

## Characteristics of small repeating earthquakes associated with the 2007 Boso slow slip event

# Hisanori Kimura[1]; Tetsuya Takeda[1]; Kazushige Obara[1]; Keiji Kasahara[2]

[1] NIED; [2] ERI

Off the Boso Peninsula, southeastern Kanto, central Japan, the slow slip event (SSE) repeats with a time interval of about 6 years. The unique characteristics of the Boso SSE are seismic swarm activities associated with the SSE. The SSE occurred with a recurrence interval of about 5 years in August 2007. Repeating earthquakes are events which repeat on an isolated fault patch distributed on the plate boundary. Numerous small repeating earthquakes are distributed near the upper boundary of the Philippine Sea plate at Kanto region (Kimura et al., 2006) and small repeating earthquake swarms have been observed in association with the Boso SSE (Kimura et al., 2004). In the case of the 2007 Boso SSE, small repeating earthquakes also occurred. Here, we study characteristics of repeating earthquake activities associated with the Boso SSE including the 2007 SSE.

Small repeating earthquakes were found in seismic swarms associated with the 2007 Boso SSE. Seismic swarms including repeating earthquakes are distributed at the deeper edge of a source fault model of Sekine et al. (2007). Most repeating earthquakes are distributed at a region of thick swarms and occurred during a period when frequency of seismic swarms is high. Repeating earthquakes are distributed along a plane gently dipping northwestward and overlaps well with seismic swarms and the source fault model of Sekine et al. (2007).

Activity area of small repeating earthquakes associated with the 2007 Boso SSE overlaps well with that associated with the past SSEs. However, number of repeating earthquakes is larger at the western part of activity area of repeating earthquakes for the 1983 and 1990 SSEs, and is larger at the northern part for the 1983, 1990 and 2007 SSEs. Number of repeating earthquakes is large at southeastern area for the 2002 SSE and is small in the 1996 SSE. Repeating earthquake activity basically started at the eastern area and migrated to the western area. In the 1983 and 2002 SSEs, repeating earthquake activities started at the southeastern area and migrated to the northern area. In the 1990, 1996 and 2007 SSEs, repeating earthquake activity started at the northeastern area.

Since repeating earthquakes reflect interplate slips at the nearby region, interplate slips may be slightly different at the region of repeating earthquakes. This difference may be caused by small differences of source processes of SSEs. Hirose et al. (2008) estimated that slip of SSE started at southeastern area and then migrated to the northern and western areas. When slip reached the western region, repeating earthquakes also occurred. GSI (2008) estimated small slip at the activity area of repeating earthquakes for the 1996 Boso SSE and larger slip at a location of the northern part of repeating earthquakes activity area for the 2007 Boso SSE. Ozawa et al. (2003) estimated that slip started at southeastern area and then migrated to the north and western areas. These source processes are consistent with our results.

The 2007 Boso SSE occurred with a recurrence interval of 4.9 years. SSEs occurred in May 1983, Dec 1990, May 1996, and Oct 2002 and recurrence intervals after 1990 are 7.6, 5.4, and 6.4 years, respectively. The average is  $6.1 \pm 1.2$  years. The recurrence interval of the 2007 SSE is shorter than the average by 1.0 sigma. Since recurrence interval is longer after shorter one of the 1996 SSE, recurrence interval of the next SSE may be longer than average. Assuming that the recurrence interval would follow the normal distribution, we can expect that the next SSE would occur from Apr 2011 to Feb 2016 with a probability of 95%.