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Integration of Empirical Signal Detectors into the Detection and Feature Extraction Application at the United States Data Center

Seismic analysts at the United States Nation Data Center (USNDC) routinely review events from repeating sources (e.g., mines, earthquake sequences). Typically these events are highly correlated and share similar station/phase associations. The USNDC has integrated a suite of efficient empirical signal detectors into the Detection and Feature Extraction (DFX) application that will simultaneously detect and identify events from repeating sources. The detector suite consists of array-based subspace and correlation detectors and a signal trace correlation detector. Detectors are trained manually using an interactive software application known as the Cluster Construction and Analysis Tool (CCAT). Cluster specific data are packaged by CCAT and imported into the USNDC framework for use in near-real time station processing. Multi-station detections from repeating events are associated to a common source, located using pre-computed empirical travel time corrections, and presented to analysts within the Analyst Review Station (ARS). Successful integration of this functionality into DFX has reduced analyst burden for repeating events allowing more time for interactive analysis of anomalous events. This work was performed in part under the auspices of the U. S. Department of Energy by Lawrence Livermore National Laboratory under contract number DE-AC52-07NA27344.

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