



# OCS Scientific Committee Meeting May 2012

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# Enhanced Verification and Interpretation of Arctic Ice Formation, Distribution, and Density



Diver on frazil ice Beaufort  
Sea  
From Reimnitz and Barnes

# Enhanced Verification and Interpretation of Arctic Ice Formation, Distribution, and Density

Page No.	Discipline	Title	Ranking
39	AQ	Arctic Air Quality Impact Assessment Modeling	1
41	MM	Chukchi Acoustic, Oceanography and Zooplankton Study: Hanna Shoal (Extension of CHAOZ)	2
43	IM	Coastal Marine Institute (extension)	3
45	IM	Cook Inlet Workshop: Information Status & Research Planning	4
47	PO	<a href="#"><u>Enhanced Verification and Interpretation of Arctic Ice Formation, Distribution, and Density</u></a>	5
49	IM	*Support for the 2012 United States-Canada Northern Oil and Gas Research Forum	6
51	MM	*Walrus Seasonal Distribution and Habitat Use in the Eastern Chukchi Sea	7
53	FE	Physical and Chemical Analyses of Crude and Refined Oils: Laboratory and Mesoscale Oil Weathering	8
55	SS	Subsistence Mapping of Wainwright, Point Lay, and Point Hope	9
AQ = Air Quality IM = Information Management PO = Physical Oceanography		FE = Fates & Effects SS = Social Systems HE = Habitat & Ecology	MM = Marine Mammals and Protected Species REN = Renewable Energy

\* Denotes project that remains contingent on collaboration with external groups.



## **BOEM Information Need:**

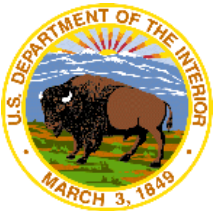
BOEM has instituted restrictions on the timing of late season (October/November-Freeze-up) drilling operations for the oil and gas industry that would assure a greater opportunity for spill response and cleanup in the event of a spill. (OCS EIS/EA BOEM 2011-061). The action requires that BOEM provide the earliest “trigger” date by which sea ice encroaches upon the proposed drilling site. This proposed study will:

- ❑ Provide improvements to in-house capabilities to assess the timing of late season ice freeze-up “trigger” date and pack ice incursion at proposed drill site locations.



## BOEM Information Need:

- ❑ Provide satellite and ground-verified supported interpreted sea ice data which documents freeze-up conditions and pack ice incursion into proposed drilling areas provided by industry during the regulatory review of applications for permit to drill (CFR§250.417).
- ❑ Provide an independent peer-reviewed assessment of the National Ice Center (NIC) interpreted data currently being used by BOEM.

