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

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(1) Region of interest: Bering-Chukchi-Beaufort Seas
(2) Ice development and status in early August 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 (Figure 1). Starting in early May, vigorous and early melt resulted in rapid northward retreat of the ice edge to below normal extent in June and July (Figure 2). Compared to 2008, this year has somewhat more extensive ice in the eastern Beaufort in late July and less extensive ice in the East Siberian Sea.

Ice thickness and ice characteristics:
Eastern Chukchi/Western Beaufort Sea: End-of-winter ice thickness distribution as presented in our June Report, i.e., much less multiyear ice of thickness comparable to previous years (3.6 m total level ice thickness mode) and first-year ice thicknesses comparable to or thicker than past years (1.7 m total level ice thickness mode with thicker deformed ice).

Coastal sea ice:
At *Wales*, in Bering Strait, local ice experts reported the last ice on 26 June, roughly two weeks later than in previous years. A surface drifter placed on an ice floe in May at Wales continued its rapid northward drift, moving to well north of Wrangell Island by the end of July.

At *Barrow*, the ice cover experienced early melt onset in late April, resulting in much superimposed ice formation similar to Wales (see June Report) and early onset of decay. However, in June, a balance appears to have been struck between the effects of such early-melt preconditioning and overall cool, and unusually overcast weather conditions. As a result, early onset of ice decay did not result in early break-up of landfast ice. Break-up east of town occurred around July 11 (Figure 3) and was among the latest in the past decade, mostly driven by lack of clear skies promoting melt and ocean heating. With ice

lingering off town through the third week in July, access to marine mammals was reported to be very good by local hunters. The last grounded ridge near town drifted loose in the last few days of July.

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

Break-up and onset of seasonal ice retreat:

Earlier, revised estimates for normal to late break-up proved to be on target. A detailed discussion of the break-up season is available at http://www.gi.alaska.edu/snowice/sea-lake-ice/Brw09/forecast. While this year has not necessarily been cooler in terms of cumulative above-freezing degree-days, the lack of sunny weather has resulted in sluggish melt. This contrasts somewhat with pan-arctic conditions, which are sunnier than normal as discussed in the report by Hori et al. for the pan-arctic sea ice outlook.

Summer conditions:

As detailed in the June and July Reports, offshore ice retreat is estimated to proceed less rapidly during the initial phase due to cooler weather and thicker first-year ice. However, the lack of multiyear ice will lead to more substantial retreat later in the season, suggesting **lighter ice conditions than in 2008.** This earlier statement remains valid, and the next few weeks will demonstrate whether the assessment was accurate, as ice loss typically slows down in late August.

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, such lingering ice is less of a problem. Sea level atmospheric pressure patterns continue to develop similar to 2005 and 2007 with persistent high pressure over the Beaufort Sea and easterly sector winds at Barrow. However, in contrast with 2005 and 2007 this year is much cloudier (Figure 3). Circulation patterns continue to favor northward advection of ice that is superimposed on ice retreat patterns and is a key factor in seasonal migration of, e.g., walrus. For example, a buoy deployed by our collaborators in Wales, Bering Strait in mid-May was well north of Wrangell Island in mid-July, a voyage of more than 600 km.

This outlook is based on heuristics and a statistical model for break-up timing (see website at http://www.gi.alaska.edu/snowice/sea-lake-ice/Brw09/forecast/). Jing Zhang and Jeremy Krieger kindly provided two-week WRF weather forecast model runs (http://knik.iarc.uaf.edu).

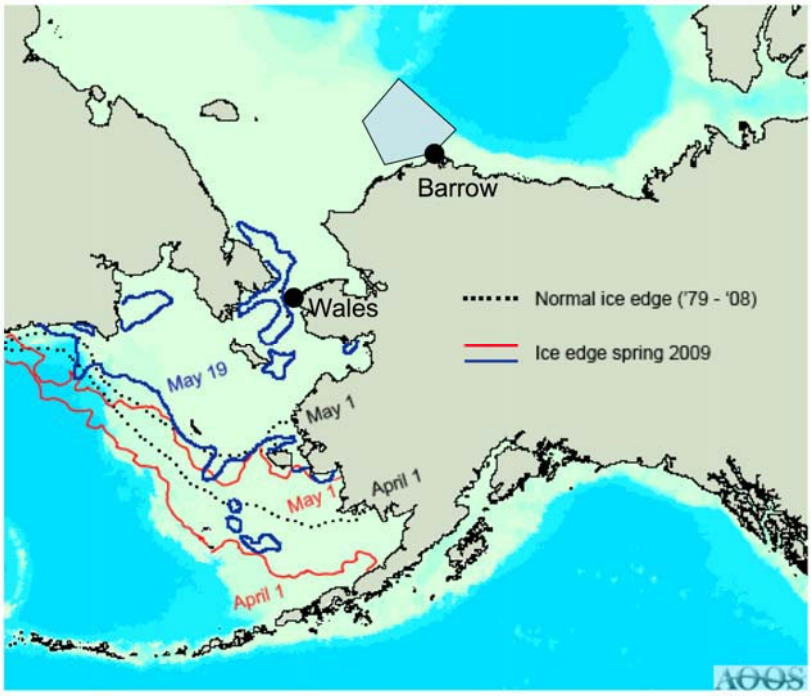

Figure 1. Ice extent derived from passive microwave satellite data (SSM/I, data provided by the National Snow and Ice Data Center (NSIDC, http://www.nsidc.org)) for the Pacific Arctic sector. Shown are observed ice edges for April and May along with "normal" ice edges (median positions) from 1979 to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

