SELECT SOCIOCULTURAL STUDIES

BOEM ALASKA REGION

Alaska Region

Physical Oceanography Studies

Planning Area	NSL #	Partners	Project Contact	TITLE
				**** PLANNED NEW STARTS (FY 2012)***
Beaufort Chukchi	AK-12-03a			Characterization of the Circulation on the Continental Shelf Areas of the Northeast Chukchi and Western Beaufort Seas [Physical Oceanography]
Chukchi	AK-12-03b			Applications for Mapping Spilled Oil in Arctic Waters [Physical Oceanography]
				****Note: The procurement of any study is contingent upon availability of funding***
				ONGOING STUDIES
				Physical Oceanography
Beaufort Chukchi	AK-06-05		Horowitz	Beaufort/Chukchi Seas Mesoscale Meteorology Modeling Study Phase II
Chukchi	AK-08-12-08	CMI	Horowitz	Satellite-Tracked Drifter Measurements in the Northeast Chukchi Sea
Chukchi	AK-09-02b	PMEL	Crowley	COMIDA: Factors Affecting the Distribution and Relative Abundance of Endangered Whales: Biophysical Moorings and Climate Modeling
Chukchi	AK-09-04	CMI	Horowitz	Mapping and Characterization of Recurring Polynyas and Landfast Ice in the Chukchi Sea
Chukchi	AK-09-06	CMI	Horowitz	Surface Current Circulation High Frequency (HF) Radar Mapping in the Chukchi Sea
Beaufort Chukchi	NT-08-02		Johnson	Adaptation of Arctic Circulation Model

COMIDA: Factors Affecting the Distribution and Relative Abundance of Endangered Whales: Biophysical Moorings and Climate Modeling

(aka CHAOZ – Chukchi Sea Acoustics, Oceanography and Zooplankton)

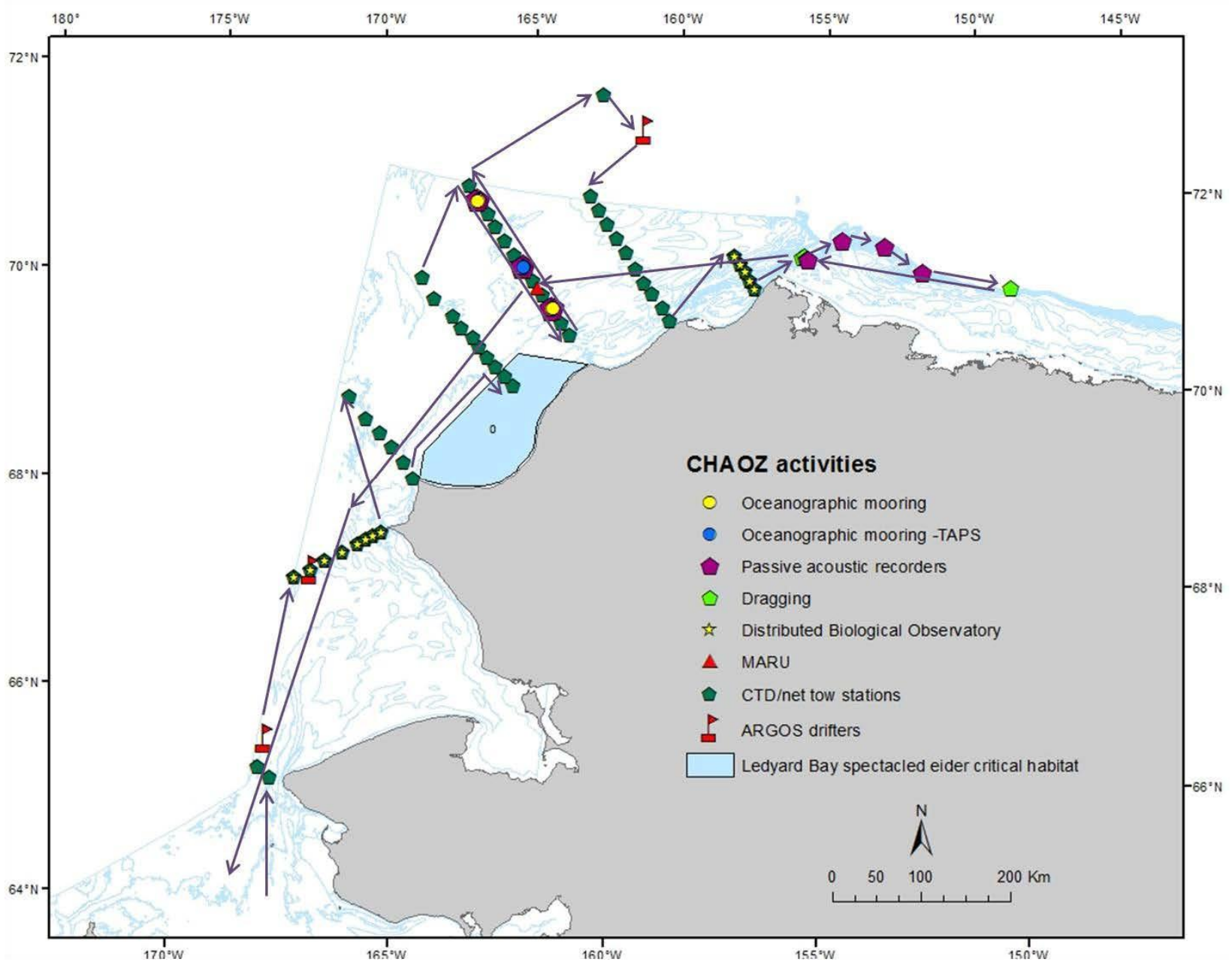
Biophysical Moorings

- **Total Cost:** $2,069,000 plus Joint Funding
- **Period of Performance:** FY 2010-2015
- **Conducting Organization:** NOAA-Pacific Marine Environmental Laboratory (in collaboration with NOAA-NMML)
- **Principal Investigators:** Dr. Phyllis Stabeno, Dr. James Overland, Dr. Sue Moore, Dr. Jeffrey Napp

Biophysical Moorings

The overall goal of this study is to evaluate the extent to which variability in environmental conditions such as sea ice, oceanic currents, water temperature and salinity, and prey abundance influence whale distribution and relative abundance.

- Obtain two full years of biophysical measurements on the shallow Chukchi shelf utilizing moorings at three sites, and collect hydrographic and lower trophic level data during deployment/recovery of the moorings.
- Provide long-term estimates of habitat use for large whale species and compare this with predictions about annual ice coverage in order to establish predictive variables to describe large whale occurrence.
- Analyze multiple ensemble members from the NCAR climate model and other International Panel on Climate Change (IPCC) models to assess the future variability of sea ice cover and extended sea ice free seasons during fall for the Chukchi Sea.


180°
175°W
170°W
165°W
160°W
155°W
150°W
145°W
72°N
70°N
68°N
66°N
64°N
CHAOZ activities
Oceanographic mooring
Oceanographic mooring -TAPS
Passive acoustic recorders
Dragging
Distributed Biological Observatory
MARU
CTD/net tow stations
ARGOS drifters
Ledyard Bay spectacled eider critical habitat
N
0 50 100 200 Km

Biophysical Moorings

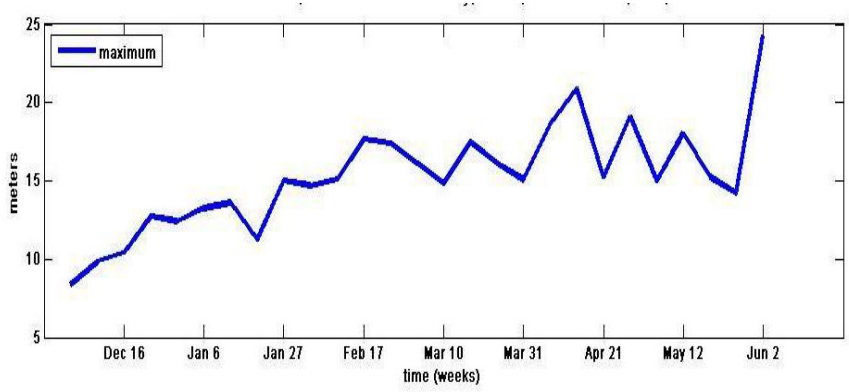
Current Status and Preliminary Results:

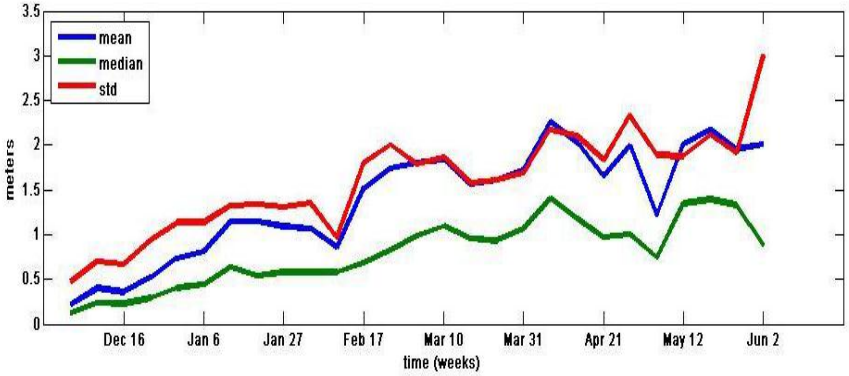
- All oceanographic moorings deployed in August 2010 were recovered in 2011. Only one instrument failed completely (an ISUS nitrate meter), all other instruments collected data for most of the deployment time.
- Data processing is ongoing.

- The climate modelers are working with NCAR and have been granted access to NCAR's super computer with resources to carry at least three 40-year simulations runs in the coupled mode. An initial test run at NCAR super computer with 5-day of integration has been carried out.

