Geophysical Research Abstracts, Vol. 7, 01732, 2005
SRef-ID: 1607-7962/gra/EGU05-A-01732

Evaluation of Hard Rock Spectral Models for Intermediate Depth Vrancea (Romania) Earthquakes using the Horisontal-to-Vertical Fourier Spectral Ratios of Earthquake Records

V. Sokolov (1)**,** K.-P. Bonjer (1), Mihnea Oncescu (2) and Mihaela Rizescu (2)

(1) Geophysical Institute of Karlsruhe University, Hertzstr. 16, 76187, Karlsruhe, Germany, (2) GEOTECH INSTRUMENTS, LLC, 10755 Sanden Drive, Dallas, Texas, USA
(Vladimir.Sokolov@gpi.uni-karlsruhe.de / Fax: +49-721-71173 / Phone: +49-721-6084625)

The frequency-dependent amplification for rock sites, as well as apparent source spectra, were studied using an earthquake ground-motion database collected in Romania. Almost all events occurred in the Vrancea focal zone (SE-Carpathians), which is characterized by a high rate of occurrence of large earthquakes in a narrow focal volume. The seismic activity ranges within an almost vertical stripe in depths between 60 and 170 km. The database used includes several hundred records from more than 100 small magnitude (M_W 3.5-5.3) earthquakes which occurred in 1996-2004 and six acceleration records obtained during four large (M_W 7.2, 6.9, 6.3, and 6.0) earthquakes. The characteristics of amplification were evaluated using the well-known technique of horizontal-to-vertical Fourier spectral ratio (H/V) of the S-wave phase (Lermo and Chavez-Garcia, 1993). The apparent source spectra were obtained from horizontal components using site (H/V), propagation path (geometric spreading and anelastic attenuation), and near-surface attenuation (kappa-factor) corrections.

An omega-square, single-corner-frequency spectral model (ω^2Brune spectrum) may describe the seismic radiation, within the frequency range from 0.2-0.3 to 15-20 Hz, during the earthquakes of various magnitudes in the Vrancea zone. The stress parameter $\Delta\sigma$, which controls the high-frequency spectral amplitudes, increases with magnitude from 20-30 bars for $M_W \leq 3.5$ up to 200-250 bars for M_W 4.8-5.3, and up to 1000 bars for the case of large ($M_W > 6.0$-6.5) events. Empirical amplification (H/V) for rock sites, showing stability for particular locations, reveal high

variability from station to station, which together with variations of values of kappa, reflects influence of local geologic and geomorphologic factors. This study was carried out in the Collaborative Research Center (Sonderforschungsbereich) 461 ”Strong Earthquakes: a Challenge for Geosciences and Civil Engineering”.