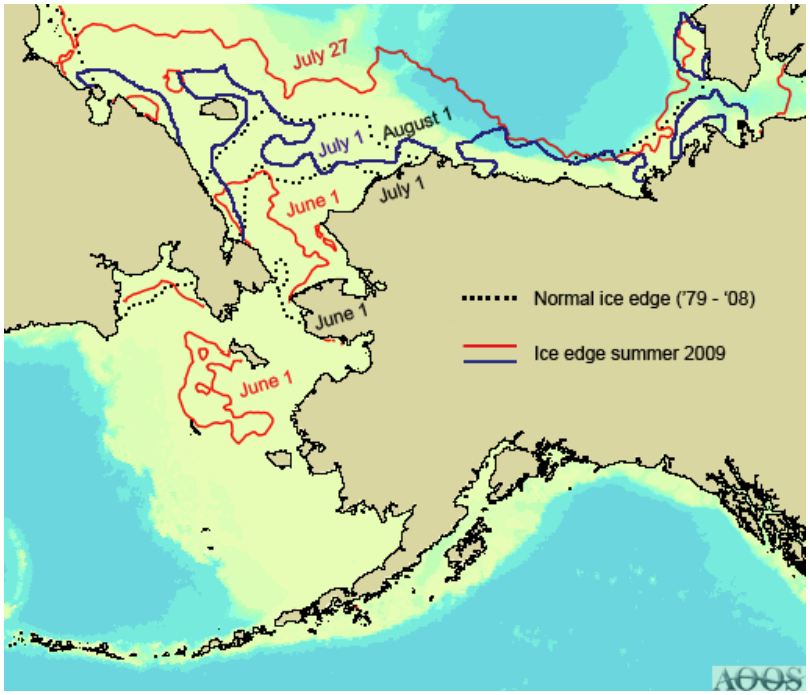

Figure 2. Same as Figure 1, but for ice extent on 1 June, 1 July, and 27 July 2009.

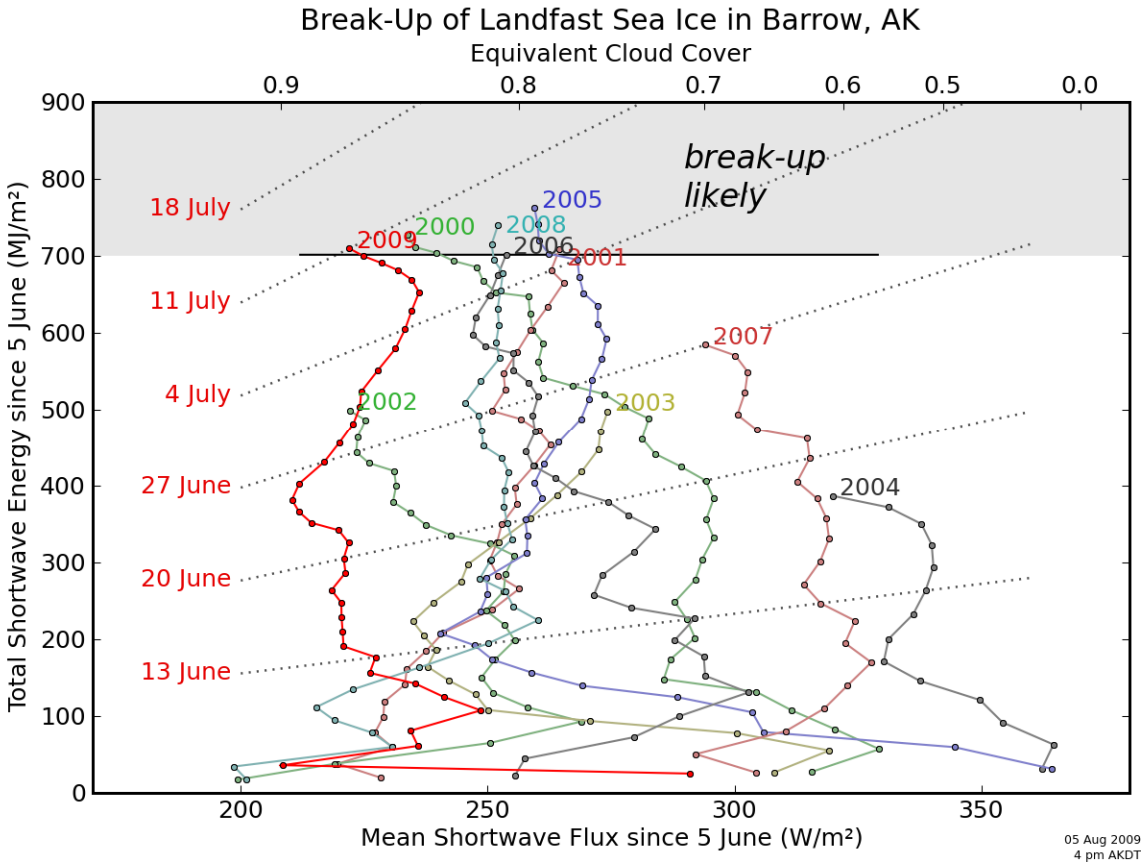

Figure 3. Break-up timing and solar shortwave energy incident at the surface (mean and cumulative shown on bottom and left axis, respectively) for 2009 (thick red line) and other recent years. Curves terminate at observed break-up. The shortwave flux is used as an indicator for radiative forcings. The grey area at the top corresponds to the seasonal stage at which ice break-up is imminent and determined by local sea level and winds. Details at http://www.gi.alaska.edu/snowice/sea-lake-ice/Brw09/forecast/.