Sea Ice Outlook 2008: A regional perspective on ice evolution in the Pacific Arctic sector

Data

Ice extent:

• Passive microwave data (SSM/I) distributed by the National Snow and Ice Data Center (NSIDC) indicate well above-normal ice extent in the Bering Sea for spring 2008 into mid-May (see Fig. 1). In late May, rapid ice retreat, aided by comparatively thin ice (see below) brought ice extent into the normal range, with significant amounts of open water in the southern Chukchi and Beaufort Sea due to retreat of thin ice.

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 0.4 m (primary mode), 1.6 m (secondary mode) and 3.3 m (tertiary mode) along 272 km of transects north of Barrow, Alaska (Fig. 1). Radar satellite imagery indicates that multiyear ice was advected from the Canada Basin and high Arctic southwards and now reaches to within 120 and 250 km of the coast of the Beaufort and eastern Chukchi Seas (with the shortest distance at Barrow). Ground-based measurements and ice coring indicate that multiyear ice north of Barrow is between 5 and 7 years of age and of mean thickness of between 3 and 3.5 m for level, undeformed ice. In the western Beaufort and eastern Chukchi Sea, thin (<0.5 m) first-year ice dominated as a result of ice formation in coastal polynyas. First-year ice north of Barrow was highly deformed through ridging and rafting. Data from 2007 available at penguin.sfos.uaf.edu with 2008 data posted within the next month after quality control.

Coastal sea ice:

• At *Wales*, in Bering Strait, level shorefast ice thicknesses were 1.14 m in the first week of May. These values are comparable to the previous ice season's thicknesses, despite late ice formation in the fall/winter. A local ice observer reported above-normal open water in the months of April and May with little access to offshore drift ice for marine mammals hunts. The shorefast ice was considered somewhat unsafe near town with a trail for boat access established further to the North of town.

• At *Barrow*, level shorefast ice thicknesses in early April were at the low end of the normal range (1.3 to 1.4 m), despite very late landfast ice formation in the fall (last week of December). Ice growth and snow depth monitoring indicate that recovery from late ice formation was aided by well-below normal snow depth (<0.1 m) into early April, with substantial snowfall in mid-/late April. Local ice observers and thickness surveys indicate a near-complete lack of grounded ridges and absence of multiyear ice, suggesting an inherently unstable landfast ice cover. Data available at www.gi.alaska.edu/BRWICE.

Outlook and potential impacts

• Break-up and onset of seasonal ice retreat: Thin ice in the Bering and southern Chukchi Sea (and by inference from satellite data in the southeastern Beaufort Sea) are likely to result in above-average rates of initial ice retreat. Lack of multiyear ice and grounded ridges render landfast ice in Bering Strait region and eastern Chukchi Sea potentially unstable and promote rapid deterioration and break-up. At Pt. Hope, shorefast ice break-out event in May required boat rescue of marine mammal hunters. At Barrow, unstable ice conditions have resulted in early dismantling of hunting camps on shorefast sea ice.
• Summer conditions: Predominantly thin ice along southeastern Chukchi and western Beaufort Sea is likely to retreat rapidly, impacting marine mammals which may be deprived of feeding and resting platforms on inner shelf, in turn affecting subsistence hunters from coastal communities. Thin ice will also promote solar heating of inshelf waters, potentially accelerating ice retreat. Thick, old multiyear ice is within 120 to 250 km of the Chukchi and Beaufort coast and likely to survive well into the melt season. This presents a potential hazard for coastal shipping and offshore exploration with potential advection of ice during periods of winds from northern sector. At the same time, if advected further south, multiyear ice may serve as important substrate for ice-associated fauna.

Information needed to improve outlook

• At the regional level, atmospheric circulation and surface winds are key drivers of seasonal evolution of the ice pack, mid-range forecasts of prevailing wind patterns will improve assessments of potential for multiyear ice incursions and solar heating of surface waters.

Submission information

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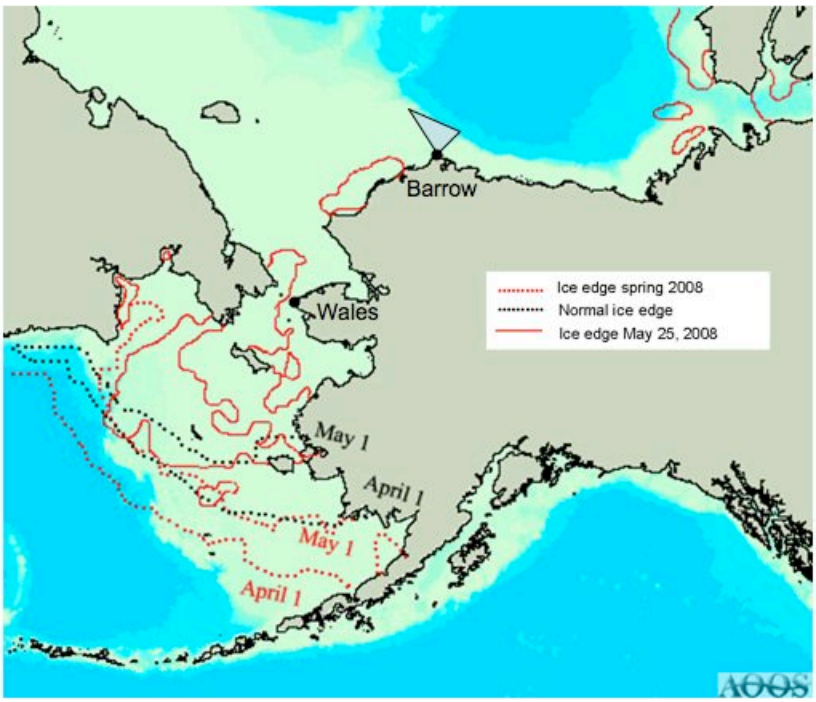

Fig. 1: Ice extent derived from passive microwave satellite data (SSM/I, data provided by NSIDC, nsidc.org) for Pacific Arctic sector. Shown are observed ice edges for April and May along with "normal" ice edges (median positions) from 1979 to 2007. The triangle and dots denote locations of airborne and coastal station measurements.