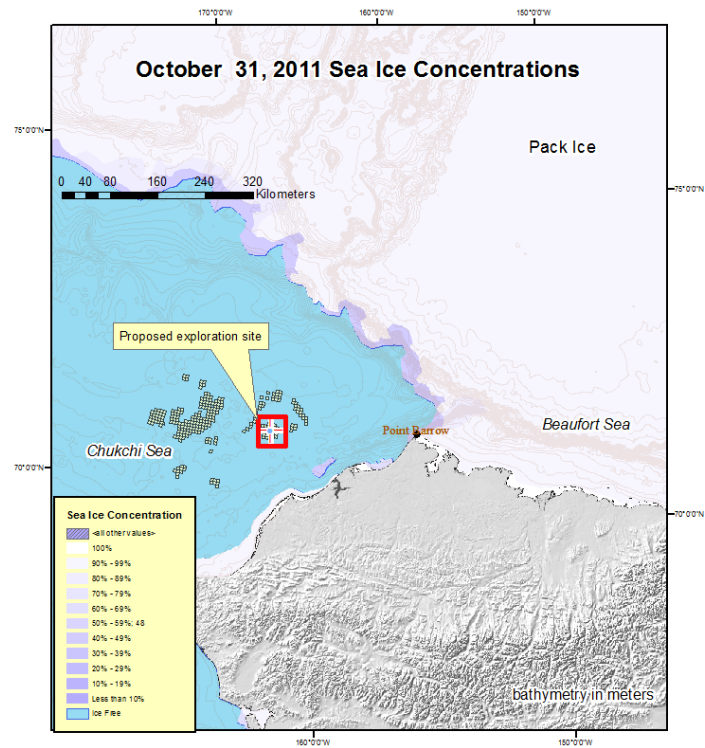
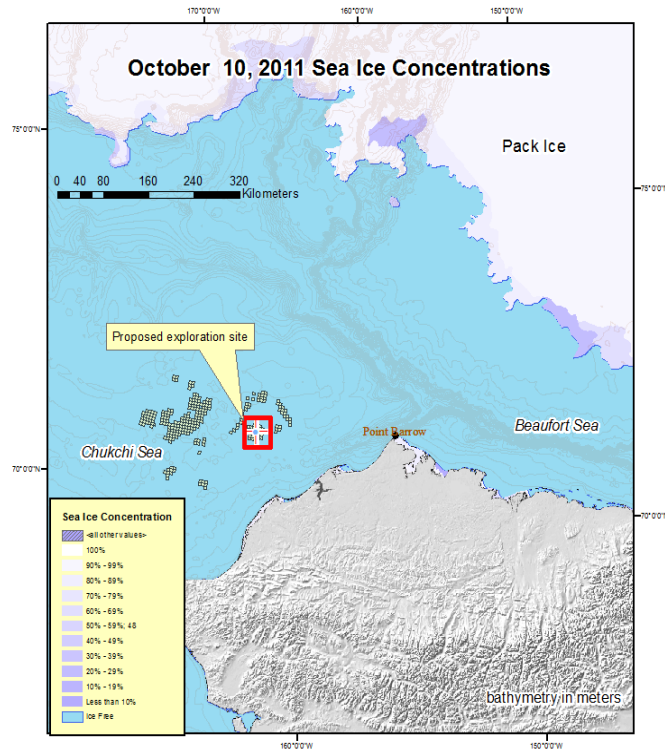


## Background:

### Relationship with Previous Work/Efforts

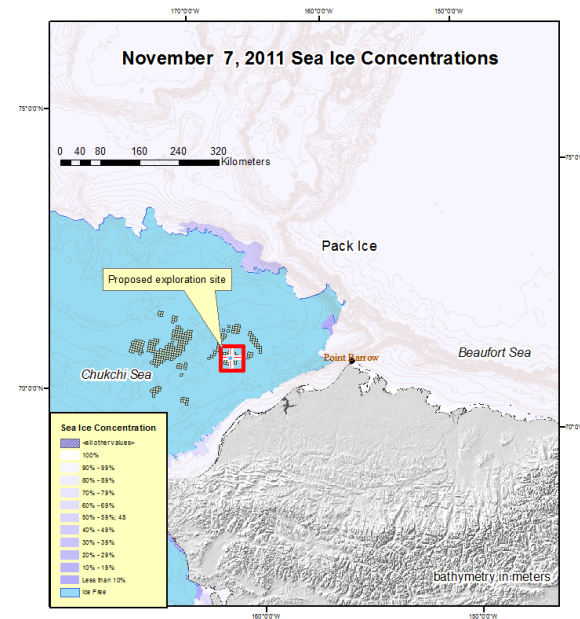
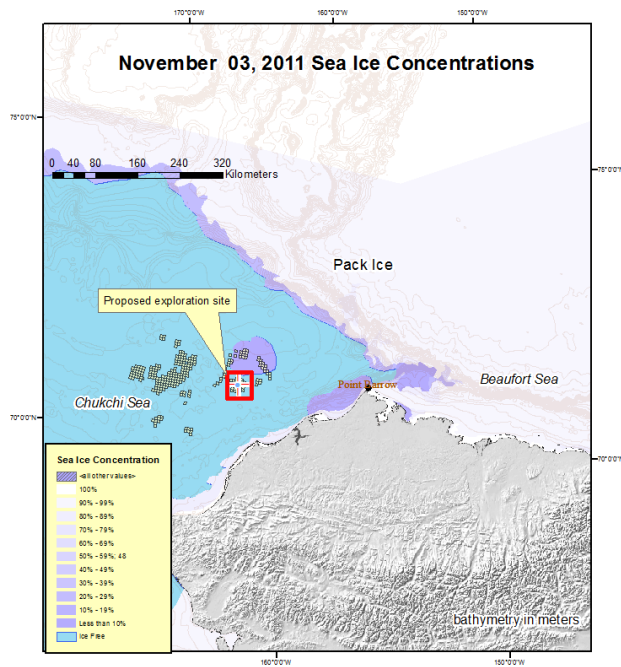
- ❑ **BOEM Sea Ice Database (1972-present) from National Ice Center interpreted data.**
- ❑ **Landfast ice has been mapped with SAR imagery for the Beaufort Sea and northeast Chukchi Sea under the completed study “Mapping and Characterization of Recurring Leads and Landfast Ice for the Beaufort and Chukchi Seas” (1994-2004). OCS Study 2005-068**



