



## **Tsunami Impact from a 1755-like event in the Aveiro Region, Portugal**

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In this study, we present 5m-resolution tsunami flooding maps for the Aveiro region, W. Central Portugal. Aveiro is known to have been impacted by the 1st November 1755 earthquake and tsunami. At that time this portion of the coast had almost no constructions nor population but ever since geomorphological changes took place, and there has been a very large population increase living in constructions extremely close to the shore. As such it is important to model and evaluate the potential impact that a similar event to the 1755 earthquake would have in this area at present. Tsunami flooding maps were computed using a digital elevation model produced from the present-day bathymetric and topographic data including bathymetric surveys, LiDAR and photogrammetric data. Tsunami scenarios were generated considering different solutions for the 1755 earthquake seismic source, in faults constrained by multibeam and multichannel seismic data. The modeling of the tsunami propagation was performed with a validated non-linear shallow water model. To compute inundation, we considered four levels of nested grids with resolutions ranging from 320m to 5m. The tsunami-associated flood is discussed in terms of flow depth, run-up height and maximum inundation area. The Ria de Aveiro is characterized by both flattened relief and significant tidal amplitude range, which can contribute to an important variation in flooding due to tsunami-tide interaction. Therefore, the effect of the tide variation on the extent of tsunami inundation is also discussed. Results are compared with the historical descriptions of the consequences in Aveiro. An event similar to the one from 1755 would cause tsunami run-up heights above one meter within the Ria de Aveiro. The Aveiro oceanic coast would also be strongly affected. The results obtained can be used to identify the potential tsunami inundation areas in Aveiro, which is important for the Portuguese tsunami emergency management system.

**Keywords:** Inundation, DEM, Numerical Modeling, Ria de Aveiro, LiDAR