

Along-strike variation of long-term slow slip event activity in the Nankai subduction zone

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We systematically searched long-term slow slip events (SSEs) in the Nankai subduction zone using GNSS data. We fit observed GNSS time series by modeled displacements that used a single rectangle fault and a ramp function with 300-day-long duration for expressing long-term SSE. A grid maximizing variance reduction was selected as a candidate of long-term SSE. We searched onset of the ramp function based on the grid search. By applying the method to GNSS data, we found 24 long-term SSEs with Mw6.1-6.9 in southern Miyazaki, northern Miyazaki, Bungo channel, and western Shikoku in southwest Japan from 1996 to 2016, which include unreported events. The long-term SSEs are segmented along strike and quasi periodic in each segment. The average recurrence interval and moment magnitude are 2.14 ± 0.73 years and Mw6.6 $\pm$ 0.2 in southern Miyazaki, 5.53 ± 0.69 years and Mw6.7 $\pm$ 0.2 in northern Miyazaki, 3.07 ± 0.98 years and Mw6.5 $\pm$ 0.3 in Bungo Channel, and 5.76 ± 1.00 years and Mw6.3 $\pm$ 0.1 in western Shikoku. In the Bungo channel, large SSEs (Mw6.5-6.9) and small SSEs (Mw6.1-6.3) occur alternately. The total slip amounts within the 20 years are approximately 58% of the plate convergence (6.5 cm/yr x 20 years) in southern Miyazaki, 21% in northern Miyazaki, 53% in Bungo Channel, and 12% in western Shikoku. There are M7.5 and M8-class locked asperities in the updip regions of the northern Miyazaki and western Shikoku SSEs, whereas the updip region of the Bungo Channel SSE is between the two asperities and the updip region of the southern Miyazaki SSE is creeping. The recurrence intervals and total slip amounts may be related to the strength of the updip interplate coupling.

Keywords: Slow Slip Event, Nankai subduction zone, GNSS