

September 2009 Regional Sea Ice Outlook
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Region:
Southern Beaufort Sea and north of Greenland

A Tale of Two Buoys

It was the best of melt seasons, it was the worst of melt seasons. It was a time of extreme melt, it was a time of modest changes... So much for Dickensian allusions. However, it is important to recognize that while there may be general trends in the ice cover, there is regional variability. This is evident in the end of July melt results from two ice mass balance buoys located in the Southern Beaufort Sea and north of Greenland (Figure 1). These buoys were deployed as part of Beaufort Gyre Environmental Observatory (BGEO) and North Pole Environmental Observatory (NPEO), all part of the Arctic Observing Network.

Table 1 summarizes melt results for these two buoys through 26 July 2009. Pre-melt ice thicknesses were 2.1 at the NPEO site and 2.5 m in the Beaufort. There was more snow at the North Pole site (0.43 m vs. 0.28 m). Through July, the Beaufort buoy had much more surface melting (0.55 m vs. 0.05 m) and bottom melting (0.28 m vs. 0.04 m) than the North Pole buoy. Figure 2 (top panel) compares air temperatures and shows that summer melt started a couple of weeks earlier at the Beaufort buoy and air temperatures were consistently higher than at the NPEO buoy. Air temperature at the Beaufort buoy also exhibited a very strong diurnal cycle. Water temperature, roughly 1 m below the ice bottom, is plotted in the middle panel. Water temperatures at the Beaufort buoy have increased by about 0.4°C, compared to 0.1 °C for the NPEO buoy. There is also a difference in bottom melting, which started in early June at the Beaufort buoy and has totaled 0.28 m so far. Bottom melt at the NPEO site did not begin until mid-July and is only 0.04 m.

Looking ahead, surface melt usually begins to wane by mid-August. At the NPEO buoy, large ice concentrations and modest upper ocean heat content indicate that modest additional bottom melting is likely. In contrast, lower ice concentration, significant upper ocean temperature elevation, and a position near the ice edge raised the possibility of significant additional bottom melting at the Beaufort site.

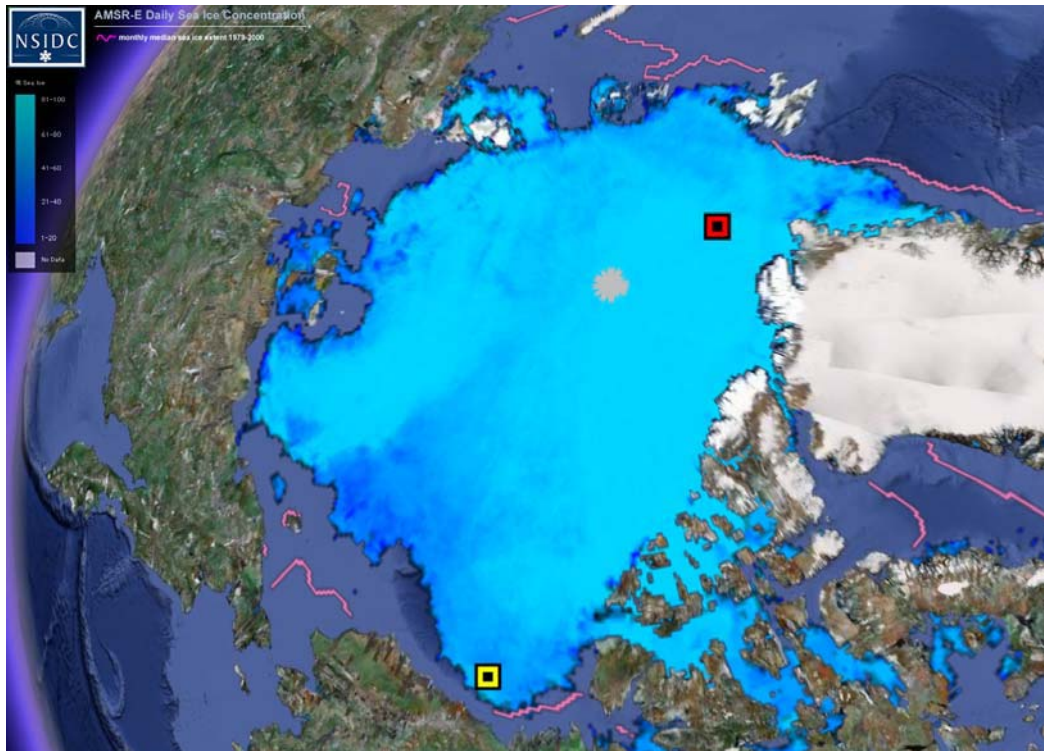


Figure 1. Position of buoys deployed at the Beaufort Gyre Environmental Observatory (yellow) and North Pole Environmental Observatory (red). The map is the 31 July 2009 ice concentration from NSIDC.

