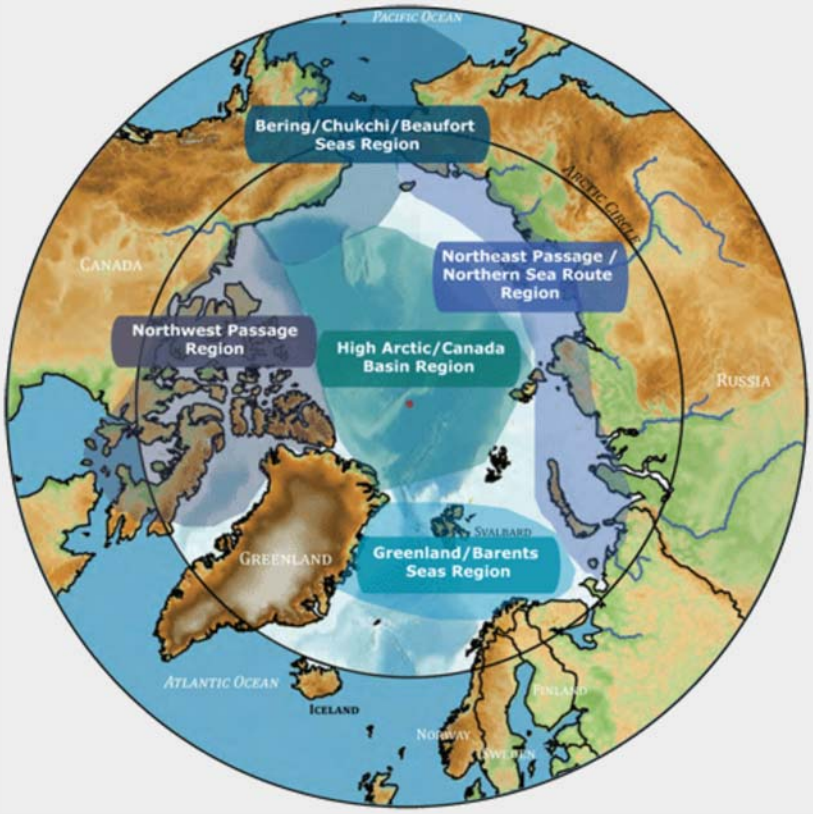
Sea Ice Outlook | 2009 Outlook

September Sea Ice Outlook: August Report



A view of the Arctic with regional labels.

REGIONAL OUTLOOK

Introduction

For the August 2009 Seasonal Outlook report, we received six updates from participating groups. Most contributors reported little change from trends identified in the July report.

The outlook for the Northwest Passage is still divided between a high probability of opening along one of the routes as anticipated by ensemble simulations with a coupled ice-ocean model, and observations of later-than-normal break-up of landfast ice, suggesting a small likelihood for clearing of ice.

In the Chukchi and Beaufort seas, ice retreat continues to exceed normal rates, driven both by rapid northward advection of ice in the western Chukchi and significant bottom and surface melt. It is intriguing to follow ice development under atmospheric circulation conditions quite similar to 2007, but with a number of interesting twists on how the summer plays out (see pan-arctic Outlook). At the regional level, there seem to be some distinct differences as well (e.g., with regards to distribution of cloud cover and melt progression). Hence, there is significant potential to obtain valuable insights into how the large scale patterns play out at the local level once the summer season comes to a close. In particular, the record low extent of multiyear ice this year presents somewhat of a wild card, since only very late in the season will it become apparent how much of the first-year ice will be completely removed over the different arctic marginal seas.

Bering, Chukchi, and Beaufort Seas

Contributions from:

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

During July, for the Chukchi and Beaufort Sea region, much of the ice evolution patterns persisted from those identified during June. Buoy drift showed substantial northward ice motion superimposed on the ice retreat pattern in the Chukchi Sea, and less so in the Beaufort. As a result, compared to ice conditions in late July 2008, this year there is less ice in the Chukchi and more ice in the eastern Beaufort Sea. Ice retreat in the Chukchi Sea is also promoted by the absence of multiyear ice, which suggests that rapid retreat will continue through August as there is little thick ice present that is likely to survive through September.

Ice conditions at Barrow illustrate how local weather patterns can result in very different ice melt patterns from what is observed at the pan-arctic level. At Barrow, 2009 had the lowest average shortwave flux at the time of break-up during the past decade. Break-up of the landfast ice, governed by a combination of cumulative solar heating and grounding of pressure ridges, was later (July 11) than during any other year since 2000 (Figure 1. http://www.gi.alaska.edu/snowice/sea-lake-ice/Brw09/forecast/). This is in contrast with the large scale picture of cloudiness as presented by Hori et al. in the pan-arctic Outlook, indicating that this summer has comparatively clear skies if you consider the Arctic as a whole.

