

Spatial distribution of organic matter in the seafloor hydrothermal system of Suiyo Seamount

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With regarding to the seafloor hydrothermal system of Suiyo Seamount, we have been collected many sediment samples from the seafloor and subsurface since the year 2000. The samples have been measured total organic carbon contents, lipid compositions, amino acids, and enzymatic activity, and the results is used consideration for the spatial distribution of organic matter in the hydrothermal system. In conclusion the caldera floor of Suiyo Seamount, where covered mainly with thick sandy volcanoclastics and far from the land, is not contained significant amount of organic matter, only around the biological communities and sulfide mounds detectable amount of organic matter is found. In addition to those site, the place contained detectable amount of organic matter may be a porous rock, top and bottom of clayey rock, and sulfide and quartz veins, where are a possible route of the hydrothermal fluid.

The hydrothermal system of Suiyo Seamount has been repeatedly visited and sampled by the manned submersible Shinkai 2000, ROV Hakuyo 2000, surface ship RV Kairei and multicoring system BMS, so there are first place to do three-dimensional sampling as a hydrothermal system of island-arc volcano. There are dense chemosynthetic-based animal community composed mainly by a deep-sea mussel *Bathymodiolus*, some part over a few tens meter square has been covered by the dense mussel colonies. The seafloor around the hydrothermal venting sites is lack of pelagic clayey sediment and is covered thick sandy volcanoclastics, where can not be found any trace of organisms, suggesting that the spread of the associated biological community is limited. Then we aim to decide the spread of organisms and clarify the distribution toward subsurface using organic geochemical approach.

At first we checked the contribution of terrigenous organic matter in the surface sediments. Long-chain alkanolic acids are considered to derive from higher plant wax in origin, so concentration of the acids is a possible indicator for terrigenous organic input. The measured concentration of the acids in the surface sediment was remarkably low, suggesting that the terrigenous organic input is not significant. The sediment samples collected by the grab sampler during RV Kairei cruise from the wide area around the Seamount were measured content of total organic carbon (TOC), the TOC values was lower than 0.1 wt.% except the sample collected near venting site where the TOC value is 0.2 wt.%. The core samples recovered by BMS show very low TOC values, the maximum value was only 0.02 wt.%. On the other hand, the samples collected during dives of the submersibles from near the vents and biological communities show relatively higher TOC value nearly 1 wt.%, it reflect the high biomass on the seafloor.

Organic carbon concentrations of the core samples obtained from beneath the seafloor were also very low (less than 0.02 weight %), however, the concentrations show a positive correlation with that of total amino acids extracted from the samples. Composition of these amino acids show a typical L-type predominance, suggesting that these acids were derived from organisms in origin. In addition phosphate, which is crucial for life on Earth, therefore phosphatase activities is good evidence for microbial markers, was measured in the core samples. The vertical distribution of acid phosphatase activity had the close tendency with that of total amino acid amount. It implies that life activity is occurred at the subvent extreme environment. Furthermore we measured carbon isotopic ratio of bulk organic matter of the several core samples, the results show a wide variation ranging from -12 and -31 per mill vs. PDB, implying that the variation of life activity at the subvent environment.