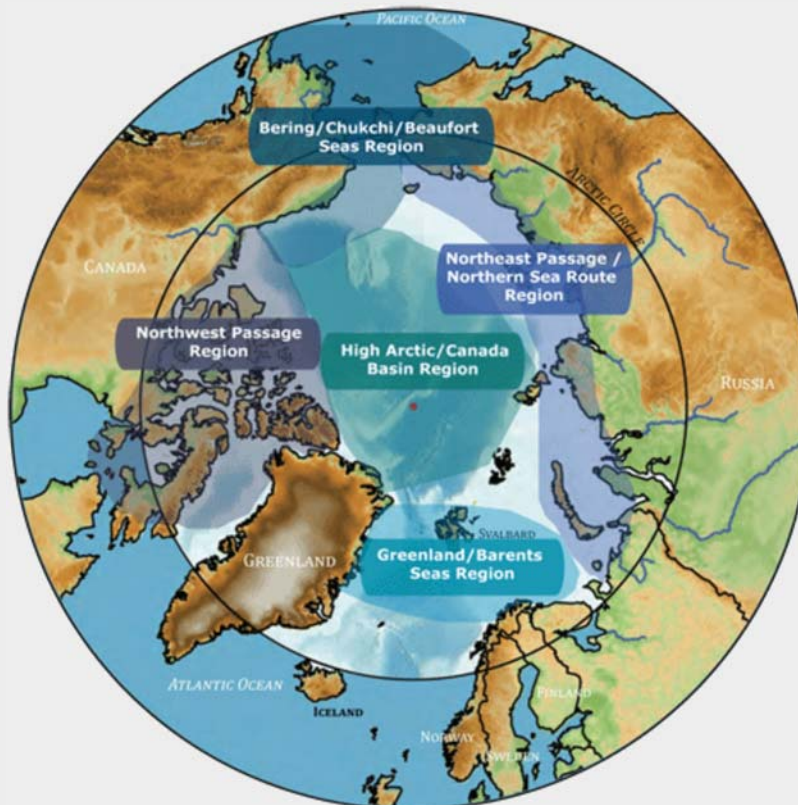


# Sea Ice Outlook | 2009 Outlook

## September Sea Ice Outlook: July Report



A view of the Arctic with regional labels.

## REGIONAL OUTLOOK

### Introduction

For the July 2009 Seasonal Outlook report, three contributions in addition to the original six have been received. The full individual regional submissions may be downloaded from the bulleted lists below.

The July Report update is of particular interest for the Northwest Passage Region (NWP) where a heuristic approach indicates that opening of the passage is not very likely, while updated ensemble simulations strengthen an earlier suggestion of an opening of the passage. Satellite data and ground observations also indicate that ice conditions in the Nares Strait west of Greenland may favor an influx of old high arctic ice into the region later in the season.

In the seas north of Alaska an interesting balance is struck between comparatively mild ice conditions (well below normal multiyear ice levels and early onset of ice decay) and cool, overcast weather conditions that are not very conducive to early melt. In this context, mass-balance buoy data (including—as a first—a buoy in first-year ice) provide a good means of assessing the progression of bottom and surface melt, potentially allowing conclusions about the disposition of solar radiation.

### Bering, Chukchi, and Beaufort Seas

#### Contributions from:

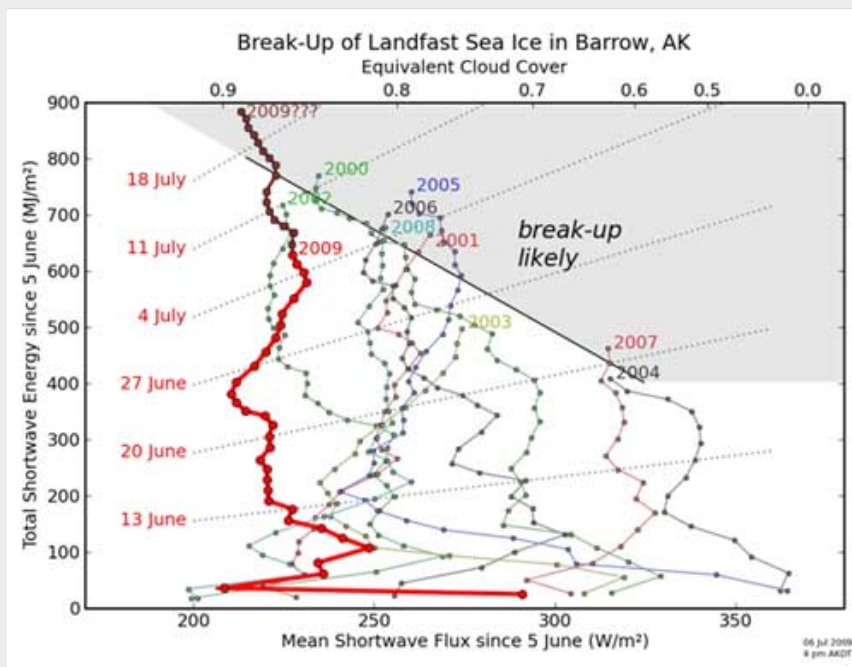
- Eicken, Petrich, and Kaufman (1 - PDF)
- Pokrovsky (2 - PDF)
- Perovich (3 - PDF)
- Fowler, Drobot, and Maslanik (4 - no new data available - see June report)

While no new data are available for the onset of ice retreat from Fowler et al., their earlier assessment of ice retreat patterns in this sector is still valid and appears to reproduce at least part of the retreat pattern, with a tongue of lingering ice north of Barrow. Pokrovsky finds that the surface wind patterns have not changed much from previous months and that this is reflected in the position of the ice edge, pushing ice north of the median ice edge. Due to cooler sea surface temperatures and a synoptic pattern similar to 2008, surface warming is sluggish, as anticipated in Pokrovsky's June Report.

