

Sea Ice Outlook 2009: A regional perspective on ice evolution in the Pacific Arctic sector (SIZONet project)

(1) Region of interest: Bering-Chukchi-Beaufort Seas

(2) Ice development and status in late May 2009

Ice extent:

- Passive microwave data (SSM/I) distributed by the National Snow and Ice Data Center (NSIDC) indicate above-normal ice extent in the Bering Sea for April 2009 (Fig. 1). Starting in early May, vigorous and early melt resulted in rapid northward retreat of the ice edge to below normal extent in late May.

Ice thickness and ice characteristics:

- *Eastern Chukchi/Western Beaufort Sea*: Ice thickness surveys with an airborne electromagnetic induction instrument indicate modal total ice thicknesses (snow & ice) of 1.7 m (primary mode, first-year ice formed in the fall), 0.9 m (secondary mode), 0.2 m (new ice) and 3.6 m (level multiyear ice) along several hundreds of km of transects north of Barrow, Alaska (Fig. 1), very much comparable to what was found in the past two years. However, radar satellite imagery (QuikScat) shows much less multiyear ice in the area in spring. In fall, a narrow band of multiyear ice was advected from the eastern Beaufort and resulted in multiyear ice floes entrained into the landfast ice at Barrow. Coring revealed that multiyear ice was typically at least several years in age, likely originating in the high Canadian Arctic.

Coastal sea ice:

- At *Wales*, in Bering Strait, level shorefast ice thicknesses were around 1.2 m in the first week of May. These values are slightly higher than in the last couple of years. Much of this is due to the accretion of superimposed and possibly snow ice, driven by above-normal snowfall throughout the winter. Local ice observers reported persistent anomalous southerly winds throughout winter dumping much snow onto the ice. For hunters, these snow dumps and overflow from early melt were affecting access to the landfast ice edge. Southerly winds prevented offshore leads from opening up and made for comparatively few hunting opportunities in spring.

- At *Barrow*, level shorefast ice thicknesses in May were at the low end of the normal range (1.4 m, similar to last year), with above-normal snow depths of 0.3 m and more. Melt onset was unusually early in late April and continued through May. Local ice observers and thickness surveys indicate a comparatively few grounded ridges, but some multiyear ice in the landfast ice cover, though not sufficient to stabilize the ice cover on a large scale.

(3) Outlook for the summer ice season and potential impacts

- Break-up and onset of seasonal ice retreat: Melt onset was much earlier than in the past few years, thinning and weakening the ice along the coast. Openings north of the ice edge in mid-May (Fig. 1) are likely also a combination of melt and ice dynamics. At Barrow, prevailing onshore winds kept the coastal lead closed, resulting in poor whale harvests, preventing early landfast ice breakout and limiting the amount of solar heating of coastal waters. An experimental break-up forecast based on solar heat input and 2-week atmospheric forecasts suggests slightly **earlier or normal break-up** (see Figure 2) – details at www.gi.alaska.edu/snowice/sea-lake-ice/Brw09/forecast/. Note, that a buoy north of Barrow indicates that in the drifting ice pack, melt onset occurred much later with less vigorous melt.

- Summer conditions: The first-year ice offshore is thicker this year than in 2008. At the same time, there is a lack of multiyear ice compared to the past two years in the Chukchi and western Beaufort Seas. Ignoring any impacts of anomalous ice dynamics, this situation suggests that overall ice retreat in 2009 north of Barrow is likely to proceed less rapidly than in 2007 and 2008, at least offshore where the effects of early coastal melt onset are not felt. At the same time, the absence of multiyear ice throughout much of the region suggests that a complete removal of sea ice is possible during the summer, with **lighter ice conditions than in 2008**. Last year, multiyear ice lingered and presented a platform for feeding walrus throughout summer and a hazard for vessels bound for the eastern Beaufort Sea. This year, there is less likelihood of such lingering ice.

This outlook is based on heuristics and a statistical model for break-up timing (see website at www.gi.alaska.edu/snowice/sea-lake-ice/Brw09/forecast/). For the statistical model predicting break-up at Barrow, improved representation of sea ice (as a boundary condition) and improved forecasts of surface solar radiation in two-week WRF runs (kindly provided by Jing Zhang and Jeremy Krieger, knik.iarc.uaf.edu) would be beneficial.

Submission information

Submitted by Hajo Eicken (hajo.eicken@gi.alaska.edu), Chris Petrich (chris.petrich@gi.alaska.edu) and Mette Kaufman (kaufman@sfos.uaf.edu) on behalf of the Seasonal Ice Zone Observing Network (SIZONet, www.sizonet.org) with support from the National Science Foundation's Arctic Observing Network Program and the Alaska Ocean Observing System.

