

Nitrogen and Carbon stable isotope ratios of zooplankton in the Oyashio region of the western North Pacific

*Maki Noguchi¹, kazuaki Tadokoro², Fujio Hyodo³, Ichiro Tayasu⁴, Chikage Yoshimizu⁴, Jun Nishioka⁵, Naomi Harada¹

1. Research and Development Center for Global Change, Japan Agency for Marine-Earth Science and Technology, 2. Tohoku National Fisheries Research Institute, Japan Fisheries Research and Education Agency, 3. Research Core for Interdisciplinary Sciences, Okayama University, 4. Research Institute for Humanity and Nature, 5. Institute of Low Temperature Science, Hokkaido University

Carbon and nitrogen isotope ratios ($\delta^{15}\text{N}$ and $\delta^{13}\text{C}$) of organisms are controlled by not only biological factors, such as catabolism and assimilation, but also physical environmental conditions that influence the isotope ratios of primary producers (phytoplankton). To examine how different water properties (i.e., nutrients and temperature) affect $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ in marine food webs, we measured $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ of zooplankton in three distinct water masses: coastal Oyashio (COY), Oyashio (OY) and warm-core ring (WCR) water along the A-line monitoring transect (38N-42.5N, 144.5-147.5E) in March 6- 26, 2015, cruise of the KH-15-1 of the *R/V Hakuho-maru* of the Japan Agency for Marine-Earth Science and Technology (JAMSTEC), and in February 28 –March 16, 2015, cruise of the WK-15-03 of the *R/V Wakataka-maru* of the Tohoku National Fisheries Research Institute, Japan Fisheries Research and Education Agency (FRA). Zooplankton samples were collected from 150 m depth to the surface using vertical tow of a NORPAC twin net (45cm mouth diameter, 0.355 mm mesh size). After collection, all samples were classified using a stereomicroscope into species or genus level, and only adults were used for isotopic analysis. Water samples were collected from the surface to 250m depth profiles for the measurements of $\delta^{15}\text{N}$ ($\text{NO}_3^+ + \text{NO}_2^-$). We compared the trophic fractionations of carbon and nitrogen isotopes ($\Delta \delta^{13}\text{C}$, $\Delta \delta^{15}\text{N}$) of zooplankton among the three water masses. We found that $\delta^{15}\text{N}$ of chaetognatha at COY tended to be higher than OY and WCR, but a simple relationship between $\Delta \delta^{15}\text{N}$ and $\Delta \delta^{13}\text{C}$, regardless of species or water masses. Combined with this $\Delta \delta^{15}\text{N}$ - $\Delta \delta^{13}\text{C}$ relation, the isotopic ratios of zooplankton would allow us to predict C and N isotope ratios of higher trophic consumers, such as carnivorous fish and seabirds.

Keywords: N and C isotope ratios, food chain, Oyashio region, isotopic fractionation