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Scenarios of tsunamis induced by sliding events in the Western Corinth Gulf (Greece)

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The Gulf of Corinth, Greece is characterized by a various and complex set of natural risks, mainly connected to its strong seismic activity. The steep slopes of the basin, together with the large amount of sediments deposited by the several rivers flowing into it, greatly increases the probability of occurrence of submarine landslides, due both to gravitational instability and to ground shaking. Thus tsunamis can be generated i) by earthquakes, and ii) by landslides triggered by earthquakes and iii) by landslide originated by pure gravitational instability, as is clearly reflected in the historical catalogue of tsunamis where one can find cases of all the above categories.

In this work, performed in the framework of the European project 3HAZ-Corinth, we concentrate on tsunamis generated by landslides. Potentially sliding masses are found along both coasts (north and south) of the western part of the Corinth Gulf. They are mainly submarine and characterized by relatively small volumes (2-9x10^7 m^3). The sediment slides are initiated from very shallow depths (20-40m) and sometimes from the coastal zone (i.e. 1963AD slump and associated tsunami). The downslope mass transport range from 1-2km. During the failure most of the slumped sediment masses are modified to debris flows (muddy sands with gravels). The observed active fault offsets in the W. Corinth Gulf is around 1m and the fault length range from 8-15km. This implies that tsunamis are expected to have local effects, but it is also pointed out that they cannot be disregarded. The considered scenarios are located in three principal areas: The Aigion zone, where a lot of reports exist concerning tsunamis generated by landslides, the Psathopirgos-Mornos zone, located to its west, both in the southern and western coast; The Trizonia-Eratini zone, in the northern coast of the Gulf.

The sliding motion is simulated with Lagrangian block models, UBO-BLOCK1 and UBO-BLOCK2, developed at the University of Bologna, while the tsunami generation and propagation is carried out through the finite-element technique via the code UBO-TSUFE, implemented by the same research team. For each scenario we compute the wave propagation and the main tsunami features, such as the time evolution of the tsunami field, the amplitude and period of the signal in the most important regions, and the spatial distribution of the minima and maxima all over the domain and the coast.