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Seismic tomography and azimuthal anisotropy for the Southern and Eastern Alps from ambient noise cross-correlations

Ehsan Qorbani (1), Dimitri Zigone (2), Petr Kolinsky (1), Florian Fuchs (1), Götz Bokelmann (1), and Easi Working Group ()

(1) University of Vienna, Department of Meteorology and Geophysics (IMGW), Vienna, Austria (ehsan.qorbani@univie.ac.at), (2) Institut de Physique du Globe de Strasbourg, Universite´ de Strasbourg, EOST, CNRS, Strasbourg, France

The eastern part of the Alpine chain is considered as an area of complex tectonics and lithospheric structure. Having a relatively dense network of stations in this region provides an opportunity to study the crustal and lithospheric velocity structure using ambient-noise correlations methods. We used continuous data recorded during 2014 at 50 permanent stations located in Austria, Germany, northern Italy, and Slovenia, along with data from 8 temporary stations of the Eastern Alpine Seismic Investigation (EASI) profile. Cross correlation of ambient noise are performed in order to estimate the Green's functions of surface waves propagating between station pairs. Dispersion curves of Rayleigh and Love waves are constructed between 2 and 30 seconds and are then inverted to obtain group velocity maps at different frequency (depth) levels. We present here a new crustal-lithospheric velocity model for the Southern and Eastern Alps, which reveals clear spatial velocity variation and contrasts, associated with major faults, deformed and damaged zones. In this study, we also assess the azimuthal anisotropy from the group velocity measurements. The new finding together with the previous results from SKS splitting and receiver function provides 3D images of anisotropy at scales ranging from crust to upper mantle. This allows us to discuss the strain field and deformation pattern within both shallow and lithospheric-asthenospheric depth, in relation with the most prominent tectonic processes in the region, such as eastward extrusion of the ALCAPA block (Eastern Alps, Western Carpathian, and Pannonian Basin).