

Database of active faults as a first step towards new seismic hazard map of Slovenia

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Slovenia occupies a seismically active region characterized by moderate seismic activity caused by faulting at the contact of the Adriatic microplate and the European plate. Active faults form five zones: a) South Alpine thrust zone, b) Istria-Friuli thrust zone, c) Dinaric strike-slip fault zone, d) Periadriatic transpressive fault zone and e) Zagreb Mid-Hungarian shear zone. Earthquake catalogues span approximately 1000 yrs (Ribarič, 1982; Grünthal and Wahlström, 2012; Stucchi et al., 2013), recording many significant earthquake events. A number of damaging to devastating historical earthquakes have occurred in the area (M 6.8 Idrija 1511, M 6.4 Villach 1348, M 6.1 Ljubljana 1895, M 5.9 Villach 1690, M 5.7 Brežice 1917, M 5.7 Bovec 1998). No historic surface ruptures were recorded, but paleoseismic evidence has been found for surface rupture during the M 6.8 1511 event (Bavec et al., 2013).

The primary goal of the project is to provide a base input to derive a new Design ground acceleration map of Slovenia (Environmental Agency of Slovenia) for regulation of earthquake resistant engineering. Seismological data alone do not sufficiently reflect the earthquake hazard, with the record length shorter than expected recurrence times of major earthquakes (hundreds to thousands of years) on faults with slip rates on the order of several tenths to several mm per year. A map of active faults was developed to provide a geological input on active faulting to assess the earthquake hazard.

To provide an improved basis, active and potentially active faults have now been systematically mapped and seismotectonically parametrized into a single database. Surface trace definition and seismotectonic parametrization was based on the compilation and critical synthesis of available geologic, paleoseismic, geodynamic, geophysical, geodetic and seismological data. Active faults with surface traces longer than 5 km were included. The SHARE - Seismic Hazard Harmonization in Europe project database format was used, with each fault and its individual segments described with: fault name, type, strike, dip, rake, depth, length, width, area, segmentation type, slip rate and possible maximum earthquake magnitude (Basili et al., 2013). Quality designators were assigned to each parameter. In addition to providing a basis for future assessments of seismic hazard, the database also produced a number of potential paleoseismic trenching sites on several major active faults. The preliminary map and database currently contains 89 active and potentially active faults and their 217 segments. All have a full set of seismotectonic parameters, as required for further use in determination of seismic hazard. All parameters will undergo rigorous testing, evaluation and review. The final map and database will be used in cooperation with seismologists of the Slovenian Environmental Agency, to define seismogenic sources as the next step towards the Design ground acceleration map.