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Seismic imaging of the Vienna and western Pannonian Basins

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The Carpathian Basins Project aims to understand the origin of the Miocene-age extensional basins contained within the compressional arc of the Alpine-Carpathian system. We present results from a temporary broadband seismic network, deployed NW-SE across the Vienna and western Pannonian basins through Austria, Hungary and Serbia, to test competing models for the evolution of the continental lithosphere. The high-resolution seismic tomography network, consisting of 46 stations operational for 14-16 months, is approximately 80 km wide with along-line separation of about 30 km and extends for almost 500 km, perpendicular to tectonic strike of the mid-Hungarian line. We recorded P-arrivals from approximately 341 teleseismic events. Preliminary analysis of residuals from events with back-azimuths almost perpendicular to the length of the array vary from slow (1.1 s) in the Vienna Basin to the north-west, to fast (-0.85 s) in the Pannonian basin to the south-east. The residuals decrease from near zero on the mid-Hungarian line and reach a minimum (-0.85 s) in southern Hungary before increasing in to northern Serbia. Corrected for known sedimentary thicknesses and estimated crustal thickness variations from controlled source surveys, the amplitude of the travel-time residuals is reduced by about 7.6% but the pattern of relative anomalies is preserved. A three-dimensional variation of velocity structure beneath the seismic network is revealed by examination of travel time residuals from a range of back-azimuths. The 3-D velocity variation obtained by tomographic inversion of the P-wave travel-time residuals will be presented along with a preliminary interpretation.