

Testing and Design of Discriminants for Local Seismic Events Recorded During the Redmond Salt Mine Monitoring Experiment in Utah

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The Redmond Salt Mine Monitoring Experiment in Utah was designed to record seismoacoustic data at distances less than 50 km for algorithm testing and development. During the experiment from October 2017 to July 2019, six broadband seismic stations were operating at a time, with three of them having fixed locations for the duration, while the three other stations were moved to different locations every one-and-half to two-and-half months. Redmond Salt Mine operations consist of nighttime underground blasting several times per week. Redmond Mine is located within a belt of active seismicity, allowing for easy comparison of natural and anthropogenic sources. Using the recorded dataset, we built 1373 events with local magnitude (Ml) of -2.4 and lower to 3.3. For 75 blasts from the Redmond Salt Mine (RMEs) and 206 tectonic earthquakes (EQs), both Ml and coda duration magnitude (Mc) are well constrained. To separate the population of RMEs from the group of EQs, we experimented with several discriminants, including the difference Ml-Mc, Rg/Sg spectral amplitude ratios, low frequency to high frequency Sg, and Pg/Sg amplitude ratios, and different combinations of two or more of these discriminants. The effectiveness of these discriminants at classifying the events is discussed.

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Promotional text

This study, which focuses of discrimination of low magnitude events recorded at distances less than 50 km, aligns with the SnT2023 goal of identifying methods to improve nuclear-test-ban monitoring and inspection.

Oral preference format

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