

MIS023-11

Room:303

Time:May 22 14:15-14:30

Pelagic ecosystem in Lake Baikal: Reconstruction from nitrogen isotopic analyses of amino acids

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The nitrogen isotopic composition of amino acids ($\delta^{15}\text{N}_{AA}$) is useful for estimating trophic position of the organism (McClelland and Montoya 2002, Chikaraishi et al. 2007, 2009). In this study, $\delta^{15}\text{N}$ of bulk organic matter and 12 amino acids including glutamic acid and phenylalanine were determined for major pelagic organisms in Lake Baikal. By using the equation proposed by Chikaraishi et al. (2009), we estimated the trophic position of these organisms and evaluate their trophic relationships. The results are consistent with simple trophic structure of pelagic food web reported by previous studies with field observations. The highest trophic position (5.0 ± 0.1) observed for seal (*Pusa sibirica*) suggested that its major diet are pelagic sculpin (Cottomephoridae & Comephoridae, 4.3 ± 0.2) and freshwater salmon (*Coregonus autumnalis migratorius*, 3.6 ± 0.2). These results are differ for the top predators of seal and sculpin from previous studies by $\delta^{15}\text{N}$ of bulk organic matter (Yoshii et al. 1999), though they were consistent for the lower position species. The $\delta^{15}\text{N}_{AA}$ results also showed four species of pelagic sculpin are in the close trophic position, despite large differences in $\delta^{15}\text{N}_{TN}$ (~ 3.4 per mil) between Cottomephoridae and Comephoridae observed by both previous and this studies. It suggests these pelagic sculpin are competing their trophic niche in the lake. It is also suggested that the efficiency of amino acid estimation of trophic position is more emphasized for the species at higher trophic position in the ecosystems, than those in lower positions.