CHARTING A NEW SEASONAL OUTLOOK FOR THE NATIONAL ICE CENTER

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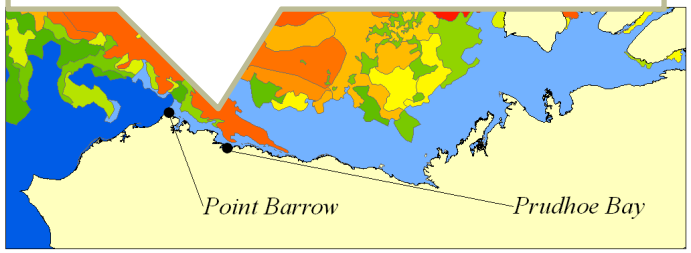
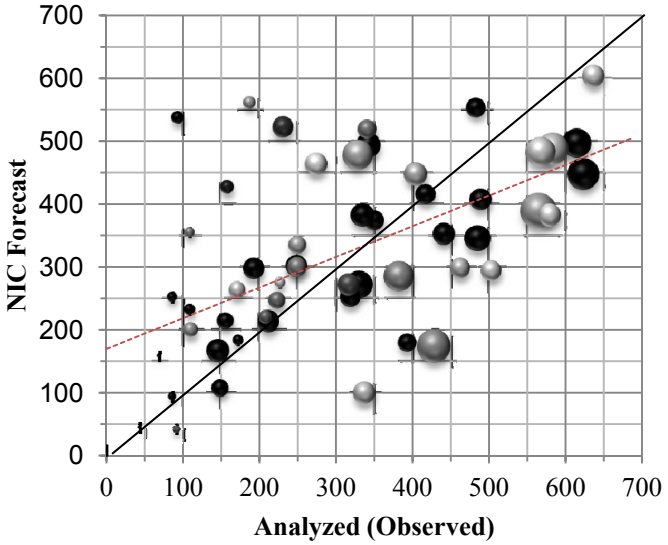
NIC's Operational Seasonal Outlook

NIC Prudhoe Bay Seasonal Outlook:

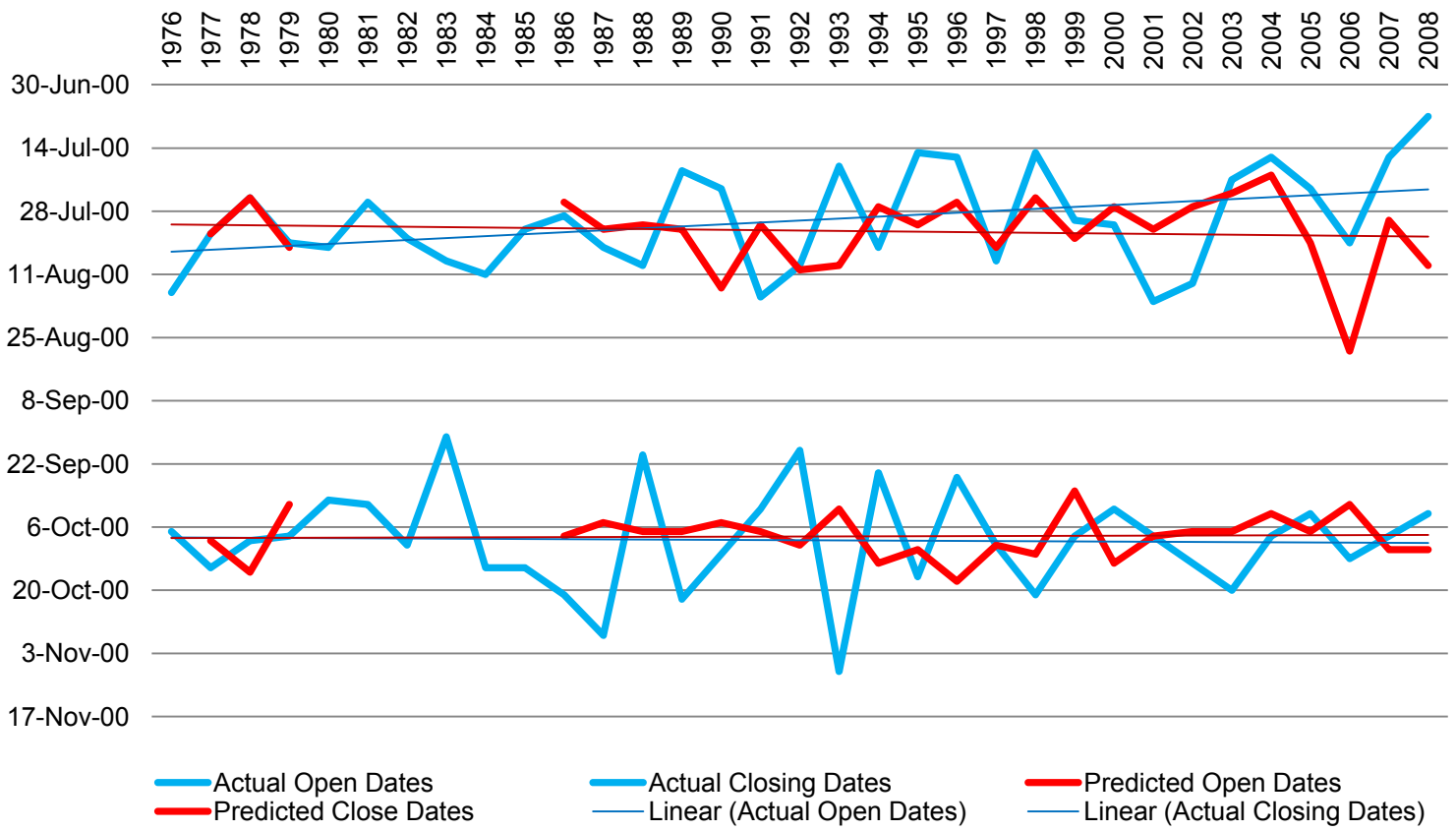
- ***Prediction of shipping route between Pt Barrow and Prudhoe Bay along Alaska's North Slope***
- ***Statistical forecast method initially developed by Barnett (1976) in response to heavy sea ice year in 1975 (North Slope route did not open in '75)***
- ***Barnett Severity Index: linear summation of opening dates, ice edge distance from shore, and navigable season length***
- ***Opening, closing dates, severity determined by change in BSI from previous year, meteorological measurements from Jan-Apr of current year***
- ***Historically, NIC Forecasts under-predict severe years (low BSI) and over-predict light years (high BSI)…***
- ***No significant development since mid-80s***

