

Ocean color remote sensing of phytoplankton community structure of the Arctic Ocean

*Amane Fujiwara¹, Emmanuel Devred², Atsushi Matsuoka³

1. Japan Agency for Marine-Earth Science and Technology, 2. Bedford Institute of Oceanography, 3. University of Laval

The Arctic Ocean is one of the most sensitive regions in response to climate change. The Arctic original marine ecosystem is placed at a high risk of losing its habitat and biodiversity. In terms of bottom-up control, an effective approach to comprehend the impact of environmental changes on the marine ecosystem is to monitor the spatio-temporal variability of the phytoplankton community structure from space. In this study, we propose a new algorithm for satellite ocean color data to identify phytoplankton community structure and monitor its spatial distribution of the Arctic Ocean.

We examined a large in situ dataset of phytoplankton pigments and bio-optical properties collected at the Pan-Arctic scale. Pigment composition and concentration measurements showed that phytoplankton communities can be divided into three major types according to their biomass, predominant phytoplankton taxa and taxonomic diversity features. We parameterized the optical properties (i.e. specific absorption spectra) of the three algal community types and developed a model to discriminate them using the spectral absorption of seawater. The model successfully discriminates the phytoplankton community types with 87% and 69% accuracy for in situ and remotely-sensed total water absorption spectra, respectively. While reducing the model uncertainty still remains an objective, our novel method based on satellite observation might provide insights into changes in the Arctic marine ecosystem when applied to long-term ocean color data.

Keywords: Remote Sensing, Arctic Ocean, Phytoplankton community structure