

Geographical distributions of primary production phenology and nutrient/iron supply in the subarctic North Pacific Ocean

*Toru Hirawake¹, Jun Nishioka², Hajime Obata³

1. Faculty of Fisheries Sciences, Hokkaido University, 2. Institute of low temperature sciences, Hokkaido University, 3. Marine inorganic chemistry division, Atmosphere and Ocean Research Institute, University of Tokyo

The subarctic North Pacific is one of the most productive regions where has the largest biological CO₂ drawdown in the world. Nutrient and iron rich waters discharged from the sub-polar marginal seas (the Bering and Okhotsk Seas) through the intermediate water support high primary production of phytoplankton in this region. However, spatio-temporal distributions of primary production and nutrient/iron are asymmetric and ununiform. Therefore, a linkage between nutrient/iron supply and primary production in the subarctic North Pacific has not been sufficiently understood. In this study, we investigate relationship between geographical distributions of primary production phenology pattern obtained from satellite data and ship-based nitrate and dissolved iron concentrations in the subarctic North Pacific. The phenological patterns in primary production were classified into 23 clusters. The highest difference between actual primary production and estimated one from nitrate concentration (residual) was found in the cluster distributed around Aleutian Islands. Primary production phenology in this cluster suggests existence of process to supply nutrient/iron continuously and spatial pattern of in-situ surface iron concentration in this region during summer supported the process. The phenological patterns of other clusters also imply existence of the area where both nutrient and iron deplete after spring bloom, and the area where iron depletion causes high nutrient and low chlorophyll (HNLC) condition. These patterns could almost be explained by the existing ship-based dissolved iron and nitrate observational data.

Keywords: primary production, iron, nutrients