Productivity, Chlorophyll and Phytoplankton in Bering Strait and Chukchi Sea

Sang Lee, Terry Whitledge and Sarah Thornton, University of Alaska Fairbanks

Sang Lee, Nutrient Lab
Photo, B. Bluhm

To estimate carbon and nitrogen uptake of phyplankton at different locations, productivity experiments were executed by incubating phytoplankton in the swimming pools on the deck for 4-7 hours after we inoculated stable isotopes (^{13}C, $^{15}NO_3$, and $^{15}NH_4$) into each bottle. We completed 10 productivity stations, which had 6 different light depths for each station using a Secchi disc to measure light intensity through the water column at each productivity station. We filtered all productivity samples bottle on GF/F (ø = 25 mm) filters for laboratory isotope analysis at the University of Alaska Fairbanks.

Along with the small productivity bottle experiments, five large volume productivity experiments were executed to look at the physiology status of phytoplankton at the small productivity stations. These filtered (GF/F, ø = 47 m) samples will be chemically analyzed for the photosynthetic end products of phytoplankton such as lipid, protein, polycarbonate and LMWM.

Since the photosynthetic end products are affected by species composition of phytoplankton, phytoplankton samples were taken from the CTD casts at every productivity station for species identification. The total 87 phytoplankton samples stored in 125 ml plastic bottles with neutral Lugol solution will be identified under a microscope at the laboratory. In addition to these samples, about 300 ml water from CTD casts at every station was filtered onto GF/F filter to be analyzed at the lab. We completed 513 water samples for Chl a from 3 different depths (sometimes, every CTD depth). Chl a from these filters will be extracted by the mixture solvent (60 % of 90 % Acetone and 40 % of DMSO) and measured by a fluorometer in our lab. The data from these samples will indicate the primary production as the basic food for the higher trophic level within the water column as well as the benthic ecosystem in the northern Bering and southern Chukchi seas and consequently in the Arctic ocean. The comparison between the current and previous (15 years ago) primary productions will suggest how the ecosystem in these regions has been changed as a result of the current change in climate in the Arctic regions.

The Chlorophyll *a* concentrations will also be used to calibrate the *in vivo* fluorescence profiles. The samples were collected with the rosette on upcasts and extracted chlorophyll *a* concentrations were be determined fluorometrically (Parsons et al., 1984).

Concurrent bioassays of phytoplankton nutrient utilization were performed using single and multiple nutrient (nitrogen, phosphorus and silicate) additions and trace metals. Emphasis will be on iron enrichments to assess potential effects on productivity rates. Phytoplankton taxa will be determined at one or two depths on each productivity station and particulate carbon/nitrogen samples will be obtained for each productivity sample.