Geophysical Research Abstracts, Vol. 9, 01716, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01716

Earthquake-generated tsunamis in the western Gulf of Corinth, Greece: single-fault and worst-case scenarios

S. Tinti, A. Armigliato, L. Bressan, S. Gallazzi, G. Pagnoni, R. Tonini and F. Zaniboni

Università di Bologna, Dipartimento di Fisica, Settore di Geofisica, Bologna, Italy

Due to its peculiar tectonic and geomorphological setting, the Gulf of Corinth (central Greece) is exposed to different kinds of natural hazards. Earthquakes, landslides and tsunamis are all hazardous phenomena that are well known to have occurred in the past, several times with disastrous effects. Especially when facing the tsunami hazard assessment problem, it appears clear that all these phenomena are closely interrelated: tsunamis can be generated by both earthquakes and landslides separately, but it is not rare that earthquakes trigger landslides that in turn generate tsunamis, or even that the earthquake and the landslide both contribute to the generation of tsunami waves, providing different and superimposing signatures in terms both of energy distribution and frequency content. In this work, carried out in the framework of the European Project 3HAZ-Corinth, we limit our attention to tsunamis generated by earthquakes in the western part of the Corinth Gulf and study their main characteristics as regards the propagation in the basin and the impact along the coastlines. We face the study using a scenario approach. One of the major steps is represented by the choice of the faults that are believed to be potentially tsunamigenic. By taking advantage of suggestions coming from other two teams involved in the 3HAZ-Corinth project, namely the teams led by Daniela Pantosti at the INGV in Rome (Italy) and by Vasilis Lykousis at HCMR (Greece), we singled out two main groups of normal faults, that we distinguish based on their direction of immersion. One family is represented by a complex system of active north-dipping, shallow-angle ($\sim$50˚) normal faults running along the southern border of the Gulf. The in-land characteristics of these faults have been widely studied with paleo-seismological techniques, but their possible offshore prolongations are far less understood. The second group of sources involves a system of active south-dipping faults, found mainly offshore the northern coasts of the Gulf, and identified

in their shallower portions by swath bathymetry and seismic profiling surveys. It is important to stress that all these faults, taken individually, are of limited extension, and never exceed 20 km in length. For each fault, we simulate the propagation of the ensuing tsunami in the Corinth Gulf through a numerical finite-element code solving the hydrodynamics equations in the shallow-water approximation. We highlight the main features of the tsunami, with special emphasis on the typical periods of the water waves, on the time evolution of the tsunami field and on the geographic distribution of the predicted maximum water heights in the basin and along the coasts. One of the main results is that, due the limited dimensions of each single fault, we obtain maximum peak-to-peak tsunami heights no greater than 2.5-3 m. This is in contrast with the information deducible from tsunami catalogues, that report run-ups larger than 5 m for some historical earthquake-generated tsunamis (e.g. 1817) or even as large as 10 m (1748). Hence, a key point to be understood is whether these extreme heights were the effect of particular bathymetric-topographic conditions at a particular coastal site, or whether they are intrinsically related to the magnitude of the seismic source. In this second hypothesis, the worst-case scenario for earthquake-generated tsunamis must be built by taking into account two or more of the above considered faults rupturing almost simultaneously. We will discuss one or two of such worst-case scenarios, whose study is currently in progress.