

Characteristics of luminescence signals from insoluble residue in raised coral reefs

*Masashi Takada¹, Aiko Shimada²

1. Department of History, Sociology and Geography, Faculty of Letters, Nara Women's University, 2. Application Support Team, JEOL RESONANCE Inc.,

Dating of aragonitic coral is important in studies of sea level and tectonic history in the tropical and subtropical coastal area. Uranium-series (U-series) and Electron Spin Resonance (ESR) dates of coral have been providing us the detailed Quaternary sea level history [1]. Aragonite of coral fossils, however, often alters into calcite during the period of burial, interfering with ^{14}C , U-series and ESR dating. In this study we dissolved altered corals by hydrochloric acid and investigate characteristics of luminescence signals from the residual materials to discuss possibilities for an elevated-temperature infrared stimulated luminescence (post-IR IRSL) dating. If we can estimate the age of coral from the insoluble residue, it will be of great help not only for cross checking the U-series or/and ^{14}C age but for estimating the age of altered coral fossils which can not be dated by them.

The fossil coral samples were taken from Yonaguni Island, southwestern Ryukyus, southwestern Japan. The sampling layer is considered as middle-late Pleistocene horizon [2]. In order to get materials from the limestone for blue light stimulated luminescence (BLSL) or post-IR IRSL dating, the outer-rim of the sample, which might be bleached by sunlight, was cut off more than 5 mm under subdued red light in a darkroom. Furthermore the sample was dissolved in 6N HCl in 10 minutes to remove the outer surface because some parts of the sample surface were rugged and difficult to cut off completely. Our preliminary experiment suggested the acid treatment of 6N HCl in 10 minutes removed more than 5mm depth from the sample surface, we think this procedure made sure to extract unbleached materials from the sample. Then the sample were washed by distilled water and again soaked in 6N HCl with hydrogen peroxide (several %) till the calcite was completely dissolved. After these treatments above, we could get small amount of residual materials from the coral fossil sample.

In this presentation we show some characteristics of luminescence signals from these residual materials and discuss possibilities for luminescence dating[3],[4].

References

- [1] Walker, M., 2005. Quaternary dating methods. Wiley, 286pp.
- [2] Ohmura, A., Kodama, K., Watanabe, M., Suzuki, A., Ota, Y., 1994. Tectonic history of Yonaguni Island, southwestern Ryukyus, Japan, deduced from coral reef terraces and uranium-series dates of Pleistocene corals. *Daiyonki-kenkyu (The Quaternary Research)* 33, 213-231.
- [3] Banerjee, D., Murray, A.S., Better-Jensen, L., Lang, A., 2001. Equivalent dose estimation using a single aliquot of polymineral fine grains. *Radiat. Meas.* 33, 73-94.
- [4] Buylaert, J. P., Jain, M., Murray, A. S., Thomsen, K. J., Thiel, C. and Sohbaty, R., 2012. A robust feldspar luminescence dating method for Middle and Late Pleistocene sediments. *Boreas* 41, 435-451.

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