

Application of global-phase seismic interferometry to EASI

I. Bianchi, A. Obermann, E. Ruigrok

A number of seismic methods exist to image the lithosphere below a collection of receivers, using distant earthquakes. In the current practice, especially mode-conversions in teleseismic phases are utilized. Instead, body-wave seismic interferometry can be used. With seismic interferometry, reflections are extracted from the coda of distant seismicity. This allows the creation of reflection responses as if there were large seismic sources at receiver locations. These reflections can be further processed into sharp reflectivity images of the entire lithosphere (e.g., Abe et al. 2007; Ruigrok et al. 2012).

This study makes use of data collected by the Eastern Alpine Seismic Investigation (EASI), a passive seismological project that aims unraveling the structures of the Earth's upper layers. 55 stations were deployed along a N-S oriented profile, and have been recording in the field for over a year (2014/2015). The EASI transect is 550 km long and developed between the Adriatic Sea and the internal Bohemian Massif. The geometry of station location within the transect has been studied in order to maximize the deep illumination coverage along the profile, with 10 km spacing (along N-S direction) and 15 km spacing (oblique), leading to a uniform ray coverage at depth considering that the majority of the seismic events are incoming from North and East directions (e.g. Japan, and Pacific Ocean) and few are arriving from South and West directions (Africa and Atlantic Ocean).

EASI uniquely samples varying lithospheric terrains and has sufficient aperture such that source-side effects can be eliminated from the estimated reflection responses. Hence, we expect to deliver a sharp reflectivity image that can help towards understanding the tectonic evolution of the Alpine and Variscan orogenies.