西部北極海における海氷・海洋生態系モデルの開発

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Development of a lower trophic level ecosystem model in the western Arctic Ocean

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A numerical model describing the lower trophic level ecosystem in the western Arctic Ocean (Chukchi Sea and Beaufort Sea) was developed to investigate the relationship between the timing of sea ice melting and ecosystem change. For this purpose, the model consists of thirteen state variables which include the typical biology in the water column and sea ice. The primary producer in the model was divided to three components: "Ice Algae", "Centric Diatoms", and "Autotrophic Flagellates". Ice algae is mainly pennate diatoms that adapted to low light intensity. Centric diatoms are the dominant species in the ice-edge bloom, and they are adapted to strong light intensity. Autotrophic flagellates are a major phytoplankton group after the bloom, and they can also live under sea ice. Zooplankton grazing these primary producers, was categorized into "Amphipods", "Copepods", and "Heterotrophic Flagellates". Top predator in the model was "Nektons" including krill, arrow warm, and other predatory species. In addition, the model includes other nutrient and detritus components. The idealized annual physical forcing (sea surface temperature, sea surface light intensity, and mixed layer depth) and sea ice condition at the Northwind Abyssal Plain (NAP) were given for the model. In the Arctic Ocean, amphipods and copepods are important food sources for higher trophic level animals such as marine mammals, sea birds, and fishes. We will introduce the seasonal variation of zooplankton biomass simulated by the model, and will discuss the effect of the timing of sea ice melting on the lower trophic level ecosystem.