

## **Tsunami early warning and evacuation mapping with GIS methods: the case of Heraklion city, Crete Isl., Greece**

Ioanna Triantafyllou, Anna Fokaefs, Tatyana Novikova, and Gerassimos Papadopoulos  
National Observatory of Athens, Institute of Geodynamics, Athens, Greece

Tsunamis are disastrous phenomena causing loss of life and heavy damage in the built environment. Heraklion, the capital city of Crete Isl. (Greece), historically was hit by very strong tsunamis generated by seismic and volcanic sources in the Hellenic Arc. This city is exposed to significant tsunami risk since the coastal population is increasing more and more collecting a variety of human activities and urban development. The main feature is that Heraklion is threatened by near-field tsunami waves since all the major tsunami sources in the area have very short travel times which are mainly in the range of 20-30 min. The population evacuation mapping in a coastal segment of Heraklion has been approached by a three-step approach: (1) determination of critical tsunamigenic sources based on historical documentation; (2) estimation of the tsunami arrival time and determination of the inundation zone through tsunami numerical simulation for extreme tsunami scenarios; (3) estimation of the optimum routes and times for evacuation from the inundation zone to safer places inland with the use of GIS tools by considering several models for the evacuation velocity of individuals and for the optimum routes; (4) evaluation of the time needed for evacuation as compared to the time needed for the early warning to arrive in potential evacuees based on the so far experience gained by the Hellenic National Tsunami Warning Center, Athens, Greece. This methodology could be applied in other tsunamigenic areas in the near-field domain such as in the Mediterranean region and beyond. This research is a contribution to the EU-FP7 tsunami research project ASTARTE (Assessment, Strategy And Risk Reduction for Tsunamis in Europe), grant agreement no: 603839, 2013-10-30, and to the ARISTOTLE-Pilot Project in the area of Early Warning Systems for Natural Disasters, EC DG-ECHO Contract 2015/S 154-283349.