Long-term Probability of a Great Earthquake along the Kurile Trench, Hokkaido Japan

*Masajiro Imoto[1], Nobuyuki Morikawa[1], Hiroyuki Fujiwara[1]

1. National Research Institute for Earth Science and Disaster Resilience

Great earthquakes (M8 and larger) repeatedly occur along the Kurile Trench off Hokkaido. A much larger one in the 17-th century (17-th type earthquake) is indicated by studies of tsunami deposits, which is considered as representing the simultaneous of Tokachi-oki and Nemuro-oki earthquakes. The Earthquake Research Committee, the Government of Japan has reported the long-term probability of the 17-th type earthquake. In this paper, we discuss the uncertainty of the long-term probability of the 17-th type earthquake. First, we apply the method by Parsons (2008) to compare the likelihood of both the Brownian Passage Time distribution and the Poisson distribution for recurrent earthquakes, where origin times of earthquakes are given with large uncertainties. We adopted the seven intervals of origin times and their +/- 2 sigma range observed at Mochirippu-toh (Table 7 in the ERC report). Two billion sequences are generated for both distributions, and 1,770,000 sequences of the BPT distribution and 2,450,000 sequences of the Poisson distribution match the origin time data. In the second, considering the probability density of each origin time, we introduce a weight for each matched sequence. The total of weight in the Poisson distribution is 20% larger than that in the BPT distribution. The present results suggest that the long-term probability of the 17-th type earthquake is a little likely given by the Poisson distribution than the BPT distribution.

Keywords: Great Earthquake, Kurile Trench, Probability, Inverse Gaussian distribution, Poisson distribution

