

## Recurrence intervals of Miyagi-oki earthquakes after the 2011 Tohoku-oki earthquake based on numerical simulations (II)

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Along the Japan Trench, interplate earthquakes (M7.1-7.4), which described as Miyagi-Oki earthquakes have occurred with recurrence intervals of approximately 30-40 years. Although it had passed only 5.5 years since the latest Miyagi-Oki earthquake on August 2005, the source regions of the past Miyagi-Oki earthquakes again ruptured during the 2011 M9.0 Tohoku-Oki earthquake. Coseismic rupture propagated to Fukushima-Oki, where three M7.3-7.5 earthquakes occurred on 1938. And 30 minutes after the mainshock, the largest aftershock (M7.6) occurred in Ibaraki-Oki, where M<7 earthquakes repeatedly occurred in the past.

Previous two studies based on numerical simulations using the composite law, which is a type of rate- and state-dependent friction law showed contrasting estimations for occurrence of the next (just after the Tohoku earthquake) Miyagi-Oki earthquake. But, both simulations estimated coseismic slip during the mainshock at the correspondent Miyagi-Oki region was much larger than that of seismic and geodetic observations. Then, we numerically simulated cycles for occurrences of seismic and aseismic events along the Japan Trench with the 3D geometry of the Pacific plate using the aging law, which is another type of the friction law. We assumed a slightly stronger frictional heterogeneity at shallower part of the Miyagi-Oki region over a wide range instead to assuming a very strong heterogeneity near the trench as the two previous studies. And we used a small value of seismic radiation damping factor to reproduce shorter propagation time during the M9.0 mainshock.

As a results, we reproduced reasonable coseismic slip at the Miyagi-Oki region, and significantly large coseismic slip along the trench. Models which qualitatively reproduced several observation characteristics showed that time interval between the M<sup>9</sup> earthquake and the first Miyagi-Oki earthquake after the M<sup>9</sup> earthquake tend to be shorter than the average recurrence interval observed before the M<sup>9</sup> earthquake. It corresponds to a previous study of Kato and Yoshida [2011]. Recurrence of M7 class earthquakes after the M9 earthquake should continuously be studied by various models. Observations around M7 class earthquake areas are also important.