

Spatial and temporal distribution of repeating earthquakes off the coast of Ibaraki Prefecture

Makoto MATSUBARA[1], Kazushige Obara[1], Keiji Kasahara[2]

[1] NIED, [2] N.I.E.D.

In the subduction zone around the northeastern Japan, seismicity of interplate earthquakes is high and there are several large events around the plate boundary. Waveforms from earthquakes occurring closely with the same focal mechanism must be similar. These earthquakes are called 'repeating earthquakes'. Igarashi et al. (2000) found many repeating earthquakes off the coast of Kamaishi, Iwate Prefecture and a few off the coast of Miyagi and Fukushima Prefecture. In this study, we investigate the existence of repeating earthquakes off the coast of Ibaraki Prefecture.

We use waveform data during September 2000 to June 2002 recorded by National Research Institute for Earth Science and Disaster Prevention's (NIED) high-sensitivity seismograph network of Japan (Hi-net). The procedure used in the waveform similarity analysis is as follows: (1) Search earthquake pairs whose hypocentral intervals are less than 30 km. (2) Calculate cross-correlation coefficients of 1-4 Hz band-pass filtered seismograms between the paired events recorded at the same station. The length of time window is set between one second before P-wave onset and five seconds after S-wave arrival. (3) Treat the paired earthquakes as 'similar events' if the coefficients calculated for more than two stations are greater than 0.90.

As a result of the analysis, we found 171 pairs off Ibaraki Prefecture. These events occurred around the plate boundary and there was no pairs in the lower layer of double seismic zone. Those pairs exist at the west of 142.5E only and no pairs are found near the side of the trench axis.

Some repeating earthquakes occurred successively, however, there are 103 pairs whose time interval is over one month. Except the burst-type events, time interval has a positive correlation with the magnitude of the latter event. It suggests that higher strain energy may be accumulated as interval is longer thus generate a larger event.