



Tsunami hazard assessment for the area of Siracusa and Augusta (eastern Sicily, Italy) by means of numerical techniques

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The eastern coast of Sicily is one of the littorals most prone to tsunami hazard in the Mediterranean Sea. The potential tsunamigenic sources are many, all connected to the complex geological pattern of the area, and they span different scales. On the local scale one can find the Hyblaean-Malta Escarpment (HME), characterized by mass failures that have been hypothesized as possible causes of local tsunami generation (see e.g. the deep-sea slide off Augusta that was speculatively associated to the 1693 earthquake). On the medium range, the faults along the HME, the Ionian Sea, the Messina Straits, as a part of the wider Calabrian Arc system, provided several relevant earthquakes in the past, some of which producing large tsunamis, such as the 1693 and the 1908 events. In the far field, the western Hellenic Arc, characterized by the largest earthquakes in the whole Mediterranean Sea, has the potential of big trans-Mediterranean tsunamis capable of severe effects also on the coasts of Sicily. In the framework of the EU-FP7 project ASTARTE, the area embracing the cities of Siracusa and Augusta, located in the southern part of the Ionian coast of Sicily, has been chosen as a test site for the evaluation of the tsunami hazard and risk by means of various techniques. In this work we adopt the worst-case credible scenario approach, which means that after taking into account the possible sources in different zones we select the largest events on the basis of historical and geo- and seismo-tectonical considerations and we compute the corresponding tsunami. The numerical calculations are carried out by means of in-house developed models: UBO-BLOCK to simulate the dynamics of the tsunamigenic slides, a code implementing the Okada equations to compute the co-seismic displacements of the sea floor, UBO-TSUFID to calculate the tsunami propagation over a domain covered by one or more regularly spaced grids with different resolution (the finer grids being nested within the coarser ones). For each scenario, this procedure provides traditionally the fields of maximum values of relevant parameters such as the highest sea level, the maximum water particles speed, the maximum run-up and inundation distance, etc as well as synthetic tide gauges in specified locations. In addition, the aggregate fields can be built by picking up the extreme values of the worst-case scenarios in each point of the domain. One of such aggregate field is the field of the largest inundation depth at the coast, also providing the maximum flooding area which is a tool of great relevance for local authorities to implement mitigation actions such as evacuation programs and long-term development plans of the coastal zone.