Surface and bottom melt obtained at a drifting buoy in the eastern Beaufort Sea support this picture with significant surface and bottom melt in July (contribution by Perovich).

While overall agreement between different satellite data sets (in particular active and passive microwave data) is good on the pan-arctic scale, potential discrepancies at the local or regional level provide an additional challenge to tracking ice evolution. This is illustrated in Figure 2, indicating that tongues of sea ice identified by QuikSCAT radar imagery in the eastern and western Chukchi Sea are not apparent in SSM/I passive microwave data. This is likely due to the presence of water at the ice surface masking ice types, and adds considerable uncertainty to projections of regional ice evolution.

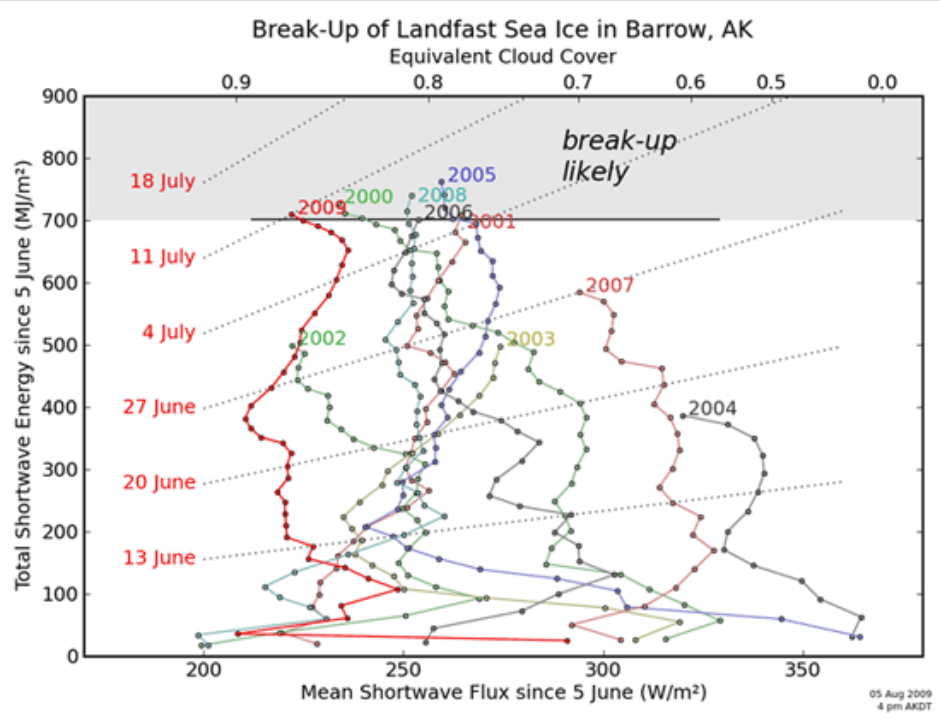


Figure 1. *Break-up timing and solar shortwave energy incident at the surface (mean and cumulative shown on bottom and left axis, respectively) for 2009 (thick red line) and other recent years. Curves terminate at observed break-up. The shortwave flux is used as an indicator for radiative forcings. The 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/

