

Response of dimethyl sulfide production by phytoplankton to change in multiple environmental stressors in the western Arctic Ocean

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The Arctic Ocean environment is experiencing rapid climate changes such as warming, ocean acidification and sea ice reduction, influencing ecosystem dynamics including biogeochemical cycling. Dimethyl sulfide (DMS) and its major precursor dimethylsulfoniopropionate (DMSP) are produced through physiological function of phytoplankton in marine environment. It has been suggested that oceanic DMS emissions could play a dominant role in climate regulation on a regional basis especially in the polar region. Unraveling the response of marine organisms against such environmental perturbations is important to better understand the present and future Arctic Ocean ecosystem and production of DMS and DMSP. We investigated the effects of temperature, CO₂ and salinity on plankton communities, DMS and DMSP in the Arctic Ocean using on-board manipulation experiment during R/V *Mirai* MR15-03 cruise. Temperature (2.2 or 7.2°C), CO₂ (300 or 600 μatm) and salinity (29.4 or 27.8) were manipulated using thermostat circulator, the addition of high CO₂ seawater, and pure water, respectively. The higher temperature enhanced the growth of phytoplankton community in terms of chlorophyll-*a*. Nano-sized (~2–10 μm) phytoplankton growth was increased due to the higher temperature but not CO₂ in the community. On the other hand, pico-sized (< 2 μm) phytoplankton growth was unchanged during the incubation. DMS and DMSP concentration were getting higher during the experiment for all batches. We will further discuss the relationships between production of DMS and DMSP and changes in the biological variables in this presentation.

Keywords: dimethyl sulfide, DMS, DMSP, ocean acidification, Arctic Ocean