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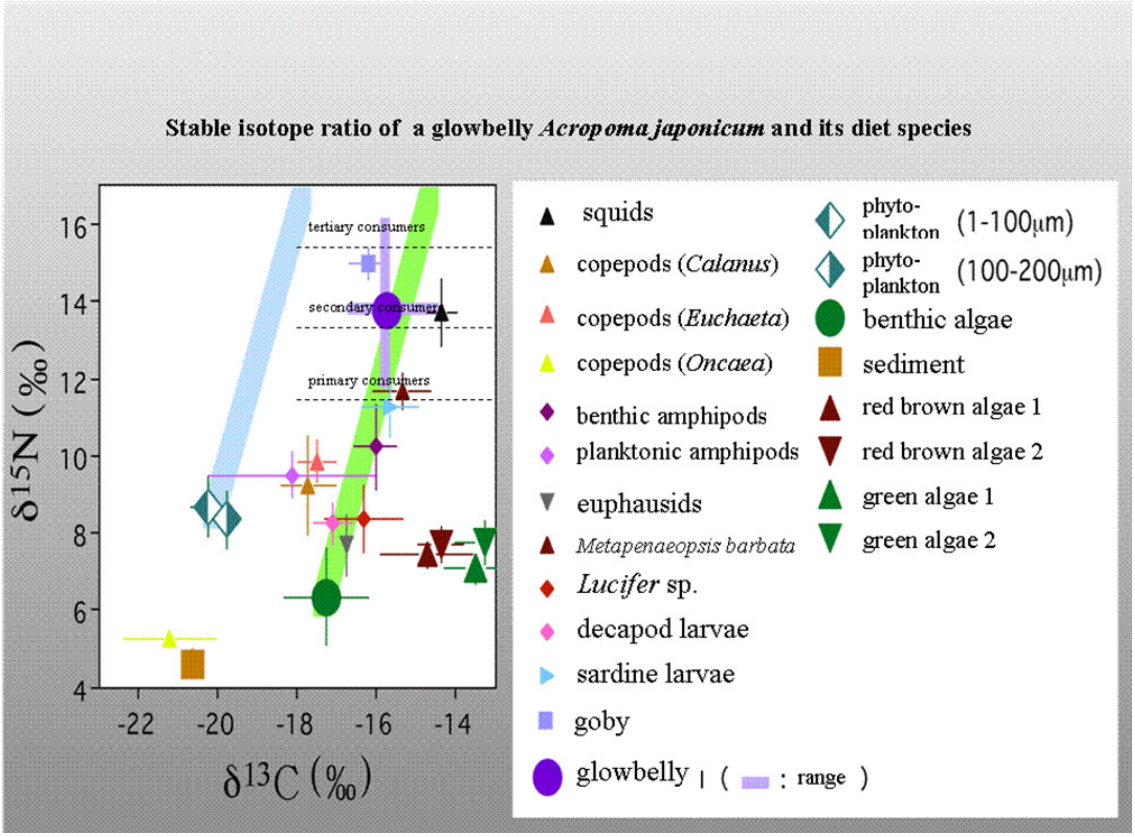
Dr. Koji Omori is an ecologist, specializing in theoretical ecology including ecosystem model analysis and aquatic ecosystem analysis. He started his career as Assistant Prof., Department of Biology, Ehime University in 1982, and was a visiting research fellow at the Center of Marine Coastal Science, New Jersey State Univ., USA in 1996. From1996 to the present, he has been Associate Prof., Center for Marine Environmental Studies, Ehime University

Dynamics Analysis and Risk Assessment of Persistent Toxic Substances in the Ecosystem

Stable-isotope ratios are a powerful tool for ecosystem analysis. For such an ecosystem analysis, we use two isotopes, carbon and nitrogen and chemical contaminants. The value of $\delta^{13}C$ is unique for each primary producer. For consumers, their value is dependent on the primary producers within their food-chain. On the other hand, $\delta^{15}N$ increases by about 3‰ with the trophic levels. So we can draw the food-web structure using these two stable-isotope ratios.

The aim of our study is to monitor long-term human impacts including chemical contaminants on marine ecosystems, focusing on population dynamics and stable-isotopic fluctuation in higher consumers, such as fish species. We have also attempted to find out a new methodology ecosystem management based on its healthiness. In our study we regarded marine ecosystems as healthy if materials are circulated regularly and stably, through food webs to higher consumers. The δ C-N map of important fish species, JAKO, and its prey organisms in demersal community was drawn. This map shows that the demersal community was supported by the epilithic algae but not by the phytoplankton, contrary to a general rule that the demersal community under euphotic zone is underlain to the phytoplankton, known as the pelagic-benthic coupling. The seasonal changes in dC-N ($\delta^{13}C$) of a higher consumer, JAKO became closer to the value of phytoplankton because its prey organism production was enhanced by the algal blooms. Its $\delta^{15}N$ also decreased in spring because they feed on lower consumers, such as copepods. This is because the availability of the secondary consumers, such as anchovy, are lacking due to overfishing. In this way, we can monitor the marine ecosystem dynamics by focusing on the stable-isotopic fluctuation of higher consumers.


Stable isotope ratio of a glowbelly *Acropoma japonicum* and its diet species
tertiary consumers
secondary consumers
primary consumers
δ15N (‰)
δ13C (‰)
16
14
12
10
8
6
4
-22
-20
-18
-16
-14
squids
copepods (*Calanus*)
copepods (*Euchaeta*)
copepods (*Oncaea*)
benthic amphipods
planktonic amphipods
euphausids
Metapenaeopsis barbata
Lucifer sp.
decapod larvae
sardine larvae
goby
glowbelly (: range)
phyto-plankton (1-100μm)
phyto-plankton (100-200μm)
benthic algae
sediment
red brown algae 1
red brown algae 2
green algae 1
green algae 2