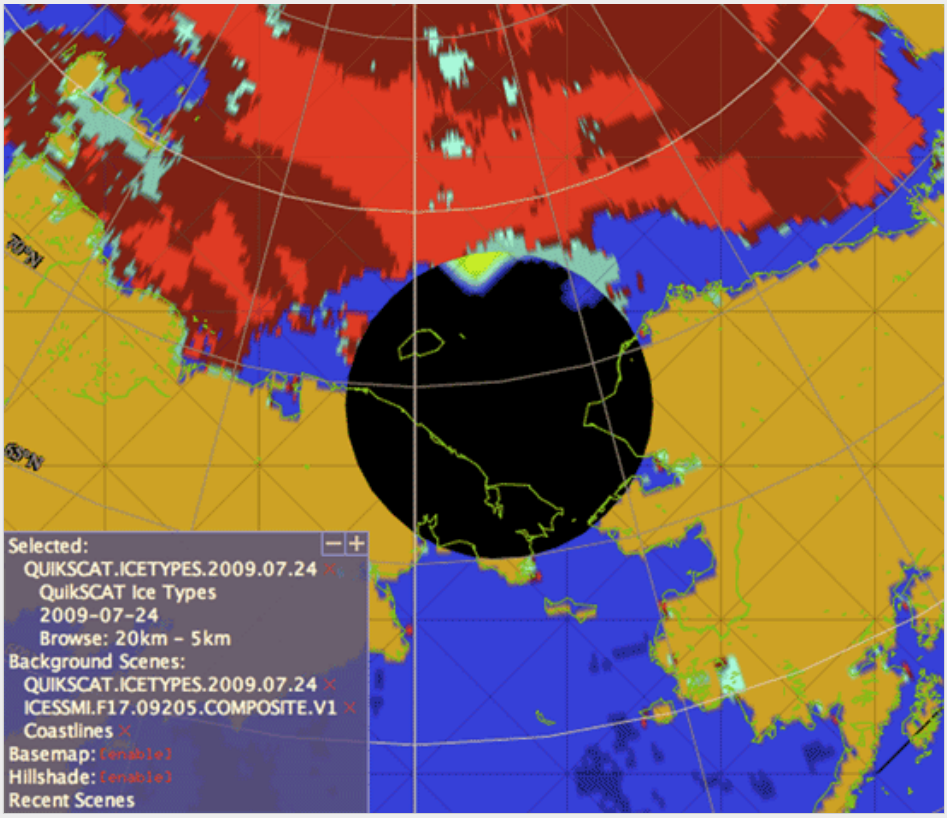


***Figure 2**. QuikSCAT radar remote sensing scene for 24 July 2009 (courtesy of Son Nghiem, JPL), overlain on an SSM/I passive microwave scene (courtesy of NSIDC) for the same day (shown as black circle with a view through the overlying QuikSCAT data).*

Note the good correspondence between SSM/I and QuikSCAT data in the top part of the circle and the lack of ice in the SSM/I scene in regions that show tongues of ice extending along the western and eastern margin of the region in QuikSCAT imagery. To explore images and related data further, visit the swath viewer site here and select the following images (by checking boxes):

***Quikscat Ice Types**—2009—Quikscat.Icetypes.2009.07.24*
***SizoNet Misc**—IceSSMI.F17.09205.Composite.V1*
***SizoNet Misc**—NIC_MIZ2009205NC_PL_A*

The top tool bar then provides access to an "x-ray tool" under the Image Information icon.

Northwest Passage (NWP)

Contributions from:

- Zhang (5 - no change from earlier months, please see July report)
- Gudmandsen et al. (6 - PDF)
- Howell and Duguay (7 - PDF)

Ensemble simulations with a coupled ice ocean model continue to indicate that one route of the Northwest Passage (NWP) is likely to open up (Zhang, see last month's contribution for details).

In contrast, Howell and Duguay find that in late July ice in the NWP Parry Route is still landfast, two weeks later than in 2007 and 2008 (see Figure 3). They assume that opening of the channels is hence very unlikely. Similar to the pattern observed for break-up of landfast ice at Barrow, Howell and Duguay also discuss the fact that early onset of melt in and of itself is not a good indicator of break-up time.

For the Nares Strait region between Greenland and the Canadian Archipelago, Gudmandsen reports on enhanced ice flux and clearing of ice due to failure of an ice barrier earlier in the season. While Nares Strait is not a navigational thoroughfare, the flushing of this ice into adjacent channels and bays may impact ship traffic and scientific operations in other areas.

