

Automated event identification of aftershocks(2)

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We are developing a seismic event identification technique for a quick grasp of aftershock activities of great earthquakes. For the case of the 2011 off the Pacific coast of Tohoku Earthquake, a number of onsets of aftershocks were not clear due to successive occurrence of aftershocks. Envelops of seismic waves are used to make it possible to estimate source locations of events without clear onsets.

The method is based on peak amplitudes and their times as

- (1)A band pass filter is applied to the seismic waves.
- (2)Envelop of seismic wave is obtained.
- (3)Peak amplitudes and times are checked.
- (4)Possible events are searched for the data of envelop amplitudes and times.

Formerly we tried to estimate source parameters by searching a solution in five-dimensional space of (origin time, latitude, longitude, depth, magnitude) by the shuffled complex evolution (SCE-UA) method. However, good solutions were seldom obtained because a combination of noise data often show a high score.

We changed the source estimation method. At the first, a group with high S/N data is searched for. We select a key data with highest S/N from the group. Then we estimate the best source parameter which is consistent to the selected data. While searching for the source location, the focal depth is fixed and epicentral distance and azimuth are changed. The origin time is obtained from the time of the envelop peak and epicentral distance, and the magnitude is estimated from the peak amplitude and epicentral distance.

Noise is often selected as the key data. Noises are usually rejected because they do not form a group of consistent data. Data of noise and identified events are removed from dataset to be checked. Data search is continued until no candidate is left.

Events are successfully identified and source locations are properly estimated for the events with a number of data. However source locations are not properly estimated for events with a small number of data.

We used seismic data from the National Research Institute for Earth Science and Disaster Prevention, Hokkaido University, Hirosaki University, Tohoku University, University of Tokyo, Nagoya University, Kyoto University, Kochi University, Kyushu University, Kagoshima University, the National Institute of Advanced Industrial Science and Technology, Aomori prefectural government, Tokyo metropolitan government, Shizuoka prefectural government, Kanagawa prefectural government, the City of Yokohama, the Japan Marine Science and Technology Center, and the Japan Meteorological Agency.

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