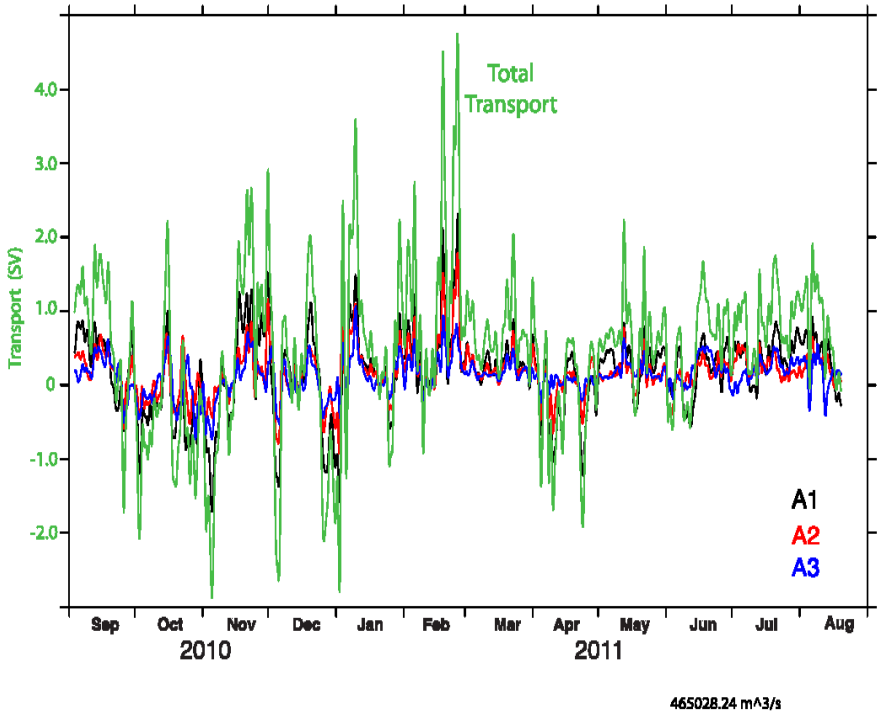
Biophysical Moorings

Ice thickness



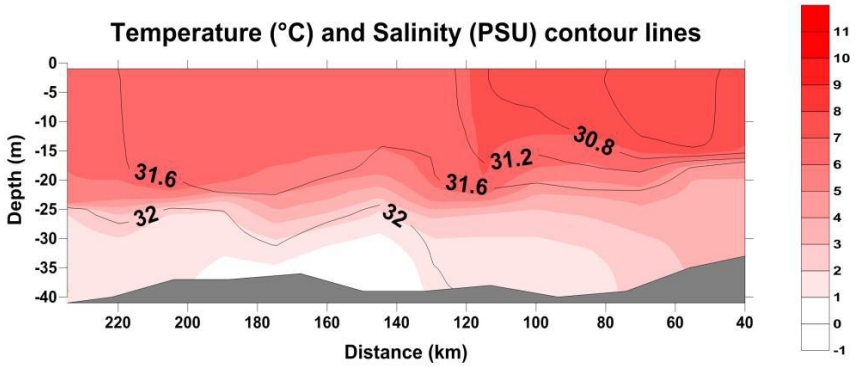


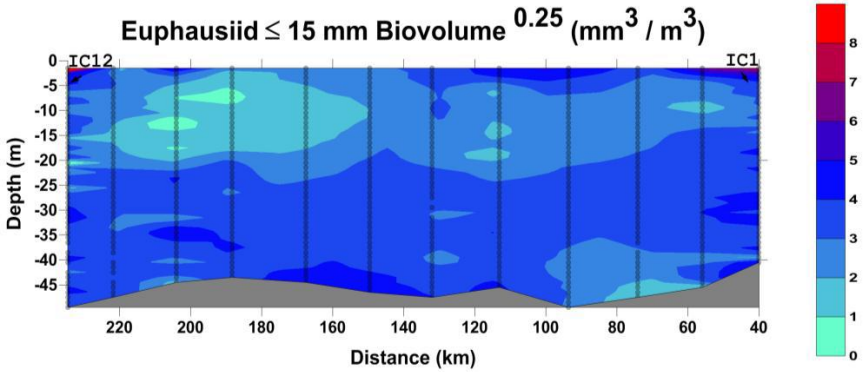
Transport toward northeast

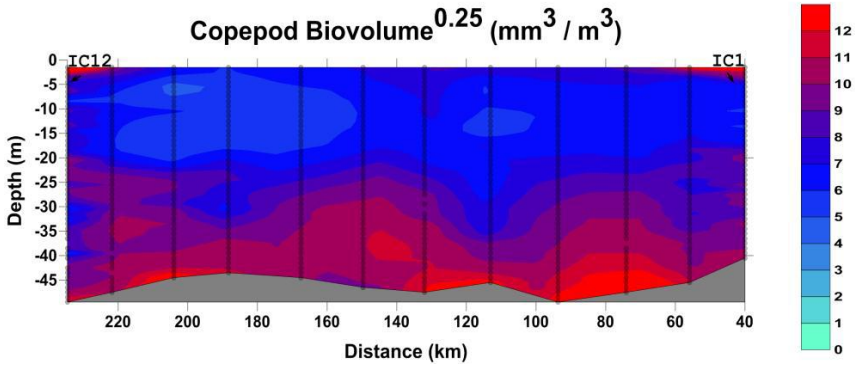


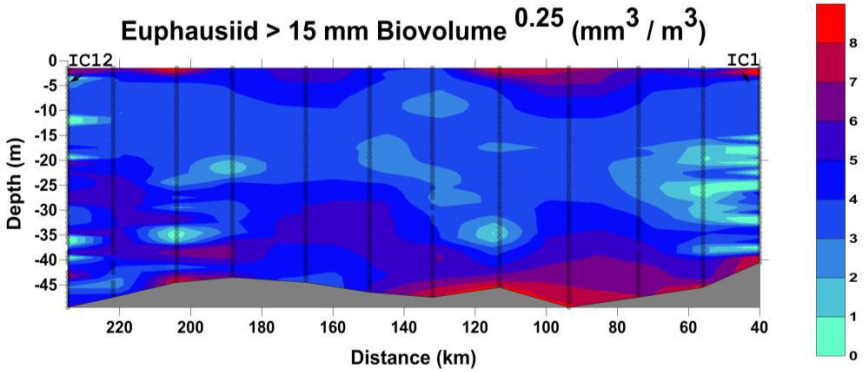
Biophysical Moorings

Across the Icy Cape transect line









Adaptation of Arctic Circulation Model

Arctic Circulation Model

- **Total Cost:** $350,000
- **Period of Performance:** FY 2011-2012
- **Conducting Organization:** Rutgers University, Arctic Region Supercomputing Center, UAF
- **Principal Investigator:** Dr. Enrique Curchitser, Dr. Katherine Hedstrom, Dr. Thomas Weingartner, Seth Danielson

Arctic Circulation Model

Oil Spill Risk Analysis (OSRA) is a cornerstone foundation for evaluating alternatives in OCS oil and gas leasing EIS preparation and for evaluating mitigation, such as oil spill contingency plans. Development and application of state-of the-art circulation models are essential to future OSRA-based EIS analyses.

Arctic Circulation Model

Objectives:

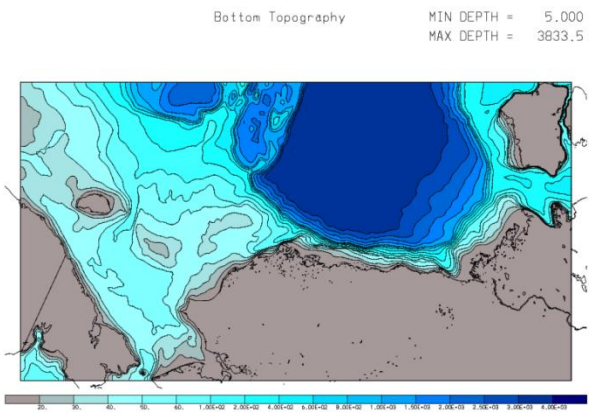
- Adapt and maximize the utility of an existing, coupled ice-ocean circulation model to represent the physical processes, especially circulation, within the Chukchi and Beaufort Sea Planning Areas.
- Provide BOEM with ten-to-twenty years of relevant modeled fields, such as gridded wind, surface water, and ice velocity, ice cover; and limited other modeled fields as agreed on between contractor and BOEM.

Arctic Circulation Model

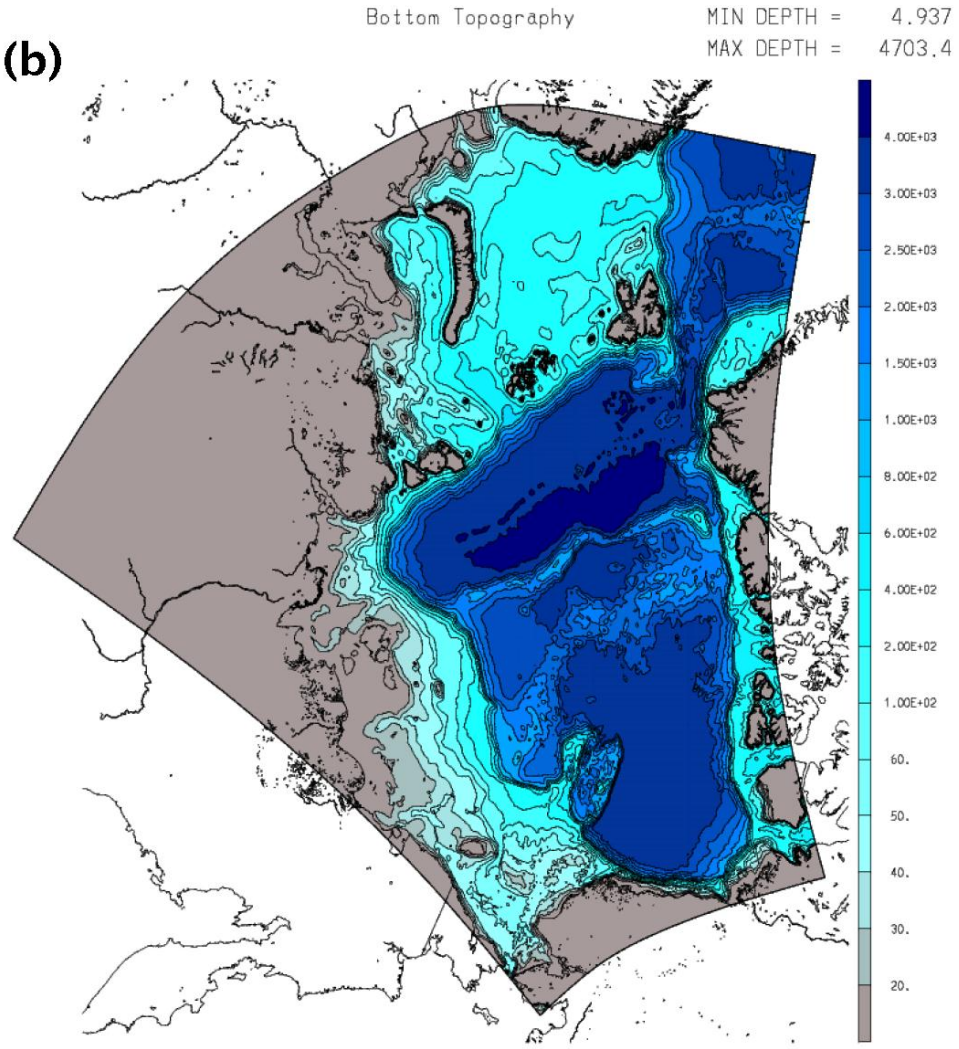
Methods:

- The Regional Ocean Modeling System (ROMS), along with its built-in 1-layer sea-ice model
- Initial and boundary conditions obtained from the Simple Ocean Data Assimilation (SODA)
- Surface forcing obtained from the Common Ice-Ocean Reference Experiment (CORE 2)
- Landfast ice imposed in the Beaufort Sea based on a monthly climatology (Mahoney)
- Bering Strait throughflow set based on mooring data (Woodgate)
- Model results will cover period 1985-2006

Arctic Circulation Model

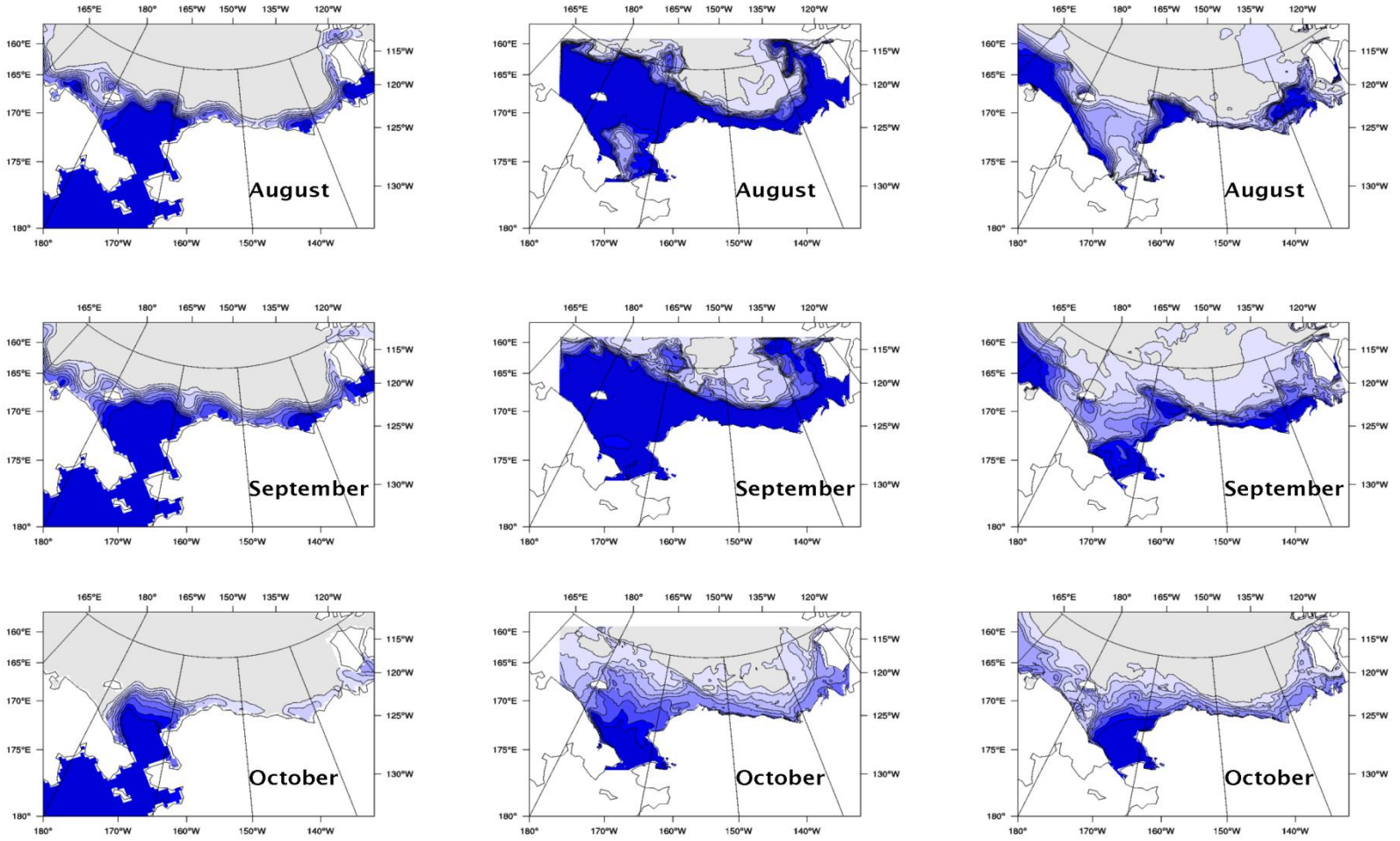


(b)



