

**ITSU-XX**  
**NATIONAL REPORT** submitted by **FRANCE**

## **BASIC INFORMATION**

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### **4. Local Tsunami Procedures**

Very small occurrence of local tsunamis are generated by cliff failure or submarine landslide. No procedure for local tsunamis are implemented

### **5. Distant Tsunami Procedures**

**What organization becomes aware of tsunamigenic events from a distant source:**

The Centre Polynésien de Prévention des Tsunamis implemented by the LDG/Pamatai.

**What actions does this organization take with regard to tsunamigenic events from a distant source?**

An alert message with recommendations on the actions to be taken is sent to the Direction de la Protection Civile that informs the general public and the media, in accordance with the Specific Emergency Plan.

**What are the criteria for initiating tsunami mitigation procedures?**

A color-code of warning which is a function of the time delay and seriousness of the danger, has been adopted to facilitate the progress of actions during real warning.

The seriousness of the danger is a function of 2 parameters :

- the delays available (3,6,9 hours)
- the event's magnitude, as established by the scalar seismic moment given by TREMORS system.

<b>YELLOW</b>	Warning at the Laboratory Warning for Civil Defense, High authorities, State Governors, and Territorial Government, but no action required immediately. Further evolution of the warning to depend on several parameters, including the earthquake's location, tide gauge readings, external information, and reports by PTWC or other warning centers. The warning can be cancelled at any time based on external information or other reports.	Delay > 9 hours and Mm > 7.0
<b>ORANGE</b>	Warning of Civil Defense, City and Local Authorities and Municipalities, Police Headquarters, and other emergency responders, but a severe danger of tsunami has not been confirmed. The time delay is 6-9 hours before the tsunami arrival, and the population has not been informed of a possible evacuation.	9 < Delay < 6 hours and 8.7 < Mm < 9.0
<b>RED</b>	Imminent danger (less than 3 hours), or very severe danger of tsunami. General warning for evacuation of population along the coast, boats in harbors, and airport.	Delay < 3 hours and Mm > 8.0 ----- Delay > 9 hours and Mm > 9.0

**What actions are taken in response to warnings issued by PTWC during intersessional period?**

Own TREMORS seismic stations are checked.

A proposal for a decision about the emission of a tsunami warning is prepared by CPPT and transmitted immediately to the Civil Defense.

## **6. National Sea Level Network**

Currently there are four (4) sea gauges installed in harbours in French Polynesia, maintained by LDG/Pamatai, PTWC or the University of Hawaii :

- one in Papeete (Tahiti harbour)
- one in Rikitea harbour (Gambiers Islands)
- two in Marquesas Archipelago, one in Taiohae (Nuku-Hiva) and one in the Tahauku bay (Hiva-Oa)

## **7. Information on Tsunami occurrences**

No local tsunami occurrences in 2003-2005.

Two distant tsunami were detected in 2003 -2005: Japan on 25 sept. 2003 ( $M_w = 8.1$ ), and Sumatera 26dec. 2004 ( $M_w = 9.3$ ).

On the 2 tide gage records in Marquesas Islands, several waves of a few cm of amplitude were observed..

Date: 1/09/2005

## NARRATIVE

### ***TREMORS Station***

One broad band station was installed in Marquesas Islands (TAOE Station). TREMORS is implemented in LDG facilities in Tahiti. This new station gives good detection and estimation of the tsunami risk for the South Pacific region.

The results are sent and publish in real time on the European-Mediterranean web page ([www.emsc-csem.org](http://www.emsc-csem.org)).

The TREMORS System has been upgraded. The computation of Mm and the seismic moment is now until 340 s. The period of computation was increased, while rupture of the 26 December 2004 earthquake lasted more than 500s.

