Enhancing Seismicity Catalogs for Basins in the Central United States

Lisa Linville[1], Kristine Pankow[1], Debi Kilb[2], and Justin Rubinstein[3]
1. University of Utah Seismograph Stations, University of Utah, Salt Lake City, Utah, USA.
2. Scripps Institution of Oceanography, University of California, San Diego, La Jolla, California, USA.
3. United States Geological Survey, Menlo Park, California, USA

Higher resolution seismic catalogs for active basins in the Central United States (CUS) can help answer fundamental science questions related to fluid-injection and induced earthquake potential that are of increasing concern to the public. Data from Earthscope's Transportable Array (TA) coupled with composite methods of earthquake detection will enable us to probe CUS basins for more complete background seismicity rates and spatial distributions, in addition to potentially illuminating subtle rate changes related to fluid injection and transient stressing. Here, we outline our approach to obtaining a more comprehensive understanding of basin seismicity using TA data through a joint method of frequency domain earthquake detection, clustering and visualization, combined with subspace (Harris and Paik, 2006) event detection (Figure 1). These methods capitalize on discriminatory spectral characteristics to decrease non-earthquake false detections and rely on clustering and array visualization to validate and associate related earthquake detections. These enhanced catalogs will help reduce the current catalog completeness levels to help determine if transient stresses from the passage of relatively large surface waves dynamically trigger events within these basins or otherwise change the distribution of induced seismicity.

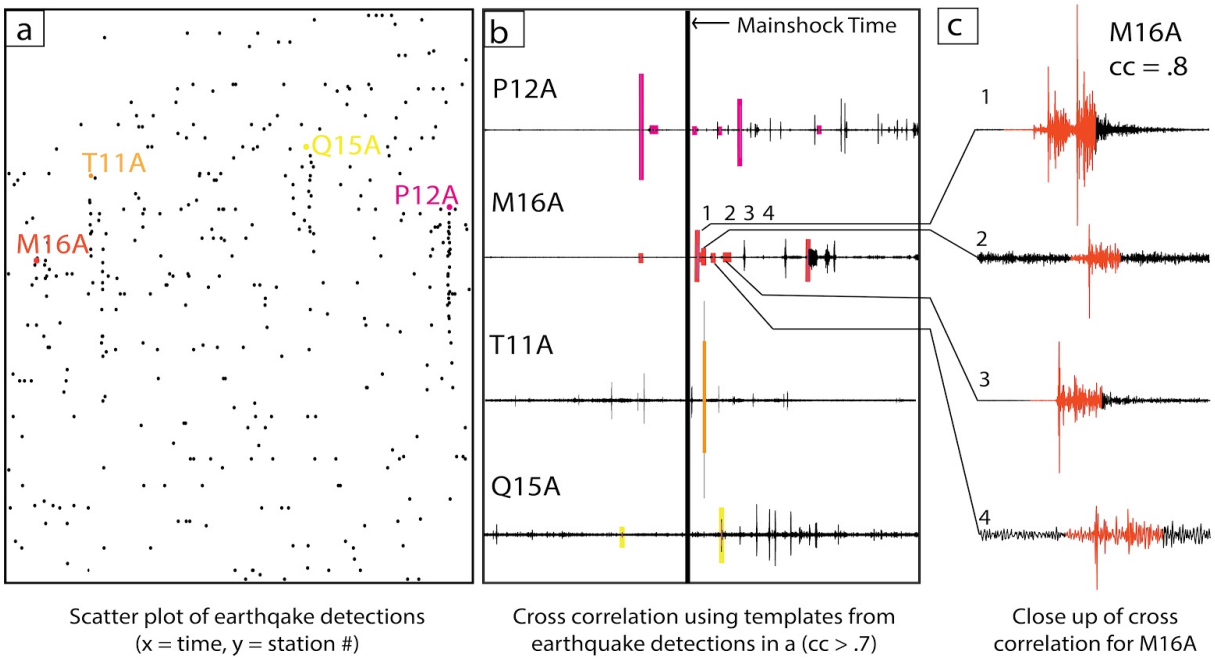

Figure 1. Array wide frequency domain detections (a) are clustered into events based on nearest neighbor techniques and used as templates for subspace detection (b-c) for stations in Utah and Nevada. These enhanced catalogs can be used to probe for statistically meaningful changes in seismicity rates after dynamic stress perturbations from large regional and global earthquakes.

Harris, David B., and T. Paik, 2006. *Subspace detectors: efficient implementation*. United States. Department of Energy