The Bering Sea: Current status and recent events

By Jeffrey M. Napp

Current status of the Bering Sea ecosystem

What a difference a year makes! Before the early 2000s, the dominant mode of variability in the physics of the eastern Bering Sea was interannual variability. From 2000 to 2005, however, the interannual signal was much reduced, and we experienced 5 consecutive "warm" years without significant intrusion of seasonal sea ice into the southeastern region (**Fig. 1**). In fact, many thought it would be "a cold day in *hades*" before we would see another frigid (or a least average) winter in the eastern Bering Sea. This year, though, a familiar atmospheric pattern associated with cold winters emerged: a negative Arctic Oscillation combined with La Niña conditions on the equator. Ice that had penetrated the southeast during winter, did not immediately recede as expected. Instead, it continued its southwesterly journey as the spring winds remained out of the northeast.

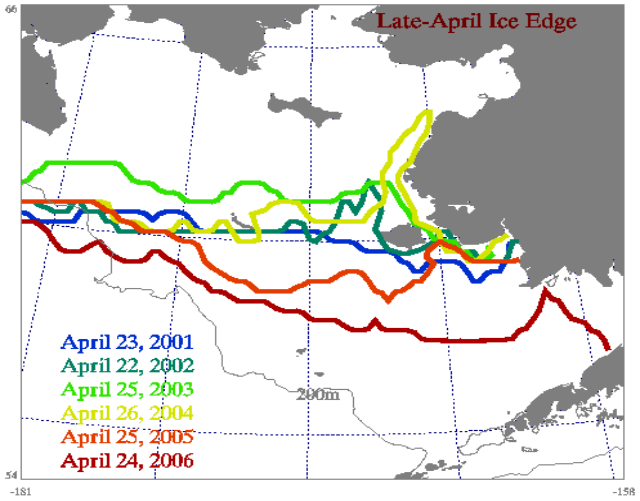

Fig. 1 Estimated position of the leading ice edge in April 2006. Source: P.J. Stabeno, NOAA – PMEL.

The energetic spring winds and atmospheric cooling of the surface layer continued mixing of the water column well into May, and helped to form a large pool of cold water (< 2°C) over the southeastern shelf. At the time of this writing (late June), the NOAA Groundfish Assessment Group from the Alaska Fisheries Science Center had completed the southern third of their annual survey. Bottom temperatures measured during this survey show the cold pool extending well into Bristol Bay (**Fig. 2**). Temperatures in Bristol Bay were much colder than the previous year, but warmer than recorded in 1999, the last "cold" year.