180 nautical mile corridor provides access to Prudhoe Bay from Barrow





Accuracy of BSI Method

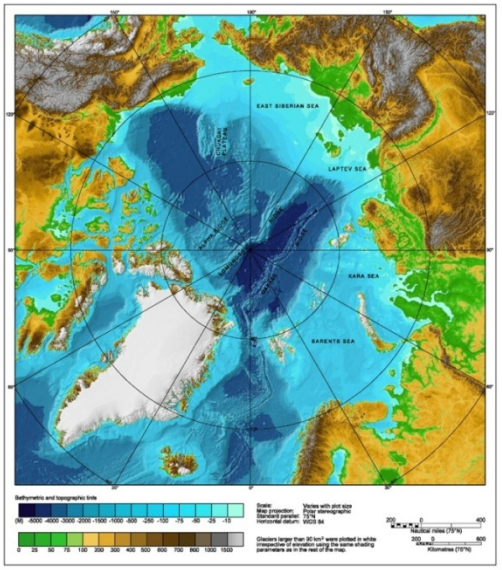


BSI is not able to consistently predict Barrow-Prudhoe Bay shipping corridor openings or closings within 1 week, and is not following trend of earlier openings.

Why Develop a New Method?

Preparing for a Changing Arctic

Map from British Broadcasting Corporation

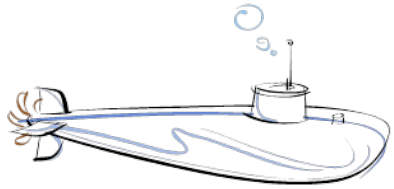


IBCAO Chart

Accurate spatial ice forecasts, outlooks needed to support:

- ***military/coast guard readiness and planning***
- ***commercial shipping and ecotourism***
- ***natural resource exploration and exploitation***
- ***scientific research***