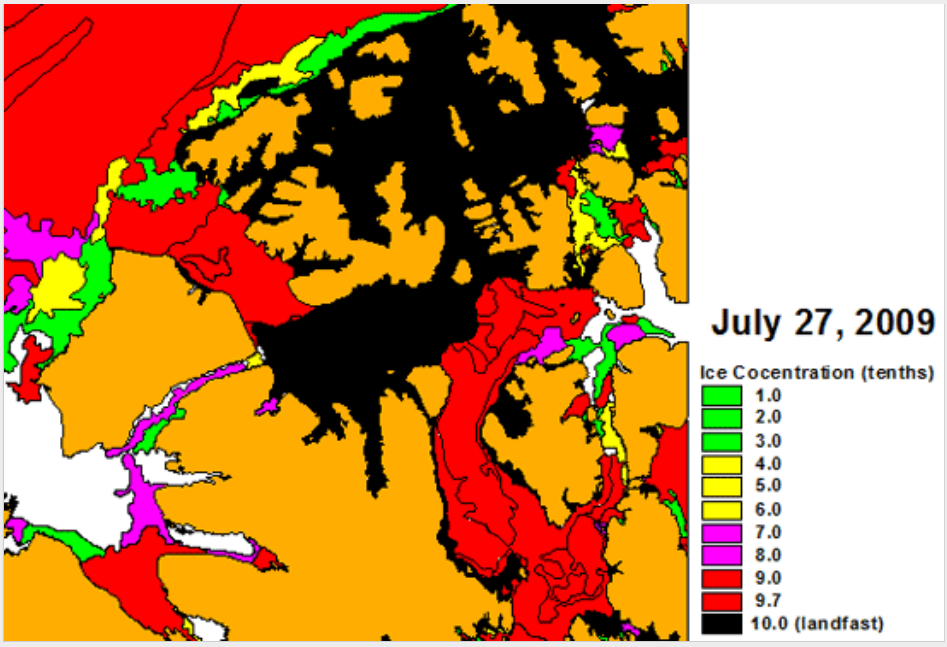


***Figure 3**. Sea ice concentration (tenths) in the Western Parry Channel region of the Northwest Passage on 27 July 2009. From contribution by Howell and Duguay, with data from the Canadian Ice Service.*

High Arctic

Contributions from:

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

Previous observations and anticipation of sluggish melt in the High Arctic continue to hold through July. As indicated by Perovich's report of mass-balance buoy data, snow cover was comparatively deep at North Pole Observatory buoys and hence, by late July, only 5 cm of surface ice melt had been observed. Bottom ice melt was also low (4 cm) compared to previous years. It is not clear whether solar heating of the upper ocean has built up a heat reservoir that may promote bottom melt later in the season.

Northeast Passage / Northern Sea Route

No change or no new information from last month's report.

Greenland / Barents Sea

Contributions from:

- Gerland and Goodwin (8 - PDF)

Ice extent in the Greenland and Barents seas for July ranges from below to well below average values. In the eastern Barents, July ice extent is at a record low for this month, surpassing July 2007, while it is roughly average just to the east in the eastern and southern Kara Sea, illustrating how regional variability and different impacts of ice drift, ocean/atmosphere warming, and ice composition on ice retreat complicate assessments of large scale anomalies. (see Figure 4)

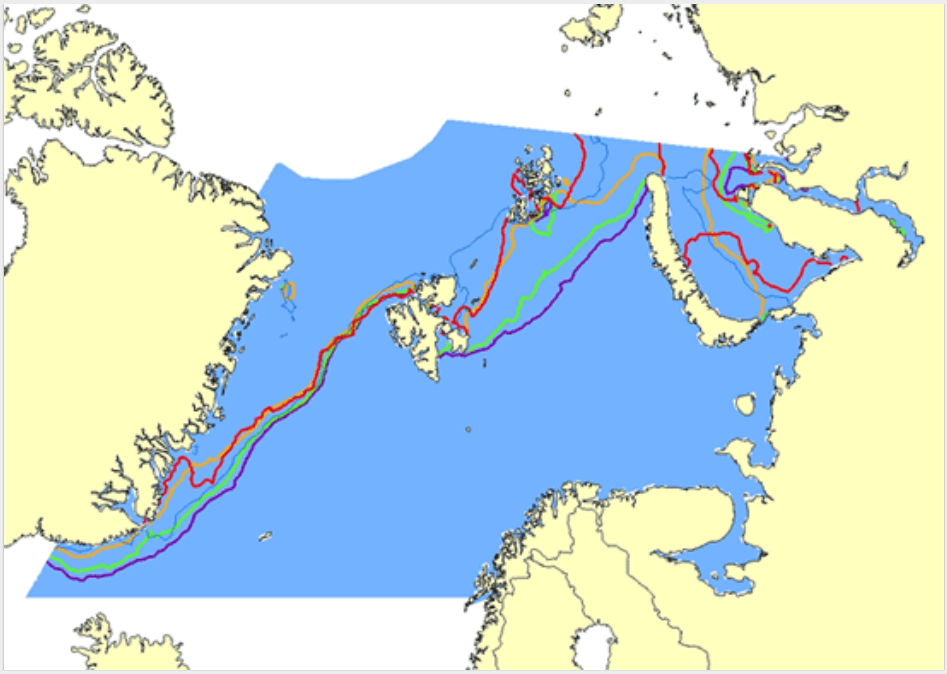


***Figure 4**. Ice extent (monthly means, July) southern border of 30% ice concentration, in the Greenland Sea / Fram Strait and Barents Sea, based on passive microwave satellite data (red = July 2009, orange = mean July 1999-2008, green = mean July 1979-2008, purple = mean July 1980-1999). The thin blue line indicates the ice extent for June 2007. From contribution by Gerland and Goodwin.*