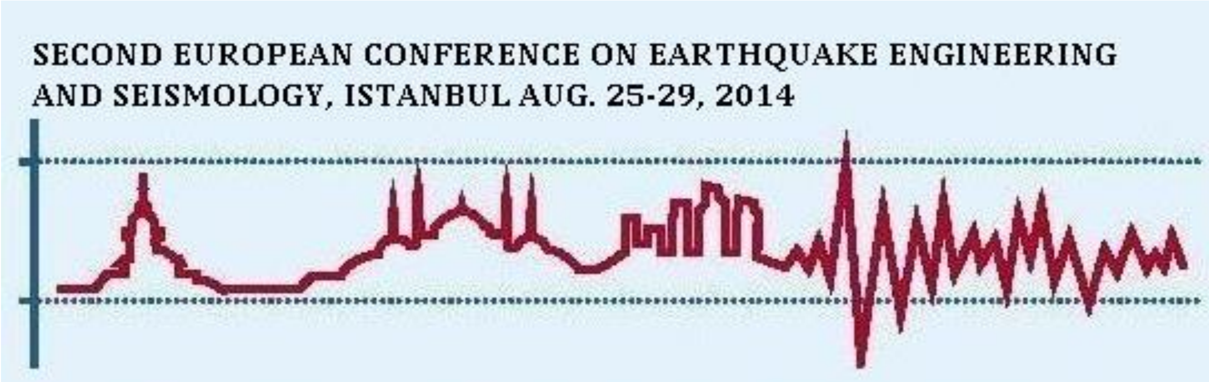

SEISMIC HAZARD ASSESSMENT FOR ICELAND USING A SITE APPROACH

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We present the results of probabilistic seismic hazard assessment for Iceland in the frame of the EU project UPStrat-MAFA using the SASHA program (D'Amico and Albarello, 2008). SASHA (Site Approach to Seismic Hazard Assessment) is a computational code developed to estimate seismic hazard in terms of macroseismic intensity by basically relying on local information about documented effects of past earthquakes, with a minor role of seismic source data. This approach allows to fully exploit macroseismic information available at the site in the frame of a formally coherent and complete treatment of intensity data, by taking into account the relevant uncertainty and the inherently bounded, ordinal and discrete character of intensity values.

For the sake of the project, the code has been significantly improved to make it applicable to areas where local seismic histories are relatively sparse. Major changes concern the reconstruction of the site seismic history: documented intensity data can be integrated with "virtual" intensities deduced either from epicentral data through empirical ground-motion prediction equations (GMPEs) or from ground motion estimates deduced from numerical simulations.

In the case of Iceland, due to the lack of observed intensities for past earthquakes, the assessment of seismic hazard was performed by only using local seismic histories reconstructed by epicentral information reduced at a number of sites by means of suitable GMPEs in terms of macroseismic intensity. In particular, the European earthquake catalogue SHEEC (Grünthal et al., 2013; Stucchi et al., 2013), with a few changes according to Ambraseys and Sigbjörnsson (2000) and Sigbjörnsson et al. (2009), was adopted together with a probabilistic attenuation model based on Bayesian statistics developed in the frame of the project, with empirical parameters assessed for Iceland. Since this model requires epicentral intensity I_0 for each earthquake of the catalogue, an empirical relation between Mw (the magnitude listed by SHEEC) and I_0 was first derived.

Seismic hazard was computed over a regular grid covering the Icelandic territory for four exceedance probabilities for an exposure time of 50 years, equivalent to average return periods of 50, 200, 475 and 975 years. For some selected localities, further return periods were examined and de-aggregation analysis was performed in order to identify magnitude/distance couples and, thus, past earthquakes more responsible for the local hazard. Results of this study appear fairly consistent with the published seismic hazard map of Iceland (in terms of PGA with 10% exceedance probability in 50 years), even though just a qualitative comparison can be made because of the different shaking measure considered (intensity versus PGA), and the different computational methodology (SASHA versus Cornell-type approach) and input data (earthquake catalogue, attenuation model, etc.) used in the two studies.

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