

SSS035-09

Room:IC

Time:May 24 08:30-08:45

Earthquake recurrence as revealed by tsunami deposit and coral drilling surveys in Sumatra, Indonesia

Yuichi Nishimura^{1*}, Tsuyoshi Watanabe¹, Shigehiro Fujino², Eko Yulianto³

¹Hokkaido University, ²Tsukuba University, ³LIPI, Indonesia

We performed coral drilling and tsunami deposit surveys along the western coast of Sumatra Island, Indonesia, to investigate large earthquake recurrence intervals for past several thousands years. Coral drilling surveys were carried out at Pagai Island in September 2009 and Simellue Island in May 2010, and tsunami deposit surveys were done along the north-western coast of Aceh Province, Sumatra Island in December 2009 and March 2010.

About the coral drilling survey, annual bands of coral skeletons in tropical areas could capture the histories of the environments changes and past events with weekly to monthly time resolution and centuries to millennium scale. Our aim is to reconstruct past records of earthquake and tsunami using geochemical and geological approaches on coral annual bands, which is crucial for establishing hazard system in Sumatra regions. We successfully collected modern and fossil coral cores using underwater and land-based drilling from South Pagai Island and Simellue Island. The obtained cores of (total 15 cores with length from 1.5 m to 3 m and diameter of 5 cm) were sliced (5 mm thickness) parallel to the axis of maximum growth direction and x-rayed to observe density banding. The age of ca. 255 (AD1755) was estimated by counting clear annual bands in the longest cores. The growth disturbances corresponding with recent earthquakes (2004 and 2005) were observed in annual bands of modern corals. Geochemical signals of isotopes and elemental analysis found the anomalies on those parts of skeletons. Our future objective is to establish the coral geochemical/geological proxies for earthquake and tsunami using long living coral and fossil cores in order to reconstruct past earthquakes and tsunamis.

About the tsunami deposit survey, we traced the 2004 tsunami layers deposited near the surface and found a clear sand layer at about 1 m beneath the present surface in Calang, Aceh Province, Sumatra. We also found a sand layer at the similar depth in Meulaboh, located about 45 km south from Calang, and this layer was dated to be about 1000 years BP. If these sand layers are tsunami deposits produced by one event of 1000 years BP, the tsunami has to be large enough to affect more than 40 km wide area along the coast. The 2004 tsunami deposits were studied in Lampuuk, northern Aceh Province. The sandy deposits were covered by newly developed soil and still clearly identified in the tsunami inundation area. In Aceh, two tsunami deposits caused by smaller than the 2004 event but large enough tsunamis were found. These sandy tsunami deposits lied between the 1839 and 1510 tephtras that might be from Seulawah Agam volcano located about 40 km east from the site.

Keywords: large earthquake, earthquake recurrence, tsunami deposit, coral drilling, Indonesia