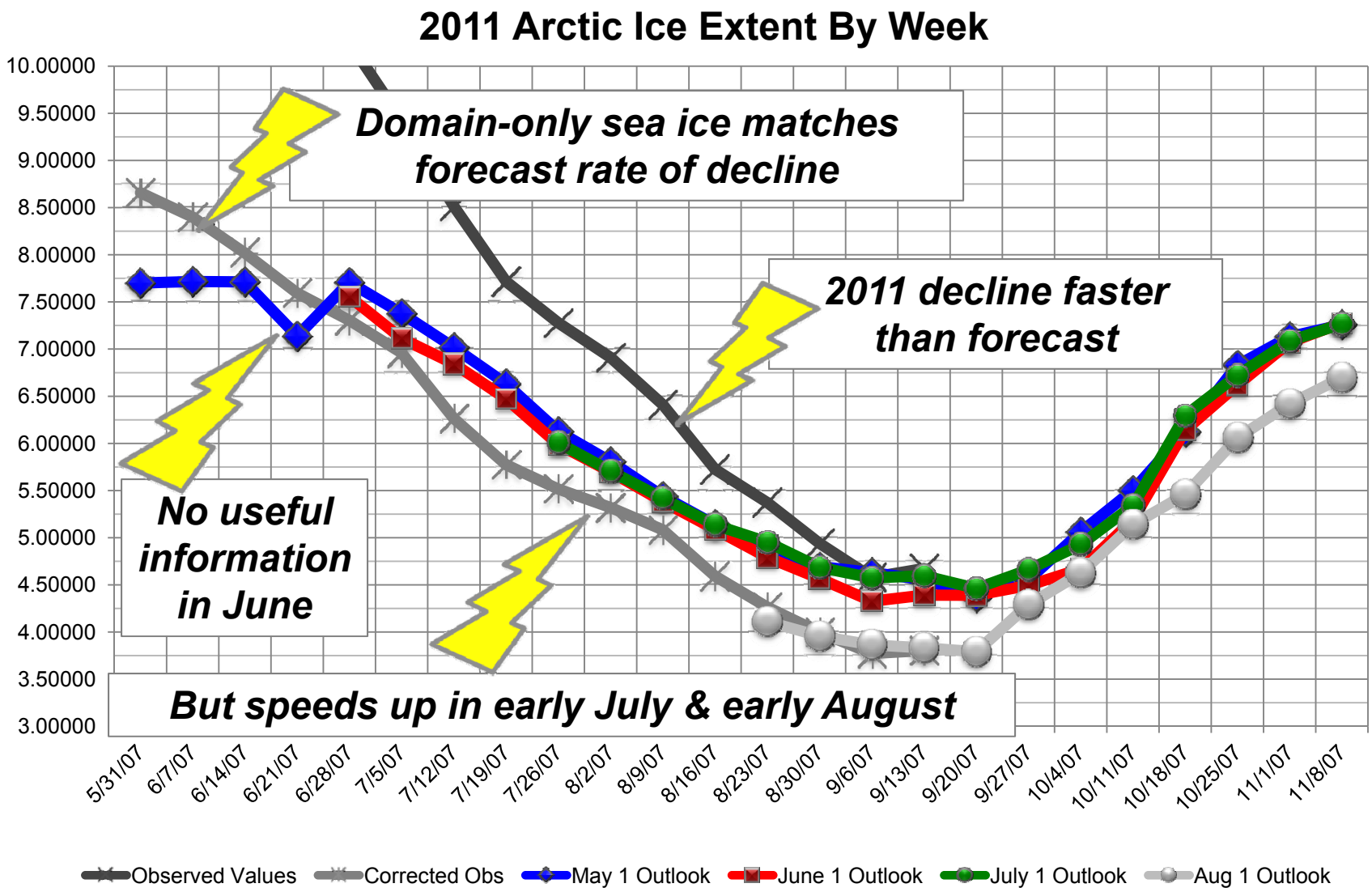
With rapidly changing conditions in the Arctic, an improved method is needed!



