Biogeochemical characteristics of dissolved and particulate organic carbon in the Amundsen Sea, Antarctica

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The Amundsen Sea Polynya (ASP) is the most biologically productive polynya in Antarctica. At the same time, the ice-shelves of the Amundsen Sea are experiencing basal melt by intrusions of warm circumpolar deep water (CDW) onto the continental shelf down deep troughs. These features make the Amundsen Sea an ideal region to monitor the influence of environmental changes on marine biogeochemical cycles.

To investigate distributions of dissolved and particulate organic carbon (DOC and POC) which are key components for understanding of export and sequestration of organic carbon, seawater sampling for nutrients (NO_3, PO_4, NH_4, SiO_2), DOC and POC measurements was carried out at 40 stations (35 stations + 5 revisit stations) in the Amundsen Sea during Korea research ice breaker R/V *Araon* cruise (ANA04B, December 31, 2013–January 15, 2014).

DOC and POC in open sea were at background concentrations of approximately 44 and 2 μM C, respectively. In the ASP, DOC and POC concentrations ranged from 38-144 μM C and < 1–60 μM C, respectively. High DOC and POC concentrations were observed in the upper 100 m of the water column. However, POC concentration sharply decreased with increasing depth. Below 100 m POC concentration remained low (< 3 μM C), whereas DOC concentration varied from 38–70 μM C, suggesting active remineralization of POC in the ASP. The NO_3:PO_4 ratios showed that *Phaeocystis antarctica* was the dominant phytoplankton taxa in the ASP, which is not readily grazed by zooplankton. The results from this study suggest that the biological drawdown of inorganic nutrients result in the net production of organic carbon in the upper 100 m, and that export flux of POC derived from *Phaeocystis antarctica* bloom would be low because of active remineralization by microbial activity.