

Event Bulletin Construction for a Global Sparse Network Using Waveform Correlation

Waveform correlation is a very useful technique for identifying repeating seismicity. In this investigation, we seek to determine the ability of waveform correlation to reconstruct a seismic event bulletin for a global, sparse network. Using about 10 years of data from the International Monitoring System (IMS) primary stations, we constructed a template library based on about 2.6 million arrivals in the arrival table of the International Data Centre (IDC) Late Event Bulletin (LEB). Then we cross-correlated several weeks of test arrivals retrieved from the IDCX arrival table against the template library and formed events from the resulting matches using cluster analysis. We applied approximate nearest neighbor (ANN) methods to perform searches 20 to 30 times faster than brute force correlation. We found approximately 30 percent of the origins reported in the LEB origin table, but that number is highly dependent on the chosen tolerance for discovery of false positives. Templates from local and regional phases had much higher probabilities of contributing a match to an origin in our bulletin. However, because there are many more templates of teleseismic arrivals in our template library, most of the matches that contributed to origins in our bulletin came from teleseismic arrivals.

Primary author: BALLARD, Sanford (U.S. Department of Energy, National Nuclear Security Administration)

Presenter: BALLARD, Sanford (U.S. Department of Energy, National Nuclear Security Administration)

Track Classification: 3. Advances in sensors, networks and processing