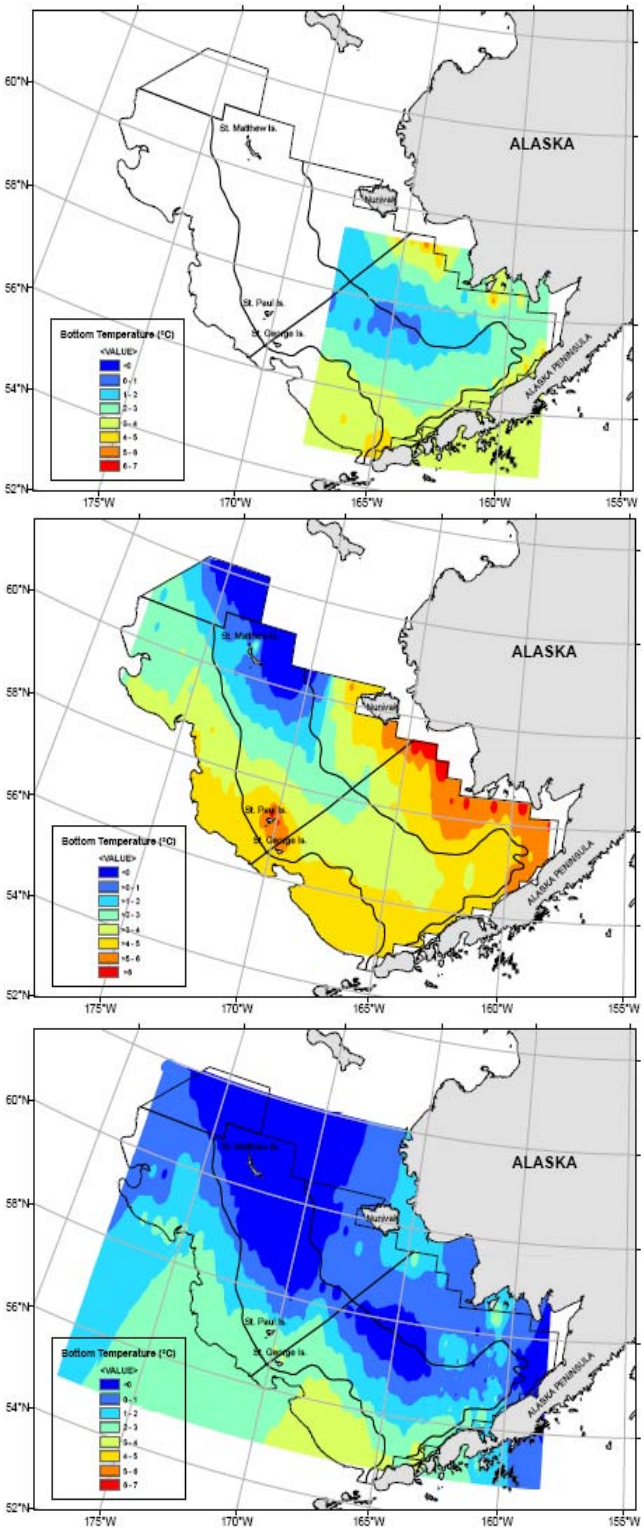

Fig. 2 Bottom water temperatures measured on the AFSC-RACE bottom trawl survey. Top: 2006 survey as of late June; middle: 2005; bottom: 1999. Source: R. Lauth, NOAA – AFSC.

Spring ice edge survey

This past spring, a group of researchers from NOAA and the University of Washington (UW) conducted a multi-disciplinary cruise along the leading edge of the ice in the eastern Bering Sea. The group was comprised of physical, biological, and fisheries oceanographers, marine mammalogists and seabird ecologists, plus a photographer and reporter from the *Seattle Times* and an independent cinematographer. They worked for about 20 days aboard UW's vessel, the *Thomas G. Thompson*. Midway through the cruise, the R/V *Thompson* was joined by the NOAA Ship *Miller Freeman* for several days to use hydroacoustics to document the distribution of fish in and around the ice. The cruise was both a NOAA investigation into effects of climate on ecosystems (North Pacific Climate Regimes and Ecosystem Productivity – NPCREP) and an unofficial pilot cruise for the NSF-sponsored Bering Ecosystem Study (BEST).

Water column sampling (hydrography, nutrients, chlorophyll, phytoplankton species and primary productivity, and zooplankton species and distribution) was conducted throughout the cruise and sampled during the transition from a well-mixed water column to a stratified water column. A minor component of the water column research was to examine light penetration through the sea ice and the contribution of ice-bound phytoplankton species to the spring bloom (**Photos 1 and 2**). On one occasion divers from the NOAA Ship *Miller Freeman* sampled the undersides of pancake ice floes for phyto- and zooplankton.

The tagging of ice-dependent seals was the focus of scientists from NOAA's National Marine Mammal Laboratory (NMML). Bering Sea populations of ringed, spotted, ribbon, and bearded seals are not routinely assessed and very little is known about where they go once the ice melts. During the cruise, the NMML scientists successfully equipped a total of 18 seals (4 adults, 1 juvenile, and 13 pups) with satellite-tracked tags (**Photo 3**). Seals were equipped with two types of instruments: SPLASH tags which telemeter position, depth, and the timing of haulout, and SPOT tags that telemeter only position and the timing of haulout. SPLASH tags are glued to the seal's fur, and fall off with their annual molt. SPOT tags are mounted on semi-permanent flipper tags.

Fisheries acoustics observations were collected by the NOAA AFSC Midwater Assessment and Conservation Engineering (MACE) group during the time when the *Freeman* and *Thompson* worked together. Previous to this expedition, there was anecdotal information suggesting that some fishes may aggregate at the ice edge. During this cruise, however, all of the acoustic signatures (scatter) in and around the ice edge were (was) associated with euphausiids or jellyfish.

Photo 1 Members of the science team prepare to obtain ice cores. Source: M. Cameron, NOAA/AFSC – NMML.

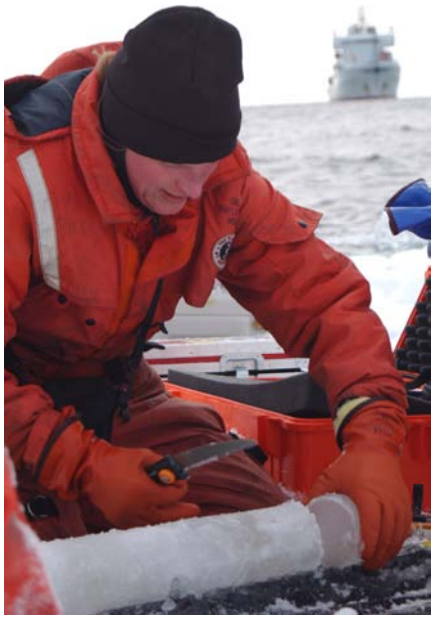

Photo 2 Dr. Carol Ladd of the science team saws the core into sections. Source: M. Cameron, NOAA/AFSC – NMML.

Photo 3 Ice-dependent seals. Pup (top) and tagged female ribbon seal (bottom) on ice. Mother has newly installed SPLASH tag attached to her back. Source: M. Cameron, NOAA/AFSC – NMML.