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深層崩壊リアルタイム検知に向けて
Real-time Detection of Deep-seated Landslides

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Extensive deep-seated landslides occurred in Nara, Wakayama, and Mie prefectures of western Japan when Typhoon Talas passed through the region on September 3-4, 2011. Signals of large landslides have been recorded by seismic networks around world, and overall force estimates have been previously determined for large landslides using long-period waves, but there have been few studies using high-frequency data to determine source characteristics of landslides. This study presents signals of at least 18 landslides caused by Typhoon Talas (2011), which were detected by high-frequency waveforms. The location of the landslides can be determined by a seismological back-projection technique and these locations correlate with the observed surface features. We have found that the volumes of the landslide correlated with the energy parameter of the seismic records.

The seismic signals can provide information about the energy radiation and durations of the landslides, which are rarely obtained from visual observations. Although the seismic networks were originally designed for locating earthquakes, the continuously recorded data can be very important for understanding the mechanisms of other natural phenomenon, such as landslides. These high sensitivity networks are part of the earthquake early warning system and data are transferred in real time. Therefore, there is a possibility to determine the locations and sizes of landslides within a minute of their occurrences. Such information can be useful for prompt emergency information, rescue efforts, and mitigation of further damage from these large landslides.

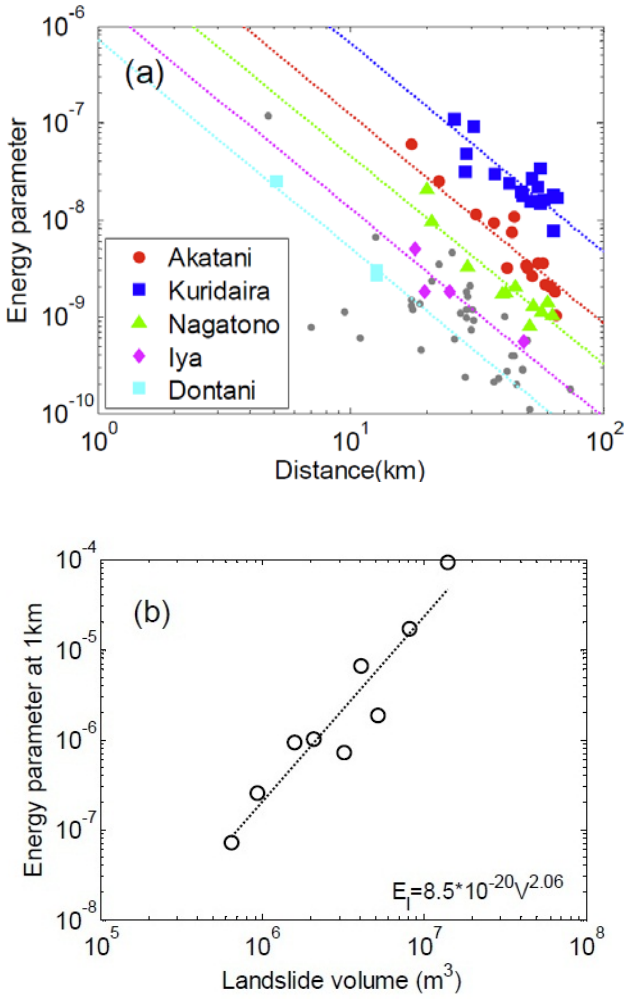

Figure 1(a) Energy parameter of different landslides as a function of source-station distance. The lines show regression function for each event. (b) Relationship between volume of the landslide and the energy parameter for a distance 1 km from the source. The line and equation in the figure show the results of a linear regression.