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Long-term seismic quiescence before the recent great earthquakes along the Kurile Trench

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The 1994 Hokkaido-toho-oki earthquake (Mw8.3) was preceded by a long-term seismic quiescence started 13 years before the main shock. The 2003 Tokachi-oki earthquake (Mw8.3) was preceded by a long-term seismic quiescence started 10 years before the main shock. The 2006 naka-Chishima earthquake (Mw8.3) was preceded by a long-term seismic quiescence started 10 years before the main shock. An earthquake catalog created by International Seismological Center (ISC) is analyzed in the study area, 140E to 160E, 39N to 55N, between January 1964 and June 2012, including 1641 earthquakes shallower than 60 km with the body wave magnitude of $5.0 \leq mb \leq 7.2$. Clustered events such as earthquake swarms and aftershocks are removed from the ISC catalog by using a stochastic declustering method developed by Zhuang et al. (2002). A detailed analysis of the earthquake catalog using a gridding technique (ZMAP) shows that the quiescence areas are located in and around the focal areas of the three great earthquakes. The quiescence area for the 1994 Hokkaido-toho-oki earthquake is a circle centered at (43.5N, 146.9E) with a radius of 32 km. The quiescence area for the 2003 Tokachi-oki earthquake is a circle centered at (42.5N, 143.5E) with a radius of 88 km. The quiescence area for the 2006 naka-Chishima earthquake is a circle centered at (47.2N, 153.1E) with a radius of 68 km. Moreover I find a long-term seismic quiescence in two areas, which has not been followed by a great earthquake yet. One of them is a circular area centered at (39.8N, 144.2E) with a radius of 68 km, which is a southern part of the focal area of the 1968 Tokachi-oki earthquake. The other one is located in and around the focal area of the 1963 Etorofu earthquake.

Keywords: seismicity, seismic quiescence, Kurile trench, great earthquake, body wave magnitude, ISC