

Significance of acclimation process in simulating chlorophyll distribution in the Arctic Ocean

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Recently, our team has developed a new oceanic ecosystem model (FlexPFT-3D) based on a novel theory for phytoplankton physiology (Smith et al. 2015). Different from our previous models (NEMURO, MEM), the model represents phytoplankton acclimation processes in which phytoplankton change their stoichiometry (nitrogen:carbon:chlorophyll:iron) according to the change of a surrounding environment. A clear improvement was found in chlorophyll distributions in oceanic interior and the Arctic Ocean. Arctic chlorophyll concentration in the new model is comparable to the observation, while it is underestimated in the previous models. In the Arctic Ocean, significant seasonal environmental change exists especially in a light condition. The new model can represent increase in the rate of chlorophyll to carbon biomass in the summer and resulting increase in the phytoplankton specific growth rate; those contribute to the improvement in simulating Arctic chlorophyll concentration.

Keywords: Phytoplankton, Ecosystem model, FlexPFT