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Comparison of pick-based and waveform-based event detectors for local to near-regional distance data from Utah

We compare a pick-based seismic event detector (PEDAL), to a waveform-based detector (WCEDS). Both algorithms were tested on data from 3-component stations in the University of Utah network. We chose to focus on Utah because the region is tectonically complex and includes both regularly occurring earthquakes as well as various types of anthropogenic sources, hence it presents a variety of challenges for event detection. The 2 week interval of time processed (January 1-14, 2011) includes a significant aftershock sequence near the town of Circleville. The data set also includes a huge number of mining induced events from a coal mining region. The events built by our two methods are scored against a master catalog, carefully built by an expert analyst who found a total of 7883 events for the 14 days. Comparison of the 3 catalogs is done using a Venn diagram, to investigate areas of overlap and isolation. Our results suggest that when tuned to achieve a comparable level of recall, the waveform-based method has better precision (i.e. fewer false events). We also found the waveform-based method to be more stable and easy to configure due to the lack of an additional processing step to generate signal detections.

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