Geophysical Research Abstracts, Vol. 8, 09202, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09202


# Earthquake-induced tsunamis in the Mediterranean Sea: scenarios of potential threats to southern Italy

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The huge loss of lives and the destruction caused by the 2004 Indian Ocean tsunami dramatically showed the need for a reassessment of tsunami hazard and risk in coastal regions prone to this threat. It is known that many countries facing the Mediterranean basin have been affected by several tsunamis in the past, some of which were catastrophic over large areas.

Our work aims to quantitatively address the problem of the tsunami hazard and risk assessment by means of numerical simulation of earthquake-induced tsunami scenarios. The work is part of a larger project, funded by the Italian Department for Civil Defense, whose main goal is the evaluation of the seismogenic potential and of the probability of occurrence of strong earthquakes in Italy. Here we show some preliminary results concerning the analysis of several simulated tsunami scenarios. On the basis of tsunami catalogues and seismogenic source databases, we selected a set of tectonic sources that, owing to their location and/or size, are believed to be especially hazardous for the Italian coasts. Once the geometrical parameters of the fault are defined (on the basis of geological and seismological evidence and constraints), we compute the coseismic vertical displacement of the seafloor, which represents the initial condition of the tsunami propagation problem. Then we solve the propagation equations (the wide used shallow-water equations) through a finite difference technique. The main outputs of a single run are the wavefields at desired times, useful to estimate the arrival times of the wavefronts, and the maximum water elevation field that gives at-glance information on the tsunami energy focusing during the whole propagation. Furthermore, for those stretches of coast that are particularly vulnerable (owing to high population density, presence of important infrastructures, etc.) we make a more detailed analysis of the wave impact.

Among the tectonic sources we studied, the 365 AD Crete earthquake indeed represents a serious threat for the Italian coastlines facing the Ionian Sea, where we estimated a wave height exceeding 1-2 meters along hundreds of km of the coast. Furthermore, the first wavefront from this source is expected to reach the coasts of southern Italy in less than 1 hour from the origin time of the parent earthquake. This finding stresses the need for an especially early warning by the geophysical monitoring systems and by the Civil Defense structures.