

Lg-Wave Cross Correlation Applied to Detection and Location of Events in High-Seismicity Regions of Mainland East Asia

Cross-correlation methods have been demonstrated by several groups to improve detection capability (~ ten-fold) and location precision (~ hundredfold), when applied on local and near-regional scales. We are finding practical ways to achieve comparable results in application to broad areas, and have succeeded with fixed-window-length three-component Lg-waves in the 0.5 to 5 Hz passband recorded on sparse networks over far-regional distances. Examples include an epicentral relocation study for events in and near China during 1985 to 2005, for which we obtain high-quality locations for about 20% of the events in the Annual Bulletin of Chinese Earthquakes. These well-located events are organized into more than a hundred clusters containing at least five events (the largest, with more than 700). Average semi-major axes of 95% confidence ellipses are only 420 m, and are only a few tens of meters for some event clusters. Slinkard et al (Bull. Seism. Soc. Amer., 2016) report the use of template Lg waveforms from 1426 aftershocks of the Wenchuan earthquake to detect about five times as many additional aftershocks, which also turn out to be relocated mainly in clusters. Such results are of potential significance to both the explosion-monitoring and earthquake-monitoring communities.

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