Response of the eelgrass epifaunal food web to acidified ocean: An experimental approach

*Toshihiro Miyajima[1], Masaaki Sato[2,3], Masakazu Hori[2]

1. Marine Biogeochemistry Group, Division of Ocean-Earth System Science, Atmosphere and Ocean Research Institute, The University of Tokyo, 2. National Research Institute of Fisheries and Environment of Inland Sea, Fisheries Research Agency, 3. National Research Institute of Fisheries Engineering, Fisheries Research Agency

For detecting and quantifying influence of acidified ocean on trophic transfer and turnover rates in food webs, a deuterium (^{2}H)-based pulse-and-chase experiment combined with carbon (C) and nitrogen (N) stable isotope mapping was developed and applied to the epifaunal community of eelgrass meadows in outdoor experimental aquaria. At first, primary producers such as seagrass (*Zostera marina*) and epiphytic microalgae were labeled with ^{2}H by a short-term incubation in $^{2}H_{2}O$-enriched seawater under natural light conditions. Then, the labeled primary producers were washed vigorously with natural seawater, and transferred to mesocosms with running natural seawater preadjusted to various pH. Macrobenthic consumers such as crustaceans and molluscs were introduced in the mesocosms and incubated for 1 month under natural light conditions. Light intensity, pH, temperature, salinity, and dissolved oxygen were continuously monitored throughout incubation. Subsamples of primary producers, consumers, and accumulated detritus were collected periodically, freeze-dried, and analyzed for hydrogen, C, and N isotopic ratios. Trophic transfer rate was evaluated by comparing the ^{2}H enrichment between the primary producers and the consumers. Because ^{2}H enrichment did not disturb natural abundance of C and N isotopes, the trophic position of each consumer could be assessed by conventional C-N isotope ratio mapping. A preliminary experiment was also performed in which primary producers were labeled with multiple tracers of ^{2}H, ^{13}C, and ^{15}N, to compare uptake and translocation processes within the seagrass and trophic transfer to consumers between these elements. In this presentation, we show results from two different acidification experiments, and discuss appropriate data analysis methods.

Keywords: Ocean acidification, Seagrass beds, Food web

