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Crustal-scale interferometric imaging in the Malargüe region, Argentina, with P-wave coda and multidimensional deconvolution

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Several seismic investigations - using receiver-function methods as well as tomographic approaches - have been carried out in the Malargüe region (Argentina) for various purposes over a few decades. We use a body-wave seismic interferometry (SI) approach to retrieve reflections later used for the consecutive imaging of the subsurface. We investigate the applicability of the body-wave SI using P-wave coda from local earthquakes with the aim to retrieve reflection responses from a part of the Andean crust below the seismic array we use. We called our technique local-earthquake P-wave coda (LEPC) SI. In this presentation, we show three different LEPC SI results based on three different SI theories: crosscorrelation, crosscoherence, and multidimensional deconvolution. We find that, from a structural-interpretation point of view, multidimensional deconvolution based on the truncated singular-value decomposition scheme provides us with a better structural imaging than the other SI approaches. We interpret deep thrust faults in the imaging results from LEPC SI, whose presence in this region has previously been indicated from interpretation of active seismic-survey data and exploration-well data. We also interpret dimmed-amplitude parts in the reflection image as possible melting zones that have been previously indicated by magnetotelluric methods. The LEPC SI method we propose could be used as a low-cost alternative to active-source seismic surveys for imaging and monitoring purposes of deeper geothermal reservoirs, e.g. in enhanced geothermal systems where the target structures are down to 10 km depth.