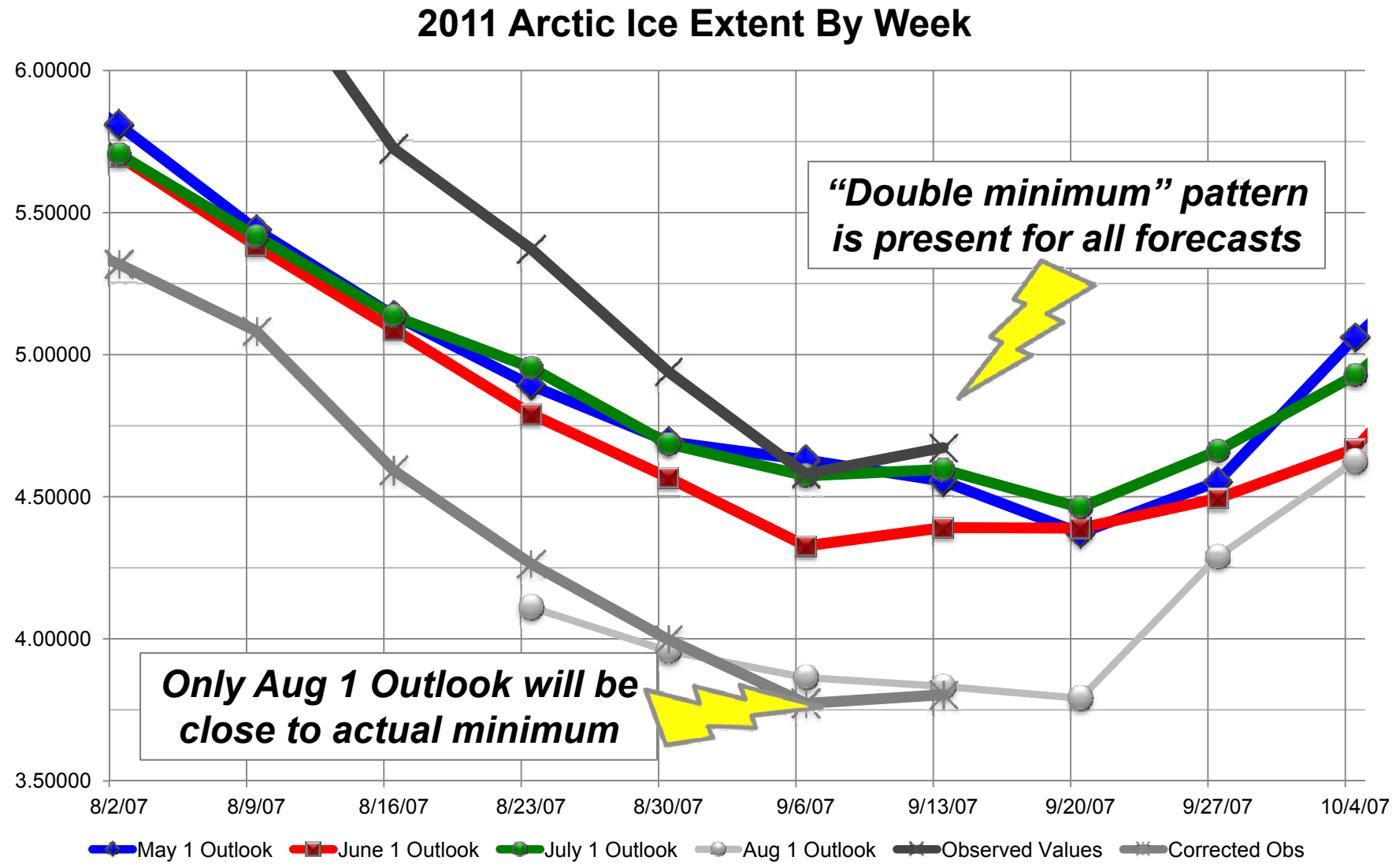
Statistical Sea Ice Outlooks

- Arctic Regional Ice Forecast System (ARIFS)
- Developed at U Colorado by Drobot, Maslanik, Fowler
- 10 years prior data, linear correlations, not de-trended (used "out of the box")
- NIC added NCEP 2m Air T and SLP
- Brute force correlation at every point that had ice at least once in last 10 years
- No projection for Canadian Archipelago
- *No ability to project ice where none has been*
- Accurate for 2010, but upon further review…

