Past Giant Earthquakes Reconstructed from Fossil Microatolls in the Andaman Islands

HAJIME KAYANNE[1], JAVED N. MALIK[2], YASUTAKA IKEDA[1], TOMOO ECHIGO[3], MASANOBU SHISHIKURA[4] AND KENJI SATAKE[5]

[1]*Department of Earth and Planetary Science, University of Tokyo, Tokyo, Japan: kayanne@eps.s.u-tokyo.ac.jp*
[2]*Department of Civil Engineering, Indian Institute of Technology, Kampur, India*
[3]*Geo-Research Institute, Osaka, Japan*
[4]*Active Fault Research Center, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan*
[5]*Earthquake Research Institute, University of Tokyo, Tokyo, Japan*

Microatolls (flat-topped *Porites* corals) serve as good indicators for the amount of uplift of the 2004 Sumatra-Andaman giant earthquake [1]. Recurrence intervals and mode of the past giant earthquakes were reconstructed from fossil microatolls at Interview Island, NW Andaman. Fossil microatolls occur at five elevations above the present sea level (48, 58, 109, 115, 125 cm above MSL). Each group is quite uniform in height with higher-elevation groups located progressively landward. The microatolls at the lowest elevation (48 cm) still left fresh polyps on their surface, suggesting uplift at the 2004 giant earthquake. The microatolls stand independently with each other, which indicate that they emerged completely by sudden uplift at the time of each earthquake, and then new ones were formed separately in the course of gradual submergence. The series of uplifted microatolls suggest that there were several events of episodic uplift followed by submergence and stillstand, with residual uplift of 0.1 m in each uplift-submergence cycle. The dates of the fossil microatolls show that the uplift events occurred at 6500, 6200, 6000 years B.P., and recurrence interval of the uplift during the period was 250 to 350 years. The event at 6000 years B.P. left a large residual uplift of 0.5 m, considerably larger than the other events. Before this event, the residual amount of uplift is 0.1m or less, which shows gradual submergence after the earthquake mostly canceled the uplift at the earthquake. On the other hand, the large residual uplift remains only at the 6000-year B.P. event showing different style of the earthquake with large net uplift occurred once in the last 7000 years. The residual uplift implies that rupture had not recovered at this event. Alternatively, the sea level change is different before and after 6000 years B.P. so that the recent earthquakes did not leave any evidence of coseismic uplift and interseismic subsidence.

Keywords: Sumatra-Andaman earthquake; recurrence interval; microatolls.

References

[1] H. Kayanne et al., *Goephys, Res. Lett.* **34**, L01310 (2007).