Geophysical Research Abstracts, Vol. 8, 04520, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04520

Sensitivity analysis of tsunamis induced by landslides from the Sciara del Fuoco, Stromboli, Italy

S. Tinti, F. Zaniboni, G. Pagnoni, R.Tonini
Università di Bologna, Dipartimento di Fisica, Settore di Geofisica, Bologna, Italy

Tsunamis in the Mediterranean Sea are not so unusual, and can have different genesis: by earthquakes, that are frequent and usually unable to generate significant waves in deep water, and by landslides, that can be either triggered by seismic events or by gravitational loading. Generally landslide-induced events have significant effects only locally, but can be really disastrous. An example is given by the two tsunamis that affected the coasts of the volcanic island of Stromboli (South Tyrrhenian sea) on December, 30 2002: they were generated by two landslides of around 10-15 million cubic meters and 4-5 million cubic meters respectively, that followed each other with a 7-minute delay. The coasts of the island were reached by 10-meter waves, with penetration up to 150 meters, and fortunately no fatalities.

Managing such phenomena can be really difficult, both for the unpredictability of the events and for the short available time to alert the population. Integrating previous studies, in this work we perform a sensitivity analysis on landslides detaching from the Sciara del Fuoco, by investigating the relationship between various characteristics of the sliding masses to the generated waves, in order to understand which parameters are most effective from the tsunamigenic point of view.

The landslide simulations are performed through a Lagrangian numerical model, that considers the mass divided into several blocks, and that computes the motion of the centre of mass of the constituent blocks. The tsunami generation and propagation is computed through a finite element approach, solving the Navier-Stokes equation in the shallow-water approximation on a grid composed by triangles, whose dimension depends on local bathymetry.