Arctic Circulation Model

Sea Ice Concentration



Satellite observations (Comiso, 2000)

The regional Chukchi domain

The Arctic domain

Application of High Frequency Radar to Potential to Potential Hydrocarbon Areas in the Northeast Chukchi Sea

Funded by

Bureau of Ocean Energy Management (BOEM)

With funding from Shell Oil Company and Conoco Phillips

Cooperative Agreement, Contract # M09AC15207

BOEM Project Manager

Warren Horowitz, Alaska OCS Region

And Headquarters Program Manager (Ron Lai)

Lead Conducting Organization

University of Alaska, Fairbanks

Institute of Marine Sciences

Lead PI, Dr. Tom Weingartner

Award Date and Costs

- Awarded as a Cooperative Agreement through the University of Alaska, Fairbanks, April, 2009
- Co-Funds (match) Shell Oil Company and ConocoPhillips

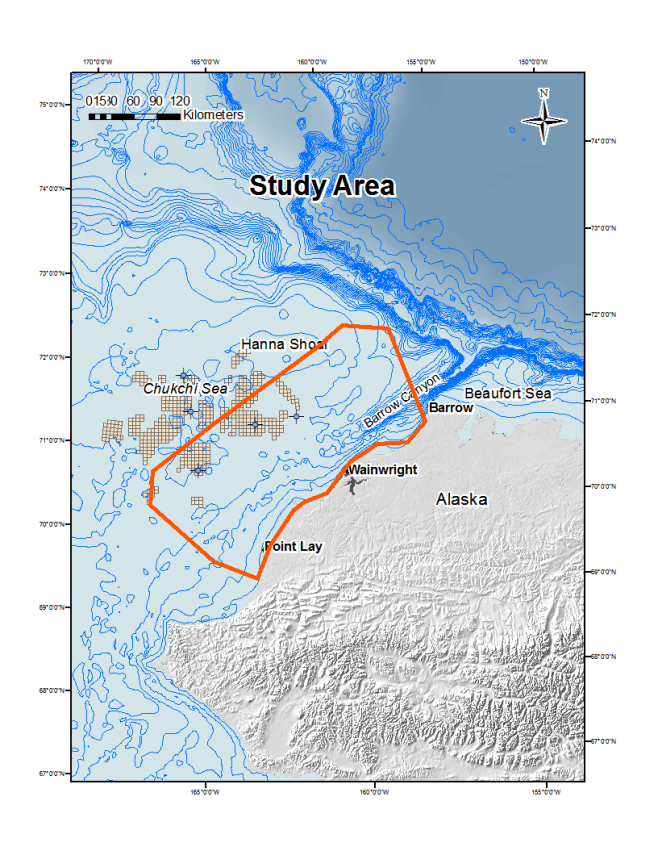
BOEM Share: $1,192,986.00

Industry Share: $1,600,000.00

Study Objectives

- Does the surface (upper 1 meter) circulation reflect the sub-surface circulation as captured by historical meter measurements?
- If not, then are these differences related to topographic gradients, seasonally- varying winds, stratification, and/or fronts?
- Is there a return (southwestern) flow between the western flank of Barrow Canyon and Hanna Shoal as predicted by circulation models. If so, how strong is this circulation and how persistent is it

Northeast Chukchi Sea Study Area



Field Season 2009

- Deployed Long Range High Frequency Radars (HFR) at Barrow and Wainwright.

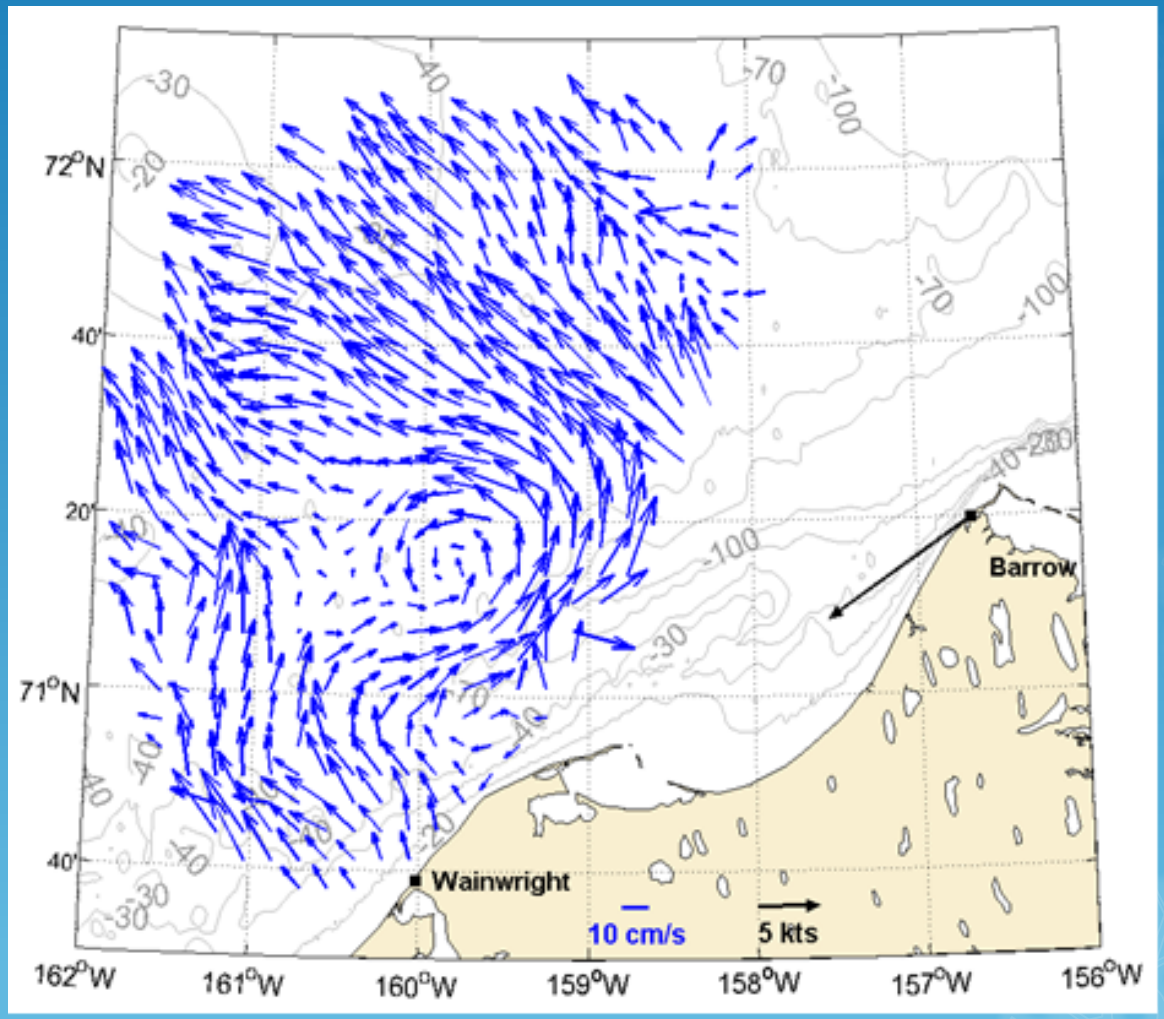
HFR: Real time surface currents (hourly) from September to mid November

