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Global and local scale high-resolution seismic event catalogs for algorithm development and testing

When developing new seismic data processing methods, the verification of potential events and associated signals can present a significant problem, especially as detection thresholds are lowered to include anthropogenic signals from surface and shallow underground sources. In particular, we note that without a complete and accurate catalog, it is not possible to accurately calculate either precision or recall. Here we present two 14-day seismic event catalogs, one developed in Utah for local-scale event processing using data from the University of Utah Seismic Station network, and the other developed for global-scale processing using data from the International Monitoring System (IMS). Each catalog was built manually by an expert analyst to comprehensively identify events from all sources that were locatable using phase arrival timing and (when available) directional information, resulting in number of event increases compared to existing catalogs of 4300% in Utah and 650% globally. The catalogs additionally contain challenging event sequences (prolific aftershocks and small events at the detection/location threshold) and novel event types and sources (infrasound only events, long-wall mining events) that make them useful for algorithm testing and development, as well as being valuable for the unique tectonic and anthropogenic event sequences they contain.

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