

Past recurrence history indicated by fossil microatolls at northeast Andaman Islands

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At the 2004 Sumatra-Andaman gigantic earthquake, coral reefs were uplifted on North Reef Island and Interview Island off northwest coast of the Andaman Islands. We succeeded in reconstruct the amount of uplift as 1.3 m by measurement of surface elevation of the uplifted microatolls (Kayanne et al., 2007, GRL, 24, L01310).

We further found fossil microatolls at higher elevations. At least, ten distinctive levels of fossil corals were discovered at Interview Island. The lowest level of corals with fresh dead tissues were uplifted by the 2004 earthquake (48 cm above MSL indicating 131 cm uplift), while others are fossilized with higher-level groups located progressively landward. Each group of microatolls is quite uniform in height within several centimetres, and the height difference between the groups ranges from 5 to 18 cm with an average of 8.7 cm. These microatolls are 1-2 m in diameter and stand independently of each other. These indicate that a group of microatolls emerged completely by sudden uplift, and then new microatolls were formed separately by gradual submergence.

The series of emerged microatolls indicate past history of coseismic uplift and interseismic subsidence. Several episodic uplift events occurred, then followed by long-term gradual submergence or interseismic reversal. Residual uplift of 0.05 to 0.2 m remained in each uplift-subsidence cycle. In the southern segment off Sumatra, fossil microatolls also suggest the occurrence of episodic events. Most of these microatolls are distributed only in the intertidal zone, indicating that the residual uplift amount is small, because most of the coseismic uplift had been recovered by interseismic submergence off Sumatra. Our observation indicates that the mode of coseismic and postseismic rupture as well as interseismic recovery is different between the Sumatra and the Andaman Islands. Sampling of corals is strictly prohibited in the Andaman Islands, but dating of these fossil microatolls is strongly desired to obtain information on the recurrence intervals of massive earthquakes of the past.