



PARLIAMENTARY OFFICE FOR THE EVALUATION OF SCIENTIFIC AND TECHNOLOGICAL CHOICES

## Tsunami warning systems in France and around the world

Public hearing of 23 June 2009  
organized by Jean-Claude Etienne, Senator from the Marne department,  
and Roland Courteau, Senator from the Aude department

### Main conclusions

#### 1. Finally, the setting up of a warning system in the western Mediterranean

The Directorate General for Risk Prevention at the Ministry of Ecology, Energy, Sustainable Development and Territorial Development (MEEDDAT) and the Vice-Directorate for Risk Management at the Ministry of the Interior, Overseas France and Territorial Collectivities have officially announced **the creation of a national tsunami warning centre for the Mediterranean, scheduled for the beginning of 2012**. Thanks to this centre, it will be possible to:

- Warn France's civil protection authorities within 15 minutes following a potentially tsunami-generating seismic event in the northeast Atlantic or the western Mediterranean.

- Confirm or disconfirm the possible occurrence of a tsunami within 20 minutes.

This centre will also play a regional role: in concrete terms, it will be responsible for informing the tsunami focal points and the foreign national and regional centres within 15 minutes following a potentially tsunami-generating seismic event in the western Mediterranean.

These two ministries will together provide **€14 million** for the setting up and running of this centre from 2009 to 2013.

**€12.6 million will go to the CEA (France's Atomic Energy Centre), including:**

- An investment of €3.5 million for setting up the permanent monitoring centre (acquisition of a "worldwide telecommunications system" for data transmission; sending of seismic data to other national centres; designing a data-processing centre; safety and operations, seismology software, software for the processing of tide gauge data; warning-emission software; development of a tsunami-scenario database and an automatic tsunami-simulation tool; etc.)

Simulation of the 1856 tsunami



CEA/DAM/DIF : Public domain

- €9.1 million to cover operation costs (salaries for the centre's 7-person monitoring team, as well as its general director, scientific director and technical director; transmission of seismic signals outside the CEA; maintenance of software, equipment/machinery and databases.)

**SHOM (the French Navy's Hydrographic and Oceanographic Department) should be attributed €1.1 million** in order to update metropolitan France's 18 tide gauges that do not yet transmit their data in real-time and to install 5 new real-time tide gauges (2 on the French Riviera and 3 in Corsica.)

In addition, this amount will also allow to hire two technicians (for 3 and 5 years, respectively) for the initial implementation of the tide gauges and transmissions, as well as one engineer (for a period of 5 years) in charge of the monitoring and national coordination of the sea-level observation networks.

**€250,000 will be attributed to CNRS** for the updating and maintenance of 4 seismic stations, whose signals will be transmitted in real-time to the early-warning centre managed by CEA.

Nevertheless, in order for this system to be truly effective, **one must increase the funding made available to the civil protection authorities for the creation of a top-down warning network** for the Mediterranean coast. In concrete terms, this network amounts to a system for warning the concerned population(s), an indispensable component of any tsunami detection system.

To be pertinent, this early-warning system will have to be based on a determination of the coasts' vulnerability. It amounts to, firstly, identifying the concerned zones (ports, beaches and coastal infrastructure) and, secondly, specifying the impact perimeters (in particular, the distances of wave penetration into the territory's interior.) Next, one must:

- Establish flood and evacuation maps for inhabited zones, so as to manage territorial development and the means of civil protection.

- Establish the best means of warning the concerned population(s), according to the seismic event's location and scenarios (nearby or far-off tsunami.)

- Organize public-awareness campaigns targeting the concerned populations and players with regard to the proper behaviour to adopt in the event of a tsunami.

**For the 2009 and 2010 fiscal years, studies dealing with the creation of a top-down early-warning network for the Mediterranean coast have been budgeted for €900,000.**

Nevertheless, these funds will be insufficient to carry out reliable digital simulations and precise flood and evacuation maps of the inhabited zones. **In the medium term, bathymetric and topographic surveys will have to be carried out for the entire Mediterranean coast (including Corsica.) The total cost is estimated at €7.5 million.**

What is more, the setting up of an effective early-warning system in the Mediterranean necessitates the installation of a dense network of tide gauges and tsunamimeters, particularly off the coast of the North African continental terrace; however, this is not provided for in the €14 million previously mentioned. The Ministry of Ecology would like to create a European consortium for the centre's long-term funding. For the time being, this consortium is having difficulty establishing itself, particularly because the discussions are being carried out among technicians, without any agreement in principle having been formulated at the level of the concerned states. Likewise, negotiations on the tide gauges and tsunamimeters to be installed off the North African coast should be held at a higher level in order to be effective. In concrete terms, **French diplomacy must become involved to push this dossier forward.**

## 2. A modern and effective early-warning system in the Indian Ocean, to which France contributes in proportion to its needs

Jan Sopaheluwanan, the Indonesian President of the Intergovernmental Coordination Group for the setting up of an Indian Ocean Tsunami Warning System, presented a very effective system based on a network of national early-warning centres that also inform the other centres. It should be pointed out that the setting up of this warning system benefitted from a significant international funding effort. It currently has 60 seismic stations, 60 real-time tide gauges and around ten tsunamimeters. As a result, in 2011, it should be capable of managing the issuance of tsunami warnings all by itself (since April 2005, the warning centres of Hawaii and Japan have been in charge of issuing warnings for the Indian Ocean.)

