Some Characteristic Small-earthquake Sequences beneath Ryukyu Arc

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The long-term earthquake prediction has usually used the characteristic earthquake model, which has an almost constant recurrence interval time. However, the essences of the characteristic events are unclear because the recurrence interval is

generally very long. The characteristic small-earthquake sequence relatively has the short recurrence interval. Therefore, those events are useful to interpret the nature of the characteristic earthquakes, but only a few cases have been reported (e.g. Matsuzawa et al., 2002; Nadeau and Johnson, 1998; Hasegawa et al., 2005).

We found some characteristic earthquake sequences and repeating earthquakes of M4-6 beneath the Ryukyu arc, including eight earthquakes of M5.1 near Miyakojima Island (mean interval 5.9 years; Tamaribuchi et al., 2009), six earthquakes of M4.1 near Okinawa Island (mean interval 2.5 years), earthquake sequences near Okinoerabu Island and near Ishigakijima Island. Moreover, we also found smaller earthquake sequences in their neighborhood, which seemed to be characteristic activities. Those earthquakes occurred on the plate boundary between Eurasian plate and Philippine Sea plate. Probably, the accumulating strain energy repeatedly destroyed same asperities enclosed by the creeping zones.

There were some characteristic earthquake sequences beneath the Ryukyu arc, because no event larger than M7 has been observed on the subduction zone around the Ryukyu islands, which could change the recurrence intervals. Probably, there would be weak interplate coupling beneath the Ryukyu arc, and seamounts could become asperities. Therefore, there would be more characteristic earthquake sequences in the Ryukyu district.

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References: Hasegawa et al., 2005, Zisin2, 58, 67-70; Matsuzawa et al., 2002, GRL, 29, doi:10.1029/2001GL014632; Nadeau and Johnson, 1998, BSSA, 88, 790-814; Tamaribuchi et al., 2009, Abstr. 2009 Japan Earth Planet. Sci. Joint Meeting, in press.