

Development of a global tsunami source database – initial results

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Tsunamis can be triggered by various sources; most commonly earthquakes, volcanoes or landslides. The characterization of tsunami offspring is an important element in the development of tsunami hazard and risk assessments. The world's known tsunami sources have been investigated in various projects and studies, especially with regard to earthquakes. Some regions have been examined numerous times by researchers and have presented differing results as a result of varying methodologies and data contributions. In addition, certain tsunami sources have very few studies or singular studies associated with them. Thus, the development of a unified, global database which collects all these sources and their so-far identified characteristics is an important step to provide a shared repository for researchers for the development of future models.

A collection of more than 50 detailed probabilistic and deterministic tsunami hazard and risk assessments has been taken out and carefully reviewed. This information about tsunami sources has been compiled and geocoded where possible. In addition, paleoseismic and neo-tectonic studies have been used in conjunction with up-to-date instrumental and historic earthquake catalogues to estimate return periods of megathrust earthquake events and to provide sufficiently well constrained estimates of magnitude-dependent earthquake return periods. The variability of these results is also presented within the database. The sources use a simple 3D geometry based on earthquake locations and focal mechanisms which additionally provide information to model characteristic events of each source. The study provides a detailed catalogue of tsunami source geometries, most of which are subduction zone interfaces, spanning from well-studied regions such as the Chile trench to small local sources like the Yap Trench near Palau in the western Pacific or the potentially subducting Northern Algerian front. In addition to earthquake sources, a database of volcanoes in the vicinity of shorelines has been assembled and categorized to identify volcanoes which might be prone to explosive eruptions causing tsunamigenic behaviour similar to Krakatoa in 1883 or flank collapse as known from the Canary Islands.

A first version of this database is shown in this study and provides an up-to-date collection of tsunami sources globally with respect to earthquakes and volcanoes.