A01-O06

A BIOLOGICAL CONTRIBUTION TO PARTIAL PRESSURE OF CO_2 IN THE WESTERN ARCTIC OCEAN AND BERING SEA

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Arctic Ocean contributes 5-14% to the global balance of CO_2 sink and source; particularly Chukchi Sea is large ocean sink for CO_2. Major controlling factor of partial pressure of CO_2 in seawater (pCO_2) in seasonal ice zone is physical processes, such as temperature, salinity, fraction of sea ice melt water, and wind-driven mixing. On the other hand, contribution of biological processes is also significant, such as blooming season after sea ice retreat. However, few studies have focused on the quantitative relationship between the biological process and pCO_2. Therefore, little is known about how much biological processes affect pCO_2. Objective in this study is to clarify biological contribution to pCO_2 in the western Arctic and Bering Sea. We conducted cluster analysis to infer the controlling factor of pCO_2 variability using in-situ sampled pCO_2, sea surface temperature, sea surface salinity and Chl.*a*, and satellite derived wind speed, sea-ice concentration and primary productivity as the input variable. The northern Bering Sea and the northern shelf of Chukchi Sea were classified into relatively low pCO_2 with high primary productivity, weak wind and less stratified region (Fig.1). Our result suggests that biological contribution to pCO_2 in the two regions is greater than other regions.

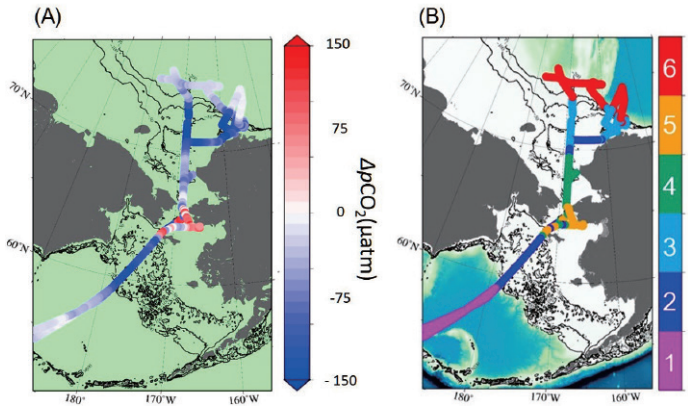

Fig.1. (A) distribution of *Δp*CO2 (pCO_2 in sea water – pCO_2 in atmosphere), (B) result of cluster analysis. Northern Bering and northern Shelf of Chukchi Sea (Cluster2, 3) had significant CO_2 sink condition. In these regions, mean primary productivity and in-situ Chl.*a* were relatively high, and mean wind speed was relatively weak, and then there is less stratification due to a little fraction of sea ice melt water.