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Detailed distribution of burst-type repeating earthquakes at the western Kanto, central Japan

Hisanori Kimura[1*], Tetsuya Takeda[1], Kazushige Obara[1], Keiji Kasahara[2]

[1]NIED, [2]ERI, Univ. of Tokyo

Numerous repeating earthquakes have occurred in association with the subduction motion of the Philippine Sea plate (PHS) and the Pacific plate below Kanto region, central Japan. In addition to continual-type repeating earthquakes, other group of repeating earthquakes, in which repeating earthquakes occur only for short period, have been observed (Igarashi et al., 2003; Kimura et al., 2 006; Templeton et al., 2008; Chen et al., 2009; hereinafter, 'burst-type'). Numerous burst-type repeating earthquakes are observed within the collision zone between the Izu-Bonin and the Japanese island arc at the western Kanto (Kimura et al., 2006). Although burst-type repeating earthquakes have been regarded to be triggered by nearby middle-sized earthquakes or slow slip events (Igarashi et al., 2003; Templeton et al., 2008), details about them are still under study. Hence we focus on detailed distribution of burst-type repeating earthquakes to investigate their generation mechanism.
In addition to previous results (Kimura et al., 2006; 2009), we analyzed earthquakes with magnitude 2.0 or greater in the seismic catalogue from Kanto-Tokai network operated by the NIED. Analyzing method and condition for repeating earthquake detection are the same as the previous study (Kimura et al., 2006). We determined high-precision hypocenters by using Double Difference (DD) method developed by Waldhauser and Ellsworth (2000). We used only differential traveltime data estimated from waveform correlation and relocated repeating earthquakes for each group.
In addition to previous results, 18 groups with 38 events were detected. Most of them are distributed within a dense seismic cluster at the eastern Yamanashi prefecture and most of them are burst-type with averaged recurrence intervals shorter than 30 days. On the other hand, groups with averaged recurrence intervals longer than 3 years were also found. Most of repeating earthquakes in the previous study have focal mechanisms other than reverse types, however, about half of newly detected events have reverse type focal mechanisms with P-axes in the direction of relative motion of the PHS. Repeating earthquakes with longer intervals tend to have reverse type focal mechanisms. Detailed hypocenter showed that most of repeating earthquakes are distributed within source dimensions expected from event size. This shows that burst-type repeating earthquakes at the western Kanto are also repetition of rupture at the identical fault patch. Most burst-type repeating earthquakes tend to occur during 1988 - 1989, 1994 - 1996, and 2000 - 2001. Several M5-class reverse type earthquakes also occurred during these periods. As a cause of burst-type repeating earthquakes, triggering by nearby middle-sized earthquakes or slow slip events has been suggested (Igarashi et al., 2003; Templeton et al., 2008). Templeton et al. (20 08) also discussed a possibility that production of continual type repeating earthquakes and thus creep is hindered in environments of granitic rock. Seno (2008) suggested that arc-arc collision was caused by large shear strength at the plate boundary in the Izu collision zone, due to absence of dehydration in the oceanic island arc crust. Furthermore, earthquakes at this region are distributed below the upper crust which was delaminated from the Izu-Bonin island arc and accreted to the Japanese island arc (Arai et al., 2009). We suggest that such difference of location of repeating earthquakes from the eastern Kanto where repeating earthquakes occur between the

subducting and the overlying plates causes difference of repeating earthquake activity.

Keywords: Kanto, burst-type repeating earthquake, high-precision relative hypocenter, arc-arc collision, Philippine Sea plate