A feasibility study for the application of seismic interferometry by multidimensional deconvolution for lithospheric-scale imaging

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Active-source surveys are widely used for the delineation of hydrocarbon accumulations. Most source and receiver configurations are designed to illuminate the first 5 km of the earth. For a deep understanding of the evolution of the crust, much larger depths need to be illuminated. The use of large-scale active surveys is feasible, but rather costly. As an alternative, we use passive acquisition configurations, aiming at detecting responses from distant earthquakes, in combination with seismic interferometry (SI). SI refers to the principle of generating new seismic responses by combining seismic observations at different receiver locations. We apply SI to the earthquake responses to obtain responses as if there was a source at each receiver position in the receiver array. These responses are subsequently migrated to obtain an image of the lithosphere.
Conventionally, SI is applied by a crosscorrelation of responses. Recently, an alternative implementation was proposed as SI by multidimensional deconvolution (MDD). SI by MDD compensates both for the source-sampling and the source-wavelet irregularities. Another advantage is that the MDD relation also holds for media with severe anelastic losses.
For lithospheric-scale imaging purposes, we study the feasibility for the implementation of MDD.