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Tsunami modelling within the framework of DT-GEO DTC-T1

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Portugal and Spain share a common history when suffering from natural hazards. In 1755, we experienced the largest natural hazard ever happened in Europe in historical times. This event included an earthquake and the second most deadly tsunami in our records, just behind the Sumatra catastrophe in 2004. DT-GEO project (A Digital Twin for GEOphysical extremes) aims at analysing and forecasting the impact of tsunamis, earthquakes, volcanoes, and anthropogenic hazards. The EDANYA group of the University of Málaga (UMA) contributes to this project developing the DTC (Digital Twin Component) related with tsunamis and, therefore, our main contribution is in "WP6. Tsunamis". The main objective within this work package is to develop and implement a **DTC for data-informed Probabilistic Tsunami Forecasting (PTF)** (DTC-T1). This DTC will be tested through four demonstrators at four relevant sites: Mediterranean Sea coast (SD4), Eastern Sicily (SD5), Chilean cost (SD6), and Eastern Honshu coast in Japan (SD7). The main aim of these demonstrators is to test the PTF for various earthquake sources across the world (Mediterranean Sea, Chile and Japan) evaluating how new functionalities such as real-time data fusion of seismic, GNSS, and tsunami data reduce source uncertainty. In particular, the SD5 Eastern Sicily, aims at testing the PTF for both earthquake and earthquake-induced landslide.

On the one hand, we contribute to the project with two European flagship codes: Tsunami-HySEA and Landslide-HySEA for the simulation of tsunamis generated by seismic sources and by landslides, respectively. In addition, continuous improvements to these codes are being performed within the framework of DT-GEO, where a new version of Tsunami-HySEA that includes a new initialization mode has been developed. This new mode allows integrating simulated data from external seismic or landslide models (such as BingClaw, SeisSol, etc.) to dynamically generate the initial water surface elevation in the tsunami simulation. On the other hand, to allow the aforementioned coupling, an interface module integrated in the workflow was developed as a joint effort between UHAM, UMA, LMU and IPGP. Current work, within the task T6.4 and deliverable D6.4, that we lead, consists on integrating the improved versions of the codes, including dispersion, in the PTF workflow.

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