Preliminary results of receiver function imaging above an underground mine

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We installed a surface seismic array at the Boliden Tara Mines area, in Navan, Ireland. The array consists of 21 broadband instruments, arranged in a square area of 5 km by 5 km. The general inter-station distance is roughly 2 km, with 6 instruments placed in a denser arrangement - 250 m apart - along a previously acquired 2D reflection seismic line. The aim of the project is to image the shallow structure around the mine using passive seismic methods. Here we present preliminary results of receiver function inversion after the first 8 months of deployment. High frequency (up to 12 Hz) receiver functions are calculated for earthquakes with $M_w \geq 5.0$, at epicentral distances ranging from $30°$ to $100°$. We use the frequency domain deconvolution method proposed by Di Bona (1998). This method includes estimations of variances for individual receiver functions, and considers both the pre-signal noise, as well as the noise involved in the deconvolution itself - a useful approach when dealing with short term deployments, and poor quality waveforms from weaker earthquakes. We perform harmonic decomposition (Bianchi et.al., 2010) of the receiver function dataset. The zero-order harmonic - representing the bulk isotropic variation of seismic velocities with depth - is used in the inversion. The RF inversion scheme follows a reversible jump Markov Chain Monte Carlo algorithm, developed by Piana Agostinetti and Malinverno (2010).