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Joint Processing of Seismic and Infrasound Signals from Mining Blasts

The joint interpretation of seismic and infrasound (SI) signals from seismic-acoustic events is a challenge for automatic processing. We have conducted a detailed study of SI signals from quarry blasts in Sweden and the DPRK. Waveform cross-correlation (WCC), applied to seismic and infrasound wave-fields generated by mining blasts, demonstrates high similarity between signals, notwithstanding measurable changes in the complex seismic source function for ripple-fired detonations and highly varying propagation effects in the atmosphere. The event definition criteria for the SI events requires reliable detections reported by at least one infrasound station together with one or more detections at primary seismic stations. Using various sets of defined parameters, we have cross-correlated seismic signals recorded at the IMS stations from thousands of historical seismic-infrasound events reported in the IDC's Reviewed Event Bulletin (REB). For the WCC method, we have optimized these defining parameters by balancing the rate of detection and false alarms. The most important parameters are the frequency band and the template length. We will present examples of historical cross-correlations of data from selected seismic and infrasound IMS stations and preliminary results of the automatic cross correlation bulletin (XSEL), in comparison with the REB, for the period February to May 2019.

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