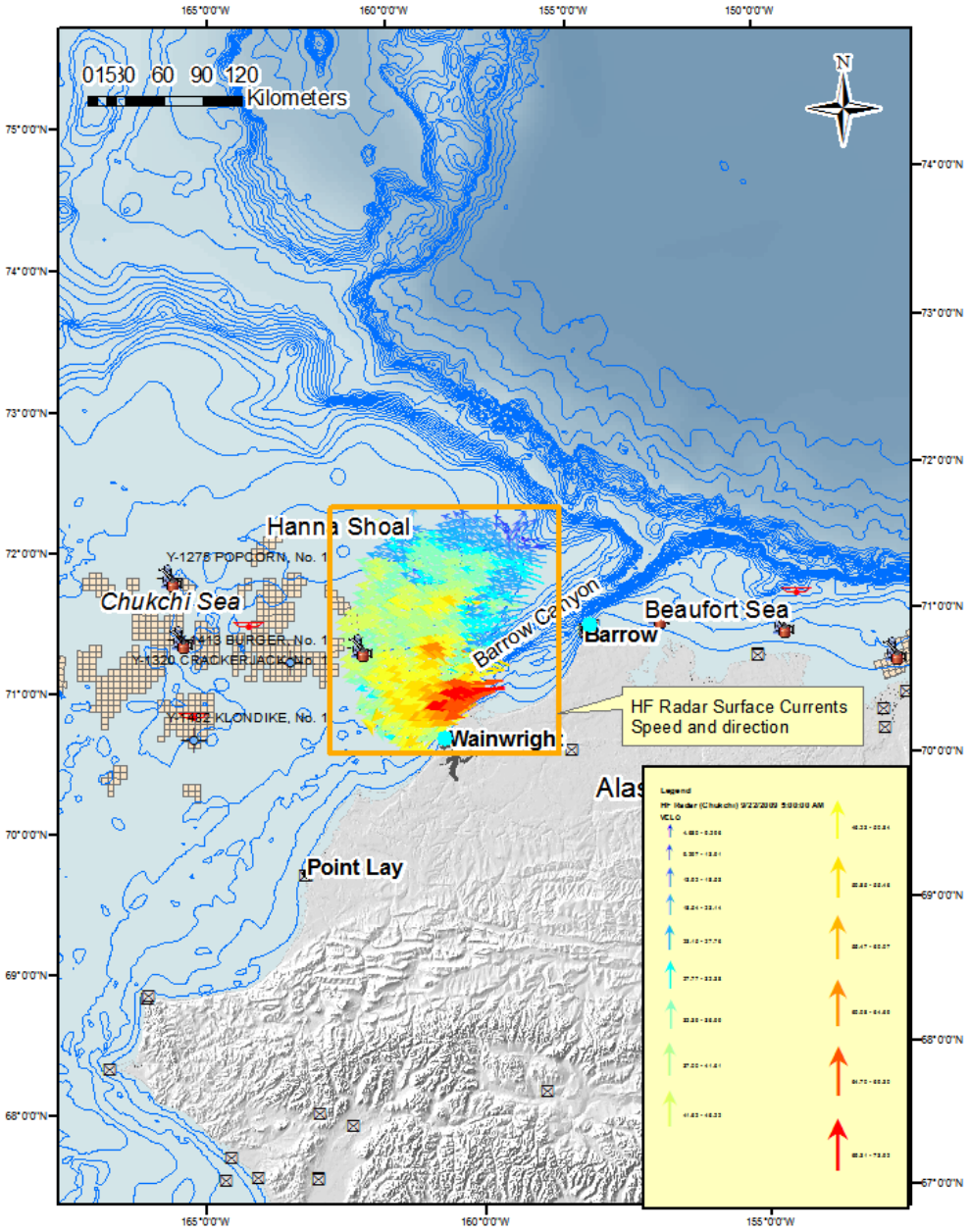
Barrow: September 9 - November 12, 2009

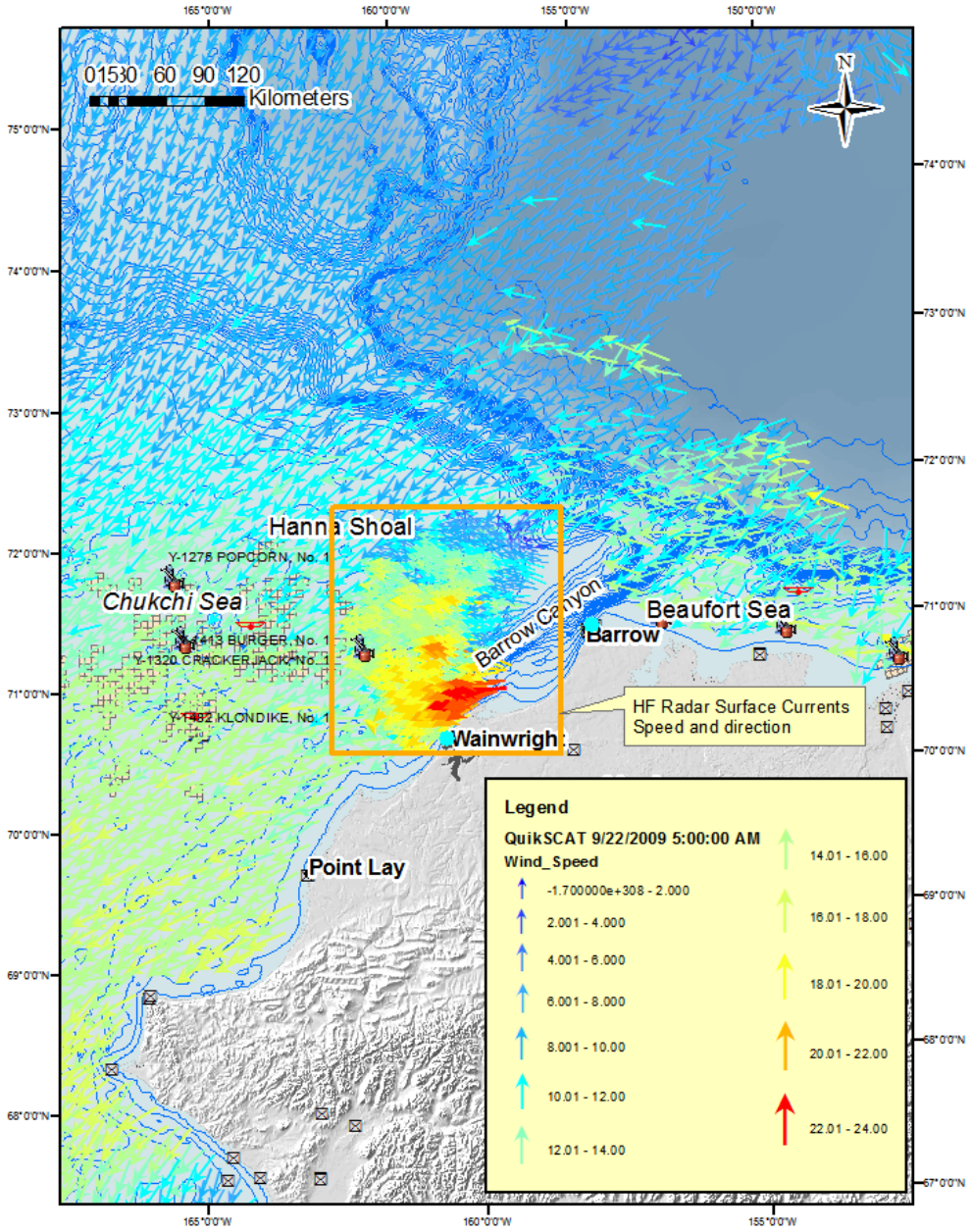
Wainwright: September 13 - November 18, 2009

- Gliders: Webb Slocum Gliders purchased and tested in Seward, Alaska.
- Moorings: Purchased and fabricated. (upward looking acoustic Doppler current profiler (ADCP), near bottom temp/conductivity and wave data.
- Deployed project Web Site: http://www.ims.uaf.edu/hfradar/ for real time data.

HFR defined Cyclonic Eddy Sept 21, 2009




0 15 30 60 90 120
Kilometers
N
Hanna Shoal
Y-1278 POPCORN, No. 1
Chukchi Sea
Y-1318 BURGER, No. 1
Y-1320 CRACKER JACKSON
Y-1382 KLONDIKE, No. 1
Barrow Canyon
Beaufort Sea
Barrow
Wainwright
HF Radar Surface Currents
Speed and direction
Point Lay
165°0'0"W
160°0'0"W
155°0'0"W
150°0'0"W
75°0'0"N
74°0'0"N
73°0'0"N
72°0'0"N
71°0'0"N
70°0'0"N
69°0'0"N
68°0'0"N
67°0'0"N


0 15 30 60 90 120
Kilometers
N
Hanna Shoal
Y-1275 POPCORN, No. 1
Chukchi Sea
413 BURGER, No. 1
Y-1320 CRACKER JACK, No. 1
Y-1382 KLONDIKE, No. 1
Barrow Canyon
Beaufort Sea
Barrow
Wainwright
Point Lay
HF Radar Surface Currents
Speed and direction
Legend
QuikSCAT 9/22/2009 5:00:00 AM
Wind_Speed
-1.700000e+308 - 2.000
2.001 - 4.000
4.001 - 6.000
6.001 - 8.000
8.001 - 10.00
10.01 - 12.00
12.01 - 14.00
14.01 - 16.00
16.01 - 18.00
18.01 - 20.00
20.01 - 22.00
22.01 - 24.00
165°0'0"W
160°0'0"W
155°0'0"W
150°0'0"W
75°0'0"N
74°0'0"N
73°0'0"N
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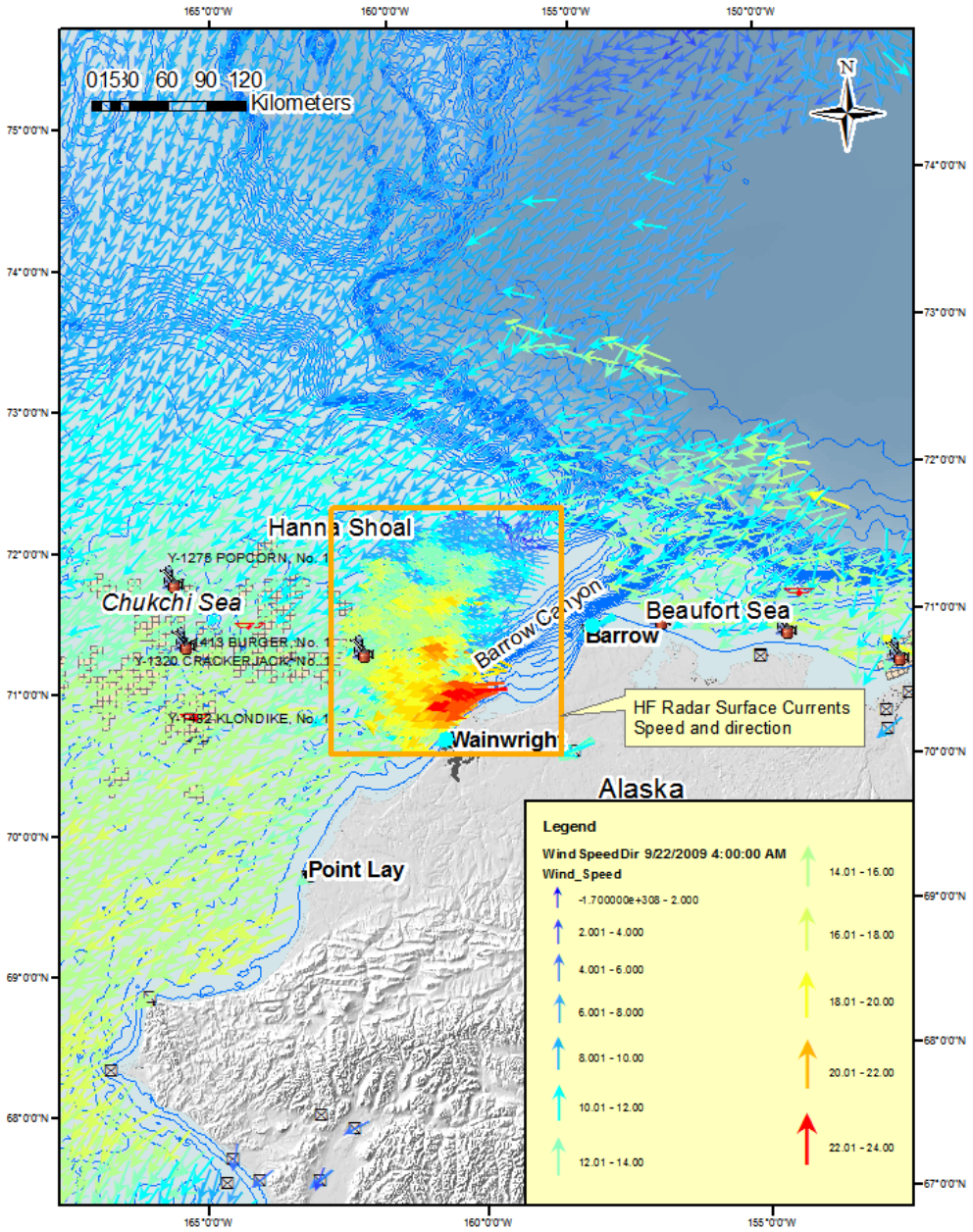
69°0'0"N
68°0'0"N
67°0'0"N


0 15 30 60 90 120
Kilometers
N
165°0'0"W
160°0'0"W
155°0'0"W
150°0'0"W
75°0'0"N
74°0'0"N
73°0'0"N
72°0'0"N
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70°0'0"N
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68°0'0"N
67°0'0"N
Hanna Shoal
Y-1278 POPCORN, No. 1
Chukchi Sea
Y-1413 BURGER, No. 1
Y-1320 CRACKERJACK, No. 1
Y-1482 KLONDIKE, No. 1
Barrow Canyon
Beaufort Sea
Barrow
Wainwright
HF Radar Surface Currents
Speed and direction
Alaska
Point Lay
Legend
Wind SpeedDir 9/22/2009 4:00:00 AM
Wind_Speed
-1.700000e+308 - 2.000
2.001 - 4.000
4.001 - 6.000
6.001 - 8.000
8.001 - 10.00
10.01 - 12.00
12.01 - 14.00
14.01 - 16.00
16.01 - 18.00
18.01 - 20.00
20.01 - 22.00
22.01 - 24.00

Field Season 2010

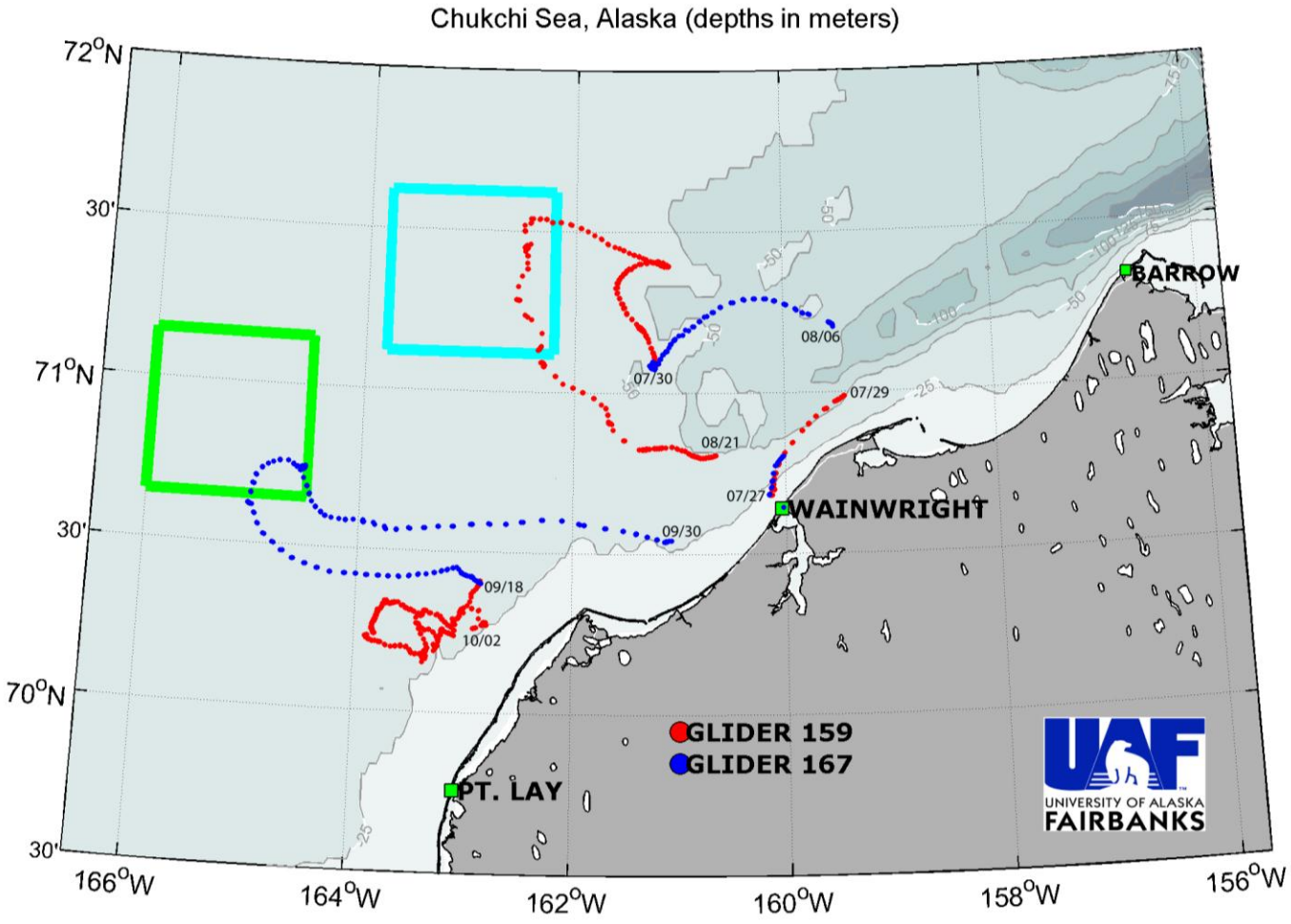
- High Frequency Radars (HFR):

