



Relative location using waveform cross correlation: comparison of the Aitik and Kiruna mines

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Waveform cross correlation (WCC) is a powerful tool of signal detection from repeated events like mining blasts. In this study, we use seismic data measured at four array stations (ARCES, FINES, NOA, and HFS) of the International Monitoring System (IMS) from two quarries in Sweden – the Aitik copper and Kiruna iron mines. Both mines are characterized by intensive blasting practice, with hundreds of blasts found by the International Data Centre and available in its Reviewed Events Bulletin. In our previous study, we applied the WCC method to these repeated signals and estimated the overall similarity of signals at one mine and between mines. In order to provide the best use of the whole multitude of historical events and to reduce the number of waveform templates needed for comprehensive signal detection and association, we applied several high-order factorization techniques to the tensor based representation of seismic array data, so the lower order tensor construction was used as synthetic waveform template set. As a result, we found that signals from two mines might correlate and the only reliable method to actually distinguish between blasts conducted at the Aitik and Kiruna mines is to locate them using arrival times obtained by cross correlation. Here, we present select results of detection, relative location and mine identification as obtained since the end of 2016. This is an out-of-sample test of the procedures related to the WCC method.