

# Impact of sporadic occurrence of Antarctic krill on plankton communities in the SIZ of the Antarctic Ocean estimated using an ecosystem model.

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The Antarctic krill (*Euphausia superba*) is known to be one of the most important zooplankton in Antarctic food-webs because of the dominance in biomass in herbivorous zooplankton groups. A recent report showed that the Antarctic krills are also one of the sensitive organisms to ocean acidification (Kawaguchi et al., 2014). Objectives of the present study are to elucidate the impact of sporadically occurring Antarctic krills on the plankton communities in the ice-covered zone (SIZ) of the Antarctic Ocean using a simple one-box ecosystem model.

A one-box NPZD (Nutrient, Phytoplankton, Zooplankton, Detritus) ecosystem model of the Antarctic Ocean (around 60oS, 110oE) was made according to Konno et al. (2014). Biological components are large and small phytoplankton, large and small herbivorous zooplankton, microzooplankton, large and small pteropods (adult and juvenile pteropods) and carnivorous zooplankton. Antarctic krills and large-sized copepods were included in the large herbivores. We tried to put multiple occurrence frequency values into the ecosystem model, because Antarctic krills distribute heterogeneously. Sensitivity analyses were made to find the effective occurrence frequency values of krills on the change in other herbivorous zooplankton such as copepod and pteropod biomass in late summer.

The present model study suggested that Antarctic krills in terms of biomass are negatively related with competitors of other large herbivores. When the dense population of krill occur in early January, large copepods and small pteropods decreased approximately 10 % and 15 % in biomass in late summer.

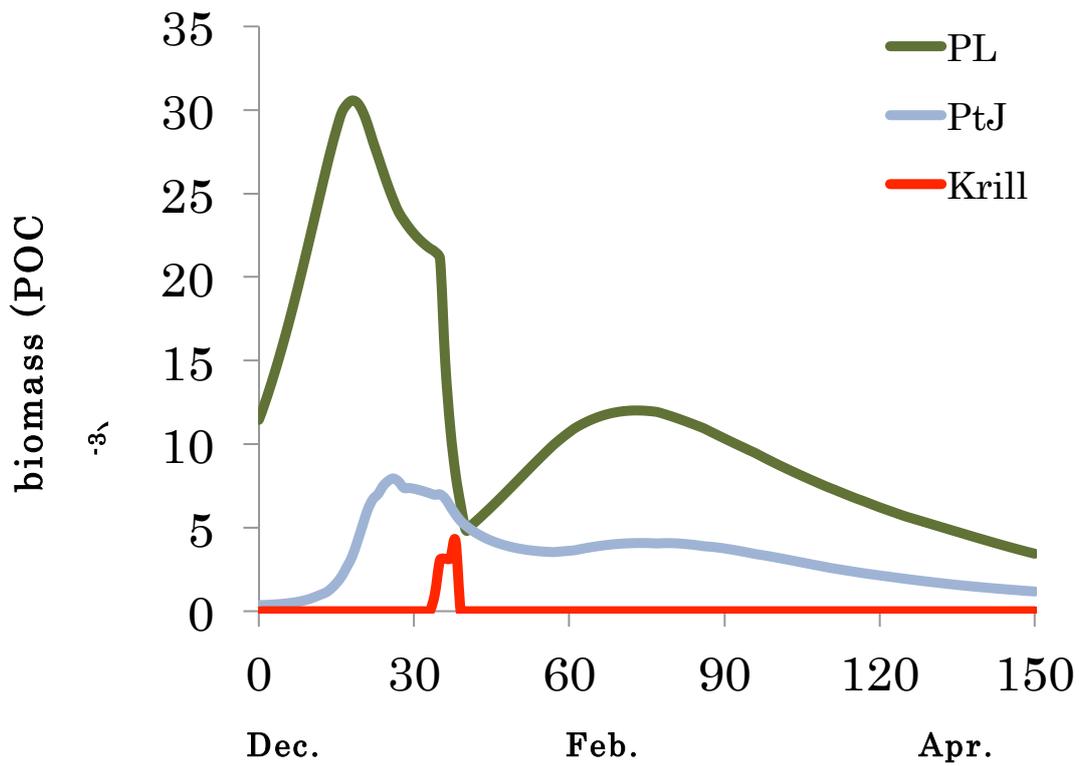


Fig.1. Simulated POC biomass change of large phytoplankton, pteropod and krill in summer (150 days). The beginning date of the simulation run is December 1 and the last date is April 30. PL, PtJ and Krill indicate large phytoplankton, juvenile pteropods and Antarctic krills, respectively.