

Seismoacoustic Monitoring of Underground Explosions at Redmond Salt Mine, Utah

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Underground blasting within an extensive tunnel complex occurs as part of regular operations at Redmond Salt Mine, located in Central Utah. During the period of October 2017 – July 2019, we monitored these explosions using seismic and infrasound sensors. The experiment recorded approximately 1000 mining-related blasts as well as several hundred small earthquakes that naturally occur in the monitoring region at source to receiver offsets of 3-25 km. The data collected early in the experiment allows us to explore the characteristics of infrasound signals generated in subterranean tunnels, which show a variety of interesting characteristics, including components related to the structure of the underground tunnel complex, and a time-varying propagation efficiency. We present analyses that attempt to explain these properties. In addition, the data collected during the experiment allow us to test location algorithms at local distances by comparing computed locations with those taken from ground-truth logs. Finally, comparison of the tectonic and explosion signals allows us to examine possible discrimination methods that will effectively differentiate explosions from earthquakes at local distances.

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