

Reconstruction of historical change in primary productivity in a coastal area of Hokkaido using biogenic Si content

Isao Kudo^{1*}, Yasuharu Hidaka²

¹Hokkaido University, ²Hokkaido University

Primary production by phytoplankton consists of the base of oceanic ecosystem. More than 50% of fish production is carried out in the coastal ocean, suggesting this high productivity should be supported by high primary productivity. Coastal area is much more influenced by human activities. In Hokkaido, especially Sapporo region, development of farming ground and urbanization since Meiji era seem to influence coastal primary production processes. Because primary producers in the coastal area are mainly diatoms, biogenic silica (BSi), originated from diatom frustules, may represent biomass of diatoms, in another word, work as index to estimate primary production. In this study, we measured BSi content in the sediment to reconstruct the historical change in primary productivity in Ishikari Bay to which the second largest Ishikari River supplies nutrients. River plume developed eastward in Ishikari Bay. As high chlorophyll-a was observed in the river plume except in May and July, 2006, the supply of nutrients from the Ishikari River contributed to enhance the productivity in the bay. The $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values in the sediment suggested strong influence of terrestrial organic matter. The average sedimentation rate was $0.65 \text{ g cm}^{-2}\text{yr}^{-1}$ near the river mouth and $0.25 \text{ g cm}^{-2}\text{yr}^{-1}$ in the central part of the bay. A high C:N ratio of 20 was found in the sediment between 1950 and 1970. This indicates the high flux of peat during this period due to active land development and flood. The BSi content in the sediment near the river mouth decreased with depth, indicating increasing trend of primary productivity toward present. Considering nutrient flux and sediment loadings, a decrease in the sediment loading seems to improve light penetration in the river mouth, resulting in the increase in diatom productivity.

Keywords: land-ocean interaction, primary productivity, nutrients, sediment, biogenic silica