

## Holocene uplifted coral reef in Lanyu and Lutaο Islands, off the southeast of Taiwan

# Shihori Inoue[1]; Hajime Kayanne[2]; Nobuhisa Matsuta[3]; Wen-Shan Chen[4]; Yasutaka Ikeda[5]

[1] Earth Planetary Science, Tokyo Univ; [2] Earth & Planetary Sci., Univ. Tokyo; [3] National Taiwan Univ.; [4] NTU; [5] Earth & Planet. Sci., Univ. Tokyo

<http://www-sys.eps.s.u-tokyo.ac.jp/~coral/>

Lutaο and Lanyu islands to the southeast off the Taiwan are located on the northern most of the Luzon Arc. The uplift rates in both islands have been unknown, though their location is a key to discuss collision tectonics of the Luzon arc. We surveyed Holocene uplifted coral reefs surrounding these two islands, and clarified uplift rates and patterns in these two islands.

In Lanyu, we found uplifted coral reef at least three levels of 4 m, 7 m, and 9 m, above mean sea level (pMSL). On the lower and middle uplifted coral reefs, we found discriminative structure of fossil corals: encrusting corals such as *Isopora* were stuck on massive giant corals such as *Porites*. Massive giant corals live recently in shallow-water zone around a depth of 6m and encrusting corals live shallower in the vicinity of the lowest sea level. Encrusting *Isopora*, which distributes predominantly on the uplifted coral reef lives densely at depths range 80 to 100 cm below pMSL.

The radiocarbon dates of massive giant corals at 3.4 m and 2 m above pMSL are 3650, and 3140 cal y BP, while those of encrusting *Isopora* at 3.6 m and 2.5m are 2340 and 1730 cal yr BP, respectively. It is inferred that the reef was formed firstly as massive giant corals on a deeper sea bottom during a high sea stand, and then encrusting *Isopora* grew up on them during a sea-level recession period.

We reconstructed the relative sea-level fluctuation history using *Isopora* as an indicator of sea-level, and estimated the average Holocene uplift rate in Lanyu at about 1.2 mm/yr from the radiocarbon dates (6440 cal yr BP) of the highest coral sampled at 9m above pMSL.

In Lutaο, we divided the uplifted corals reef into three levels at elevations of 2.5 m, 3 m, and 4 m above pMSL based on its discontinuous form, which are wholly lower than terraces in Lanyu. There we did not recognize any discriminative structure of fossil corals as were observed in Lanyu. The uplifted coral reefs in Lutaο consist mainly of encrusting *Isopora* and *Acropora*.

By reconstructing relative sea-level changes in Lutaο in the similar way as in Lanyu, we estimated the average Holocene uplift rate about 0.5 mm/yr from the radiocarbon date (6620 cal yr BP) of the highest coral at the elevation of 4.4m.

Average Holocene uplift rate is 15 mm/yr in the Holocene marine terraces on the east coast of the Taiwan (Yamaguchi and Ota, 2002), and 5 to 7 mm/yr in Tainan (Chen and Liu, 2000). On the contrary, the uplift rate is as small as 1.6 mm/yr in Lungkeng, located at the southern tip of the Taiwan. This is because the Eurasian- Philippine Sea plate convergence changes from collision to subduction somewhere in the south of Taiwan. Uplift rates in Lutaο and Lanyu are also much smaller than the Taiwan orogenic belt. Therefore we conclude that the two islands are located out of the orogenic belt where the land is raising at amazingly rapid rates due to collision between these two plates.

### References

Yamaguchi, M. and Ota, Y. (2002): Tectonic and Paleoseismological Significance of Holocene Marine Terraces on the East coast of Coastal Range, Taiwan. *J. Geol. Geography*, 111 (3), 323-340

Chen, Y.-G. and Liu, T.-K. (1993): Holocene radiocarbon dates in Hengchun Peninsula and their neotectonic implications. *J. Geol. Soc. China*, 36 (4), 457-479.

Chen, Y.-G. and Liu, T.-K. (2000): Holocene uplift and subsidence along an active tectonic margin south western Taiwan. *Quaternary Science Reviews* 19, 923-930.