

Reexamination of the fault model for transient slow slip event in the Japan Trench before the 2011 Tohoku-Oki earthquake

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Slow slip events are one of the important phenomena in the plate interface. Ito et al. (2013) investigated two transient slow slip events that occurred before the 2011 Tohoku-Oki earthquake deduced from the dense ocean bottom pressure (OBP) gauge data. They adopted differential pressure record between neighboring two OBPs for the effective removal of the remaining non-tidal oceanic mass variation. Their approach, however, can only know the relative displacement between two adjacent stations. Thus, it is difficult to understand the absolute displacement in each OBP station. Based on these background, we reexamined the SSE fault model using reprocessed OBP data set.

We used 8 OBP stations (TJT1, GJT3, P09, P08, P06, P02, P03, and P07) which is the almost same data set with Ito et al. (2013). The ocean tide and by non-tidal oceanic mass variation are removed by the model. We fitted the drift model (combination of an initial exponential and a linear component) to each of the observed time series to estimate the drift function of individual sensors. Even though the such procedure, the residual component still appeared. Thus, we calculated the differential time series of the OBPs in the eastern part (TJT1, GJT3, P09, and P08) relative to the averaged time series in the distant OBP stations (P06, P02, P03, and P07). Furthermore, we calculated the displacement field in each OBP station of eastern part according to the same definition of the time window with Ito et al. (2013).

We obtained the characteristic result between 19 Feb. to 8 March, 2011. TJT1 site, which located in the most eastern site, showed clear uplift. In contrast, GJT3 site, which is the neighboring site of the TJT1, shows small subsidence. Based on these data, we reexamined the SSE fault model. Obtained result shows the possibility of two fault locations. First model located in the very shallow part of the plate interface, the second model located in the slightly deeper part compared with the first one.

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