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

Progress Report No. 1
October 1, 2010 – April 1, 2011

Activities Undertaken

Since the study was initiated in October, 2010, the following activities have been undertaken under the contractual Scope of Work:

- ***Task 1. Planning and Administration***: Input regarding specific topics of interest was solicited from the study participants; logistical arrangements were made for the aerial reconnaissance missions conducted in February; and meteorological data and ice charts were procured from publicly-available sources.
- ***Task 2. Satellite Imagery***: 17 RADARSAT II images of the Alaskan Beaufort Sea and 19 RADARSAT II images of the Chukchi Sea were procured from Shell, along with occasional publicly-available AVHRR images. The images were used to follow the general progress of freeze-up, quantify ice drift rates, and select features of interest to be investigated during the aerial reconnaissance missions.
- ***Task 3. Aerial Reconnaissance Missions***: Five aerial reconnaissance missions were undertaken in early February, 2011, consisting of two fixed-wing and one helicopter flight in the Beaufort Sea and two fixed-wing flights in the Chukchi Sea.
- ***Task 4. Data Processing and Analysis***: Analysis of the data acquired under Tasks 1 through 3 has been on-going since completion of the aerial reconnaissance missions.

Key Findings

Key findings to date are summarized below:

- In sharp contrast to 2009-10, the 2010-11 freeze-up period was characterized by a paucity of major storm events. This circumstance resulted in significantly less deformation of the first-year ice than noted a year earlier. In addition, the coastal flaw lead that forms off the Chukchi Sea coast tended to be smaller and to open less frequently than in 2009-10.
- Also in sharp contrast to 2009-10, no significant invasions of multi-year ice occurred in 2010-11.
- Air temperatures during the 2010-11 freeze-up and winter seasons have been relatively warm. As a result, the growth of the first-year ice sheet has been slower than normal.
- The only significant ice pile-up noted in the Beaufort Sea was located on the man-made Oooguruk Offshore Drillsite. It attained an estimated height of 3 m but did not

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encroach onto the work surface. Although pile-ups were absent from the natural barrier islands, grounded ice rubble typically covered between 20 and 50% of the north-facing island shorelines. The rubble appeared to have formed offshore and then been driven onto the beaches. The largest pieces, with heights up to 5.5 m, were found on Cross Island (Plate 1).

Plate 1. 5.5-m Grounded Rubble on North Shore of Cross Is. (3 February 2011)

- Twenty seven ice pile-ups were noted on the Chukchi Sea shoreline, including 12 that encroached onto the beach. The largest, with an estimated height of 8 m and encroachment distance of 40 m, was located in the vicinity of Wainwright.
- As in 2009-10, the landfast ice zone was poorly-developed in the Beaufort Sea east of Prudhoe Bay at the time of the early-February aerial reconnaissance missions.

Activities Planned

- Continue the analysis of weather data to establish the chronology of freeze-up.
- Continue the analysis of RADARSAT II imagery to quantify ice movement rates and correlate the movements with meteorological conditions.

- Continue to process and analyze the field data with respect to flight lines, features observed, and photographs.
- Commence preparing the project 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
	4/1-6/1/11				
	6/1-8/1/11				