

Monthly progress report, June 2011

1) Summary of work performed and progress made during preceding month

A. *Analysis of ice distribution and lead patterns*

We have now acquired, through the Geographic Information Network for Alaska (GINA) a complete set of clear or mostly-clear sky AVHRR imagery over the Chukchi study region for the period 1993-2010. Following quality checks, these data will be used for a quantitative analysis of lead fractions and patterns.

Work is also continuing towards a detailed summary of repeatable lead patterns in the Chukchi Sea. A recent result of this is a complete dataset of first appearance dates for a polynya in the vicinity Hanna Shoal (72°N, 161.9°W). The presence of a polynya indicates grounded ice. Figure 1 shows the date on which a polynya was first observed in AVHRR data between 1993 and 2010. These results indicate a linear trend (significant at the 95% level) toward later formation of grounded ice on Hanna Shoal (3.4 days later per year). We should caution that these results are preliminary and we have not yet taken account of cloudiness, which will give rise to later polynya observations. However, if the formation of the Hanna Shoal polynya is dependent on the availability of deep-keeled ridges to become grounded, then we would expect to observe later formation dates as multiyear sea extent decreases in the Chukchi Sea.

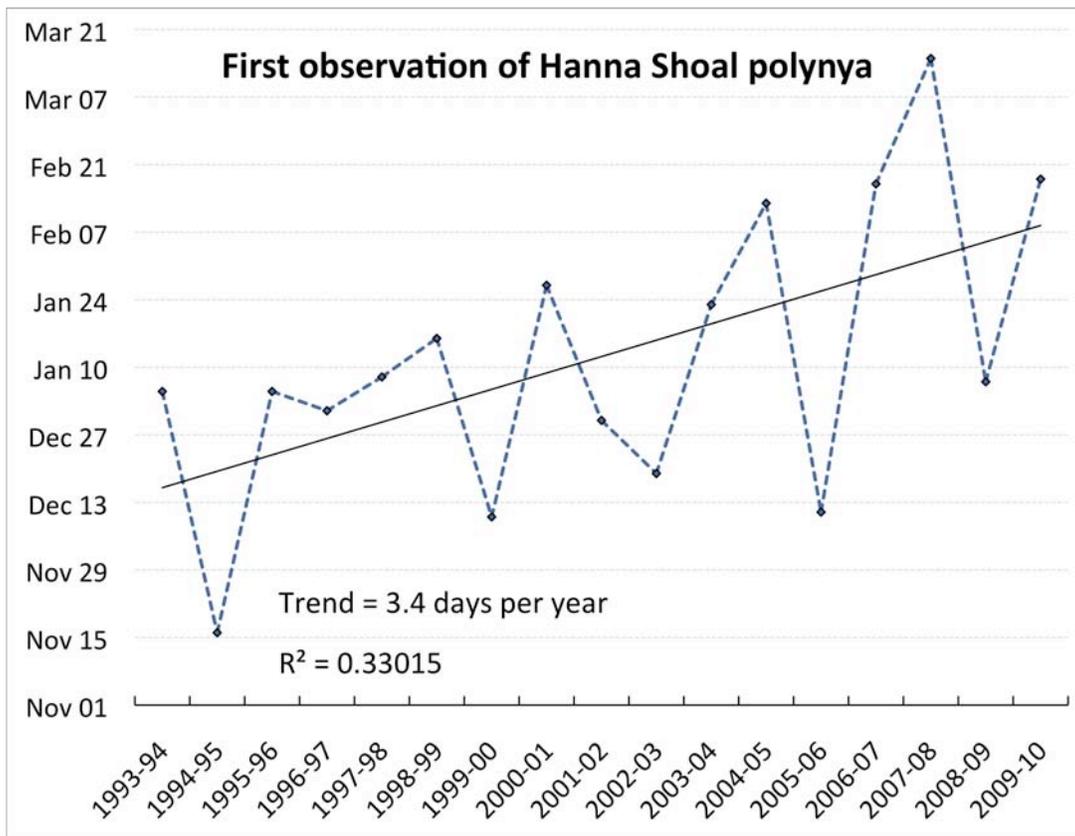


Figure 1: Date of first observation of Hanna Shoal polynya in AVHRR data

B. Analysis of landfast ice extent

SAR data mining and processing

No new data were acquired or processed during June

Water depth at the seaward landfast ice edge

We have completed a preliminary analysis of water depth at the seaward landfast ice edge (SLIE) in the Chukchi and Beaufort study region based on the SLIE delineations available so far and the bathymetric described in the progress report for May, 2011. As in the previous study (AK-03-06, MMS-71707), we have calculated the distribution of water depths at the SLIE for each month and for each of the different subregions of coast. We presented the coastal 11 coastal subregions, in the April 2011 report. For reference we include we include them again here in Figure 2.

