

Spatial distribution of carbon isotopic composition of fatty acids in the Suiyo hydrothermal system

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Various faunal activities have been found around hydrothermal vents on the deep-sea floor. The biological activities depend primarily on organic matter produced by chemoautotrophs such as sulfur-oxidizing bacteria and methane-oxidizing bacteria. In previous studies, sulfur-oxidizing bacteria is a primary producer in the hydrothermal system of Suiyo seamount in the Ogasawara Island. In this study, we determined carbon isotopic compositions of individual fatty acids extracted from mussels, sediments and sea water filtrates from the Suiyo seamount area in order to understand spatial distribution of the bacterial activity.

Carbon isotopic compositions of 6 mussel gill tissues range from -37.1 to -34.6 per mil (vs. PDB), which is consistent with the values reported from sulfur-oxidizing bacteria. An unusual fatty acid, C19:1D12 is identified in all mussel gills, which may be a specific biomarker of thiotrophy. Carbon isotopic compositions of fatty acids from 6 mussel gills range from -43.1 to -36.2 per mil. The isotopic variation suggests different biological responses to environmental conditions such as hydrothermal activities and nutrients in the Suiyo seamount.

Fatty acids of sediments and seawater filtrates are more enriched in ^{13}C (~-32 per mil for the sediments and ~-21 per mil for the filtrates, respectively) than those of mussel gills. Probably the carbon isotopic compositions of fatty acids from sediments can be explained by a mixing between ^{13}C -depleted fatty acids produced by thiotrophic bacteria and ^{13}C -enriched fatty acids derived from usual marine organisms.