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On the repeatability of the rupturing processes of the moderate-sized repeating earthquakes

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We have investigated rupture processes of moderate-sized repeating earthquakes showing that the processes can be changed from event to event even in the characteristic earthquake sequence off Kamaishi, Iwate Prefecture, Japan (Shimamura et al., 2011). In this study, we investigate rupturing processes of two moderate-sized earthquakes (M5.7 on May 12, 1997 and M5.6 on October 22, 2005) in the repeating earthquake sequence (Hasegawa et al., 2005; Yamada et al., 2009) off Iwaki, Fukushima Prefecture, Japan. Results of preliminary analyses indicate that the rupturing processes of the two events are considerably different: the 1997 event ruptured several small seismic patches while the 2005 event ruptured only one large seismic patch. Amplitude spectra estimated from spectral-ratio technique shows that the two events have almost the same amplitudes and shapes for the frequency range below 1 Hz. However, above 1 Hz higher than corner frequencies of around 0.3Hz, two spectra are very different and the 1997 event has another peak around 3 Hz. This characteristic can be explained by the rupturing of plural small patches investigated in the preliminary analyses of the rupturing processes. This result indicates that an asperity can be occasionally ruptured in different ways than usual suggesting that time variation of the pore pressure may cause the change in the rupturing processes as proposed by Seno (2003).