

Ice Algal Community in High Saline Brine of Sea Ice

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Summary

In the high latitudes, sea ice is formed annually. Sea ice contains brine, which consisted of high saline and nutrients. Ice algal community is developed in this brine although temperature is as low as $-1.8\text{ }^{\circ}\text{C}$ and solar irradiance is less than 1 % of sea ice surface. Ice algae is the most important primary producer in the high latitudes during ice season since phytoplankton in a water column under sea ice is extremely scarce. Most study has focused on ice algal community in the well developed sea ice. However the initial incorporation of plankton from seawater to newly formed sea ice has never been studied due to a logistic problem. Therefore, the novel *in situ* incubation experiments were conducted to determine the initial development of microbial community in relation to size groups of ice algae during the initial formation of fragile sea ice in Saroma-ko Lagoon, Hokkaido, Japan. Bacteria, viruses, and nanoflagellates were incorporated into the newly forming sea ice together with smaller than $2\text{ }\mu\text{m}$ picophytoplankton. Timing for those organisms to reach their plateau abundance in the sea ice was coincided with that photosynthetic ^{13}C assimilation was detected from the incorporated phytoplankton cells. Dissolved organic matter produced by the acclimatized phytoplankton cells may mediate microbial dynamics. Microbial association among bacteria, viruses, and nanoflagellates except for picophytoplankton was observed although they had different incorporation rates. Ecological significance of microbial association was discussed in relation to their implication to biogeochemical carbon cycle in the high latitudes.