Comparative study of growth in Manila clam under different environmental conditions of submarine groundwater discharge

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Submarine Groundwater Discharge (SGD) is often characterized by high concentration of nutrients and documented as an important pathway between land and sea contributing to the biological productivity in coastal waters. We investigated to what extent SGD contributed to the growth of primary consumer by the field rearing experiments of Manila clam at two sites (Mega and Torisaki) along the Mt. Chokai volcanic coast in northern Japan from June to August 2015. Average Radon 222 (^{222}Rn) concentration at surface layer of Mega and Torisaki for two months were 4037 Bqm^{-3} and 241 Bqm^{-3}, respectively. The $\delta^{13}C$ of shell of Manila clam ($\delta^{13}C_{SHELL}$) reflected the $\delta^{13}C_{DIC}$ of the ambient water, i.e. lower $\delta^{13}C_{SHELL}$ value at Mega than that at Torisaki. There was the positive correlation between ^{222}Rn activity and DIN concentration ($r=0.881$ $p<0.01$). Contrary to expectations, the average growth rate of Manila clam reared at Mega was slightly smaller than that at Torisaki. The concentration of chlorophyll-a was almost the same at two sites. However water temperature at Mega was about 2 ℃ lower than Torisaki. Kobayashi and Toba (2005) reported that clear positive correlation between the growth rate of Mania clam and rearing water temperature. This suggested the negative effect of low temperature on the growth of manila clam. This study showed the seepage area does not always have a favorable influence on fisheries resources. The larger-scale effects of SGD on biological production of primary consumer is necessary.

Keywords: submarine groundwater discharge, Manila clam, growth , stable carbon isotope ratio

