



Scenario of a massive submarine landslide off Cape Rizzuto, eastern Calabria (Italy), and of the consequent tsunami

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Italy, with 8000 km-long coastlines, ranks 15th among the world countries for coastal extension. Therefore, for Italy coastal hazard assessment is an essential challenge to protect anthropic structures (as many as 646 cities are found along the shoreline, and in addition one can count 734 harbors and more than 2200 km of maritime infrastructures) and to save human lives (about 30% of the Italian population permanently resides in coastal areas).

We propose a case study of a hypothetical tsunamigenic massive landslide that might have occurred off Cape Rizzuto (eastern Calabria coast, Italy). Analyzing seismic profiles and the sea bottom morphology, we have identified clues suggesting the possible occurrence of a deep-seated submarine slide involving a volume of about 25 km³, whose movement could produce a tsunami with extremely high-impact on a local scale. If the occurrence of this landslide deposit is confirmed by additional studies, the potential landslide-triggered tsunami could affect 250 km of shore and about 440,000 people.

The adopted approach includes the analysis of slope stability, the simulation of the landslide dynamics and the computation of the ensuing tsunami generation and propagation. First, we assess the peak ground acceleration, consistent with local seismicity and historical earthquakes, necessary to mobilize the submarine slope by using the minimum lithostatic deviation method. Then, we simulate the landslide movement by using the numerical model UBO-BLOCK1, whose results allow us to define the input for the tsunami generation. Lastly, we simulate the tsunami propagation by means of the numerical model UBO-TSUFDD. All the cited numerical tools have been developed and are being maintained by the tsunami research team of the University of Bologna.

This contribution is part of a broader effort aiming at assessing the tsunami hazard potentially affecting Calabria, and producing local maps of maximum wave heights on the coast is an essential step to assess potential damages and losses.