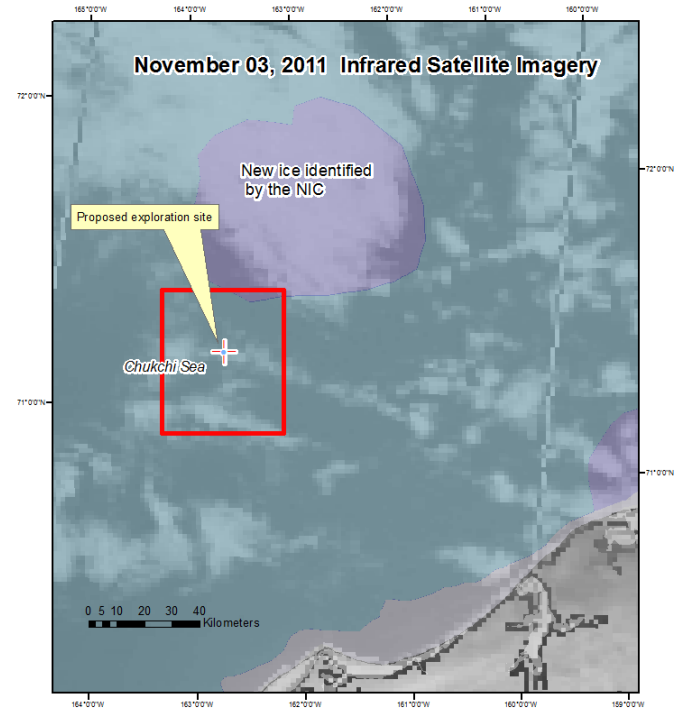
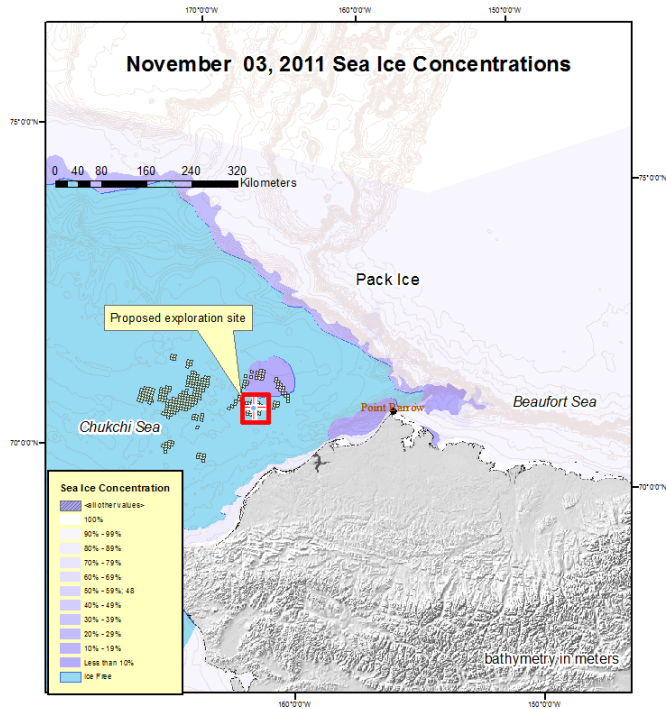


