Illustrating isoscape map for better understanding the ecological and geochemical nitrogen dynamics

DAOCHAO XING[1] AND YOSHITO CHIKARAISHI[2]

[1]Environmental Science, Hokkaido University
[2]Institute of Low Temperature Science, Hokkaido University
(daochaox@pop.lowtem.hokudai.ac.jp)

Stable isotope analysis of bulk nitrogen in organisms or their tissues has been used as a conventional tool for tracing nitrogen transfer in ecological and geochemical studies. However, the $\delta^{15}N$ values of primary producers ($\delta^{15}N_{baseline}$) vary spatially and temporally in natural ecosystems, which always provides us unexpected large errors in our understanding of the transfer process in these studies.

Isoscape map illustrated via compound-specific isotope analysis of amino acids will be useful to clarify the spatial variation in natural ecosystems. Indeed, several amino acids such as phenylalanine (Phe) have little elevation in the $\delta^{15}N$ value during trophic transfer along food chains, and the values of Phe found in carnivorous, local fish can record monthly-year scale integrated information in the ecosystems.

In this study, to demonstrate the illustration of isoscape map for the coastal area, we collected the resident fish *Oplegnathus fasciatus* from 7 sites along Sagami bay, and measured the $\delta^{15}N$ values of amino acids in the fish by GC/IRMS. From the results, we found a large gradient in the $\delta^{15}N$ value of Phe across Sagami bay (Fig.1), which may reflect the mixture of isotopically distinct nitrogen sources (e.g., natural current, agriculture, and industrial inputs) into the bay. This isoscape map provides us to understand how variable in the $\delta^{15}N_{baseline}$ value for studied site, and thus can be useful in advances of ecological and geochemical studies.

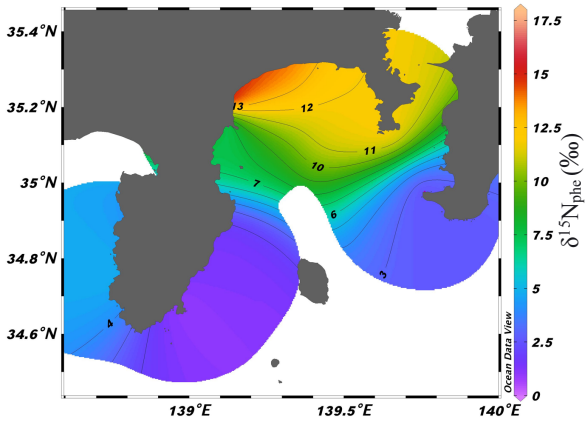

Fig 1. Isoscape map of Sagami bay.