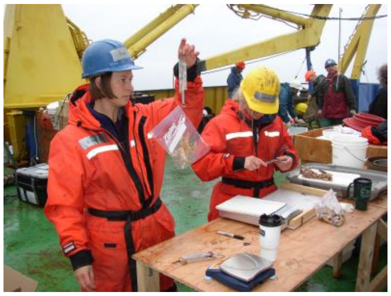
Arctic Epibenthic Community Structure and Benthic Food Web Structure

Katrin Iken and Bodil Bluhm, University of Alaska Fairbanks
Ken Dunton, University of Texas at Austin (not on board)



Bodil Bluhm and Katrin Iken
Photo, M. Dennett

Our goal for the Rusalca cruise was to use the Arctic benthic ecosystem as an indicator for long-term climate changes since it acts as an integrator for oceanic processes and as a filter for seasonal fluctuations. Our two main objectives were:

1. To create present-day baseline data of megafauna community structure and diversity of the epibenthos
2. To establish the benthic food web structure and its linkage to the pelagic system in order to establish an observing system for change in bottom-up processes.

To address objective 1, we collected benthic invertebrate epifauna at 17 stations. At 15 of those stations, a beam trawl (2.26 m effective opening) was used which was towed between 1-10 minutes bottom-time at 1 knot towing speed and was taken in collaboration with B. Holladay/Dr. Norcross. At station 10, we used Dr. Sirenko's dredge and at station 11 we used Dr. Stein's otter trawl catch for community structure analysis because of problems with the beam trawl. The catch was rinsed and then sorted into species or taxa (see Table 2). Individuals of all species/taxa were counted and they were weighed by species. Vouchers were preserved in 4% formalin-seawater solution buffered with hexamethylenetetramine. Abundance and biomass can later be determined from the area trawled as catch per unit effort (CPU). ROV images of the seafloor taken at the stations that were analyzed for epibenthic community composition will provide supplementary valuable information about the distribution patterns and behavior of the epibenthic organisms.

For objective 2, we collected as many members of the pelagic and benthic food web as possible in order to conduct stable isotope analysis on them. The analysis of naturally occurring stable carbon and nitrogen isotopes in the tissue of organisms is an efficient tool to establish food web relations between species and to analyze the coupling between water column and benthic processes. These stable isotopes show a stepwise enrichment between prey and consumer during assimilation processes, thus allowing identification of relative trophic positions among members of a food web. Three replicate water samples per station were taken from the CTD rosette from the chlorophyll maximum as indicated by a

Starfish: Photo B. Bluhm

fluorescence peak during the CTD cast. Water was filtered onto pre-combusted GF/F filters and filters were frozen for later stable isotope analysis. Zooplankton from the upper water column were sampled with a handnet and provided by Dr. Hopcroft and Dr. Kosobokova. Surface sediment from the organic layer and infauna were sampled from Van Veen grabs in collaboration with Dr. Sirenko, Dr. Gagaev and A. Balsom/Dr. Grebmeier. Epifauna was sampled from beam trawls and otter trawls in collaboration with B. Holladay and Dr. Stein. A total of 62 water samples, 40 surface sediment samples, 143 plankton samples and 2165 tissue samples of infaunal and epibenthic organisms were taken for stable isotope analysis. Stable isotopes will be analyzed using continuous-flow isotope ratio mass spectrometry at the Alaska Stable Isotope Facility.