

**2010 Freeze-Up Study of the Alaskan Beaufort and Chukchi Seas**

**Progress Report No. 2  
April 1, 2010 – June 1, 2011**

***Activities Undertaken***

During the past two months, the following activities have been undertaken under the contractual Scope of Work:

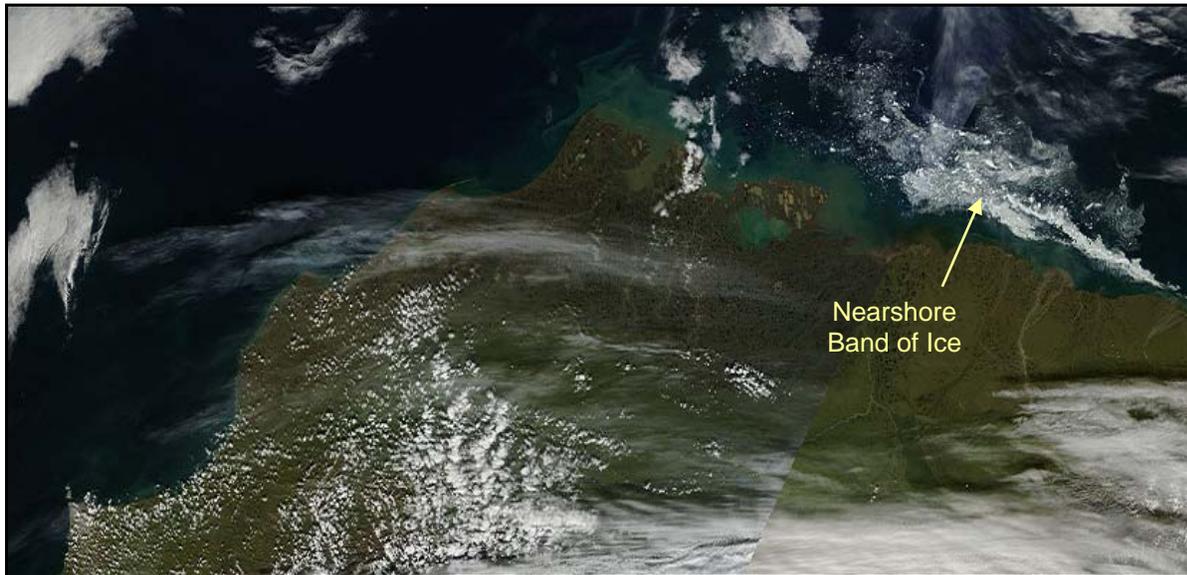
- ***Task 1. Planning and Administration:*** Meteorological data and ice charts were procured from publicly-available sources.
- ***Task 2. Satellite Imagery:*** The 17 RADARSAT II images of the Alaskan Beaufort Sea and 19 RADARSAT II images of the Chukchi Sea were analyzed to track the progress of freeze-up and to quantify the extent of the landfast ice, the location of multi-year ice, and the motion of selected ice floes.
- ***Task 3. Aerial Reconnaissance Missions:*** The digital photographs taken during the five aerial reconnaissance missions conducted in February 2011 were correlated with the flight paths, and the photo locations were plotted on a series of drawings that display the flight paths as well as observations of the ice characteristics made during the flights.
- ***Task 4. Data Analysis and Reporting:*** The data acquired under Tasks 1 through 3 were used to compute freezing degree days and ice thickness, and to analyze storm characteristics, variations in the width of the landfast ice zone, ice drift velocities, and ice pile-up characteristics. Preparation of the draft report currently is underway.

***Key Findings***

Noteworthy findings are summarized below:

- Freeze-up in the Beaufort Sea began in early October but progressed at an unusually slow pace due to a combination of warm air temperatures and disruptive storm events. The ice canopy did not encompass the entire Beaufort until the first week in November.
- Due to a paucity of prolonged easterly storm events in December and January, the landfast ice zone in the Beaufort Sea developed slowly. Lacking a well-grounded shear zone at its outer edge, the landfast ice remained unstable and subject to retreat.
- In the Chukchi, freeze-up in the nearshore area began in mid-October. As in the case of the Beaufort, the ice canopy grew slowly, with the occurrence of full ice cover delayed until the last week in November.

- Air temperatures in both the Beaufort and Chukchi tended to be slightly higher than in 2009-10, resulting in slightly lower accumulations of freezing degree days in both basins.
- The sizeable ice fragments noted on the barrier islands of the Beaufort Sea during the field reconnaissance mission in February appear to have resulted from a band of old ice than remained grounded in the nearshore region between Flaxman Island and Harrison Bay throughout the 2010 open-water season and persisted until the time of freeze-up (Figure 1).



After: National Ice Center, 2011, [http://www.natice.noaa.gov/products/weekly\\_products.html](http://www.natice.noaa.gov/products/weekly_products.html).

**Figure 1. MODIS Image Showing Nearshore Band of Ice on August 14**

***Activities Planned***

- Continue the analysis of weather and ice movement data.
- Continue preparation of the draft report.

***Percent Completion***

**Contract Amount = \$99,907.00**

Invoice No.	Period Covered	Work Completed Each Period		Work Completed to Date	
		% of Total	\$	% of Total	\$
3163	10/1/10-4/1/11	75	\$74,930.25	75	\$74,930.25
3198	4/1-6/1/11	15	\$14,986.05	90	\$89,916.30