Table 1. Summary of ice melt through 26 July 2009. The units are meters.

	Snow depth 1 June	Ice thickness 1 June	Surface ice melt	Bottom ice melt
BGEO	0.28	2.5	0.55	0.28
NPEO	0.43	2.1	0.05	0.04

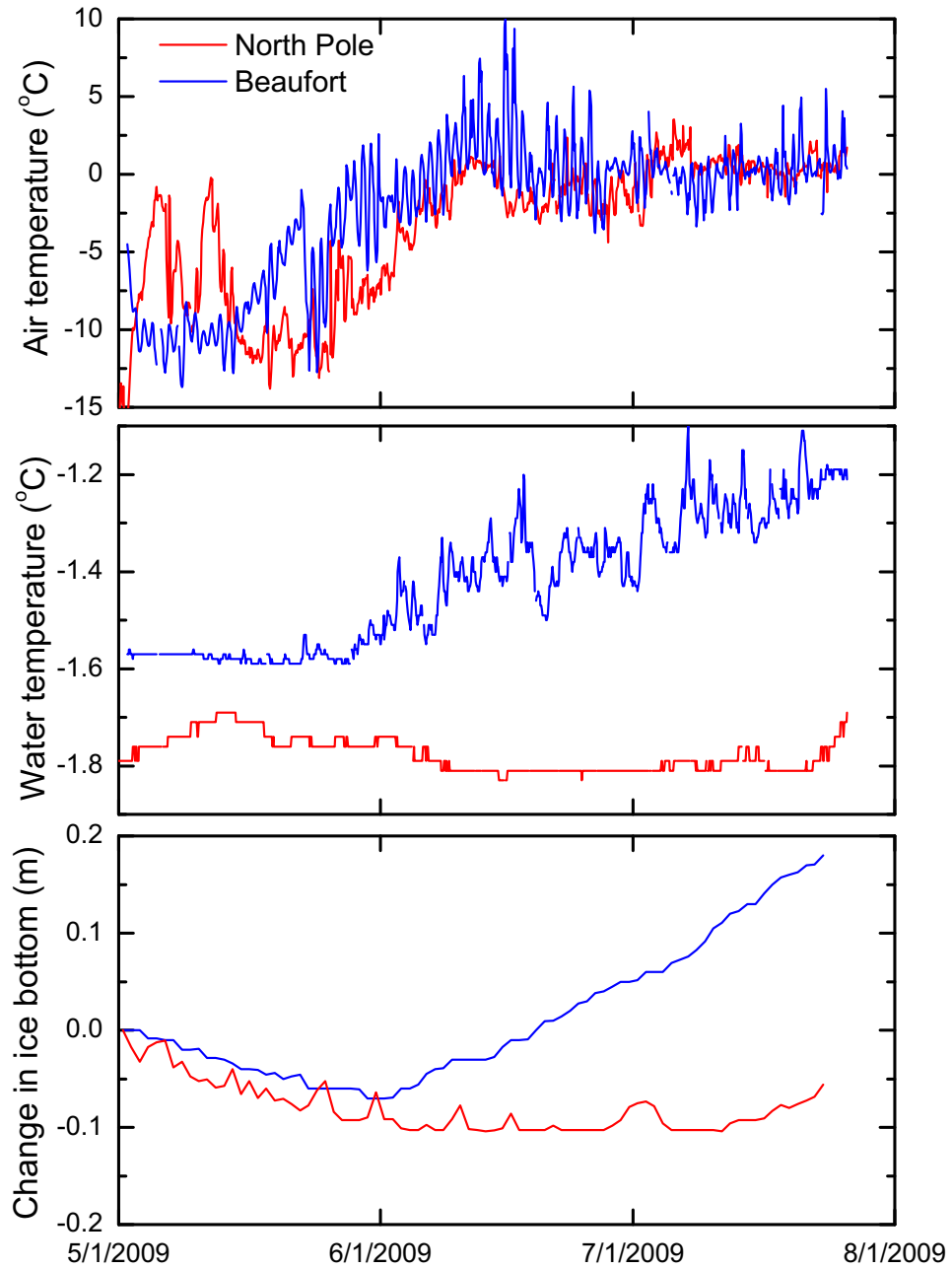


Figure 2. Observations of air temperature, water temperature (just below the ice), and change in the ice bottom for the North Pole and Beaufort buoys from May 1 to August 1, 2009.