

High resolution biogeochemical modelling in the North Pacific

*Hatsumi Nishikawa¹, Humio Mitsudera¹, Hiroshi Yoshinari⁵, Takuya Nakanowatari², Tomohiro Nakamura¹, Keisuke Uchimoto³, Hiroyasu Hasumi⁴

1. Institute of Low Temperature Science, Hokkaido University, 2. National Institute of Polar Research, 3. Research Institute of Innovative Technology for the Earth, 4. Atmosphere and Ocean Research Institute, University of Tokyo, 5. National Institute for Environmental Studies

It is now well known that the subarctic North Pacific is one of high-nutrient low-chlorophyll (HNLC) regions, caused by a growth-limiting scarcity of the micronutrient iron. On the other hand, in the Oyashio region most of nitrate is consumed during spring and the primary production is high. Recent observations revealed that iron supply from sediment on the northwest continental shelf the Okhotsk Sea, adjacent to the Amur River estuary plays an important role (e.g. Nishioka et al., 2013). Dense shelf water (DSW) takes up iron from sediment, thereby transporting iron into the Okhotsk Sea intermediate water. Iron in the intermediate water is then raised to the sea surface by tidal mixing around the Kuril Islands, making it available for primary production. In this study, we aim to clarify the iron cycle not only in the Okhotsk Sea but also in the subarctic North Pacific using a high-resolution iron circulation model.

The simulation reproduces HNLC in the subarctic North Pacific in summer and large biological production around the Oyashio region and the Transition Domain in spring season. Distribution of iron concentration of our model was in good agreement with the observations.

Keywords: High resolution modeling, Nutrient transport, Iron supply