### ***Evolutions of the tsunami emergency plan in French Polynesia.***

Taking into account the evolutions in technology and data analysis, a new tsunami warning plan has been re-evaluated and updated in collaboration with Civil Defense. Also, a color-code of warning which is a function of the time delay and seriousness of the danger, has been adopted in a similar way than Meteo-France for typhoon warnings, to facilitate the progress of actions during real warning. The seriousness of the danger would be a function of 2 parameters : the delays available (3,6,9 hours) and the event's magnitude, as established by the scalar seismic moment given by TREMORS system. The next Table shows the color scale of warning as a function of the time delay (depending on the concerned regions) and magnitude. The time delays were simply set at 9 hours, 6 hours, and less than or equal to 3 hours, and the actions corresponding to each color were set to be :

<b>YELLOW</b>	Warning at the Laboratory Warning for Civil Defense, High authorities, State Governors, and Territorial Government, but no action required immediately. Further evolution of the warning to depend on several parameters, including the earthquake's location, tide gauge readings, external information, and reports by PTWC or other warning centers. The warning can be cancelled at any time based on external information or other reports.	Delay > 9 hours and Mm > 7.0
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***Preliminary Focal Mechanism Determination (PDFM)***

This project has been started in 1997 with the goal of getting early solution of focal mechanism for strong earthquake in a context of tsunami warning. A good knowledge of the seismic source is obviously of crucial importance in tsunami warning because the tsunami excitation is strongly dependant of focal depth, earthquake size (seismic moment), and fault geometry. In one hand for recognizing a true shallow thrust faulting event is of great importance for issuing a true warning, on the other hand, it is a matter of fact that tsunamis are poorly excited by shallow (even big) event with pure strike slip fault geometry (quake of Macquarie Isl. of June 1985 and Balleny Isl. of mars 1998).

In the PDFM project the moment tensor is obtained from the inversion of surface wave spectra (Rayleigh and Love). In fact, we want to use the benefit of the analysis of each TREMORS stations, which send automatically the surface wave spectra via email to a central laboratory : spectra are ready for the inversion.. At the present stage it is not fully automated, and needs still operator intervention.

In 2003 and 2005 more than 45 focal mechanisms were published in the EMSC web page.

***2 Tsunami warning exercises in French Polynesia***

After the 26 December Indian Ocean Tsunami, the French Polynesia High Commissariat decide to organize tsunami warning exercise was held in several French Polynesia Islands : Nuku Hiva, Ua Pou (Marquesas Isl.) and Moorea (Society Isl.); to test in situ, the tsunami warning plan with local authorities state administrators, municipalities, Police and Fire-man, and in several places the coastal population.

The goal of this exercise was to identify potential communication problem during warning that might occur between the Civil Defense and local authorities. During this exercise, a realistic scenario of tsunami generated by a 8.5 magnitude earthquake located in Chile was chosen, and CPPT and Civil Defense transmitted one message per hour to local authorities, involving practical actions (inventory of radio, infirmaries, available cars, safe and high places to evacuate the populations ...etc.).

***Tsunami risk assessment and prevention in French Polynesia***

A project of tsunami risk assessment and prevention in French Polynesia, in the frame of a more global risk project lead by French BRGM (Bureau des Recherches Géologiques et Minières), has just begun since April 2005. In addition to the assessment of regional seismic hazard, the CEA/DASE and LDG/Pamatai are in charge of gathering and synthetizing tsunami data bases (tsunamis having reached French Polynesia, observed tide gauges of events, observed damage) and in a second step to provide numerical constraints to the establishment of PPR (Plans de Prévention des Risques) for exposed bays. Six bays will be studied in detail, in the Society Islands, in the Marquesas Islands, in the Australes and in the Tuamotu, while a more regional numerical approach will provide elements to assess a level of hazard along the Polynesian coastlines (not exposed, moderately exposed, highly exposed).

***IOC Cooperation***

Since December 26 2004, F. Schindelé, ITSU Chairman and Representative of France , was partly on secondment at Unesco/IOC to participate to the implementation of the Tsunami Warning and Mitigation System in the Indian Ocean, and the other seas. For more details, see the Chairman report.

**Web site**

DASE has implemented a web site in France **[www-dase.cea.fr](http://www-dase.cea.fr)**.

The 26 December tsunami study is presented in the page :

**[http://www-dase.cea.fr/actu/dossiers\\_scientifiques/2004-12-26/index.html](http://www-dase.cea.fr/actu/dossiers_scientifiques/2004-12-26/index.html)**

**Publications**

The mechanism of great Banda Sea earthquake of 1 February 1938: applying the method of PDFM to historical event, Emile Okal and D. Reymond, EPSL, 216, 2003.

Hébert, H., F. Schindel  , Y. Altinok, B. Alpar, and C. Gazoglu, Tsunami hazard in the Marmara Sea (Turkey): a numerical approach to discuss active faulting and impact on the Istanbul coastal areas, Marine Geology, 215, 23-43, 2005.

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