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Understanding lithospheric structure from local seismic tomography in western Romania

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We determine crust and upper mantle structure in the western part of Romania using regional seismicity recorded on a combined temporary and permanent network (station spacing $\sim$ 50 km). The area is characterized by shallow seismic activity of moderate magnitude (ML < 6) with frequent clusters of events. Tectonically, the region is divided into blocks and basins bordered by intra-crustal faults. The major structural features developed in the region are: the Pannonian Basin with a thin subsiding lithosphere (ca 60 km) and four Dacidic units (Inner Dacides (ID), Transilvanides (T), Middle Dacides (MD), Marginal Dacides (MaD) and Outer Dacides (OD)) with a thicker lithosphere (100 - 140 km), uplifted by recent orogeny. These structures outcrop in the mountain chains and extend westward under the sedimentary cover of the Pannonian Depression. The newest (Neotectonic) tectogeneses were extensional (syn-rift phase) and compressional (basin inversion) resulting in brittle structures: grabens and horsts, separated by NW-SE oriented faults, affecting both the basement and the sedimentary cover. Two Neogene NW-SE oriented major grabens developed at the basement level of the Pannonian Basin: Sannicolau Mare in the West and Caransebes in the East. These structures, extended in the mountains as small depressions, controlled by Neogene normal faults, with the basement lowered down to over 7 km (at Hungary - Romania border). As input data we used local earthquakes recorded in the western part of Romania by both a dense temporary network deployed as part of the South Carpathian Project (SCP), and permanent national stations. SCP is a joint project between the University of Leeds (UK) and the National Institute of Earth Physics (Romania) started in 2009. The earthquakes were selected by requiring a minimum of four P-wave arrivals with a clear onset per event. We invert P- and S-wave arrival time data using the tomography approach of Koulakov et al. (2009). Our preliminary results correlate well, at a first approximation, with the main geotectonic units in the region.