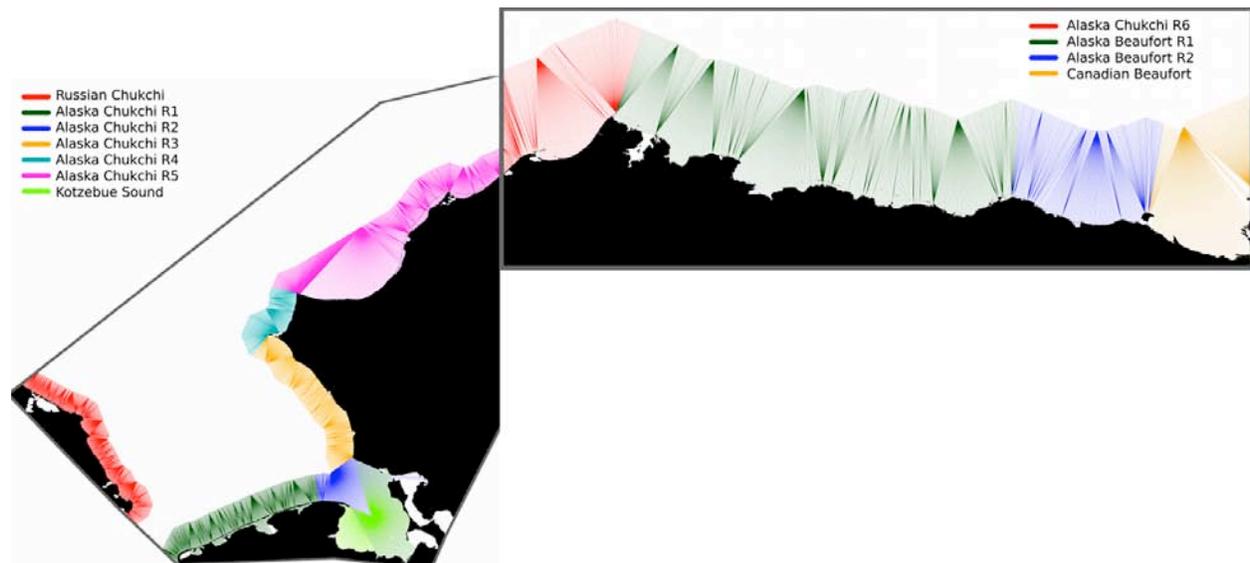


Figure 2: The 11 subregions comprising the two main study regions for the landfast sea ice component of this project. (First presented in this form in monthly report for April 2011)

The results of the SLIE water depth analysis are shown in Figure 3. Despite representing an incomplete SLIE dataset, this figure presents a great deal of information about the behavior of landfast and regional and seasonal variability. A more thorough treatment will be given to these results when all the SLIE data have been processed, but there are some general features that can be noted at this stage. First, all subregions display a modal SLIE water depth by the end of landfast ice season, which tends to lie between 15 m and 20 m. One exception to this is AK Chukchi 3, the southwest-facing section of coast between Kotzebue and Point Hope, where landfast sea ice occupies shallower water than elsewhere and exhibits a modal SLIE water depth around 10 m. Landfast sea ice along The Russian Chukchi coast extends into deeper water than elsewhere and Figure 3 indicates a bimodal SLIE water depth distribution in this region, with modes at around 25 m and 35 m.