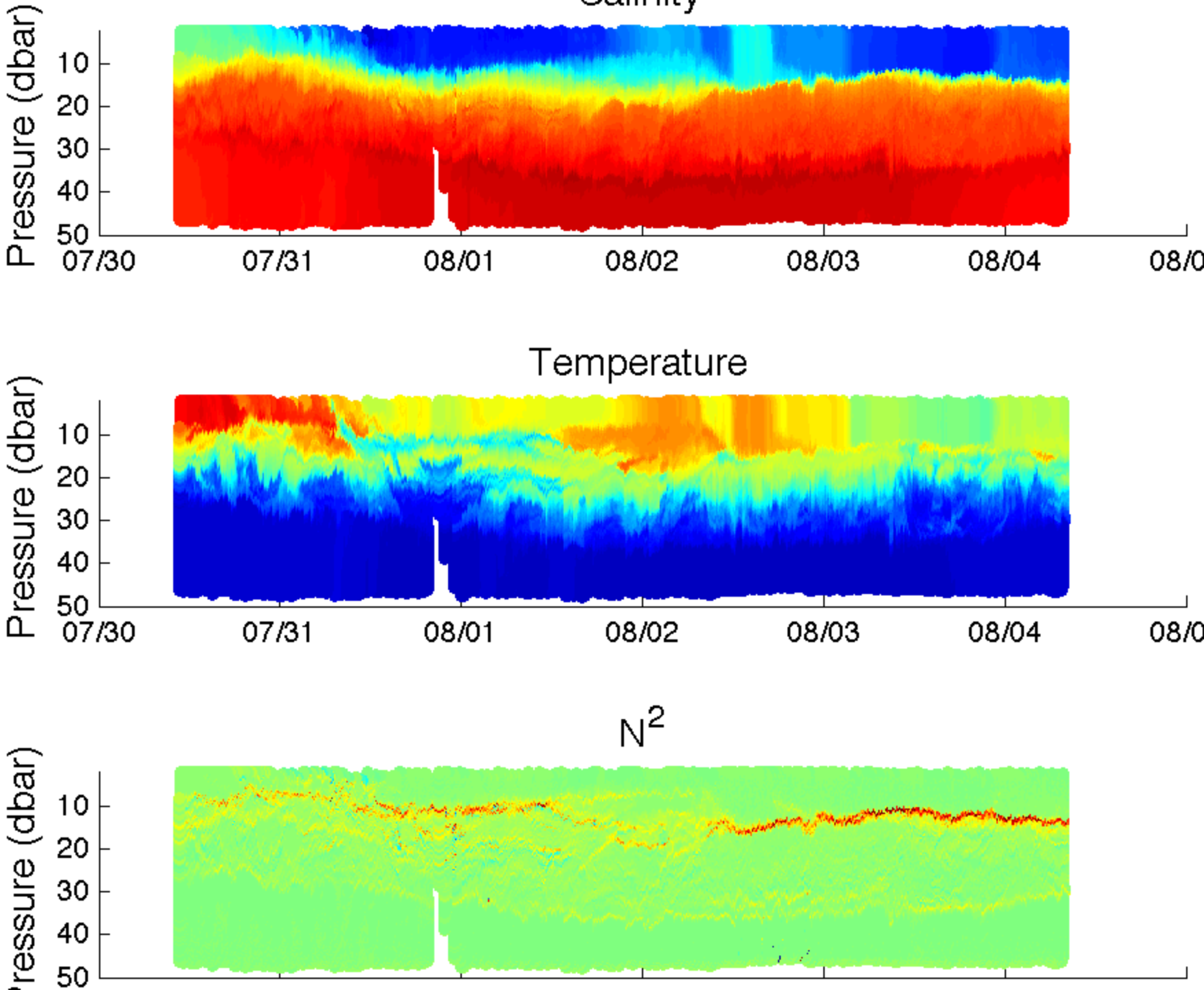
Barrow: July 13 - November 5, 2010

Wainwright: July 14 - November 6, 2010

Point Lay: September 10 - November 28, 2010

- Moorings: deployed six moorings across the head of Barrow Canyon,August 2010.
- Gliders: Two glider missions beneath the HFR mask. (July 26th and September 17th) (see figure)


Chukchi Sea, Alaska (depths in meters)
72°N
30'
71°N
30'
70°N
30'
166°W
164°W
162°W
160°W
158°W
156°W
BARROW
WAINWRIGHT
PT. LAY
08/06
07/30
07/29
08/21
07/27
09/30
09/18
10/02
GLIDER 159
GLIDER 167
UNIVERSITY OF ALASKA
FAIRBANKS


Salinity
Pressure (dbar)
10
20
30
40
50
07/30
07/31
08/01
08/02
08/03
08/04
08/0
Temperature
Pressure (dbar)
10
20
30
40
50
07/30
07/31
08/01
08/02
08/03
08/04
08/0
N2
Pressure (dbar)
10
20
30
40
50

Chukchi_HFR_AUV_2010_hires.wmv

Final Field Season 2011

- HFR: Barrow, Wainwright, and Point Lay

Barrow: July 14 - November 12, 2011

Wainwright: June 21 - November 20, 2011

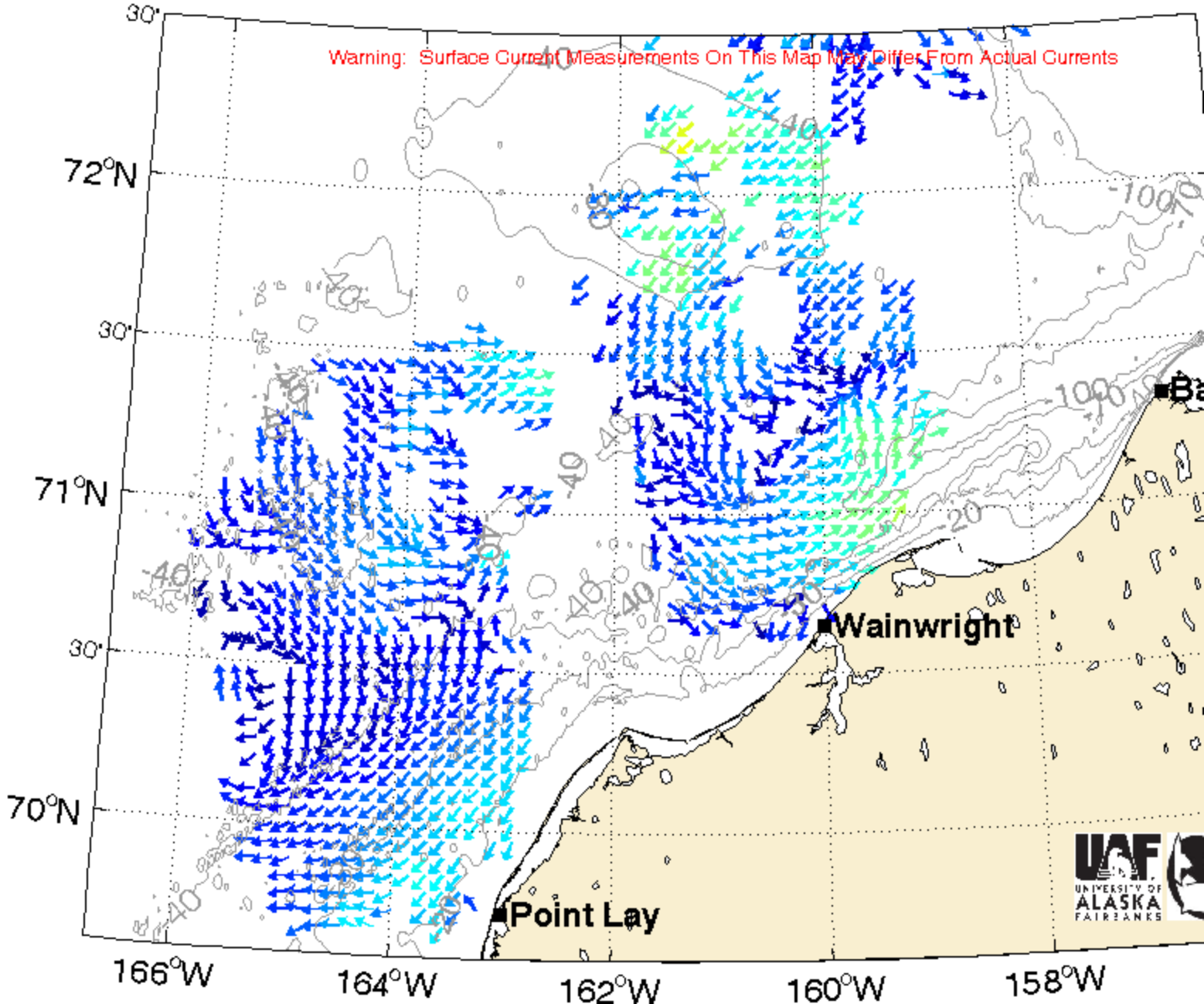
Point Lay: August 3 - November 21, 2011

- Gliders: Two Glider missions
- Moorings: All six moorings deployed in August 2010 were recovered on August 26, 2011.

Where We Are Now?

- HFR: HFR data analysis has begun both individually as well as in conjunction with the 2010 glider data. 2010 HFR data is also being analyzed together with mooring data from the Burger lease (Industry Mooring).
- Gliders: All glider data from both 2010 and 2011 has been quality controlled. We are beginning to analyze the combined HFR and glider data in concert using quality controlled HFR fields.
- Moorings: The initial processing of the data has begun. The moorings recorded data on currents, temperature, salinity, and wave

Chukchi Sea Surface Currents
9-5-2011 14:00 AKT



Final Products

- Draft Final Report: May 2012
- Final Data: June 2012
- Final Report: August 2012
- Journal Article (submission): September 2012
- Technical Summary: September 2012


Thank you

Weather Research and Forecasting Model (WRF) for the Chukchi Sea and Beaufort Seas

Funded by

Bureau of Ocean Energy Management (BOEM)

Contract # M06PC00018

BOEM Project Manager

Warren Horowitz, Alaska OCS Region

And Headquarters Contact (Ron Lai)

