

Seismic Quiescence Off Miyagi and Fukushima Prefectures before the earthquake of Miyagiken-Oki (M7.2) on August 16 2005.

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The interplate earthquake of M7.2 occurred off Miyagi prefecture on August 16, 2005 (hereafter, the 2005 earthquake of Miyagiken-oki). Seismic quiescence was found in two areas of the Pacific off coasts of the Tohoku district in few months before the 2005 earthquake of Miyagiken-oki. In this study, we investigated the area and period of the seismic quiescence before the 2005 earthquake of Miyagiken-oki in detail, and also seismic activity before the 1978 Miyagiken-oki earthquake (M7.4) on June 12, 1978.

The integrated hypocenters were used for analysis of the seismic activity before the 2005 earthquake of Miyagiken-oki. Data were the declustered earthquakes equal or larger than M3.0 in the interplate and the upper part of the double seismic zone of the Pacific Plate off the Pacific coasts of the Tohoku district. We firstly picked up the area and period of the seismic quiescence with methods of Z-map (Wiemer and Wyss, 2000) and secondly researched the detail changes of the seismic activity for the areas and the periods. Here, for estimating a level of the seismic quiescence, we used a method of the Seismic Activity Index (SAI) that was established for monitoring the seismic activity of the Tokai Earthquake (Tsukakoshi and Ishigaki, 2003). In the case of the 2005 event, we selected the base period from October 1997 to December 2003 for estimating the fundamental seismic activity level.

The seismic quiescence was detected in the two areas. One of the seismic quiescence was located in the area of 50kmx50km with the center in N37.7 E142.5 about 100km distant from the shore off Souma. The M6.8 earthquake off Fukushima prefecture occurred in the east region adjacent to the off Souma area on October 31, 2003. Another of the seismic quiescence was located in the area of 50kmx50km with the center in N37.0 E142.2 about 150km distant from the shore off Iwaki. Here, the off Souma area was located in adjacent to the south side of the source region of the 2005 earthquake of Miyagiken-oki. Also, Miura et al. (2005) found out the afterslip in the south side of the source region of the 2005 earthquake of Miyagiken-oki. The two areas were located in the north side and south side to the area of the larger afterslip. Both of the seismic quiescence in the two areas began from September 2004. Seismic activity did not remarkably change in other areas. The SAI of the two areas showed level of 0 \pm 1 (probability of 1 \pm 4% under a poisson process) in the seismic quiescence period. The seismic activity in the off Souma area had recovered and has activated after the 2005 earthquake of Miyagiken-oki. The seismic activity in the off Iwaki area has continued to be low level.

The seismic quiescence of the earthquakes equal or larger than M4.0 was found in the area around off Miyagi and Fukushima prefectures before the 1978 Miyagiken-oki Earthquake. In the case of the 1978 event, the base period was from January 1972 to December 1975. The seismic quiescence began from the beginning of 1976 and continued to be in the level of SAI 0 to 1 about one year before the 1978 Miyagiken-oki earthquake.