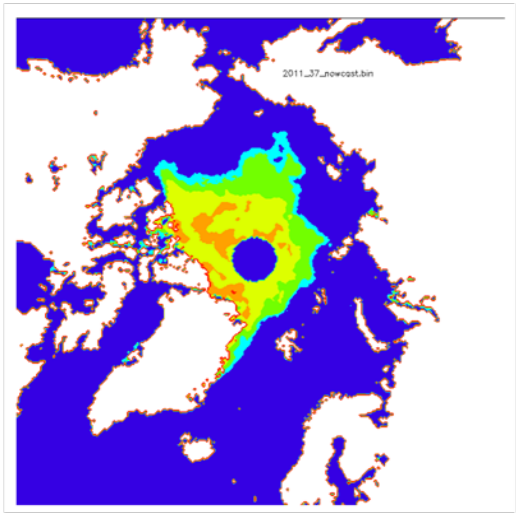
2011 Sea Ice Outook



September Minimum



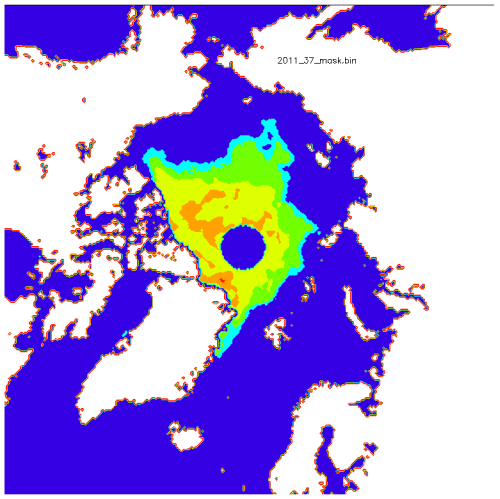
Spatial Outlooks



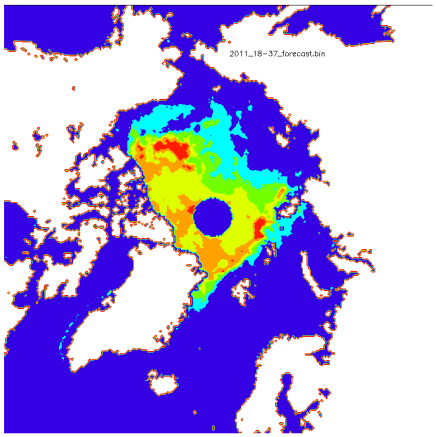
Observed

Week 37

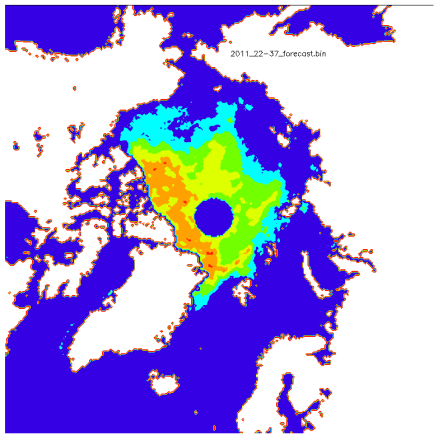
- All outlooks over-predict ice concentration
- The ice > 4/10 (yellow) is too compact
- MIZ (green) gets better over time
- Open Water (light blue) decreases over time



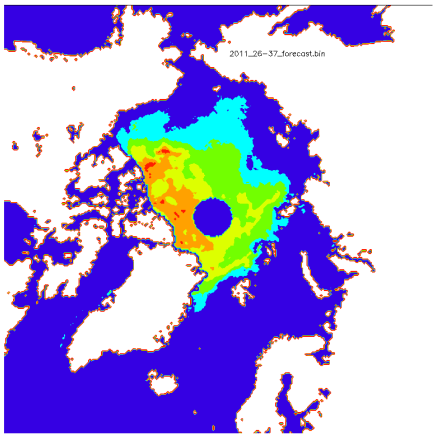
Corrected



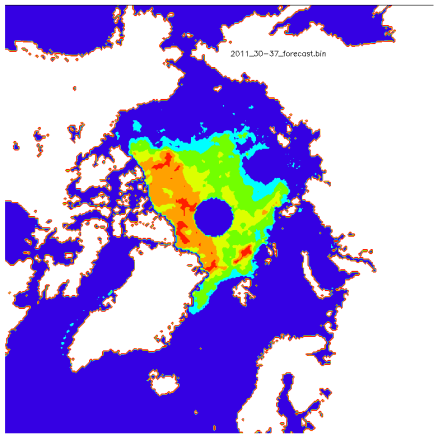
May 1 (NAIS)



June 1



July 1



Aug 1

So Far…

- Model “as is” will get you in the general area of diminished sea ice, but an accurate forecast appears to be only within 2 months or less
- False minimum seen by NSIDC in 2010 repeated here; 3 of 4 forecasts suggest later true minimum → synopic-scale variability governs
- Improvements may be seen by adding data, adding “intelligent” methods for sorting data, or adding pseudophysics to account for synoptics
- Higher resolution needed to resolve Archipelago, other features

Recommendations

- Forecasts/Outlooks on the order of **1-12 months** are most useful for Coast Guard, Navy, for planning of forward deployment, future allocation of resources
- Stakeholders (oil, minerals, tourism, native Alaskans) will benefit from **accurate** predictions of **how much** ice and **where** it be
- Shorter term forecasts can be handled by existing resources (e.g., Navy Research Lab: PIPS/Arctic Cap Regional Forecast System, NWS)
- NOAA GFDL, NCAR, Navy, NASA, Los Alamos, several others already have longer-scale sea ice and **coupled climate models**; with limited (zero) funding, **we don't need another one**
- An **operational product** is needed for US to meet future Arctic needs in **defense, commerce, and homeland security**

Questions?