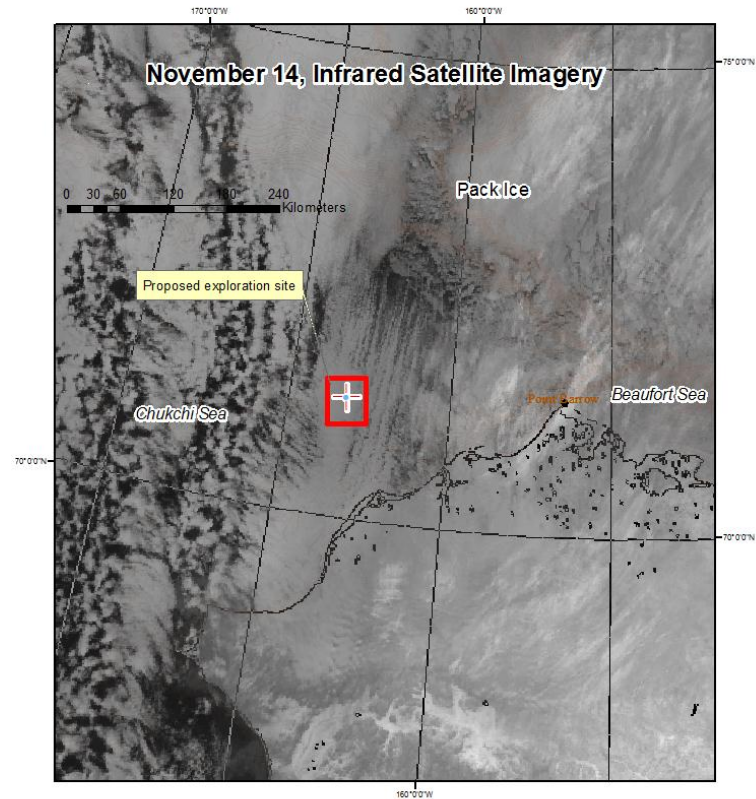
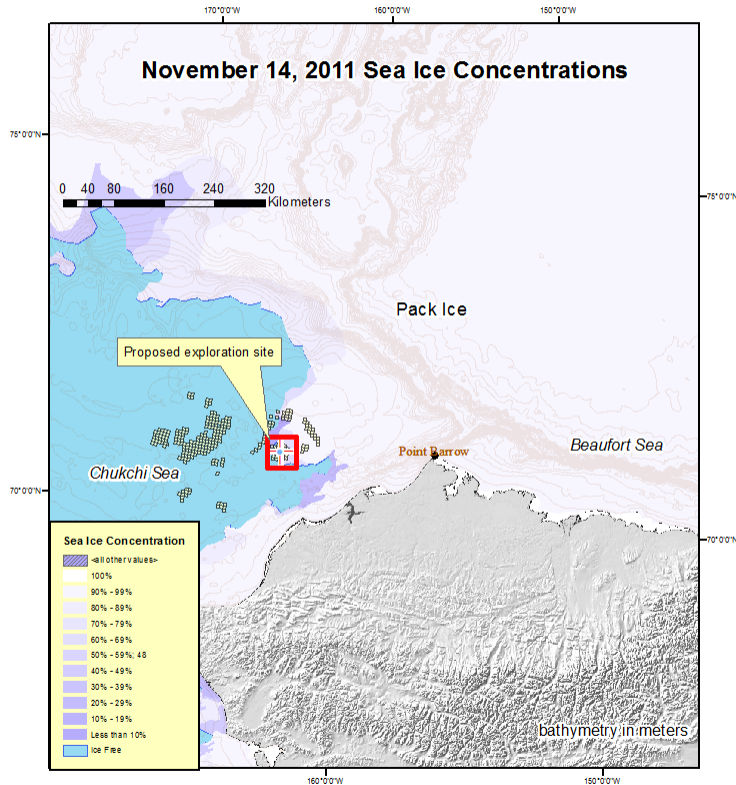
## New Ice Forms Over Proposed Drill Site

