Geophysical Research Abstracts
Vol. 16, EGU2014-4946, 2014
EGU General Assembly 2014

Worst-case scenario approach to the tsunami hazard assessment for the Apulian coasts (southern Italy)

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In the framework of the Mediterranean basin, Apulia cannot be counted among the most active areas in terms of earthquake and tsunami activity. Nonetheless, in its northern part, which includes the Gargano peninsula, several earthquakes with magnitudes up to 6.7 occurred historically, some of which were also tsunamigenic. The most famous one is the 30 July 1627 event, which produced extensive inundation in the northern part of Gargano and relevant effects also in some portions of its southern side. Its parent fault is still a matter of debate, since both the inland epicentral location determined by macroseismic studies and the strike-slip dominant focal mechanism inferred from local geology are incompatible with a tsunami excitation capable of producing the effects reported by the coeval sources. Moreover, Apulia is bounded by much more tectonically active and tsunamigenic regions, such as the Dalmatia-Montenegro-Albania coastal belt to the East, the western Hellenic Arc to the South-East and the Calabrian arc to the South-West. Finally, Apulia is located in a strategic position in between eastern and western Europe, involving the installation of crucial international infrastructures, such as the Trans-Adriatic gas pipeline. For all the reasons mentioned above, performing an accurate assessment of the hazard related (at least) to earthquakes and tsunami impact in Apulia represents a need. The OTRIONS project developed a multi-parametric network for this purpose, and in its framework we studied the tsunami hazard along the Apulian coasts by means of a worst-case credible scenario approach. This involved the selection and characterisation of all possible tsunamigenic sources both at local and remote distances: this task was carried out as a shared effort with the Italian national RITMARE project. The recognised sources, mainly retrieved from the published literature and from databases available online, include tectonic faults as well as submarine landslides. The tectonic faults we selected are located mainly in the Gargano region, in the central and southern Adriatic offshore, along the coastal belt ranging from Dalmatia to Albania, in different sectors of the western Hellenic Arc and along the eastern Calabria coasts. The landslide scenario is based on the Pleistocene (circa 25 Ka BP) Gondola slide mapped offshore southern Gargano. Coherently with the worst-case approach, a key problem we faced and discuss here is the definition of the maximum magnitude for all the selected tectonic sources. For all scenarios, the tsunami simulations have been performed by means of the in-house UBO-TSUFD numerical code: the main outputs, that we present and discuss for few selected examples, include wave elevation time series in selected coastal sites, maximum wave amplitudes and wave propagation snapshots over the entire computational domain. Finally, we will go into finer spatial detail by studying the tsunami impact inside two Apulian harbours, namely Brindisi and Otranto, that represent important sites from the industrial and infrastructure point of view.