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Community and herbivorous activity of heterotrophic protists in the western boundary of Canada Basin during the early summer, Arctic Ocean

Eun-Jin Yang (1), Ho-Kyung Ha (2), Kyung-Ho Chung (3), and Sun-Young Kim (4)

(1) Republic Of Korea (ejyang@kopri.re.kr), (2) Republic Of Korea (ha@kopri.re.kr), (3) Republic Of Korea (khchung@kopri.re.kr), (4) Republic Of Korea (sykim@kopri.re.kr)

During July/August 2010, we measured heterotrophic protistan grazing impacts on phytoplankton growth rate and community structure in the vicinity of western boundary of Cananda Basin using the icebreaker R/V Araon. A variety of environmental condition and trophic condition were encountered, from free sea-ice cover to heavy sea-ice cover, and from low chlorophyll-a (< 0.1 ug L^{-1}) to diatom blooming (> 3 ug L^{-1}). The community of heterotrophic protists was dominated by naked ciliates and heterotrophic dinoflagellates. Ciliates dominated in eddy-out and HDF dominated in eddy-in site. Heterotrophic protistan biomass and size structure matched with the chlorophyll-a concentration and size-fraction.

Phytoplankton growth rate varied from 0.13 to 1.81 d^{-1}, on average 0.72 d^{-1}. Grazing rate of heterotrophic protistan varied from 0.12 to 1.52 d^{-1}, on average 0.64 d^{-1}. Grazing rate was significantly correlated only to phytoplankton growth rate ($p < 0.001$), and not to initial chlorophyll-a concentration or other measured environmental factors. Heterotrophic protists grazed from 19.1 to 181.4% (average 92.1%) of daily chlorophyll-a production and from 11.3 to 79.4% (average 43.0%) of initial standing stock. In this study site, heterotrophic protisan grazing and phytoplankton growth were high compared to rates reported summer 2004 in western Arctic Ocean. Community of heterotrophic protist is clearly important in determining the fate of phytoplankton during the early summer in the study area.