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Assessing tsunami hazard for the town of Varna (Bulgaria) by means of a worst-case scenario approach

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Although the tsunami hazard in the Black Sea is not comparable to other regions of the Euro-Mediterranean area, nonetheless tsunami catalogues indicate that it is far from being negligible as several historical events were recorded, some of which being locally damaging.
Taking advantage of the results produced by the EU-FP6 TRANSFER project, which studied the tsunami hazard for the entire Black Sea starting from different tectonic sources located throughout the basin, we focus on the Bulgarian coasts and in particular on the coastal city of Varna, which is the third as regards population in Bulgaria and represents an important economic and touristic centre.
We selected two tectonic sources placed just offshore the NE coast of Bulgaria (where Varna is located), sharing the same fault parameters except for the strike (90° and 40° respectively), one being almost parallel to the coast, the other intersecting the coast itself. The maximum expected magnitude for these faults is 7.5. We compute inundation maps by means of the in-house finite-differences shallow-water code UBO-TSUFD. We exploited a quite detailed topographic DEM of the city of Varna to build nested computational grids with resolutions resulting from a compromise between the DEM itself and the bathymetry data available close to the Bulgarian coast. The maximum values of water elevation, current speed, flow depth and momentum flux are calculated for each case and implemented in suitable maps. The last step of the work consists in building aggregated fields, i.e. maps obtained by combining the two different scenarios and taking the maximum of the relevant computed physical parameters in each grid node. These results will be used in a later work to integrate preliminary tsunami vulnerability and risk analyses focussed on Varna that were conducted in the frame of the EU-FP6 SCHEMA project.