Geophysical Research Abstracts
Vol. 16, EGU2014-6021, 2014
EGU General Assembly 2014

Love and Rayleigh wave dispersion from regional Ambient Noise Tomography in the Eastern Alps of Europe

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ALPASS is an international passive seismic monitoring experiment aimed at understanding the upper mantle structure in the in the European Eastern Alps. Data were collected from May 2005 to June 2006 at about 50 locations with an average spacing of 20 km, and have been used for teleseismic travel time tomography and receiver function analysis in previous studies. We combine the ALPASS data from 23 broadband stations with additional data from the temporary CBP (Carpathian Basin Project) network (15 stations), and present results from ambient noise tomography applied to the region covering the easternmost part of the Alps and its transition to the adjacent tectonic provinces (Vienna Basin, Bohemian Massif, Dinarides). By turning each station into a virtual source, we are able to recover surface waves in the frequency range of 0.05 - 0.5 Hz, which are sensitive to depths of approximately 2 - 15 kilometers. The three-component recordings allow distinguishing between Rayleigh waves on the vertical/radial components and Love waves on the transverse component. On average, the Love waves have higher apparent velocity by about 15%. Owing to dense receiver spacing and high S/N ratio of the obtained interferograms, we are able to derive a large set of dispersion curves. The complicated 3D structure of the investigated region calls for a tomographic approach to transform these dispersion curves to be representative of local 1D structures. The results correlate well with surface geology and provide the input to inversion for the vertical shear-wave velocity distribution. Compared to data from active source experiments, we derive lower average shear wave velocities. This observation is comparable to receiver functions analysis which show a high Vp/Vs ratio for the area of the Molasse basin, where the shear wave velocities retrieved from the surface wave inversion are in particular low.