Lead Conducting Organization

Lead PI Xiangdong Zhang

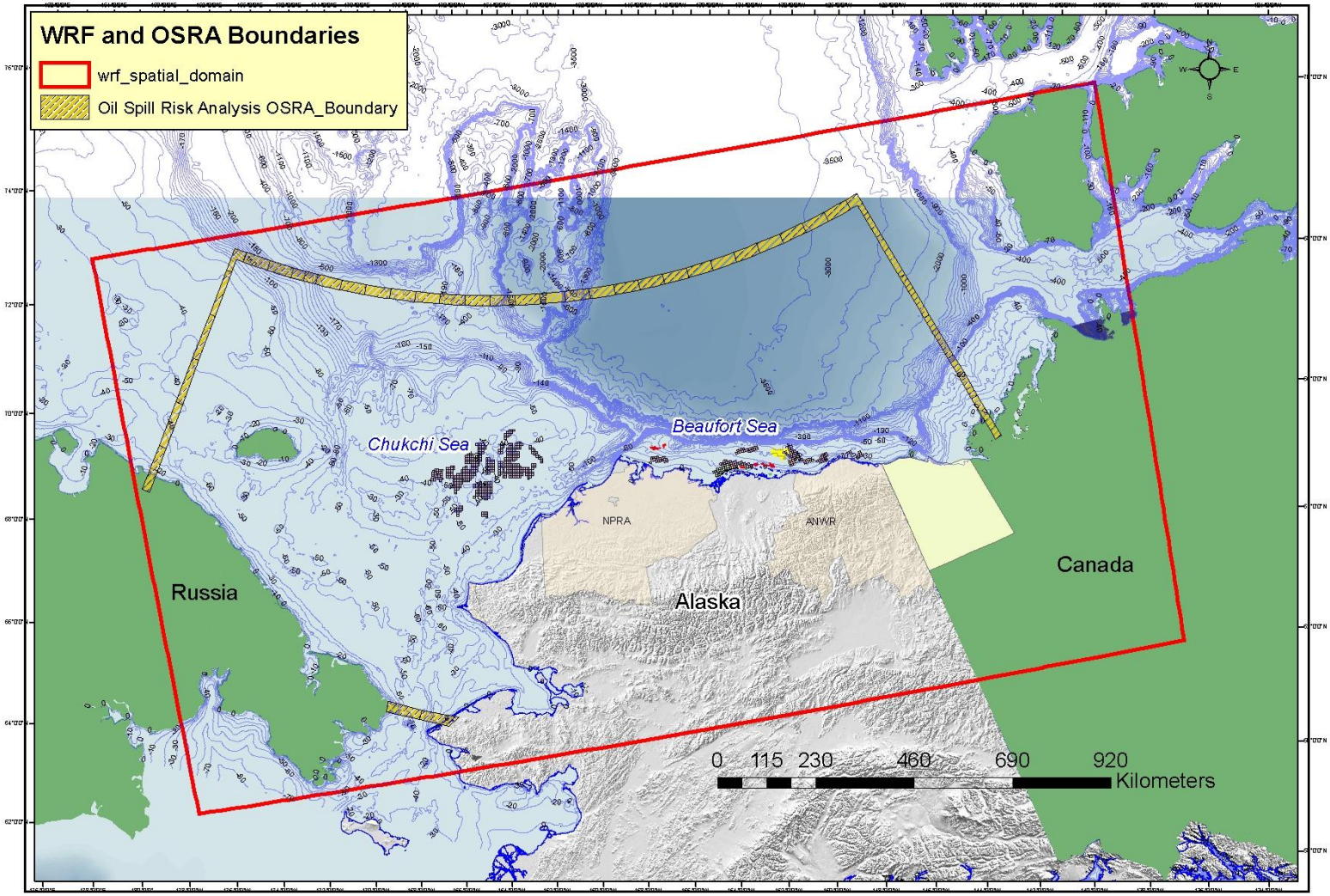
International Arctic Research Center (UAF)

Study Objectives

- To improve our understanding of the mesoscale meteorology of the Chukchi and Beaufort seas to include a better understanding of the sea breeze and orographic impacts with the ultimate goal to ensure a more accurate simulation of ocean circulation models, oil spill trajectories, and future improvements of our Oil Spill Resource Assessments (OSRA) for the Alaska OCS.
- To achieve more accurate along shore and cross shelf wind gradients for wind velocities, direction, temperature, and other significant surface environmental variables.

Study Objectives (Cont.)

- Define seasonal variability and long term trends by conducting a long-term hindcast simulation with the optimized data-modeling system 1979-2009.
- Document the high-resolution climatological features of the Beaufort/Chukchi seas surface winds, including an analysis of the inter-annual variability and long-term change, as well as the physical processes and mechanisms for shaping the Beaufort/Chukchi seas wind field climatology.



Warren Horowitz MMS October 1, 2008

Tasks I

- Collection of In-Situ Observational Data (1979-2009)
- Deployment of Offshore Meteorological Buoys during the Open Water Season
- Development and Testing of Coupled WRF Sea Ice Model
- Conduct Sensitivity Analysis of Model Physics

Tasks II

- Conduct Five Year Model Simulation (2005-2009) and Sensitivity Analysis
- Conduct Final Thirty Year (1979-2009) WRF Model Run and Final Sensitivity Analysis

Tasks III

- Conduct Climatological Analysis of Model and Observational Data 1979-2009
- Produce Final Report
- Final Presentation at the Alaska Marine Science Symposium 2013

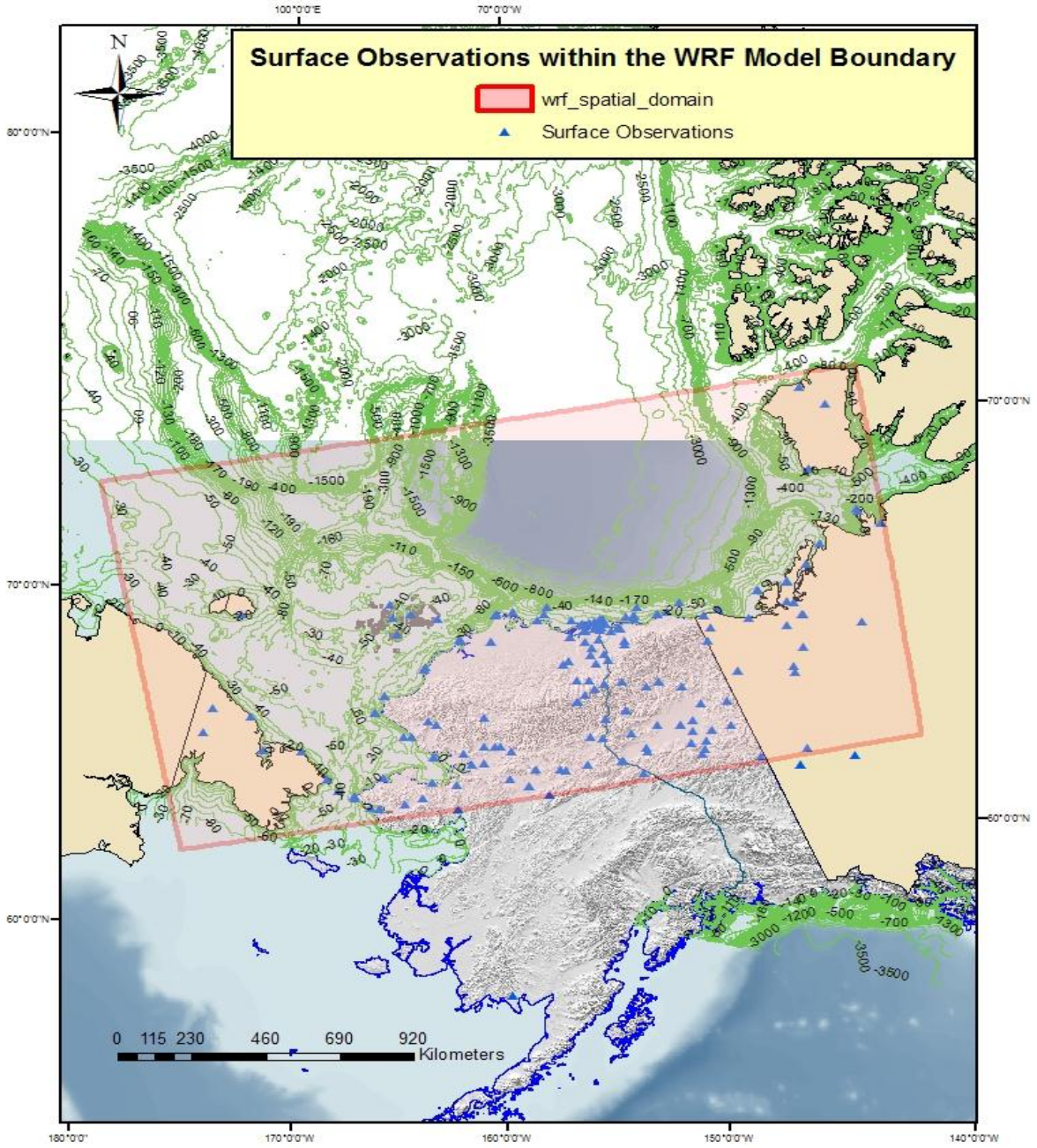
Status of Tasks

- Collection of In-Situ Observational Data (1979-2009)

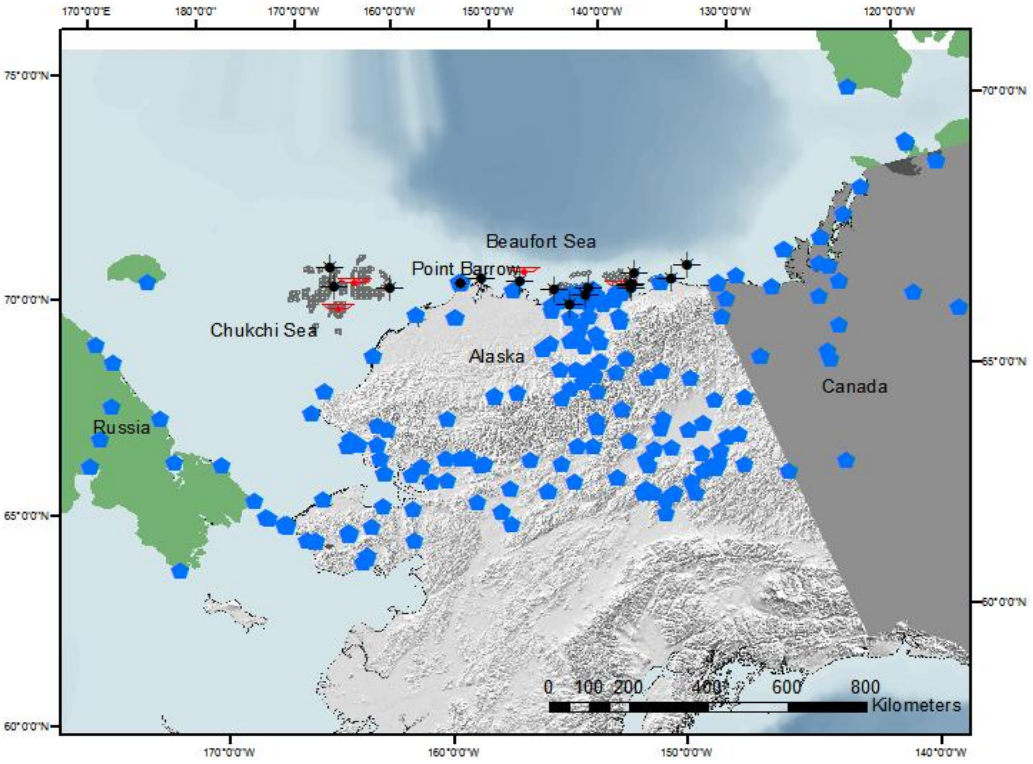
Observational Database delivered to BOEM with summary statistics