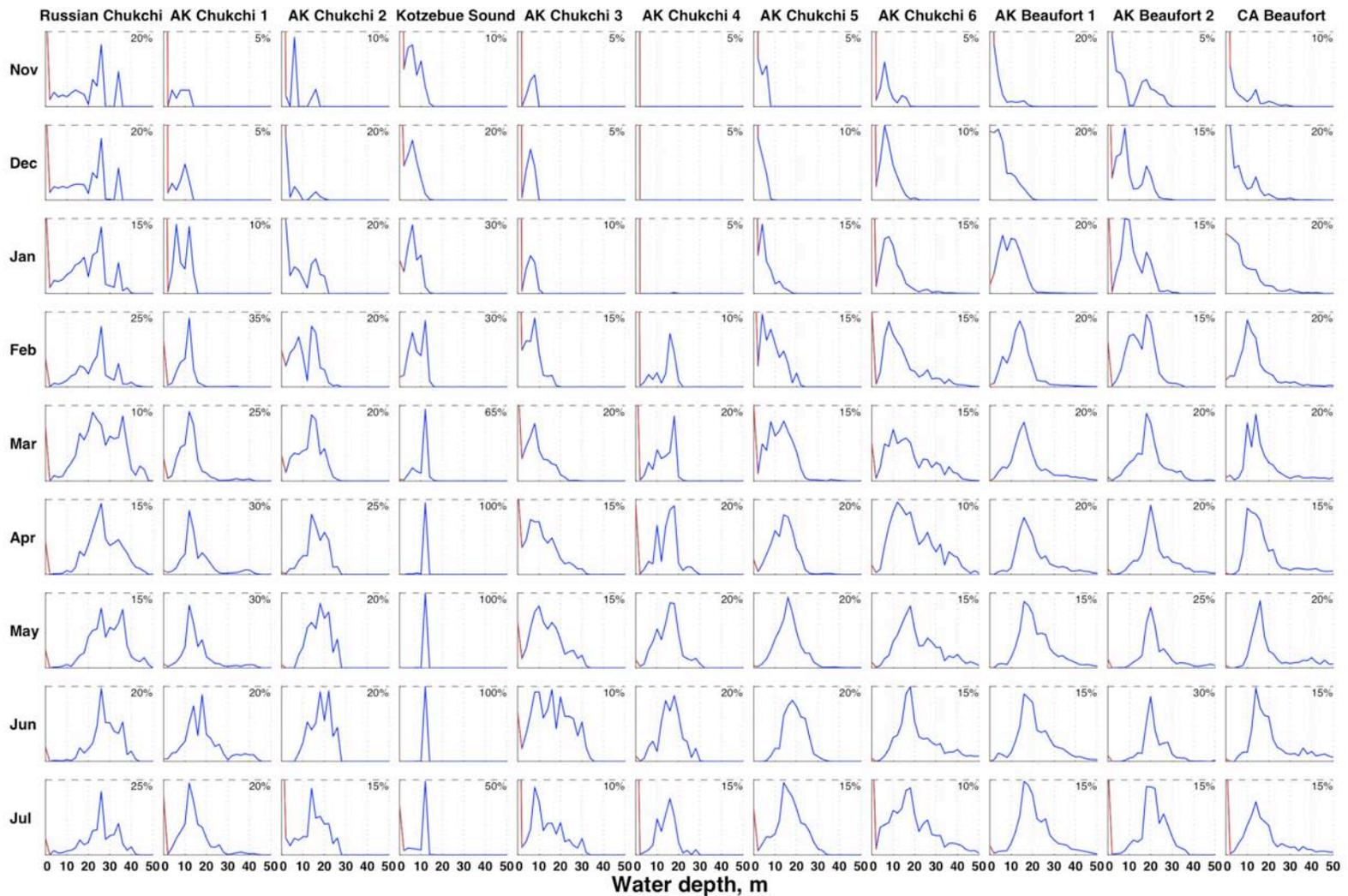


Figure 3: Distributions of water depths at the SLIE by subregion and month. The percentages in the top right corners provide the vertical scale for each plot. Zero water depth contributions are shown in red. The subregions are shown Figure 2.

Assessing potential alternative approaches at deriving landfast ice edge locations and landfast ice stability

Our manuscript entitled “Mapping Arctic Landfast Ice Extent Using L-band Synthetic Aperture Radar Interferometry” has been accepted for publication by the journal *Remote Sensing of the Environment*. In addition, we have been examining break-up of landfast near Barrow using C-band InSAR data from European Remote Sensing satellite, ERS-2. This satellite is due to be decommissioned on July 4, 2011, but has been operating in a 3-day repeat “sea ice” phase since March, providing the first opportunity for C-band InSAR since 1994.

C. Miscellaneous activities

n/a

2) Summary of significant technical, schedule or cost problems encountered during preceding month

n/a

3) Summary of resolutions agreed to between Contractor and MMS re item (2)

n/a

4) Significant meetings held or other contacts made in connection with project during preceding month

Hajo Eicken presented on Alaska coastal and offshore ice regimes at the Fourth Symposium on Maritime Operations in an Ice-Diminished Arctic, June 21-23 in Washington, DC. The meeting also provided for an opportunity for updates with Shell (M. Macrander, R. Raye), BOEMRE (Tim Holder) and others.

5) Action items, open questions etc.

n/a