

Forecast experiments using friction law on occurrence times of the Kamaishi repeating earthquakes

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Uchida et al. (2014) reported that a repeating earthquake sequence on the plate boundary off the shore of Kamaishi showed a regular recurrence interval before the 2011 Tohoku-oki earthquake (M9). After the Tohoku-oki earthquake, the repeaters showed increases in magnitude and shorter recurrence intervals. A M6 class event occurred just after the M9 event. Uchida et al. (2014) proposed a conceptual model in which conditionally stable regions and unstable regions are distributed. Using this model, Yoshida, Kato, and Fukuda (2015) conducted numerical simulations of the Kamaishi repeaters assuming the afterslip obtained by Fukuda et al (2013). In this simulation, a M6 class event was reproduced, and the calculated occurrence times of the following repeaters resembled the observation to some degree.

In this study, we perform trial experiments on occurrence time forecast of the Kamaishi repeaters. 11 events occurred after the M9 events. Assuming various parameters, we calculate the occurrence times of the 10 events before the latest event. We select proper models by evaluating these models, and calculate the occurrence time of the 11th event using the selected models. Average of the calculated times would provide an estimate. We discuss how we should evaluate the models, and incorporate simulations into prediction schemes.

Keywords: Kamaishi repeaters, occurrence time, prediction experiment, numerical simulation, rate and state dependent friction law, afterslip