- Deployment of Offshore Meteorological Buoys during the Open Water Season

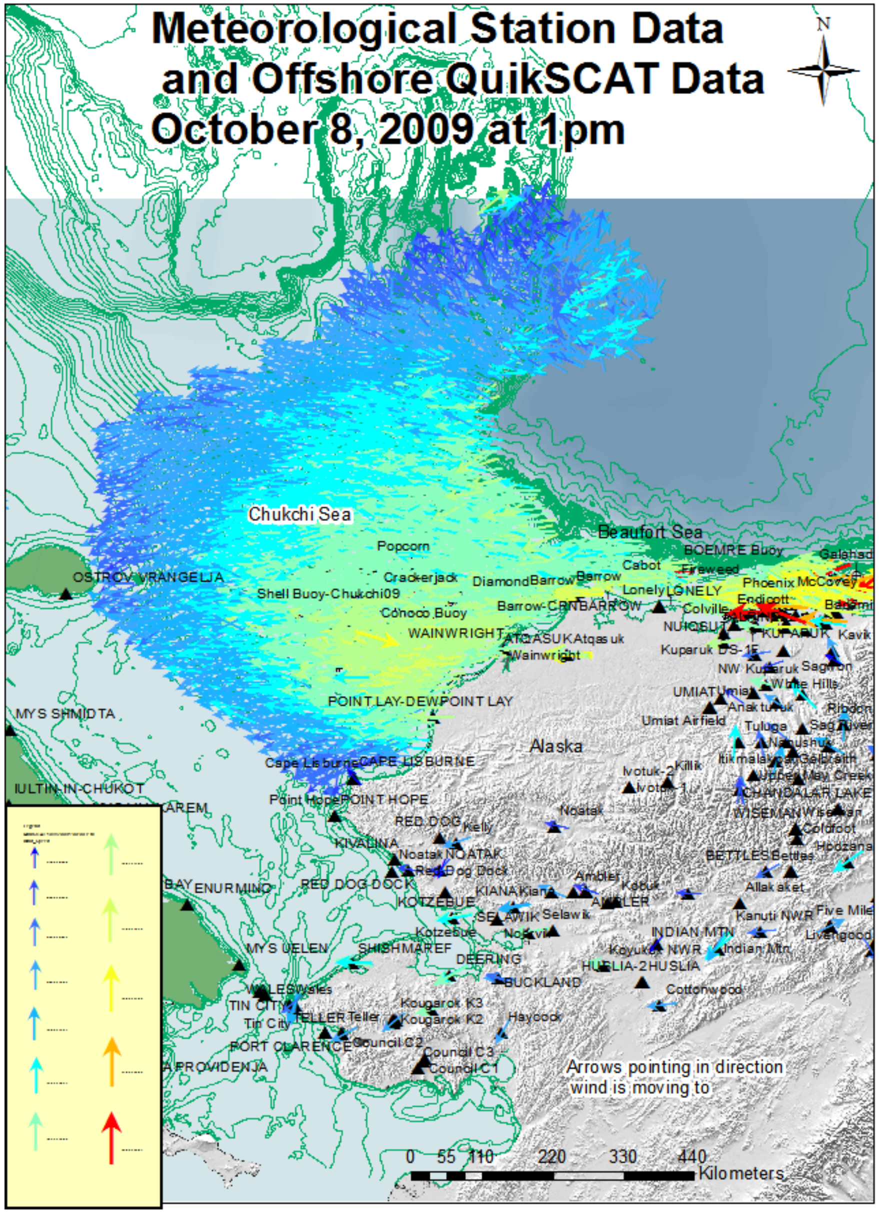
Two meteorological buoys deployed.


Surface Observations within the WRF Model Boundary
wrf_spatial_domain
Surface Observations
N
100°0'0"E
70°0'0"W
80°0'0"N
70°0'0"N
60°0'0"N
180°0'0"
170°0'0"W
160°0'0"W
150°0'0"W
140°0'0"W
0 115 230 460 690 920
Kilometers

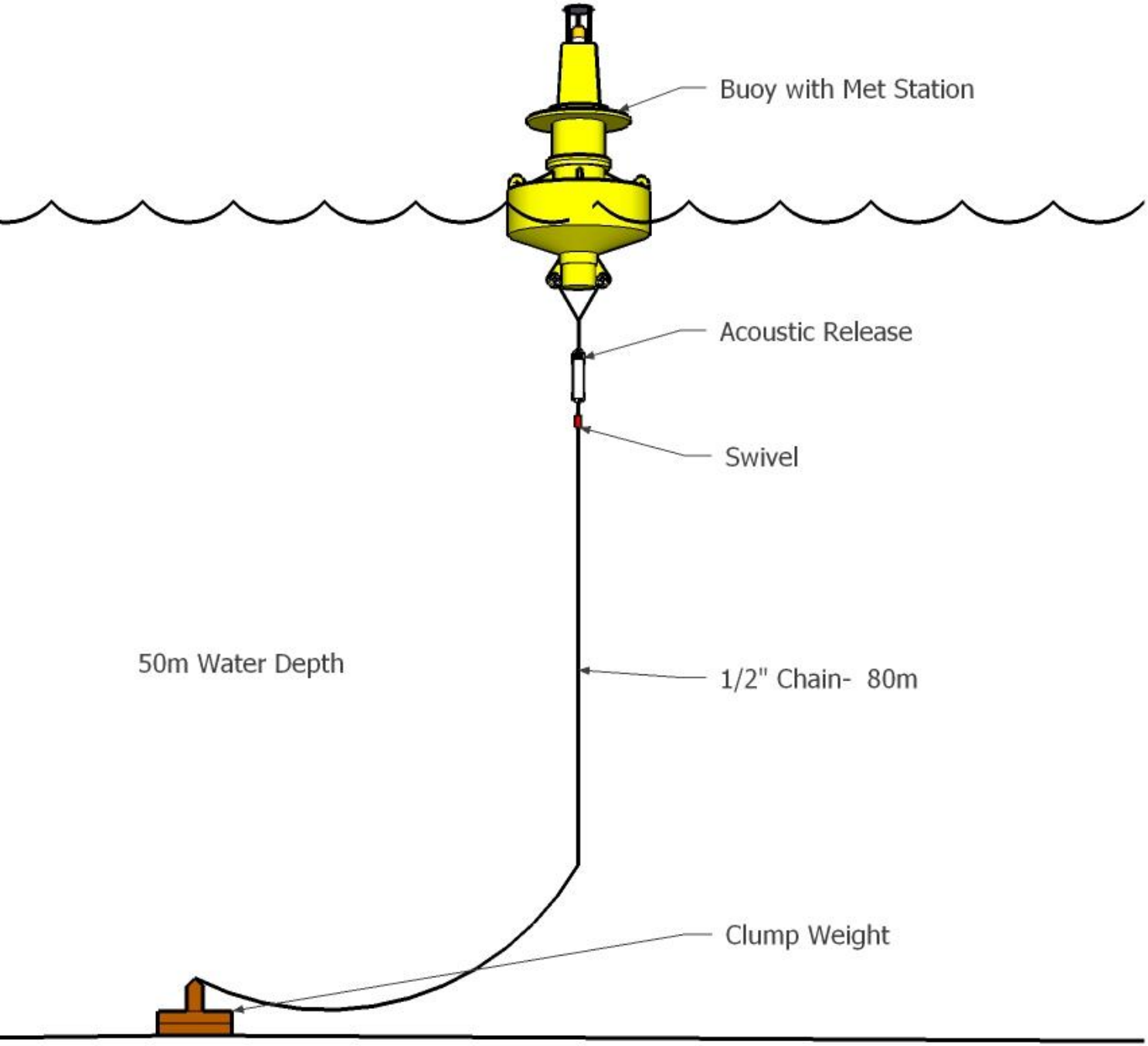
Meteorological Stations (Onshore, Coastal, Offshore Well Sites and Offshore Moored Buoys) within Observational Database

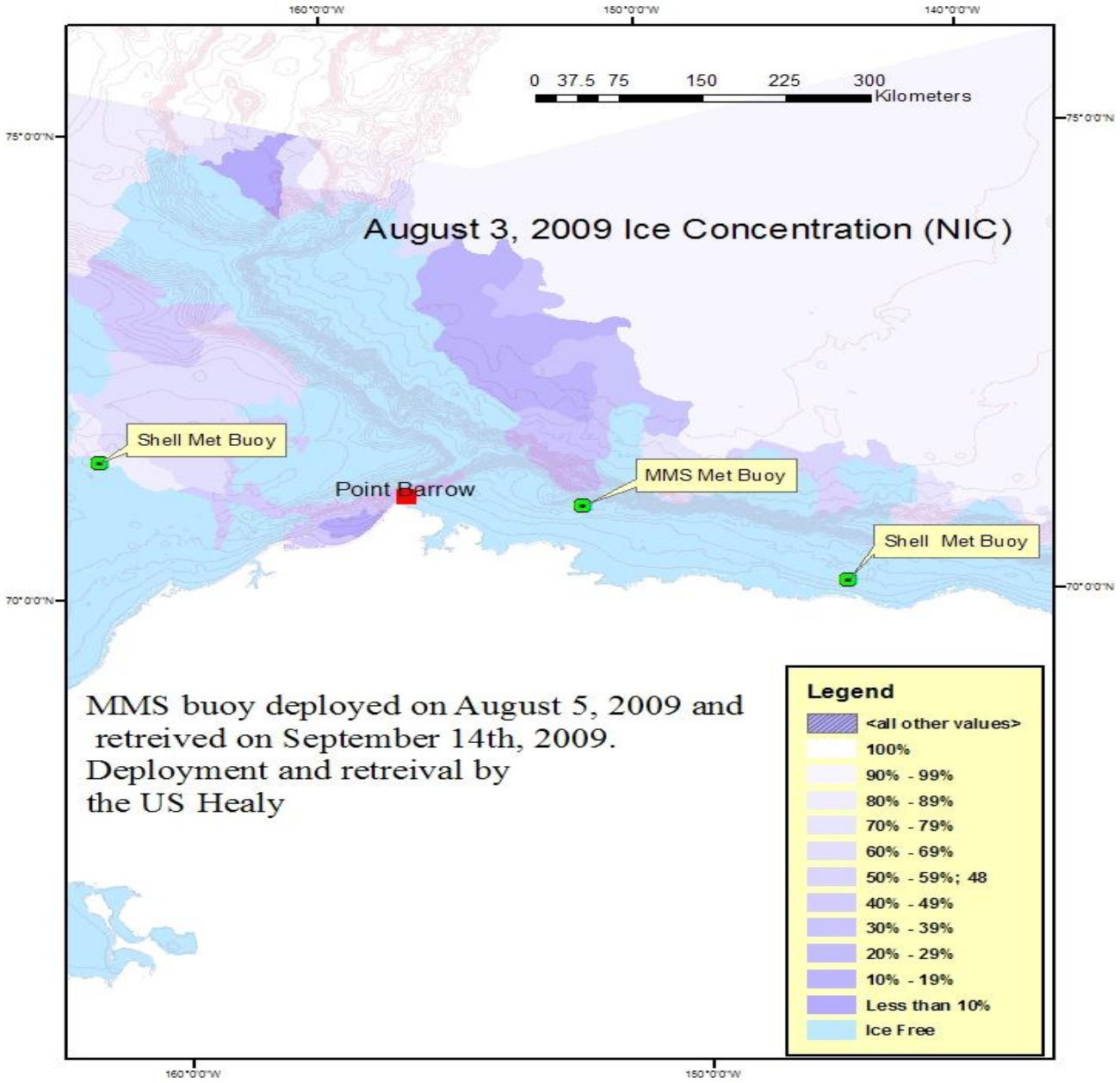


Observational Database also includes Meteorological Stations from Ships and QuikSCAT data



Meteorological Station Data
and Offshore QuikSCAT Data
October 8, 2009 at 1pm
N
Chukchi Sea
Beaufort Sea
Alaska
Popcorn
Crackerjack
Shell Buoy-Chukchi09
Conoco Buoy
WAINWRIGHT
OSTROV VRANGELJA
MYS SHMIDTA
POINT LAY-DEWPOINT LAY
Cape Lisburne CAPE LISBURNE
Point Hope POINT HOPE
RED DOG
KIVALINA
KOTZEBUE
SHISHMAREF
DEERING
BUCKLAND
MYS UELEN
TIN CITY
Tin City
TELLER Teller
PORT CLARENCE
PROVIDENJA
Council C2
Council C3
Council C1
Kougarok K3
Kougarok K2
Haycock
Barrow
Cabot
BOEMRE Buoy
Galahad
Fireweed
Phoenix McCovey
Endicott
Colville
Kuparuk DS-1E
NW Kuparuk
White Hills
Umiat Airfield
Anaktuvuk
Tuluga
Sag River
Ribdon
Kavik
CHANDALAR LAKE
WISEMAN Wiseman
Coldfoot
Hodzana
BETTLES Bettles
Allakaket
Kanuti NWR
Five Mile
Livengood
INDIAN MTN
Indian Mtn
Koyukuk NWR
HUSLIA-2 HUSLIA
Cottonwood
Noatak
Kobuk
Ambler
AMBLER
KIANA Kiana
SELAWIK Selawik
Noorvik
Kotzebue
Killik
Ivotuk-2
Ivotuk-1
Arrows pointing in direction
wind is moving to
0 55 110 220 330 440
Kilometers


Buoy with Met Station
Acoustic Release
Swivel
50m Water Depth
1/2" Chain- 80m
Clump Weight


160°0'0"W
150°0'0"W
140°0'0"W
75°0'0"N
70°0'0"N
0 37.5 75 150 225 300
Kilometers
August 3, 2009 Ice Concentration (NIC)
Shell Met Buoy
Point Barrow
MMS Met Buoy
Shell Met Buoy
MMS buoy deployed on August 5, 2009 and retreived on September 14th, 2009. Deployment and retreival by the US Healy
Legend
<all other values>
100%
90% - 99%
80% - 89%
70% - 79%
60% - 69%
50% - 59%; 48
40% - 49%
30% - 39%
20% - 29%
10% - 19%
Less than 10%
Ice Free

Status of Model Development and Testing

- Development and Testing of Coupled WRF Seaice Model (Completed)
- Sensitivity Analysis of Model Physics (Completed)
- Five Year Model Simulation (2005-2009) (Recently Completed)

Status of Model Development and Testing

- Sensitivity Analysis (Recently Completed)
- Final Thirty Year (1979-2009) WRF Model Run (To begin February/March 2012)
- Final Sensitivity Analysis (Summer 2012)

Status of Final Products

- Climatological Analysis of Model and Final Observational Data 1979-2009

(October 2012)

- Final Report, Technical Summary

(December 2012)

- Final Presentation at the Alaska Marine Science Symposium 2013

(January 2013)


Thank you

SOCIAL INDICATORS IN COASTAL ALASKA: ARCTIC COMMUNITIES

- *BOEM Information Need:*
- Social and economic baseline data of "well-being"
- Potential local and regional impacts from OCS activities
- Documentation and assessment of NSB communities proximate to development
- Survey instrument with an OMB control number for use in any coastal Alaska community
- Collaboration with the Arctic Council and international monitoring (working group)

SOCIAL INDICATORS IN COASTAL ALASKA: ARCTIC COMMUNITIES

Background:

A) Relationship with Previous Work/Efforts:

Larsen, J.N. and P. Schweitzer

2010 Arctic Social Indicators. Copenhagen: Nordic Council of Ministers.

Kruse, J. B. et. al

2008 Survey of Living Conditions in the Arctic, SLiCA. In V. Møller et. al, eds. Barometer of Quality of Life around the Globe. Berlin: Springer.