## New Ice Melts Over Proposed Drill Site









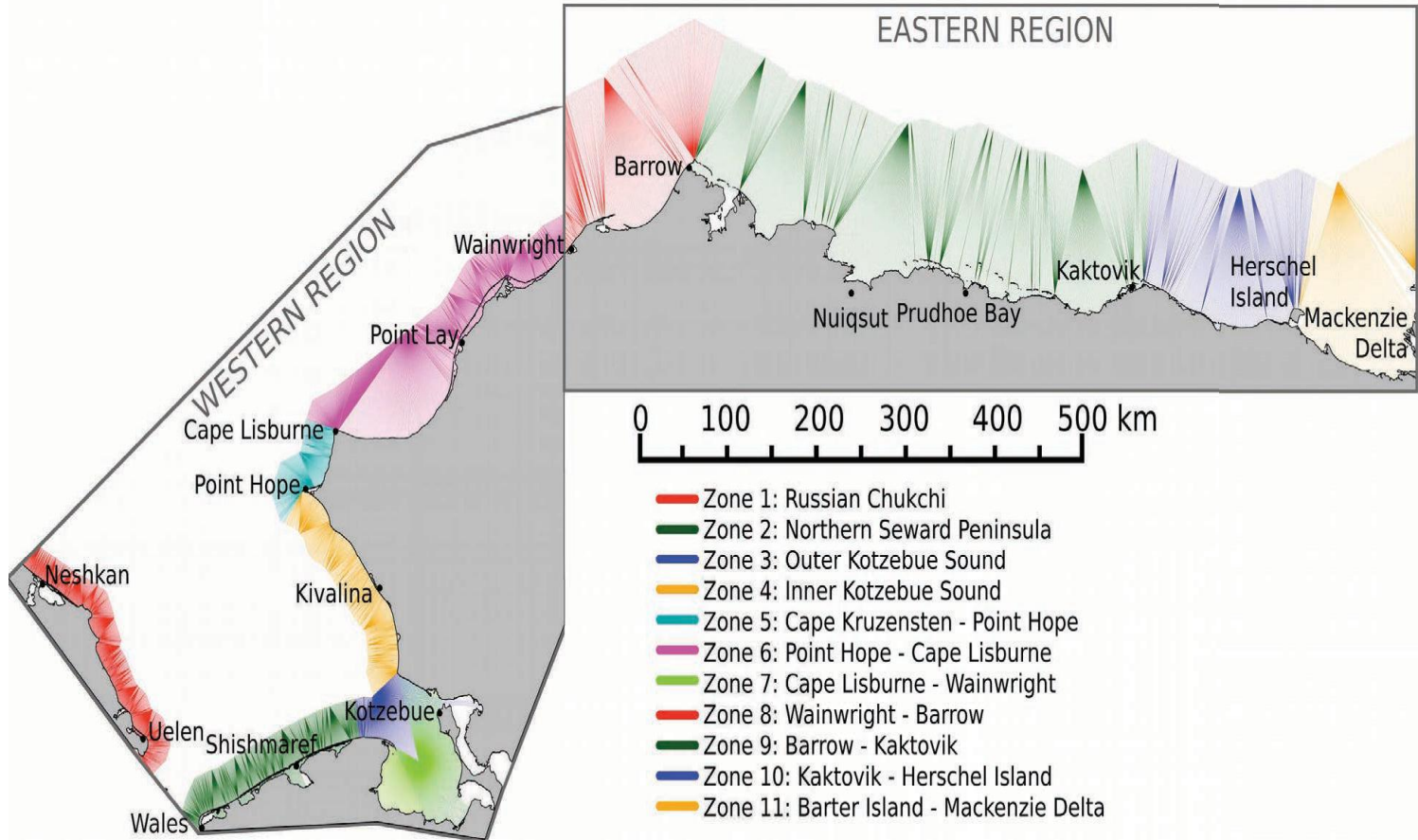
**Background:**

**B) Relationship with Concurrent/Future Efforts**

- ❑ **Mapping of landfast ice and leads (Chukchi and Beaufort Seas).**
- ❑ **Beaufort and Chukchi Mesoscale Meteorology.**
- ❑ **Arctic Air Quality Impact Assessment Modeling**



# Enhanced Verification and Interpretation of Arctic Ice Formation, Distribution, and Density



# Enhanced Verification and Interpretation of Arctic Ice Formation, Distribution, and Density

**Study's Objectives:** The study will achieve the following objectives pertaining to the months of October/November during the years 2007-2013 for the areas which include the Chukchi and Beaufort Sea active OCS lease areas:

- Interpret, analyze, and document the seasonal and inter-annual spatial and temporal characteristics of timing, growth and persistence of new ice formation, and its relationship to available atmospheric and oceanographic measurements.
- Interpret, analyze and document the seasonal timing and growth of pack ice incursion with changing atmospheric forcing conditions.
- Compare interpreted sea ice data from this study to the National Ice Center and Canadian Ice Service's sea ice data.
- Provide improved analytical and decision-making tools for BOEM staff.



# Enhanced Verification and Interpretation of Arctic Ice Formation, Distribution, and Density

## Methods:

- ❑ Acquisition of bi-weekly high resolution Synthetic Aperture Radar (Radarsat II), MODIS SST and other imagery as needed.
- ❑ Improve sea ice data interpretation through ground-truthing from available meteorological and oceanographic measurements of offshore and coastal observations (offshore meteorological buoys, coastal met stations, CTD or glider surveys). Also aerial surveys.

