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Massive Application of Lg-Wave Cross Correlation and Double-Difference Location

Previous work for a test case in the 1999 Xiuyan, China, earthquake sequence has demonstrated that Lg-waves correlate extremely well for this region and can be used to obtain high precision solutions for epicenters using the double-difference technique. Lg-waves are well suited for correlation when available because they are the largest amplitude arrivals on the regional seismogram, they have long durations, complex waveforms, with high frequencies that make correlations very robust. Measurement error is estimated to be about 7 ms based on internal consistency. Lg-waves for locations also propagate more slowly resulting in a smaller uncertainty in distance, for a given uncertainty in travel time. The inverted epicenter estimates have a location precision on the order of 150 m. The locations are computed using four to five regional stations 500 to 1000 km away. The epicenter estimates are not substantially affected by the sparseness of stations or large azimuthal gaps which is important for regional nuclear monitoring. We are currently extending the previous work to apply the technique on a massive scale to all the events in and near China from 1985 to 2005. We first are analyzing 2379 events that we have previously identified as repeating.

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