SOCIAL INDICATORS IN COASTAL ALASKA: ARCTIC COMMUNITIES

B) Relationship with Concurrent/Future Efforts:

- Ongoing NEPA analysis, exploration and development, Beaufort and Chukchi Seas.

- Draws upon concurrent and/or completed studies – "Sharing Networks"; "Cross Island Subsistence Whaling"; "Offshore Subsistence Hunting"; and "Effects of Oil & Gas Development on Nuiqsut Subsistence Harvesters"

- Builds upon earlier era Social Indicator data

SOCIAL INDICATORS IN COASTAL ALASKA: ARCTIC COMMUNITIES

- *Objectives:*
- Identify and describe socioeconomic (mixed cash and subsistence) community characteristics
- Synthesize broad range of existing social data for identified communities
- Collect new data on key social indicator variables
- Refresh on regional aspirations and values

SOCIAL INDICATORS IN COASTAL ALASKA: ARCTIC COMMUNITIES

- *Methods:*
- Invite representatives from each community, the NSB, ICAS, and the Alaska Eskimo Whaling Commission to create a North Slope Management Board (NSMB) to review and comment on survey and deliverables

- ID key sources, scope, and quality of data from known sources (census data etc.)

- Focus on 6 domains: economics, health/safety, cultural continuity, local control, environment, education

- Develop capacity building and training opportunities for local residents

SOCIAL INDICATORS IN COASTAL ALASKA: ARCTIC COMMUNITIES

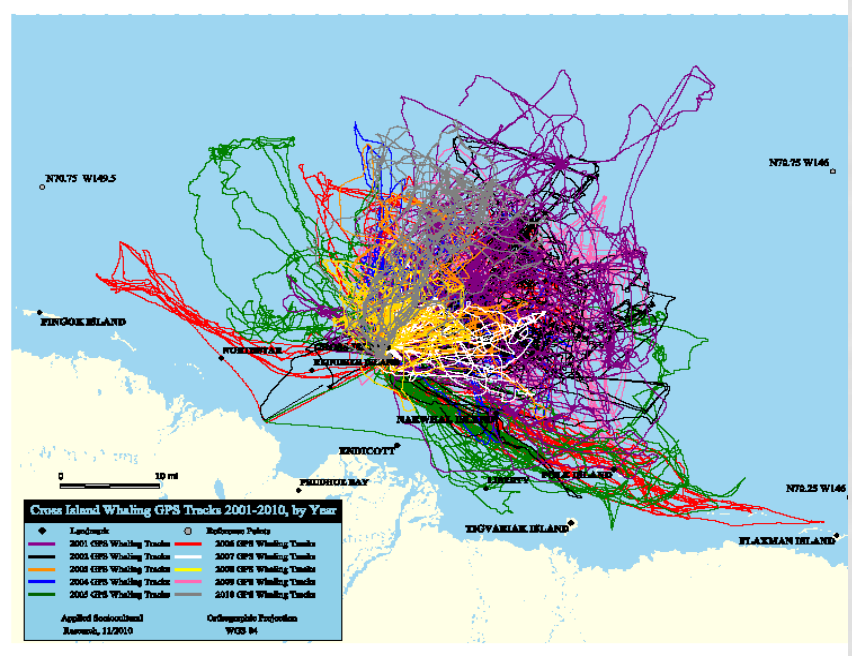
- Enhanced community engagement on all projects
  - Local Involvement: including local hire and or training for participation in project tasks; public briefings with local communities about project goals, research design, and study results; and consideration about whether and how to include explicit TEK statements in final study products
  - Local and Scientific Outreach: disseminate research results to the local community. At a minimum outreach must include provision of a separate executive summary in language appropriate to a non-science lay audience and either a poster delivery or personal presentation of study findings to local schools or residents. Documentation of completion of a public outreach effort will be required at the end of the project.

INTEGRATION OF TK

- Growing partnerships between biologists and hunters; bowhead study received DOI PIC award.
- Hunters participate actively in research and interpretation of data as they capture and tag sea mammals.
- Projects include whales, walrus, ice seals

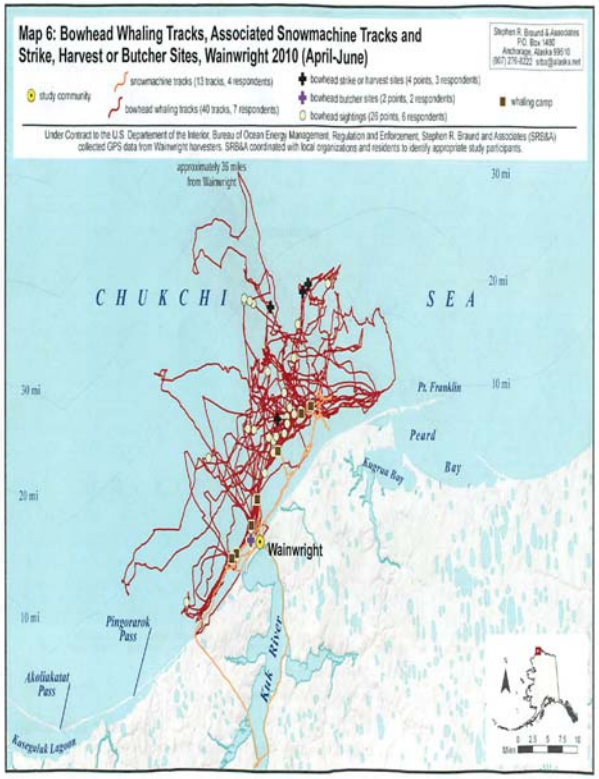
LONG TERM MONITORING: CROSS ISLAND WHALING

- Data collected from 2001-2012
- Shell has committed to ceasing all operations and moving entirely from area during subsistence whaling.



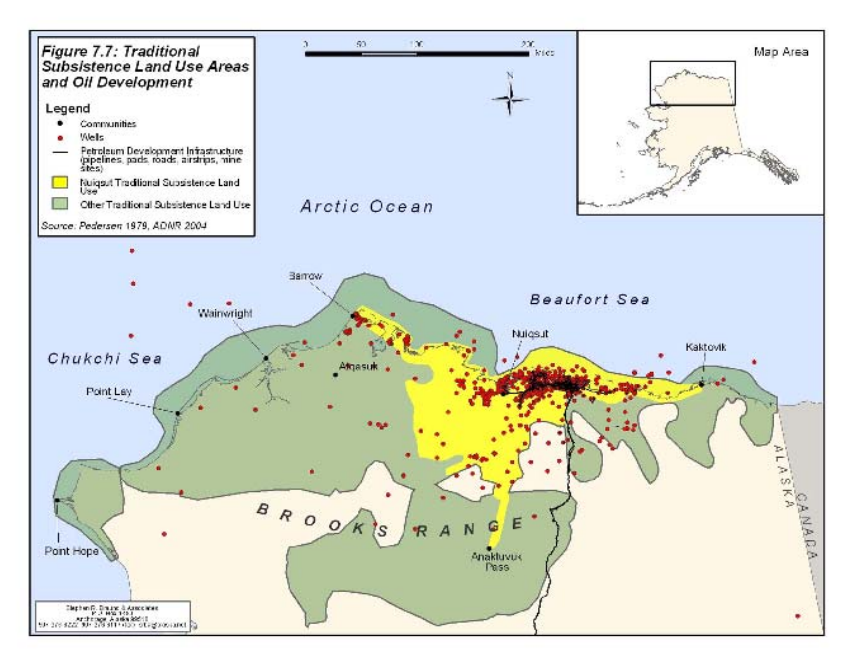
IMPACT MONITORING FOR OFFSHORE SUBSISTENCE HUNTING, CHUKCHI SEA

- Study completed for 2 seasons in Pt. Lay and 1 season in Wainwright
- Hunters highly cooperative and helpful
- Communities interested in longer time-series study
- Interest in extending also to Pt. Hope



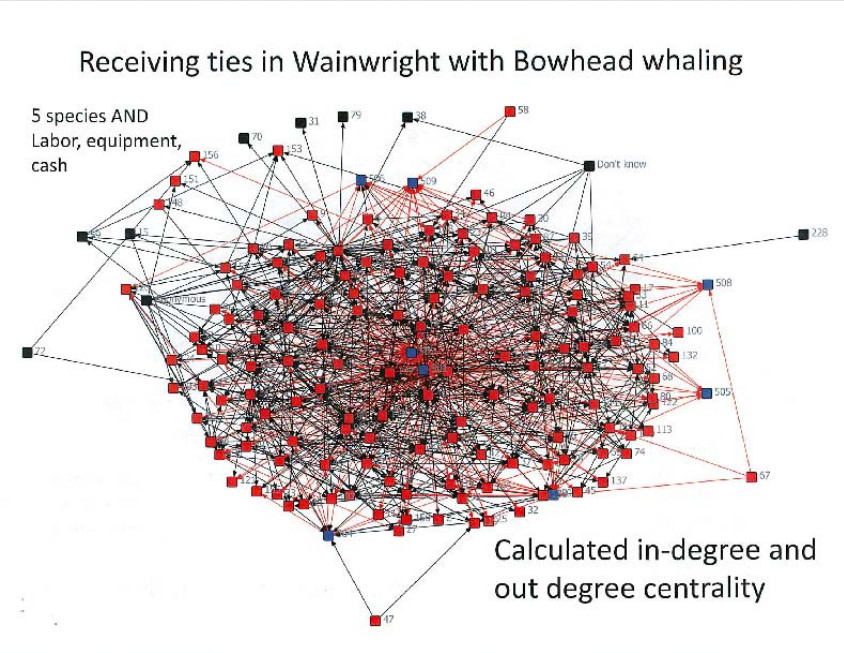
MONITORING AND ASSESSING MITIGATION IN THE VICINITY OF NUIQSUT, ALASKA

- 54 hearings from 1975-2006, 1,190 public comments.
- Mitigation measures in 303 documents.
- Linked to 1,620 records of concerns and are coded.
- Top 5 concerns identified.
- Top 5 mitigations identified.
- Team preparing to validate results with key harvesters.



SHARING NETWORKS TO ASSESS VULNERABILITY OF LOCAL COMMUNITIES TO O&G DEVELOPMENT

- Delays due to:
  - *OMB approval process;*
  - *Achieving concurrence at Kaktovik.*
- Survey instrument completed with over 90% response rate.
- Data under analysis.
- Final report is due 06/12.
- Won DOI PIC award.



SUBSISTENCE SALMON BEAUFORT SEA

- Salmon started appearing in large numbers in early 1970s.
- Discussions completed in Barrow and Nuiqsut (35).
- Barrow harvested over 20K salmon in 2008.
- Nomenclature problematic at species level e.g. all large salmon called “kings.”