

Estimation of areas with a large slip of the next a large earthquake from the stress drop of small earthquakes

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Stress drop of earthquakes is one of the physical parameters that reflects the difference of the fault strength and the dynamic frictional stress level. It is reported that the stress drop of small earthquakes occurred in the source region of the 2004 Parkfield earthquake (Mw6.0) were relatively large [Allmann and Shearer, 2007] and that small earthquakes in and around large slip patches of the 2006 Kihoro Bay earthquake (Mw6.7) had larger stress drops [Yamada *et al.*, 2010]. These results suggest that the region with a large slip in large earthquakes permanently have large difference of strength and the dynamic frictional stress level and that it would be able to predict large slip areas by analyzing the stress drop of small earthquakes.

Large earthquakes occurred repeatedly about every 50 years; 1915 (M7), 1952 (Mw7.8), and 2003 (Mw8.0) [e.g., Yamanaka and Kikuchi (2003)] off the south-east of Hokkaido (Tokachi-oki region), Japan. The 2003 Tokachi-oki earthquake had two characteristics, which were that the slip area of the 2003 Tokachi-oki earthquake was the deeper half of the source area of the 1952 Tokachi-oki earthquake [e.g., Yamanaka and Kikuchi (2003)] and that significant afterslip was observed at adjacent areas to the coseismic rupture zone [Miyazaki *et al.* (2004)]. We analyzed the stress drop of small earthquakes in the source region of the 2003 Tokachi-oki earthquake and investigated the special distribution of the values.

We estimated stress drops of 423 small earthquakes ($4.0 < M < 5.0$) occurred from June, 2002 to December, 2010. First, we calculated empirical Green's functions from waveforms of smaller earthquakes and estimated corner frequencies from spectra of the velocity seismograms by assuming the omega-squared model of Boatwright (1978). We then calculated stress drops of the earthquakes by using the model of Madariaga (1976). Most of the values were around 3MPa, while some earthquakes had stress drops with an order of 0.01MPa and 100MPa. We are going to examine each seismogram carefully and compare the special pattern of the stress drop of small earthquakes with the slip distribution and the afterslip of the 2003 Tokachi-oki earthquake.

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We used Hi-net waveform data (<http://www.hinet.bosai.go.jp/>).

Keywords: stress drop, area with a large slip, small earthquake