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The shear wave velocity underneath Bucharest City inferred from Love waves

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We use Love waves from regional events recorded during the Urban Seismology Project (URS) to infer the structure beneath Bucharest City, the capital of Romania. The Love wave dispersion shows a distinct variation from high phase velocities in the south to low velocities in the north of the city. We are able to explain the phase velocity dispersion by a simple model with linearly increasing velocity with depth in the upper part and an underlying homogeneous halfspace. Both are separated by a discontinuity, which is believed to be the interface between the Cretaceous and the Neogene at increasing depth (from 1000 m in the south to 1500 m in the north). These results close a gap between existing velocity models from shallow seismics and VSP recordings near the surface (down to 100 m depth) and models for the crustal structure (2 km and deeper) from seismic refraction studies.

Data was recorded by a network of 34 seismometers from the Karlsruhe Broadband Array (KABBA), installed in the city of Bucharest from 10/2003 until 08/2004. For a set of 8 regional events, the Fourier coefficients of the Love fundamental mode were fitted by plane waves with non-uniform phase velocity. This way we obtain dispersion curves where phase slowness varies linearly with latitude. By application of the Neighbourhood Algorithm (as presented in the geopsy package) we obtained subsurface models for three different locations in the city.

In the framework of the CRC 461 Strong Earthquakes, this study contributes to seismic hazard mitigation for Bucharest City which is one of the most endangered European cities with more than three nearby earthquakes of magnitude 7.0 or higher per century.
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