

2010 REGIONAL SEA ICE OUTLOOK July Report

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1. Region of Interest:

Chukchi Sea at Barrow, Alaska.

2. Sea Ice Parameter

Break-up date of landfast ice at Barrow, Alaska

URL: http://seaice.alaska.edu/gi/observatories/barrow_breakup

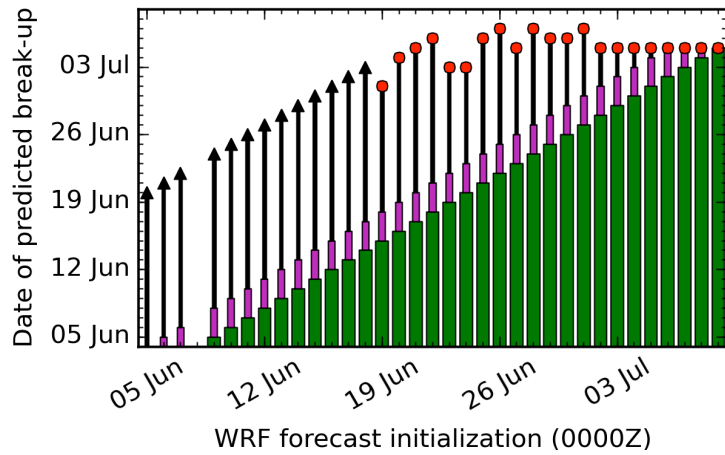
An operational break-up forecast was performed based on insolation measured and forecasted over a two-week period. It was assumed that break-up would take place in a way similar to previous decades, i.e. grounded pressure ridges hold rubble and level landfast ice in place until the latter starts to disintegrate from melt due to solar radiation. The research station at NARL, North of Barrow, served as reference location for the forecast. Measured and forecasted insolation indicated early on that break-up should happen about 5 days earlier this year than in 2009, i.e. around July 5. Break-up in 2009 – on July 11 – was among the latest observed in the last 10 years. However, landfast ice was insufficiently grounded in 2010 and broke out in discrete floe fragments before it could melt in place. South to North from Barrow to Point Barrow, ice broke out on June 25, July 4, and July 8 at downtown Barrow, NARL, and Point Barrow, respectively. Tentative investigations indicate that the break out events appear to be associated with low sealevel pressure (June 25 and July 4) and wind direction and speed (July 8). Break-up as a series of discrete break-out events was also observed in 2003, 2004, and 2007. Of the years with break-out, break-out in 2010 took place one to three weeks later than in previous years.

3. Outline of Methods / Techniques

The degree of grounding of landfast ice was assessed from observations of pressure ridge thickness derived from ice thickness measurements and estimates based on sail heights. Observation of ice near-shore ice movement (i.e. break-up) was based on webcam, coastal RADAR, local observers, and satellites. Insolation was measured with a Kipp-Zonen radiometer (courtesy ARM), estimated based on NOAA cloud cover observations, and forecast for 16 days based on a GFS/WRF weather forecast (Zhang and Krieger).

4. Estimate of Forecast Skill

The operational break-up forecast was consistent to +/- 2 days for up to two weeks in advance and consistent to the day up to one week prior to the final break-up prediction. However, while it was assumed that near-shore ice would break up by moving along the coast in response to partial melting of level ice and winds, it actually broke out in floe fragments probably in response to bottom melt of pressure ridges, sealevel fluctuations, winds and currents. The proximity of forecast break-up date at NARL (July 5) and observed break-out at NARL (July 4) is likely coincidence.



Forecast break-up date (red dots) based on insolation measurements (wide, green bars), estimates based on cloud observations (narrow, purple bars), and weather forecast (black lines). Black triangles indicate that break-up was expected beyond the reach of the forecast. Only break-up forecasts based on 00:00Z weather forecast runs are shown.

5. Improving Outlook Detail and Accuracy

A more suitable quantification is needed of the degree to which landfast ice is grounded. Since the ice broke out rather than melt in place, the quality of the thermodynamic component cannot be assessed this year.