



## **Preliminary application of seismic noise cross-correlation techniques at Boliden Tara Mines (Ireland)**

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Boliden Tara mine, located in eastern Ireland, is the 2nd largest lead-zinc mine in Europe and is still expanding its operation. The mine sits below a patchwork of small active agricultural farms. We investigate the feasibility of using passive seismics as an imaging tool for further exploration at the mine. In recent years active industry-standard reflection seismic methods have proved very successful at the site.

In this study, we apply the cross-correlation techniques to both locally and regionally generated seismic noise in the 2-40Hz band. Noise sources span a large frequency range and include mining activity, a nearby motorway, a confined sea to the east (Irish sea), the open Atlantic ocean to the west and local intense atmospheric storms.

We deployed a twenty-one broadband seismic network in an area of 5 by 5 km, SW of the mine site. Interstation distances vary from 200 m up to 7 km. After several months of data recording (at time of writing), we have obtained a large number of usable interferograms at a range of frequencies, showing a high signal-to-noise ratio. Here we test the applicability of the standard passive data preprocessing techniques on high-frequency cross-correlation analysis. We also observe space-time variability of noise sources that can be explained by the irregularity of traffic, farming activity and atmospheric storms crossing the deployment.

Our initial focus is on the extraction of high-frequency surface waves for shallow 3D structural information at the site and usable waveforms have been obtained despite the predictable lack of spatially homogeneous high-frequency noise sources – although there is spatial variability in quality due to highly localised high-frequency noise sources. We support the studies with full wavefield numerical simulations, generating a synthetic noise dataset to use as a benchmark against real seismic noise data.