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2013-2014 年房総スロースリップイベントにおけるすべりと地震活動の時空間発展
Spatial and temporal evolution of slip and seismicity during the 2013-2014 Boso slow slip event

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GPS time series data show that transient crustal deformation has been occurring in the Boso peninsula, central Japan, since December 2013. Observed spatial and temporal patterns of surface displacements suggest the occurrence of transient aseismic slip on the subducting Philippine Sea plate. In addition, an increased rate of seismicity was observed from 31 December 2013 to 9 January 2014 off the east coast of the Boso peninsula. The location of the increased seismicity partly overlaps with the areas of seismic activity during the past Boso slow slip events.

To estimate spatial and temporal evolution of aseismic slip, we use GPS data from 71 stations of the GEONET in the Kanto region and data from 6 stations located along the east coast of the Boso peninsula, which are operated by Earthquake Research Institute of University of Tokyo and Tohoku University. The data are analyzed with GIPSY-OASIS II software to obtain daily coordinate time series at the 77 stations. Secular velocities, seasonal variations, and postseismic deformation following the 2011 Tohoku-oki earthquake are removed from the time series. We use a modified version of the Network Inversion Filter to estimate spatial and temporal evolution of daily cumulative slip and slip rate on the Philippine Sea plate. Slip slowly started around 20 December 2013 off the east coast of the Boso peninsula and then slip rapidly accelerated around 28 December and propagated to the west. Slip continued to accelerate until 3 January and then rapidly decelerated until 9 January.

To investigate spatial and temporal correlation of slip and seismicity, we use a matched-filter technique to detect earthquakes in the area of increased seismic activity. The detected earthquakes are located along the northern edge of the large aseismic slip and migrated from east to west during the period of rapid aseismic slip (31 December to 9 January). This migration pattern is consistent with the propagation of rapid aseismic slip, suggesting that the earthquakes are triggered by stress loading due to the propagation of aseismic slip. We do not identify significant seismic activity before 28 December, indicating that the slow slip event started well before the initiation of the seismic activity.

キーワード: スロースリップイベント, 地震活動, GPS
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