

The Upwelling Fluid on the Biological Community at the Subduction Zone Sagami Trough

Norio Yoshida¹ and Hiroaki Tsukahara²

1) National Research Institute for Earth Science and Disaster Prevention

2) Shinshu University

Giant clam communities were discovered on the deep-sea floor of Sagami Bay. The biological activity of the community is considered to be kept by sulfur and carbon compounds in upwelling fluid at the site.

Gamma-ray surveys at the communities were carried out using an NaI(Tl) detector fixed at the side of "SHINKAI 2000." The gamma-ray spectrum was obtained with a multichannel pulse height analyzer. The giant clams get the biological energy from the upwelling fluid coming from the bottom of the sea. Therefore, relatively strong venting of fluid is expected through the community. The upwelling rate is affected by the crustal activity(e.g., crustal movement, earthquake, and volcanism). The community is a suitable place for monitoring the crustal activity. Relatively strong intensity of gamma-rays of ^{214}Bi , an offshoot of inert gas ^{222}Rn , was observed at the living clam community sites as expected. A large difference in the intensity among the communities was also observed.

The radioisotope ratio $^{14}\text{C}/^{12}\text{C}$ and stable isotope ratio $^{13}\text{C}/^{12}\text{C}$ in the giant clam shells were measured to confirm the fluid upwelling. The ratio $^{14}\text{C}/^{12}\text{C}$ was measured on specimens collected from two areas: Off-Hatsushima and the Sagami Knoll. The values were scattered over a wide range: normalized isotope ratio in per mill, $\delta^{14}\text{C} = -347\text{‰}$ to -159‰ . Even the living clams have various $\delta^{14}\text{C}$ values, and have not the highest $\delta^{14}\text{C}$ in the community. These data indicate that the $\delta^{14}\text{C}$ value does not correspond to the age of the shell, but to the degree of contamination of the seawater around the shell with the upwelling fluid. The ratios $^{13}\text{C}/^{12}\text{C}$ and $^{14}\text{C}/^{12}\text{C}$ were measured on specimens collected from the Sagami Knoll. The data showed linear relation between the values of $^{14}\text{C}/^{12}\text{C}$ and $^{13}\text{C}/^{12}\text{C}$. We infer from the linear relation that the carbon in the shells came from two sources, ordinary bottom seawater and upwelling fluid.