The Application of Teleseismic P-wave Receiver Functions to the Eastern Alps

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The purpose of this study is to explore the subsurface of the Eastern Alps by the application of the seismological technique named Receiver Function, in order to produce an image of the crust and to infer details on the structures and complex layering of the crust, providing the basis for a tectonic interpretation. The Receiver Function (RF) is a seismological methodology that employs records of teleseismic events for inferring acoustic impedance contrasts at depth beneath the seismic stations. The RFs use the principle that the teleseismic P-waves, which are generated by earthquakes occurring at large epicentral distances (greater than $25°$), and hit the subsurface beneath the recording station at a near vertical angle, are partially converted into S-waves. The amplitude, arrival time, and polarity of locally generated P-to-S (Ps) phases are sensitive to the S-velocity of the structure beneath the receiver. The differential arrival time between the direct P-wave and the converted Ps-wave is a proxy for the depth of the converter and the S-wave velocity between the surface and the converter itself. Computing the RFs at different frequency ranges allows creating a multi-scale image of the structures. This allows focusing and interpreting the structures at different depths. For this study, the data recorded by four temporary stations deployed for the AlpArray network are used; the analysis of the RF data highlights the presence of 3D features related to the deformation of the Eastern Alps occurred during mountain building.