

Food web analysis of Toyama Bay and seasonal changes of zooplankton: Using stable carbon and nitrogen isotopic ratios

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The isotopic ratios of stable carbon and nitrogen can be a key to finding out the influence that the environmental changes such as rising seawater temperature have on marine food web. The main aims of this study were i) to explore the food web in Toyama Bay, which has separate water masses in the water depth shallower than approximately 200m and deeper than that respectively, and ii) to analysis primary producers by measuring zooplankton. Aquatic samples of fishes and zooplankton inhabiting in the two layers of water were collected in offshore Toyama Bay as well as sinking particles organic matter, sedimentary organic matter and POM (particulate organic matter). We also collected sample of zooplankton from Yamato Basin in the Central Japan Sea, and NYUZEN DeepSeaWater Park in order to analyze the stable carbon and nitrogen isotopic ratios.

Both on the analysis of these isotopic ratios, we reached the following findings. Aquatic creatures in Toyama Bay are located on a food web starting from POM and phytoplankton is the primary producer of both the shallow water and deep water creature. The $\delta^{13}\text{C}$ values of zooplankton collected in Toyama Bay were higher than those from Yamato Basin. It is suggested that this is because the growth rate of the phytoplankton in Toyama Bay is faster than that in Yamato Basin. The $\delta^{15}\text{N}$ in zooplankton depleted with the increase of the nitrate concentration in the surface seawater, and $\delta^{13}\text{C}$ enriched with the increase of chlorophylla concentration in the surface water. Thus, it is considered that the $\delta^{15}\text{N}$ value reflects the supply of nitrate and the $\delta^{13}\text{C}$ value reflects the growth rate of phytoplankton.

Keywords: Stable isotope ratio, Toyama Bay, Zooplankton