



## **Spectral ground motion models for intermediate-depth Vrancea (Romania) earthquakes: new insights into attenuation characteristics, site effects and source spectra**

**A. Oth** (1,4), D. Bindi (2), S. Parolai (3) and F. Wenzel (4)

(1) European Center for Geodynamics and Seismology, Luxembourg, (2) Istituto Nazionale di Geofisica e Vulcanologia, Italy, (3) GeoForschungsZentrum Potsdam, Germany, (4) Geophysical Institute, University of Karlsruhe, Germany (adrien.oth@ecgs.lu)

The intermediate-depth earthquakes occurring in the Vrancea (Romania) seismogenic zone pose a serious threat to Romania and its neighbouring countries. During the last century, four events with magnitudes larger than 6.5 occurred within this narrowly confined focal volume. For reliable seismic hazard assessment in Romania, a thorough knowledge of the source characteristics of these earthquakes as well as the seismic attenuation characteristics and site effects is indispensable. This study deals with the separation of these effects in the observed ground motion spectra of S-waves using the generalized inversion technique (GIT).

The analyzed database consists of more than 850 records from 55 earthquakes obtained at 43 stations of the K2-accelerometer network installed in Romania in the framework of the Collaborative Research Center (CRC 461) 'Strong Earthquakes' (operative since 1997, <http://www-sfb461.physik.uni-karlsruhe.de/>). The magnitudes of most events range between  $M_W=4-5$ , but also data from the few larger shocks in 1986 ( $M_W=7.1$ ), 1990 ( $M_W=6.9$  and  $M_W=6.4$ ) and 2004 ( $M_W=5.8$ ) are included. This is the largest available database ever analyzed for Vrancea earthquakes.

The GIT technique is commonly applied in the case of crustal earthquakes, where the azimuthal coverage of the sources around the stations and vice-versa is usually good

and inhomogeneities in attenuation average out. This is however not the case for the intermediate-depth Vrancea events, which display a very special geometry. Therefore, this study is not a standard application of the GIT and the method is adapted to this new situation. The obtained results show that strong lateral variations of the seismic attenuation characteristics exist beneath Vrancea, which have important implications in view of the expected ground motion distribution from future earthquakes. The source spectra depict high corner frequencies as compared with crustal events, which is a clear indication for high stress drops of the order of 1 kbar. Furthermore, a comparison of the obtained site amplification functions with the H/V-ratios shows that the latter ones are not a good estimate of site response in the case of Vrancea earthquakes.