



Propagation modelling of the February 2010 Chilean tsunami over French-Polynesia on a massive parallel processing system

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On the 27th February 2010, an earthquake with magnitude of 8.8 occurred 115 kilometers NNE of Concepción, Chile. The French Polynesia Tsunami Warning System (CPPT), located on Tahiti, notified French Polynesia authorities through tsunami information bulletin about a red tsunami warning level, the highest warning level. When major earthquakes occurring in the Nazca subduction zone have magnitudes such large, historical tsunami events showed that the most concerned islands in French Polynesia are the Marquesas Islands that present few outer reefs, more gradual bottom slopes and large bays. The tsunami travel time to Tahiti is about three hours and about four hours to reach Marquesas islands where respectively we observed near the coast a maximum elevation wave about 0.3 and 3.0 meter on the tide-gauges.

In this context, the associated tsunami has been modelled over Pacific ocean using multiple grids with different sizes to test the accuracy and real-time local forecast possibilities that offer our model using a parallel implementation. The water surface initialisation has been computed from Okada's formulation, using seismic parameters of the CPPT. Tsunami propagation has been modelled by a finite-difference numerical model solving shallow water equations. The model is implemented using the domain decomposition technique in conjunction with message passing interface (MPI). The values of tsunami amplitudes, flow velocities and arrival times are compared to the observed data in French Polynesia. This model is developed in the framework of the CPPT and the future French Mediterranean Tsunami Warning System part of the North-eastern Atlantic and Mediterranean Tsunami Warning System (NEAMTWS) to enhance the pre-computed generation/propagation forecast database.