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Probabilistic tsunami hazard assessment for the coasts of Italy: preliminary results in the frame of the RITMARE Project

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The five-year project called RITMARE ("La Ricerca ITaliana per il MARE") is a very ambitious national research and innovation program focussed on all aspects relevant to marine and coastal research, technology and management, with emphasis on networking and international cooperation. The program objectives fit into the overall European Commission vision documents and strategic programs and cover five major themes, one of which deals with technologies for the sustainable management of the coastal areas. The theme is further articulated in work-packages and specific actions, including the systematic and quantitative tsunami hazard assessment for the whole Italian coastlines. The University of Bologna takes part in the project RITMARE, being a member of the University Consortium Conisma, that is a direct partner in the project.

We present here some preliminary results obtained by the Tsunami Research Team of the University of Bologna (TRT-UNIBO) by applying a modified version of a hybrid statistical-deterministic approach to the southern Tyrrhenian, Ionian and Adriatic coasts. A widely adopted approach formulates the problem of the tsunami hazard assessment in terms of the probability of occurrence of tsunamigenic earthquakes, which is appropriate in basins where the number of known historical tsunamis is too scarce to be used in reliable statistical analyses, and where the largest part of tsunamis have tectonic origin. The TRT-UNIBO approach starts by building a single homogeneous earthquake catalogue covering the whole national territory, as well as the adjacent areas that are believed to have the potential to produce tsunamis with relevant far-field effects along the Italian coasts. A proper statistical analysis of the catalogue allows retrieving the earthquake occurrence rate at a regional scale as well as in a set of cells in which the studied geographical domain is divided into. The final result of the statistical analysis is the computation for each cell of the parameters of the truncated cumulative Gutenberg-Richter law. A second step consists in determining the tsunamigenic potential by using suitable relationships between the earthquake magnitude and the initial disturbance of the sea in each cell. For each magnitude and hence for each initial condition offshore, the tsunami height at the coast is computed through empirical amplification formulas. The output of this second step is given by the spatial distribution of the minimum magnitude needed to produce tsunami heights at the coast larger than a given threshold. The results coming from the two steps are finally combined to determine the number and distribution of tsunamigenic earthquakes expected to occur over a given time interval and to produce tsunami heights larger than a given threshold along any stretch of the Italian coastline. We will present maps relative to different tsunami height thresholds over a suitable time interval (f.i. 10,000 years) and discuss the consistency with the information retrievable from the Euro-Mediterranean tsunami catalogue of the TRANSFER Project.