With regard to France, progress has been made. For instance, the installation of real-time tide gauges continues, though slowly: since 2007, new real-time tide gauges have been installed in La Réunion, Mayotte and Kerguelen. A second marigraph should be installed in La Réunion. Finally, two other devices should be installed either on Tromelin Island or in Madagascar and the Crozet Islands.

Another positive development: La Réunion has set up a specialized emergency-assistance plan and will participate in the simulation exercise to be held this coming October throughout the entire Indian Ocean basin.

In addition, SHOM, in cooperation with IGN (France's National Geographic Institute), is currently carrying out all coastal bathymetric and topographic surveys (the Litto 3D® project) for La Réunion, Mayotte and the small Scattered Islands in the Indian Ocean.

## 3. A warning system extension into the Pacific Ocean

The tsunami warning system in French Polynesia is the oldest such system and well worn in, though room remains for improvement. Indeed, two new tide gauges were installed in French Polynesia in 2008.

In 2007, the French government became aware of the vulnerability of New Caledonia and of Wallis and Futuna, and decided to set up an early-warning system. 13 sirens have since been installed in New Caledonia (a total of 35 are planned), as well as a few on Wallis and Futuna. However, although funding exists for the acquisition of 8 tide gauges for New Caledonia (including the Loyalty Islands), their actual purchase has been suspended until the passing of an agreement for the funding of their installation and maintenance.

## 4. The situation in the Caribbean remains a cause of concern

In the absence of a clear strategy on the part of the public authorities, IPGP (Paris Institute of Geophysics) must manage alone and without additional funding the French involvement in the tsunami warning system for the Caribbean. IPGP's very conscientious local and national authorities make great efforts to move this dossier forward, in particular, by rallying the territorial collectivities so as to obtain funding.

Nevertheless, the state cannot continue to divert its international responsibilities onto a scientific body that, due to a lack of specific ministerial directives and the corresponding funding, is not only incapable of taking any initiative, but also has no legitimacy to represent France.

The obstacles observed in the transition to real-time tide gauges illustrates this situation. SHOM currently has two tide gauges in Martinique and in Guadeloupe, though no real-time devices. Yet, a technical mission and €10,000 in transmission means would suffice for a transition to real-time and for France to begin to meet its international obligations. Nevertheless, as this is not an immediate priority for SHOM and as France has yet to establish a clear political strategy for this basin, such delays continue to accumulate.

This situation is all the more regrettable given the fact that there exist competent and devoted personnel in departments as diverse as the General Staff of the West Indies, IPGP, the University of the West Indies and of French Guiana, and the technical services of the Departmental Council of Martinique, to name but a few, which are ready to collaborate on a shared project that would make the most of local skills and savoir-faire.

In addition, greater involvement on the part of France in establishing an operational tsunami warning system would have positive repercussions for its international influence in the Caribbean. **Indeed, the overseas departments play a strategic role in France's relations with its neighbouring countries in this zone, which is often little known in metropolitan France.** During her intervention, the President of the Intergovernmental Coordination Group for the Tsunami Warning System in the Caribbean, Lorna Innis from Barbados, pointed out the expectations of the region's smaller, poor states vis-à-vis great industrialized countries, such as the United States and France, and reiterated her desire to see the latter become more involved.

Finally, the amounts in question are inconsequential compared to the possible benefits for France, especially as **the devices/infrastructure necessary for the implementation of a tsunami warning system could surely be used to manage other marine submersion risks** (storm tides, strong waves, an increase in sea level due to climate change, etc..)

**Nonetheless, a positive development was also discussed:** within the framework of the State-Region Plan Contract, IPGP obtained funding for the acquisition and installation of 2 real-time tide gauges in Guadeloupe. Negotiations are currently under way for the funding of 3 additional tide gauges. IPGP has approached SHOM for advice on the equipment it should purchase. **Therefore, a real dialogue exists between SHOM and IPGP; this is important, for it is these two bodies that have tide gauges in the West Indies, excepting the departmental council's tide gauges in Le Prêcheur.**

What is more, IPGP has been provided two time slots by the Puerto Rican early-warning centre on an American weather satellite (GOES) that will allow two French tide gauges to rapidly transmit their data to this centre. **It is, therefore, all the more important to convert, as of this year, two tide gauges to real-time.**

Marina Beach in Madras, 26 December 2004



Source: AFP