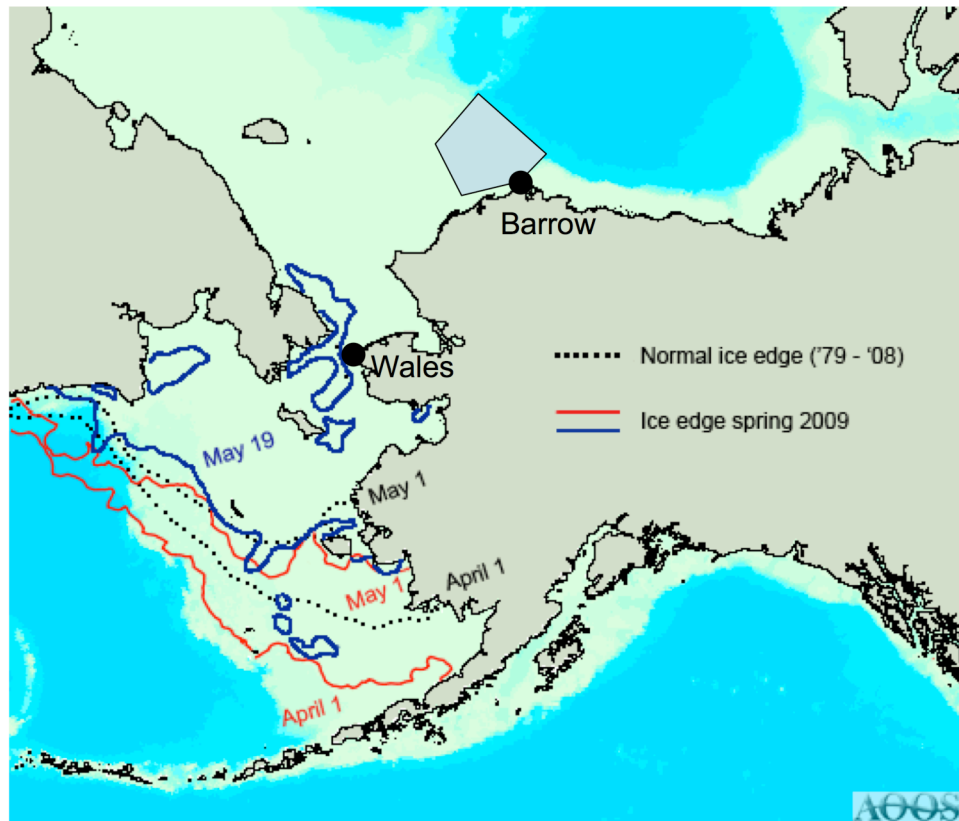


Fig. 1: Ice extent derived from passive microwave satellite data (SSM/I, data provided by NSIDC, nsidc.org) for Pacific Arctic sector. Shown are observed ice edges for April and May along with “normal” ice edges (median positions) from 1979 to 2008. Locations of the airborne surveys and coastal stations are also shown.

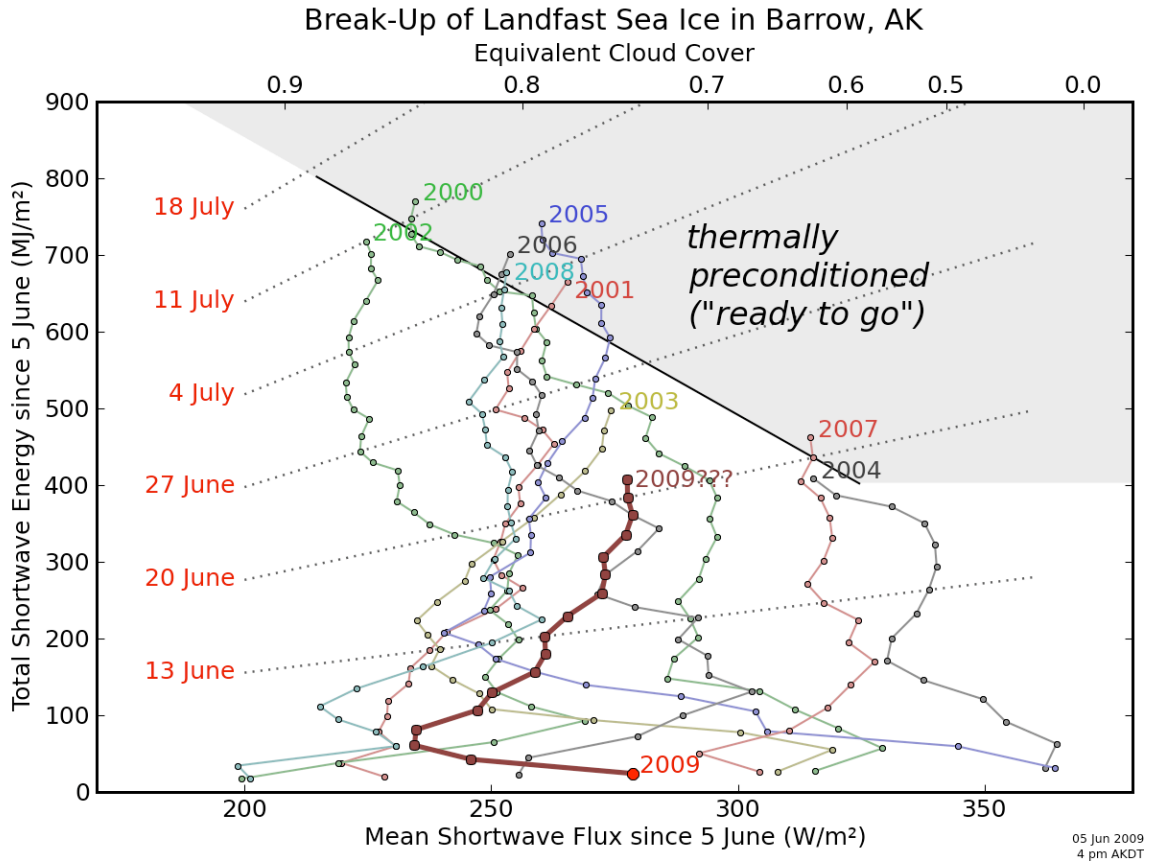


Figure 2: Observed (2000-2008, thin lines) and projected (thick red line) decay of landfast ice at Barrow, AK. Details of the method employed are provided at www.gi.alaska.edu/snowice/sea-lake-ice/Brw09/forecast.