This is reflected in observations of ice retreat patterns by local ice experts in the Bering Strait area who report slower ice retreat and lingering ice in the Bering Sea compared to recent years (report by Eicken et al.). At Barrow, an interesting balance between a relatively early onset of melt in April (and subsequent high ice temperatures) and overall cooler conditions with much less solar heating than normal is playing out, as discussed by Eicken et al.

(<http://www.gi.alaska.edu/snowice/sea-lake-ice/Brw09/forecast/>). Figure 1 illustrates that 2009 ranks among the years with the lowest amount of solar heating of the surface, explaining sluggish melt and break-up progress despite an anomalously warm (preconditioned) ice cover at Barrow.

Overall, however, the comparative lack of multiyear ice offshore discussed in the June Reports by Fowler et al., and Eicken et al., is likely to result in below-normal ice extent in summer. Buoy data indicate that both surface and bottom melt are underway in the northern Chukchi and northeastern Beaufort Seas in late June.



**Figure 1.** 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=observed as of July 6; thinner dark red line=forecast) and other recent years. Four prior years' curves terminate at observed break-up. The shortwave flux is used as an indicator for the combined effect of both radiative and wind 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.

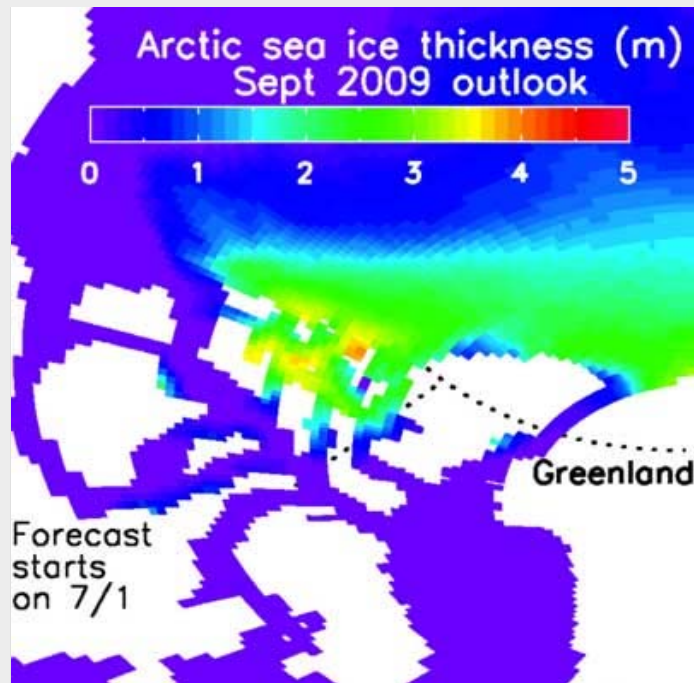
Details at <http://www.gi.alaska.edu/snowice/sea-lake-ice/Brw09/forecast/>

### Northwest Passage (NWP)

**Contributions from:**

- Zhang (5 - PDF)
- Gudmandsen et al. (6 - PDF)
- Howell and Duguay (7 - no change from last month - see June report)

Howell and Duguay's assessment of the role of multiyear ice in hindering complete melt-out of the NWP has not changed. Zhang's ensemble simulations of the area (see Figure 2) suggest, however, that a navigation channel is likely to open later in the season and July Report indicates slightly higher ice retreat than the June Report.



**Figure 2.** Ensemble prediction (starts 1 July 2009) of ice thickness in the Northwest Passage region for September 2009 (Zhang).

In a new contribution, Gudmandsen points out that Nares Strait between Greenland and Ellesmere Island is largely ice-free, due to flushing of multiyear ice. Once the ice barrier at the top of the strait gives way, ice from the Arctic Ocean can spill over into this region, affecting navigation, but also providing a mechanism to reduce ice concentrations in an area of very thick ice in the high Arctic.

### High Arctic

#### Contributions from:

- Perovich (3 - PDF)
- Fowler, Drobot, and Maslanik (4 - no new data available - see June report)

There is no change in the overall distribution of multiyear ice (and its comparatively low concentration) as discussed in the June Report. Perovich's summary of drifting buoy observations indicates that melt is somewhat lagging in the interior Arctic, with the North Pole buoy still reporting 0.4 m of snow on the surface.

### Northeast Passage / Northern Sea Route

#### Contributions from:

- Pokrovsky (2 - PDF)
- Fowler, Drobot, and Maslanik (4 - no new data available - see June report)

There is no change in the distribution of ice of different age classes discussed in the June Report. In addition to much less multiyear ice than normal, Pokrovsky points towards the warm inflow of Atlantic water into the Arctic that may have impacted ice conditions over the western Siberian shelves.

### Greenland / Barents Sea

#### Contributions from:

- Gerland and Goodwin (8 - PDF)

In a new contribution, Gerland and Goodwin discuss ice thickness and extent in the Greenland and Barents Sea areas. They note that in some Svalbard fjords, landfast ice has been much more extensive, though not necessarily thicker in 2009 than the past decade. At the same time, they point towards below normal ice extent in the Barents/Kara Sea, also compared to the record minimum in 2007, which they see coupled to oceanic processes and promoting further warming of surface waters in the region.