

Metadata Accuracy Within Seismic Networks

Seismic station metadata includes such parameters as location, digitizer parameters and sensor calibrations. Accurate metadata are essential for effective nuclear explosion monitoring, allowing researchers to analyze vast amounts of seismic data throughout the world. Yet, our research demonstrates problems with the accuracy of seismic station metadata, particularly calibration metadata. Observed errors in calibration metadata include unknown, outdated, and incorrect parameters, as well as inappropriate calibration applications. Incorrect station parameters often propagate within a network. For example, a review of metadata from Geotech S-13 stations archived at the Incorporated Research Institutions for Seismology Data Management Center reveal that many calibration tables list erroneous sensitivities arising from misapplication of the factory calibration sheet. This error propagates by routine copying of the assumed standardized response. Additionally, our work across networks of the Former Soviet Union shows that calibrations are often unknown following conversion from analog to digital recording, and sensor orientations and coordinates are sometimes incorrect. We have developed a field-portable system to calibrate electromechanical sensors, thus improving station calibration metadata accuracy. This technique is available to assist networks with calibrations and vetting of station metadata to help produce high quality scientific data for accurate seismic hazard and Comprehensive Nuclear-Test-Ban Treaty (CTBT) monitoring.

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