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Development of Local Amplification Factors in the NEAM Region for Production of Regional Tsunami Hazard Maps

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The standard way of estimating tsunami inundation is by applying numerical depth-averaged shallow-water run-up models. However, for a regional Probabilistic Tsunami Hazard Assessment (PTHA), applying such inundation models may be too time-consuming. A faster, yet less accurate procedure, is to relate the near-shore surface elevations at offshore points to maximum shoreline water levels by using a set of amplification factors based on the characteristics of the incident wave and the bathymetric slope. The surface elevation at the shoreline then acts as a rough approximation for the maximum inundation height or run-up height along the shoreline. An amplification-factor procedure based on a limited set of idealized broken shoreline segments has previously been applied to estimate the maximum inundation heights globally. Here, we present a study where this technique is developed further, by taking into account the local bathymetric profiles. We extract a large number of local bathymetric transects over a significant part of the North East Atlantic, the Mediterranean and connected seas (NEAM region). For each bathymetric transect, we compute the wave amplification from an offshore control point to points close to the shoreline using a linear shallow-water model for waves of different period and polarity with a sinusoidal pulse wave as input. The amplification factors are then tabulated. We present maximum water levels from the amplification factor method, and compare these with results from conventional inundation models. Finally, we demonstrate how the amplification factor method can be convolved with PTHA results to provide regional tsunami hazard maps. This work has been supported by the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement 603839 (Project ASTARTE), and the TSUMAPS-NEAM Project (http://www.tsumapsneam.eu/), co-financed by the European Union Civil Protection Mechanism, Agreement Number: ECHO/SUB/2015/718568/PREV26.