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waveform correlation and template event metadata to reduce analyst workload

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Waveform cross correlation uses template waveforms from historical seismic events to detect recurring events from the same seismic source. Waveform cross correlation works well for dense regional networks, so research challenges arise when applying similar techniques to a sparse network such as the International Monitoring System (IMS). Effective waveform cross correlation requires templates with broad frequency content to produce reliable single-station detections over a broad area, but because high-frequency information attenuates strongly over distance, such high-quality templates with broad frequency content only exist for stations at local to near-regional distances from the target seismic sources. Our research seeks to improve the effectiveness of waveform cross correlation detections through use of template event metadata and network analysis of corroborating stations. We seek patterns of multiple station corroboration of seismic arrivals to generate a more effective collection of template waveforms for a network of stations. A network-focused perspective of recurring events improves the credibility of detections, since the number of stations that detected the template event originally, in combination with the relative amplitude of recurring detection, enables estimation of how many stations are likely to detect the subsequent event; thus, we select waveform correlation detections to reduce analyst workload.

Promotional text

Identify opportunities and methods for improving nuclear test monitoring and verification by improving IDC automated pipeline with waveform correlation techniques to reduce analyst effort on routine recurring events such as mining blasts.

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