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# Preliminary numerical simulations of the 27 February 2010 Chile tsunami: first results and hints in a tsunami early warning perspective

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The tsunamigenic earthquake (M 8.8) that occurred offshore central Chile on 27 February 2010 can be classified as a typical subduction-zone earthquake. The effects of the ensuing tsunami have been devastating along the Chile coasts, and especially between the cities of Valparaiso and Talcahuano, and in the Juan Fernandez islands. The tsunami propagated across the entire Pacific Ocean, hitting with variable intensity almost all the coasts facing the basin. While the far-field propagation was quite well tracked almost in real-time by the warning centres and reasonably well reproduced by the forecast models, the toll of lives and the severity of the damage caused by the tsunami in the near-field occurred with no local alert nor warning and sadly confirms that the protection of the communities placed close to the tsunami sources is still an unresolved problem in the tsunami early warning field. The purpose of this study is two-fold. On one side we perform numerical simulations of the tsunami starting from different earthquake models which we built on the basis of the preliminary seismic parameters (location, magnitude and focal mechanism) made available by the seismological agencies immediately after the event, or retrieved from more detailed and refined studies published online in the following days and weeks. The comparison with the available records of both offshore DART buoys and coastal tide-gauges is used to put some preliminary constraints on the best-fitting fault model. The numerical simulations are performed by means of the finite-difference code UBO-TSUFD, developed and maintained by the Tsunami Research Team of the University of Bologna, Italy, which can solve both the linear and non-linear versions of the shallow-water equations on nested grids. The second purpose of this study is to use the conclusions drawn in the previous part in a tsunami early warning perspective. In the framework of the EU-funded project DEWS (Distant Early Warning System), we will try to give some clues for discussion on the deficiencies of the existing tsunami early warning concepts as regards the warning to the areas which are found close to the tsunami source, and on the strategies that should be followed in the near future in order to make significant progress in the protection and safeguarding of local communities.