

INORGANIC CARBON SYSTEM IN THE WESTERN ARCTIC OCEAN IN THE RAPID CHANGING ARCTIC CLIMATE

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The Arctic Ocean lies in the center of the current climate change as the summer sea-ice extent shrinks dramatically during the last decades. Several modeling studies predict complete disappearance of the sea-ice extent in summer this century. One of the concerns resulting from this rapid change in the Arctic climate is the impact on the marine ecosystem in which carbon is the backbone of the energy flow initiated by solar energy. In addition, the shift of the ice-covered to the complete open ocean may lead to the change in the CO₂ flux across the sea-surface due to the imbalance in $p\text{CO}_2$ between, which is ultimately driven by the primary production in the surface mixed layer and by the Arctic circulation. To investigate the change in the air-sea CO₂ flux and the carbonate system interior of the water column, we have visited for 5 years the western part of the Arctic Ocean every summer season since 2010 by the Korean ice breaking R/V Araon. The areas surveyed were always undersaturated with respect to the atmospheric CO₂ despite large variability of the degree of saturation. We explored the spatial and temporal characteristics of the carbonate system in conjunction with the extent to which physical and biological properties would influence. To identify the driving forces in air-sea CO₂ gas exchange and changing carbonate system interior of the water column, we focused on the impact of sea-ice melting, freshwater input from the continent, biological activities, and chemical processes, which allow us to delve in carbonate system variation in this particular area. In the presentation I will discuss the results from the 5-year observations in the picture of the rapid change in the Arctic environment.