Differences in the composition and photosynthetic physiology of spring phytoplankton assemblages between coastal Oyashio and Oyashio waters

*Koji Suzuki[1], Kazuhiro Yoshida[1], Hisashi Endo[1]

1. Hokkaido University

Every spring massive diatom blooms occur both in coastal Oyashio (COY) and Oyashio (OY) regions off East Hokkaido. In general, surface COY waters possess lower temperatures and salinities and higher nutrient levels as compared with those in the OY, so that marked differences in the abundance, community composition, and photosynthetic physiology of phytoplankton between the two water masses can be expected. These, in turn, could influence the biogeochemical processes and ecosystems in the two regions. However, such information has still been scarce thus far. Therefore, we carried out field campaigns using the R/V *Hakuho Maru* during 6–26 March 2015 and the TR/V *Misago Maru* during 16–17 April 2015. The abundance and community composition of phytoplankton were assessed from UHPLC pigment analyses. Diatom community composition was also estimated with a DNA metabarcoding technique. Furthermore, we evaluated the photosynthetic physiology of phytoplankton in terms of photosynthesis-irradiance curves, chlorophyll variable fluorescence, and diatom-specific *rbcL* gene expression. During the R/V *Hakuho Maru* expedition, phytoplankton little bloomed at most stations in the COY and OY where diatoms were predominant in the phytoplankton assemblages. On the other hand, diatoms proliferated in COY waters during the TR/V *Misago Maru* observations. The genus *Thalassiosira* was predominated in the diatom assemblages of the COY, whereas a mixture of *Thalassiosira, Minidiscus,* and *Fragilariopsis* dominated in the OY. In the 24-h bottle incubation experiments where temperatures increased by +7˚C from those of ambient seawater, increases in diatom-specific *rbcL* gene expression and chlorophyll *a*-normalized maximum photosynthetic rate were observed in COY waters, whereas no such temperature effect was confirmed in the OY. Our results suggested that *Thalassiosira* in the COY could respond sensitively to the increase in temperature and then form blooms rapidly.

Keywords: Phytoplankton, Spring bloom, Community composition, Photosynthetic physiology

