



Comparison of local magnitude scales in Central Europe

Robert Kysel (1), Jozef Kristek (2,1), Peter Moczo (2,1), Andrej Cipciar (1,2), Kristian Csicsay (1), Miroslav Srbecký (1), Miriam Kristeková (1,2)

(1) Geophysical Institute, Slovak Academy of Sciences, Bratislava, Slovakia, (2) Comenius University Bratislava, Faculty of Mathematics, Physics and Informatics, Bratislava, Slovakia

Efficient monitoring of earthquakes and determination of their magnitudes are necessary for developing earthquake catalogues at a regional and national levels. Unification and homogenization of the catalogues in terms of magnitudes has great importance for seismic hazard assessment.

Calibrated local earthquake magnitude scales are commonly used for determining magnitudes of regional earthquakes by all national seismological services in the Central Europe. However, at the local scale, each seismological service uses its own magnitude determination procedure. There is no systematic comparison of the approaches and there is no unified procedure.

We present a comparison of the local magnitude scales used by the national seismological services of Slovakia (Geophysical Institute, Slovak Academy of Sciences), Czech Republic (Institute of Geophysics, Academy of Sciences of the Czech Republic), Austria (ZAMG), Hungary (Geodetic and Geophysical Institute, Hungarian Academy of Sciences) and Poland (Institute of Geophysics, Polish Academy of Sciences), and by the local network of seismic stations located around the Nuclear Power Plant Jaslovske Bohunice, Slovakia. The comparison is based on the national earthquake catalogues and annually published earthquake bulletins for the period from 1985 to 2011.

A data set of earthquakes has been compiled based on identification of common events in the national earthquake catalogues and bulletins. For each pair of seismic networks, magnitude differences have been determined and investigated as a function of time. The mean and standard deviations of the magnitude differences as well as regression coefficients between local magnitudes from the national seismological networks have been computed. Results show relatively big scatter between different national local magnitudes and its considerable time variation. A conversion between different national local magnitudes in a scale 1:1 seems inappropriate, especially for the compilation of the earthquake database for the seismic hazard assessment in Central European Region.