# 海氷融解が植物プランクトンの現存量および生産力に及ぼす影響

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# Effects of melting sea ice on phytoplankton abundance and productivity

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Sea ice in the Southern Ocean is an important factor to control phytoplankton abundance and productivity. Although several studies have assessed functions of sea-ice on phytoplankton dynamics in the Ross Sea and the west Antarctic Peninsula regions, the effects of melting sea-ice still remain elusive in the Indian sector of the Southern Ocean. For the better understanding the effects on phytoplankton abundance and productivity, we conducted an incubation experiment by the $^{13}C$ method in the austral summer. Sea ice and seawater were collected at an ice edge (64°41.9'S, 109°56.0'E) on 11 January, 2018 by the training vessel *Umitaka-maru* of TUMSAT, and then sea ice cubes (~20 kg) were melted in filtered seawater (180 L) in a dark container on deck. Incubations were carried out in the following four test sections: 1) seawater, 2) sea-ice melting water, 3) the blended, sea-ice melting water plus seawater, and 4) the blended, filtered sea-ice melting water plus seawater, for approximately 24 hours under a natural light condition in a water bath on the upper deck. In addition to the net primary production, we also obtained samples for bulk and size-fractionated chlorophyll *a* (chl *a*) concentrations, nutrients, and phytoplankton and micro-zooplankton community compositions before and after the incubation. We found significant differences in chl *a* ratios of final concentration to initial concentration (chl $a_{Fin}$/chl $a_{Init}$) of the bulk and <10 μm size class among four test sections (Fig. 1). These results suggest that dissolved and particulate materials in sea ice could affect phytoplankton abundance in <10 μm size class, which is potentially preferred food size by micro-zooplankton.

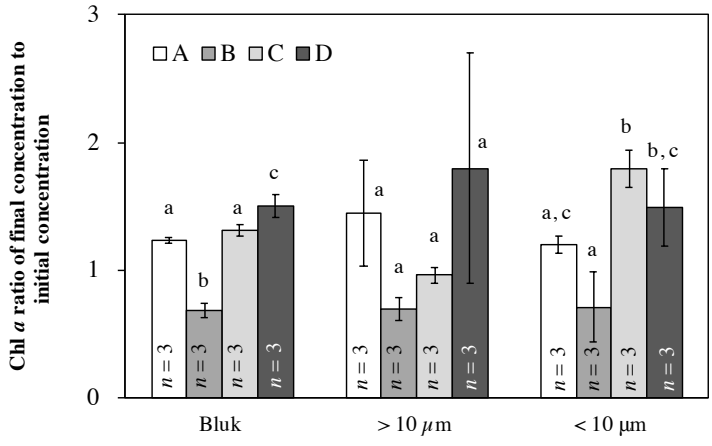


Fig. 1. Bulk and size-fractionated chl *a* ratios of final concentration to initial concentration in (A) seawater, (B) sea-ice melting water, (C) sea-ice melting water plus seawater, and (D) filtered sea-ice melting water plus seawater. The same letters above each bar in bulk and size-fractionated chl *a* ratios denote no significant difference according to Tukey multiple range test at the 0.05 alpha level.