

Inter-seismic behavior and Indian Ocean Dipole records along the western Myanmar subduction zone recorded by coral microatolls

*Sze-Chieh Liu¹, J Bruce H Shyu¹, Chuan-Chou Shen¹, Pei-Ling Wang², Hong-Wei Chiang¹, Yu Wang³, Chung-Che Wang¹, Soe Thura Tun⁴

1. Department of Geosciences, National Taiwan University, Taipei, Taiwan, 2. Institute of Oceanography, National Taiwan University, Taipei, Taiwan, 3. Earth Observatory of Singapore, Nanyang Technological University, Singapore, Singapore, 4. Myanmar Earthquake Committee, Myanmar Engineering Society, Yangon, Myanmar

The Sunda megathrust is one of the major plate boundaries in South Asia, along which the Indian-Australian plate subducts northeastward beneath the Burma micro-plate offshore western Myanmar. In the past several centuries, the 1762 Arakan earthquake was the only giant event occurred along this plate boundary, and caused significant co-seismic uplift along a large stretch of the western Myanmar coast. In previous studies, the magnitude of the event and the potential seismogenic structures were analyzed based on uplifted coastal features on the Ramree and Man-Aung Islands, two of the largest coastal islands of western Myanmar. However, constraints on the inter-seismic behavior of this plate boundary are still very limited, particularly due to the lack of high resolution instrumental records in this area. Therefore, we utilized coral microatolls as natural tide gauge to analyze relative sea-level history and to obtain information of land-level change during the inter-seismic period.

For some coral genus such as *Porites*, the highest level of survival (HLS) is constrained within a few centimeters of the lowest tide level. Therefore, once the relationship between HLS and the sea level is established, the morphology of the microatolls can provide us the relative sea-level history based on the patterns of their annual growth bands under x-radiographs. U-Th dating technique can constrain the age of the coral, and we can also identify sea level anomalies caused by climatic events through oxygen isotope analysis.

We collected several slabs of coral microatolls from the intertidal zone near Leik-Ka-Maw, a small village in northwestern Ramree Island, approximately 80 km away from the trench. The microatolls were uplifted and killed during a local earthquake event in 1848, and preserved HLS records of about 80 years between the 1762 Arakan earthquake and the 1848 event. Our results show that the coral recorded a HLS rise at a rate about 6 mm/yr, which represents land-level subsidence during the inter-seismic period. Several temporary HLS die-down events are also present, likely produced by Indian Ocean Dipole (IOD) events based on the microatoll morphology and results of oxygen isotope analysis. We hope our results would provide additional constraints for improving the earthquake recurrence interval calculations for hazard assessments in this populous area.

Keywords: Myanmar, inter-seismic deformation, coral microatolls, seismic hazard

