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Evaluation of nutrient sources for the sponges inhabited around seafloor hydrothermal areas in the Okinawa Trough

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Since discovery of seafloor hydrothermal vents the dense and endemic animal communities inhabited around the hot vents have been the most impressive feature for many scientists. Such animals have been known as chemosynthesis-based species and studied many investigaters. On the other hand, some benthic animals foundon abyssal plain have been observed slightly high density at the adjacent area to active vent sites. It implies that those opportunistic benthos may also rely on the chemosynthetic primary production and the hydrothermal chemosynthetic ecosystem may extend widelyrather than previous expectation.

In that case, it is an interesting issue how the dense sponge community is sustained around the hydrothermal fields. For clarifying the issue isotope geochemical study has been performed to evaluate food ecology of the sponges and some other animals obtained from the deep seafloor in the Okinawa Trough.

Stable isotope analysis of carbon, nitrogen, and sulfur of the sample organisms obtained from the Tarama knoll show significant low delta^{13}C and delta^{34}S values for the sponge samples. Those results suggest plausible contribution of sulfur oxidizing bacteria as food source for the sponges because such low delta^{13}C and delta^{34}S values are often observed for thioautotrophic chemosynthesis-based animals. The sulfur isotope ratios of the sponges also imply that the source of sulfur for sulfur oxidizing bacteria is possibly magmatism in origin. It also implies that the observed turbid water at the Tarama knoll is hydrothermal plume. Therefore, active high-temperature hydrothermal emission supplying hydrogen sulfide is expected at the Tarama knoll.

On the other hand, the sponge sample obtained from the Daiichi Kohama knoll shows similar isotopic characteristics observed for the sponges from the Tarama knoll. It may also imply the importance of sulfur oxidizing bacteria as food source for the sponge at the Daiichi Kohama knoll, therefore, hidden hydrothermal emission may be expected at the knoll.

Keywords: stable isotope, sponge, deep sea, seafloor hydrothermal system, Okinawa Trough