Geophysical Research Abstracts
Vol. 15, EGU2013-7700, 2013
EGU General Assembly 2013

Tsunami hazard assessment for the island of Rhodes, Greece

Gianluca Pagnoni, Alberto Armigliato, Filippo Zaniboni, and Stefano Tinti
University of Bologna, Department of Physics and Astronomy, Bologna, Italy (gianluca.pagnoni3@unibo.it)

The island of Rhodes is part of the Dodecanese archipelago, and is one of the many islands that are found in the Aegean Sea. The tectonics of the Rhodes area is rather complex, involving both strike-slip and dip-slip (mainly thrust) processes. Tsunami catalogues (e.g. Papadopulos et al, 2007) show the relative high frequency of occurrence of tsunamis in this area, some also destructive, in particular between the coasts of Rhodes and Turkey. In this part of the island is located the town of Rhodes, the capital and also the largest and most populated city. Rhodes is historically famous for the Colossus of Rhodes, collapsed following an earthquake, and nowadays is a popular tourist destination.
This work is focused on the hazard assessment evaluation with research performed in the frame of the European project NearToWarn. The hazard is assessed by using the worst-credible case scenario, a method introduced and used to study local tsunami hazard in coastal towns like Catania, Italy, and Alexandria, Egypt (Tinti et al., 2012). The tsunami sources chosen for building scenarios are three: two located in the sea area in front of the Turkish coasts where the events are more frequent represent local sources and were selected in the frame of the European project NearToWarn, while one provides the case of a distant source.
The first source is taken from the paper Ebeling et al. (2012) and modified by UNIBO and models the earthquake and small tsunami occurred on 25th April 1957.The second source is a landslide and is derived from the TRANSFER Project “Database of Tsunamigenic Non-Seismic Sources” and coincides with the so-called “Northern Rhodes Slide”, possibly responsible for the 24th March 2002 tsunami. The last source is the fault that is located close to the island of Crete believed to be responsible for the tsunami event of 1303 that was reported to have caused damage in the city of Rhodes.
The simulations are carried out using the finite difference code UBO-TSUFD that solves the Navier Stokes equations in shallow water approximation. To cover the entire basin two nested grids (a coarse one with 30 arc sec resolution and a finer one with 200 m resolution) are used, constructed on bathymetry data provided by the TRANSFER database.
The results, as fields of highest wave elevation, maximum flood, maximum speed, arrival times and synthetic tide-gauges, are provided and discussed both individually (i.e. separately for each source) as well as in the form of a single, aggregate result, as required by the worst-case scenario technique.

References

Ebeling, C.W., Okal., E.A., Kalligeris, N., Synolakis, C.E.: Modern seismological reassessment and tsunami simulation of historical Hellenic Arc earthquakes. Tectonophysics, 530-531, 225-239, 2012.

Papadopoulos, G. A., Daskalaki, E., Fokaefs, A., and Giraleas, N.: Tsunami hazards in the Eastern Mediterranean: strong earthquakes and tsunamis in the East Hellenic Arc and Trench system, Nat. Hazards Earth Syst. Sci., 7, 57-64, doi:10.5194/nhess-7-57-2007, 2007.

Tinti S., Pagnoni G., Armigliato A., and Tonini R.: Tsunami inundation scenarios and tsunami vulnerability assessment forthe town of Alexandria, Egypt, Geophysical Research Abstracts
Vol. 14, EGU2012-10325, 2012, EGU General Assembly 2012.