



A methodology for tsunami hazard-to-damage assessment along the Italian coasts

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In the most general terms, assessing tsunami hazard and damage for a given geographic area requires a structured approach involving the identification and the characterization of the potential tsunamigenic sources of interest for that area, the availability of adequate and reliable topographic and bathymetric databases, the quantification of the physical observables related to tsunami impact relevant from the scientific, engineering and civil protection perspectives, a reasonable approach to assess vulnerability and to combine it with the hazard outputs to obtain the damage, and a robust strategy to evaluate the uncertainties to be associated to the final results. When it comes to practical applications, the choice of the methodology that is most appropriate for each specific steps of the procedure above can be strongly dependent on the extension of the area of interest and on the type of tsunamigenic sources involved, not to mention the availability of sufficiently detailed topographies and bathymetries and of appropriate funding/computational resources. A typical example is represented by the computation of high-resolution inundation maps, which can turn out to be a prohibitive task when the geographical scales are regional or even national/transnational.

The study presented here is the result of the synergy among three research groups belonging to three Italian institutions that had the possibility to work together in the frame of the recently completed Italian National Project SPOT (“Sismicità Potenzialmente innesabile Offshore e Tsunami”), funded by the Italian Ministry of Economic Development MISE). The main goal of the collaboration was to investigate the possibility of defining and applying a shared approach to the modelling of the propagation and impact of tsunamis generated by earthquakes and landslides over the Italian coasts facing the Adriatic sea, the Ionian sea and the Sicily Channel. The different expertise and know-how of the three research groups allowed to develop a methodology covering all the main steps and approximations required for modelling, with a computationally cheap approach and in the absence of very detailed topo-bathymetric models, tsunami scenarios and their impact on coastal structures in the context of tsunami hazard-to-damage assessment. We briefly comment on the key points of the methodology and then we present some applications related to scenarios of tsunamis generated by earthquakes and landslides and affecting the coasts of the Gulf of Gela (southern Sicily, Italy). The results are provided in terms of maximum water height inland and of damage to buildings and are discussed also in relation to the methodology limitations and to the still open problems.