### **Deployment of sensors if budget allows.**

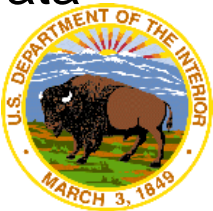
- ❑ Utilize atmospheric and oceanographic data in conjunction with high resolution SAR imagery to document the seasonal growth of new ice from shore, and the daily, weekly, and late season movement of pack ice into the active lease areas.



# Enhanced Verification and Interpretation of Arctic Ice Formation, Distribution, and Density

## Methods II:

- ❑ Five years of late season data will be incorporated into the BOEM Sea Ice Database to quantify the late season formation, growth, movement, speed and characteristics of new ice and pack ice incursion into the Beaufort and Chukchi seas active lease areas from 2007-2013.
- ❑ Comparison of results will be made against interpreted National Ice Center (NIC) and Canadian Ice Service (CIS) sea ice data for late season ice formation for Beaufort and Chukchi seas active lease areas.
- ❑ The derived data and analysis will be delivered in appropriate database formats that will enhance the current BOEM Sea Ice Data Analysis.



# Enhanced Verification and Interpretation of Arctic Ice Formation, Distribution, and Density

## Methods III:

- ❑ The final report and a peer-reviewed journal article will be produced to document the accuracy of the interpreted data.
- ❑ Recommendations will be provided to the NIC and CIS to improve sea ice data analysis.





## Additional *Pertinent* Information

- ❑ Industry ships may not be able to clean up a spill in new slush ice, but they can still operate ships to conduct other end of season activities during these initial freeze-up conditions.**
- ❑ The incursion of late season pack ice may severely limit non-icebreaker supported ship activities**

