

SSS011-P12

Room: Convention Hall

Time: May 27 17:15-18:45

Rupture process of the largest aftershock of the 1994 Sanriku-haruka-oki earthquake and its nearby M6 repeaters

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Yamada et al. (2009) found that M[~]6.0 earthquakes (Group A) have repeatedly occurred with a mean interval of 13.8 years since 1940 off Taneichi, Iwate Prefecture, Japan. Moreover, they also found another group (Group B) of repeaters of M[~]6.0 close to the Group A with a mean interval of 16.3 years since 1940. The earthquakes belonging to respective groups show very similar waveforms indicating that they have occurred at respective same locations. On the west of the two groups, the largest aftershock (M7.1) of the 1994 M7.6 Sanriku-haruka-oki earthquake occurred on January 7, 1995. None the less, the two groups show regular recurrence patterns. It is quite important to investigate the reason why the two sequences are so regular in order to understand the nature of interaction between the earthquakes. In this study, we analyzed the rupturing process of the largest aftershock of the 1994 Sanriku-haruka-oki earthquake and investigate the reason why the earthquake did not rupture the M[~]6.0 repeating earthquake asperities.

We used digital waveforms of JMA acceleration seismometers installed at stations in Hokkaido and Tohoku District (northeastern Honshu). We numerically integrated the waveforms to obtain the velocity seismograms and filtered them with a pass-band of 2 to 10 seconds. We utilized empirical Green's function method in the analysis of the rupturing process. We used waveforms of an M6.2 earthquake in Group A as the Green's functions. In total 4 stations for P waves and 3 stations for S waves were used by selecting the waveforms with clear onsets.

The result shows that the rupture was propagated from the hypocenter to west (toward the deeper part of the plate boundary) and south. This means the rupture was propagated toward the other side of the Groups A and B. This is thought to be the main reason why the asperities for Groups A and B did not rupture with the largest aftershock.

[References]

Yamada, Y., Y. Ishigaki, Y. Takagi, K. Tamaribuchi, M. Nakamura, K. Maeda, M. Okada, G. Tange, Characteristic earthquake sequences off northeast Japan (off Iwaki, Fukushima Prefecture and off Taneichi, Iwate Prefecture), Rep. Coord. Comm. Earthq. Pred., 82, 84-90, 2009.

Keywords: repeating earthquake, rupture process