

Regularly Occurring Small Earthquakes Off Sanriku, Japan
(Abstract)

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Far off Sanriku is known as one of the most seismically active areas in the world. On the other hand, there are no historical records of large earthquakes near the seashore off Sanriku between 39N and 40N, although microearthquake activity is very high there. Thus, aseismic slip might be dominated on the plate boundary there similarly to the creep segment of the San Andreas fault. In order to verify this hypothesis, we have investigated the earthquake clusters in this region using Tohoku University's earthquake catalogue. As a result, we found that one of the clusters is dominated by nearly identical and regularly occurring small earthquakes (characteristic events). This cluster is located about 10 km away from the seashore and its depth is around 50 km. By relocating the hypocenters using JMA (Japan Meteorological Agency) catalogue, we confirmed that small earthquakes with JMA magnitude (M_j) of 4.8 ± 0.1 have repeatedly occurred with a recurrence interval of 5.35 ± 0.53 years since 1957; eight characteristic events in total are identified. Many earthquakes smaller than M_j 4.0 also occurred in the cluster. Very few events occurred just after the 'characteristic' events but the seismicity gradually became active in the latter half of the recurrence interval. From the P-wave first motion data and waveform similarity, we ascertained that these 'characteristic' events have almost identical focal mechanisms of low-angle thrust fault type, which indicates that these events occurred within a small asperity on the plate boundary. Since this cluster is isolated from other clusters, such an asperity is likely to produce characteristic events if the region surrounding the clusters is creeping. If this cluster really has characteristic nature, the next event with M_j 4.8 will occur there in July 2000 ± 6 months.