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Stress drops of interplate earthquakes along the Japan trench by coda spectrum ratio analysis

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The use of S-wave coda spectrum-ratio in estimating corner frequencies is thought to have advantages that it can reduce the effect of site, path and radiation pattern differences significantly (e.g., Mayeda et al., 2007; Somei, 2010; Wada et al. 2010; Moyer et al., 2010). First of all in this study, we applied the method to the off-Kamaishi M~4.9 repeating earthquake sequence (Matsuzawa et al., 2001) to check its validity for relatively separated event pairs. The results show that the corner frequencies are estimated precisely even for earthquake pairs with hypocentral separations of 40-50km. Here, we used multiple time windows of 5 s by repeatedly shifting by 1 s in the time range of 20-50s after the S wave arrival. Next we applied this method to three categories of interplate earthquakes along the Japan trench: 1) small repeating earthquakes (M3.0-4.4, Uchida et al. 2006, 2009), 2) moderate sized repeating earthquakes (M4.5-5.9, Uchida et al., 2010), 3) low-angle thrust type earthquakes (M3.6-5.9, NIED, 2011). For these offshore earthquakes, the hypocenter errors sometimes exceed 20km and it is difficult to select closely located earthquakes. Thus, the coda spectrum ratio can contribute to the precise estimation of corner frequencies and stress drops for these earthquakes. The estimation show that the stress drops for the earthquakes in these three categories increase with their depths. This probably reflects the increase of confining stress with depth.