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Investigation on the possible source of the 27 February 2010 Chile earthquake through tsunami numerical simulations and comparison between calculated and observed data.

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A strong tsunami followed the Mw = 8.8 thrust-faulting earthquake that occurred offshore central Chile on 27 February 2010. More than 500 people were killed and hundreds of thousands displaced by the earthquake and tsunami, with severe damages to structures and houses especially in the Juan Fernandez islands and along the Chilean coast between the cities of Valparaiso and Talcahuano, that are very close to the epicentre. This region is characterized by the convergence between the Nazca and the South American plates, where the strong tectonic loading triggered several very large (Mw greater than 8) tsunamigenic earthquakes in the past (i.e in 1835, 1906 and 1960). This event confirms the ineffectiveness of the actual tsunami hazard mitigation plans for the area very close to the tsunami source and the need of many further efforts to improve our knowledge. In this work we try to provide a contribution to this task by means of tsunami numerical simulations. Using different source hypotheses, the aim is to compare the modelling results to some of the available observation data (tide gauge records and run-up measurements), finding out useful suggestions on the several and not yet agreeing hypotheses provided so far.
Some field data have been collected by a post tsunami field survey conducted by a joint team of the Universities of Bologna (Italy), of Valparaiso and of Santa Maria (Chile) along the coastline running from Llo-Lleo in the north to Puertecillo in the south.
The 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, that can solve both the linear and non-linear versions of the shallow-water equations on nested grids.