

SSS026-P02

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## Objective Repeating-earthquake Analysis beneath Japan

Koji Tamaribuchi<sup>1\*</sup>, Masaki Nakamura<sup>1</sup>, Yasuyuki Yamada<sup>1</sup>

<sup>1</sup>JMA

The long-term earthquake prediction has usually used the characteristic earthquake model, which has an almost constant recurrence interval time. We detected some repeating earthquake sequences (that is, those seismic waves are similar at the same stations between each other quake) to find characteristic earthquakes (JMA, 2010, Nakamura et al., 2010), including the case of off Kushiro (M4.8; Sakoi et al., 2010), the cases of off Iwate Prefecture (M6.1 and M6.0; JMA, 2009a), the case of off Fukushima Prefecture (M5.7; JMA, 2009a), the cases of off Okinoerabujima Island (M5.3 and M5.2; JMA, 2009b, Tamaribuchi et al., 2009) and the case of near Miyakojima Island (M5.1; Tamaribuchi et al., 2010). However, it was not objective that all of them were detected by human on a case-by-case basis. Therefore, we attempted an objective and comprehensive analysis to find repeating earthquakes, using digital records of the type 87 and type 95 seismographs.

Our method is as follows. First, we searched a relation between magnitude and frequency which has high coherence value within a band of 0.1-10Hz as a preliminary step. As a result, we obtained the following,  $f_{lower} = \log a - b M$  ( $a=22.4$ ,  $b=0.86$ ), where  $f_{lower}$  is the lower frequency in calculating coherence value and  $M$  is the magnitude by JMA. The upper frequency is the following,  $f_{upper} = 4 * f_{lower}$ . Second, we computed coherences for three components using the above relational expression. We chose earthquake pairs whose median coherences were 0.95 or more. Finally, we classified those pairs into groups on the basis of cluster analysis.

We found many repeating earthquakes of M4-6 beneath Japan. Most of groups located on the plate boundary, including beneath the Hidaka region, beneath the east coast of Ibaraki Prefecture and beneath the northwest of Chiba Prefecture. No repeating earthquake was detected near the major asperities such as off Sanriku, off Tokachi, the Tokai and the Nankai. On the other hand, there are some candidates of repeating earthquakes in aftershocks and swarms. We wondered that the same asperities were actually ruptured in those cases.

In this study, we used the type 87 and 95 seismographs, but there was not enough data to grasp the characteristic earthquake sequences of M5-6. By using the type 59 analog seismographs, we would detect more characteristic earthquake sequences.

References: JMA, 2009a, Report of the Coordinating Committee for Earthquake Prediction . Japan, 82, 84-90; JMA, 2009b, Report of the Coordinating Committee for Earthquake Prediction, Japan, 82, 417-422; JMA, 2010, Report of the Coordinating Committee for Earthquake Prediction, Japan, 83, 613-632; Nakamura et al., 2010, Abstr. 2010 Japan Earth Planet. Sci. Joint Meeting, SSS013-P05; Tamaribuchi et al., 2009, Abstr. 2009 Japan Earth Planet. Sci. Joint Meeting, S149-P005; Tamaribuchi et al., 2010, Zisin2, 62, 193-207; Sakoi, 2010, Abstr. of SSJ 2010 Fall Meeting, D11-06.