温帯性造礁サンゴ軟体部の安定同位体比変動
Variation of stable isotope in soft tissue of scleractinian corals collected from Temperate zone in Japan

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Corals are mainly dependent on the organic matter produced by photosynthesis of their symbiotic algae zooxanthellae, but also using particulate organic matter in seawater such as plankton as nutrient sources. However, we still do not know much about the seasonal variation of nutritional dependence, such as how much it changes depending on seawater temperature and light intensity. Carbon isotopic ratios ($\delta^{13}C$) and nitrogen isotopic ratios ($\delta^{15}N$) have been used as key indicators in estimating the nutrients of living organisms. Sulfur isotopic ratio ($\delta^{34}S$) also is applied as a useful estimation technique to know feed origin. In this study, we studied seasonal variation in nutrient source of Temperate zone coral by using stable isotopic ratio.

Two coral specimens (*Porites heronensis* and *Alveopora japonica*) were collected in February to March or October to November for 2 years at Shimoda, Izu, Japan. At the same time particulate organic matter was also collected by the filtration. We took them back to the laboratory and firstly measured the metabolisms such as photosynthesis, respiration and calcification rate. After measurement of metabolisms, coral soft tissue was removed from their skeleton by using water-jet of NaCl solution, and these were separated into host coral tissue and zooxanthellae by centrifugation. In order to remove sulfate ions derived from seawater from the sample, soft tissues and zooxanthellae were dialyzed respectively. Samples after dialysis were powdered by freeze dry, and $\delta^{13}C$, $\delta^{15}N$, $\delta^{34}S$ were measured using a stable isotope ratio mass spectrometer (IsoPrime 100).

Both of two coral specimens showed a similar metabolic tendency, and photosynthesis, respiration, calcification decreased greatly at low temperature. Although there was no clear trend in seasonality, slight variations in both carbon, nitrogen and sulfur stable isotopes were observed throughout the year for both host tissues and zooxanthellae. Because photosynthesis activity was decreased in winter season, it is expected that dependency on particulate organic matter increases at low temperature. However, isotope ratio of particulate organic matter is far from host coral and zooxanthellae, especially carbon isotope. Therefore, it is hard to consider that corals use these organic matter directly as feed. Because respiration is decreasing at low temperature, it is possibly that corals use energy such as storage lipids after dropping their metabolisms. For future study, it is necessary to analyze lipid, etc. and to investigate more about coral nutrition sources.

