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Developing an event-tree probabilistic tsunami inundation model for NE Atlantic coasts: Application to case studies

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This study constitutes the first assessment of probabilistic tsunami inundation in the NE Atlantic region, using an event-tree approach. It aims to develop a probabilistic tsunami inundation approach for the NE Atlantic coast with an application to two test sites of ASTARTE project, Tangier-Morocco and Sines-Portugal. Only tsunamis of tectonic origin are considered here, taking into account near-, regional- and far-filed sources. The multidisciplinary approach, proposed here, consists of an event-tree method that gathers seismic hazard assessment, tsunami numerical modelling, and statistical methods. It presents also a treatment of uncertainties related to source location and tidal stage in order to derive the likelihood of tsunami flood occurrence and exceedance of a specific near-shore wave height during a given return period. We derive high-resolution probabilistic maximum wave heights and flood distributions for both test-sites Tangier and Sines considering 100-, 500-, and 1000-year return periods. We find that the probability that a maximum wave height exceeds 1 m somewhere along the Sines coasts reaches about 55% for 100-year return period, and is up to 100% for 1000-year return period. Along Tangier coast, the probability of inundation occurrence (flow depth > 0m) is up to 45% for 100-year return period and reaches 96% in some near-shore costal location for 500-year return period.
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