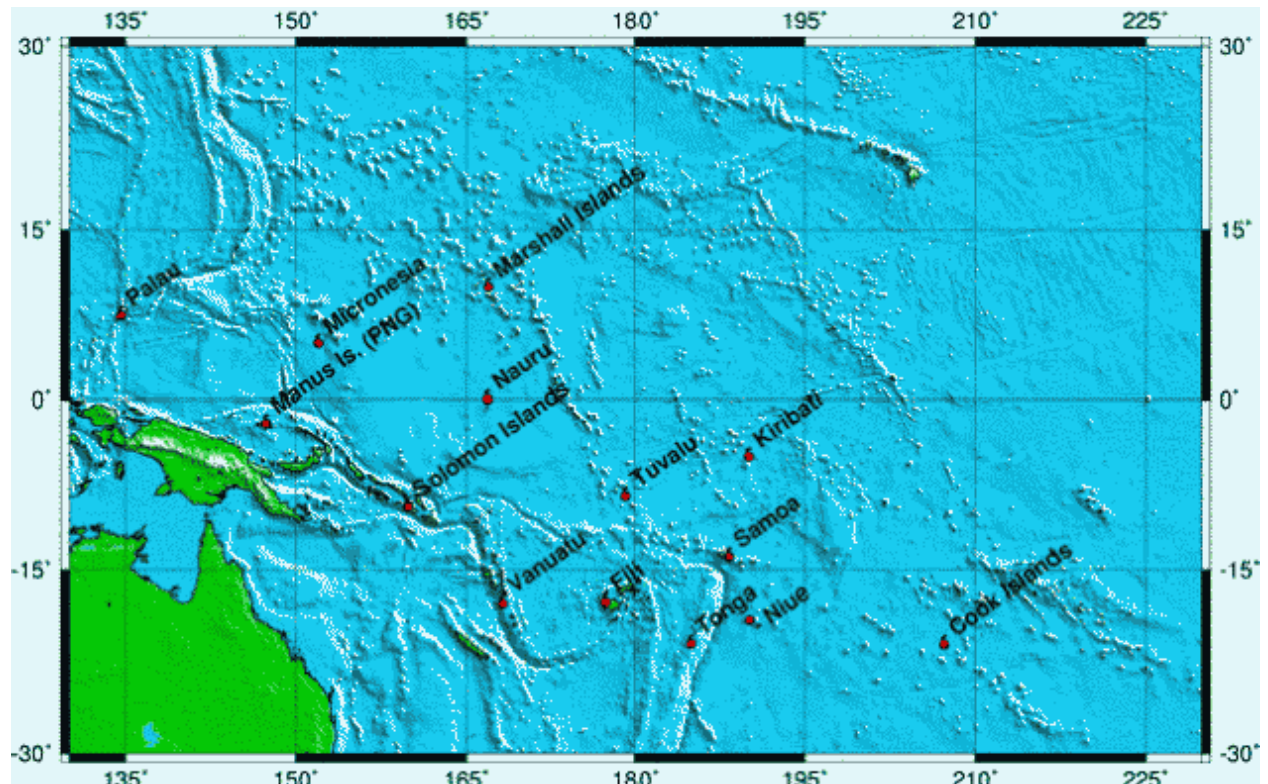
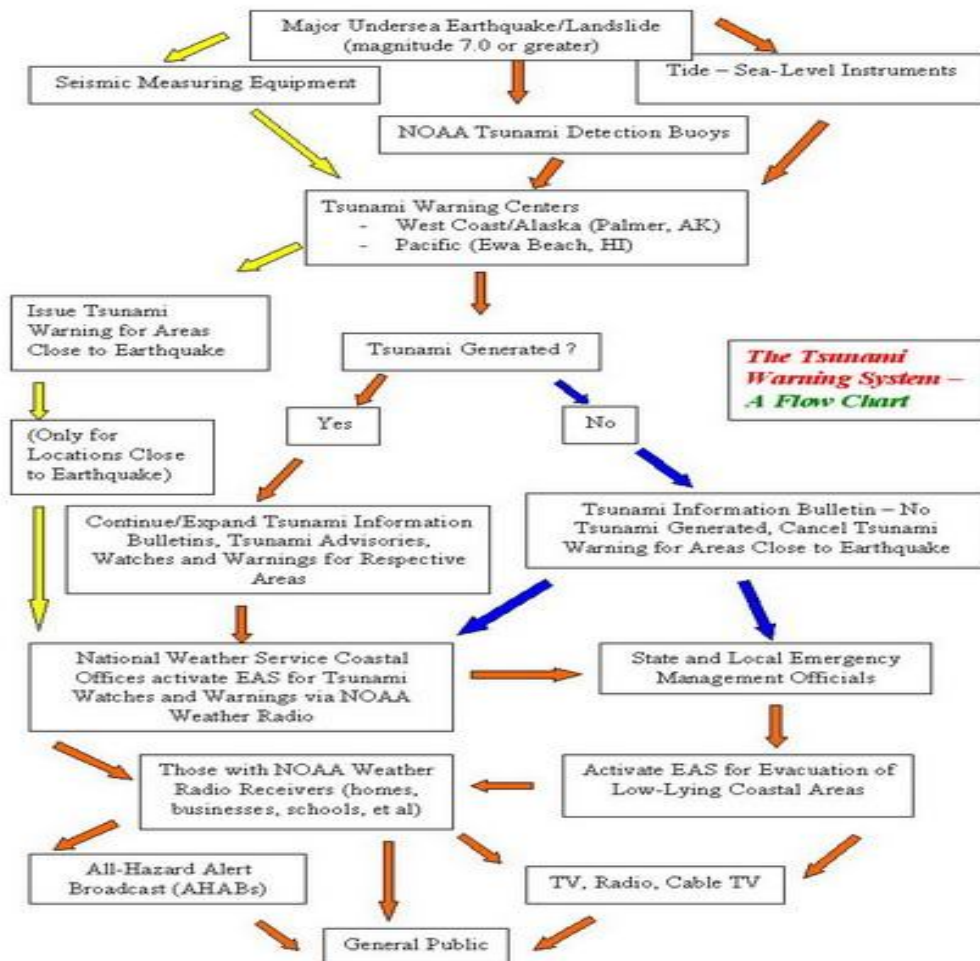


