



Shear-wave splitting and the distribution of lithosphere and asthenosphere at depth beneath the Carpathian arc

R.M. Russo (1), **V.I. Mocanu** (2), M. Radulian (3), M. Popa (3), and K.-P. Bonjer (4)

(1) Dept. of Geol. Sci., University of Florida, Gainesville, FL 32611 USA (russo@geology.ufl.edu), (2) Dept. of Geophysics, University of Bucharest, Bucharest, Romania 020956 (mocanu@gg.unibuc.ro), (3) Nat. Inst. Earth Physics, P.O. Box MG-2, Bucharest-Magurele, Romania (mircea@infp.ro, mihaela@infp.ro), Geofisikalische Inst., Universitat Karlsruhe, 76187 Karlsruhe, Germany (Klaus.Bonjer@gpi.uni-karlsruhe.de)

The unusual intermediate depth (70-180 km) seismicity in the bend zone of the Carpathian arc has been variously interpreted as the last stage of detachment of an oceanic lithospheric slab subducted all along the Carpathian arc, or as the locus of current continental lithosphere delamination. The frequent strong seismicity forms a tight cluster 40 km by 70 km, long axis trending NE, with much reduced shallow seismicity above. Tomography studies show the earthquake volume corresponds to a vertical finger of high seismic velocities extending from around 70 km to more than 300 km beneath the Vrancea bend zone. Our previous study of seismic attenuation along paths from Vrancea events to the permanent German-Romanian K2 network installed around the Vrancea zone reveal systematic changes in attenuation indicating juxtaposition of hot asthenosphere beneath the Transylvanian Basin and old, cold lithosphere of the East European, Scythian, and Moesian Platforms. We are currently mapping the distribution of lithosphere (low attenuation) and asthenosphere (high attenuation) to determine whether or not delamination of continental lithosphere or slab detachment may be occurring beneath Vrancea. In order to gauge the degree to which upper mantle flow may play a role in these processes, we have examined shear-wave splitting along nearly vertical paths from the Vrancea earthquakes to the surface seismic network. Preliminary results indicate that splitting is strong along certain paths, and that a pattern of fast shear-wave polarization directions (and hence upper mantle mineral alignment) exists in and around the Carpathian bend zone: fast directions approximately parallel both the Eastern and Southern Carpathians' trends away from Vrancea.