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High Resolution Tsunami Flood Maps for the Portuguese Mainland

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The Portuguese mainland has a high susceptibility to earthquakes and tsunamis, either due to its location along the Atlantic ridge or due to its proximity and position on the Fracture Zone Azores-Gibraltar (boundary between the lithosphere plates Eurasian and African). This region is designated as AT2- "Atlantic" in the catalog Genesis and Impact of Tsunamis on the European Coasts (GITEC) and extends from the Azores to the Strait of Gibraltar, (Baptista, 1998; Baptista & Miranda, 2009). Without a way to avoid this natural phenomenon, the risk mitigation effort focuses primarily in prevention and preparation of appropriate responses in case of an event. Specifically, the identification of potentially flooded areas is a very important aspect with regard to the implementation of preventive measures and the preparation of response actions. In order to produce reliable flood areas maps, is essential to have reliable top-bathymetric information (Emodnet, acoustic survey bathymetries, digital terrain models, LIDAR, etc.) and also a numerical model that can accurately calculate the tsunami propagation from its origin to the coastal areas and that allows also to calculate the subsequent flooding.

In the framework of a project promoted by the Portuguese National Authority for Civil Protection (ANPC) to assess the tsunami flood risk along the Portuguese coast, there were performed different simulations of tsunami events that have potential to strongly impact the coastal areas. These simulations were performed using MOHID water modelling system (http://www.mohid.com) which is a fully 3D open source modelling system offering the capability to use hydrostatic or non-hydrostatic approaches that allows the adoption of an integrated modelling philosophy, not just for the physical and biogeochemical processes, but also different spatial scales allowing the user to use a nested model scheme. The tsunami generation follows the methodology adopted by the COMCOT model (Cornell Multi-grid coupled Tsunami Model) which includes approximations for the consideration of instantaneous rupture processes from Okada (1985), Mansinha and Smylie (1971) and transient ruptures or landslides.

For the risk analyses and flood evaluation a methodology proposed in the framework of the European project SCHEMA was used and several high resolution maps were created containing information about the maximum flood area, maximum column, maximum velocity and maximum flood danger (including the identification of critical equipment's and infrastructures)

These results will be used to support Civil Protection Authorities in preparedness and response actions in case of a tsunami occurrence. In this paper it is presented a description of the used methodology and some of the most relevant results achieved.