Fig 1. Tide gauges installed in the Pacific as part of the Australian Sea Level Monitoring Project

Early Warning System via the Pacific Tsunami Warning Centre

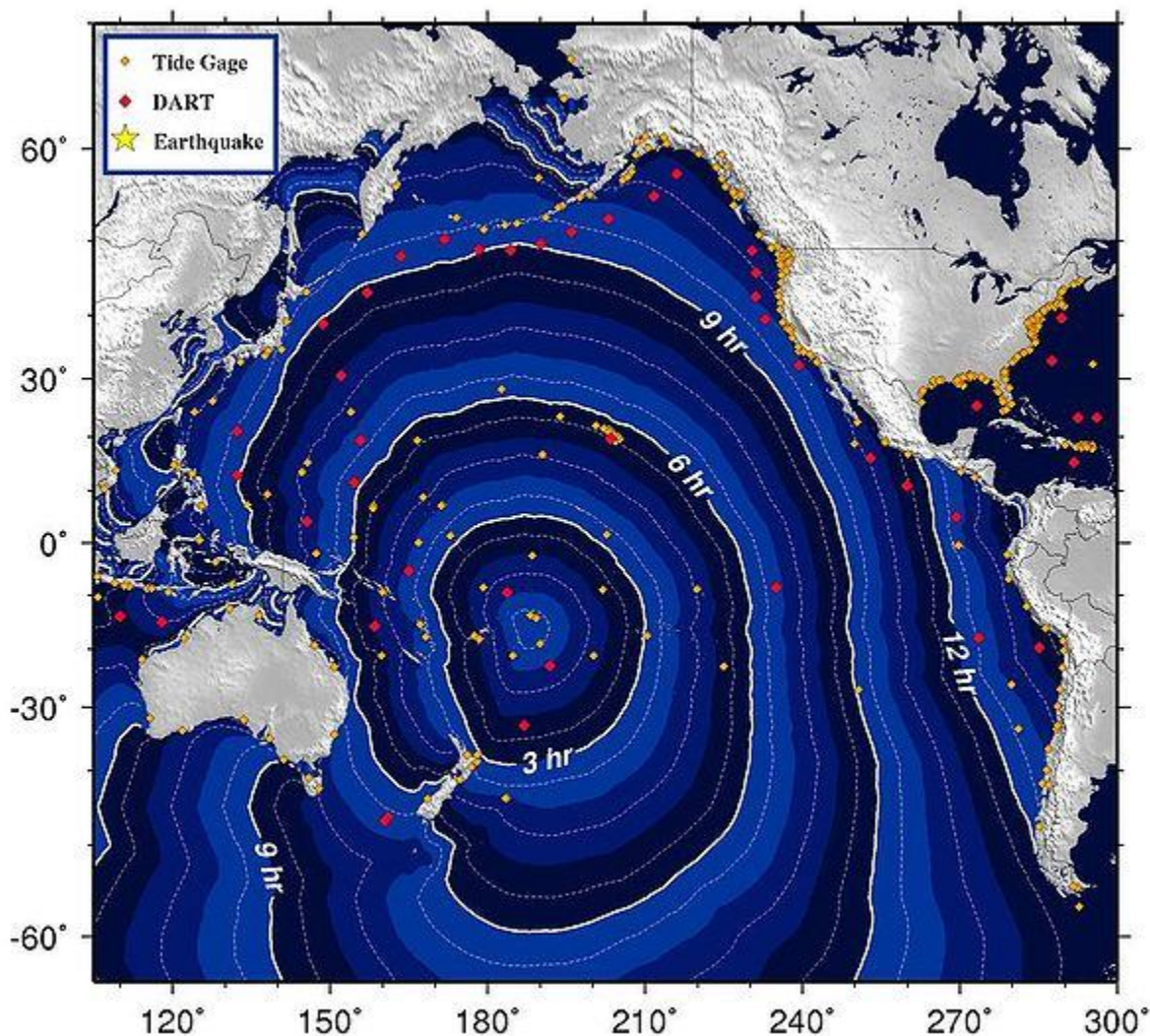
The Early Warning System in place now for the Southwest Pacific is provided via the Pacific Tsunami Warning Center in Honolulu, Hawaii. A schematic diagram of the process is given.



With the seismic stations, tide gauges and gps stations forming a network in the Pacific, any event triggered by these stations would be picked up by PTWC in Honolulu, analyzed and advise is given to all countries in the Pacific as a warning. Three types of warnings are given, depending on the strength of the event, too countries in the form of an information, watch and warning with their respective criteria.

Tsunami Travel times are given as maps to guide the communities of an expected time of the first waves to their shores. Such travel times are important to the Pacific due to the closeness of the faultlines to the countries. It would be crucial for people on the coast to understand the warning system and to decide when to move for safety, if required.

Tsunami Travel Times



GMT 2009 Sep 29 18:03:48 UTC

Fig 2. Tsunami Travel Times for the Samoa Tsunami in September 2009

National Meteorological Services

It should be kept in mind that National Meteorological Services play a major role in the dissemination of tsunami warnings, let alone the early warnings for weather in their respective areas. Since these national entities have put into place communication procedures for getting warnings to the communities, it is essential that any early warning system to be derived for any new system ought to be consulted with this entity. Since each and most of the National Meteorological Services in the Pacific Ocean, especially the small NMSs, their linkage through the Nadi-Regional Specialized Meteorological Centre, who is responsible for the early warnings of the region especially those pertaining to severe weather tropical cyclones, must be utilized in the time of need. The linkages of these NMSs to the national plans and disaster management policies go along way in implementing standard operating procedures for each and every member of SOPAC.

An upgrade of this communication of the tsunami warnings are the usage of SMS messages from Honolulu key stakeholders in each country that are responsible for the dissemination of the warnings. Messages are also sent via Aeronautical Fixed Telecommunications Network, AFTN, Global Telecommunications Network, GTS and via e-mail and internet. The Emergency Manager's Weather Information Network Systems, EMWIN, is also used in most countries where a system is carried by the NMS and the National Disaster Office.

Conclusion

The aim of this proposal is not to overlook the work and assistance given by the numerous partners in the region, but rather to enhance the performance of the early warning system in an area that is becoming a high risk to the region and to the globe as a whole. We hope that the project can extend to the hazard mapping of the Pacific Tectonic Plate and to complement the work of the respective monitoring networks in the region.