# Five years of ecosystem data from the northeastern Chukchi Sea

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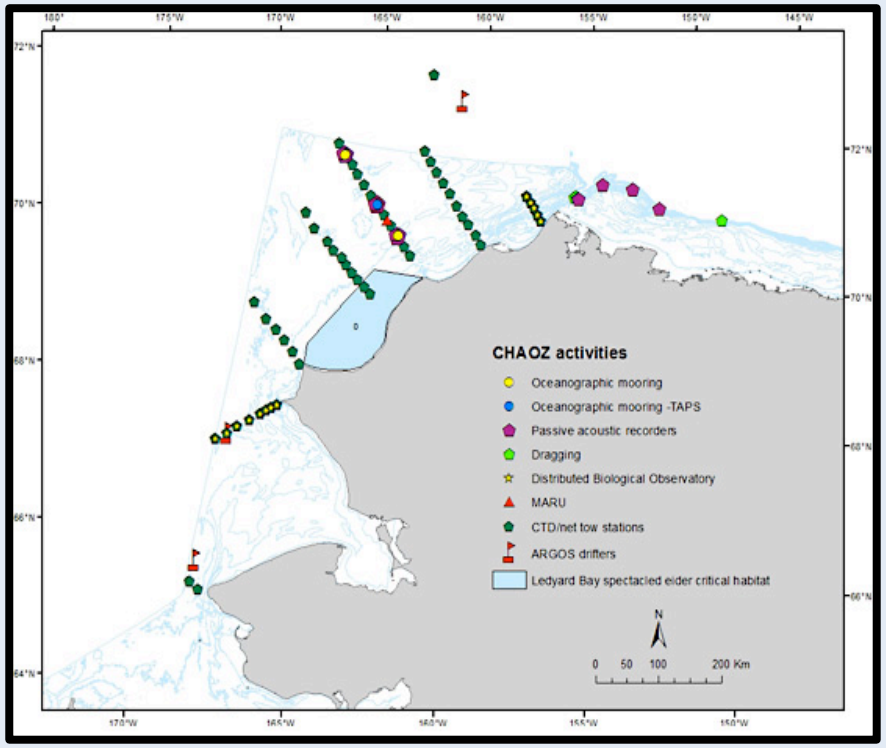
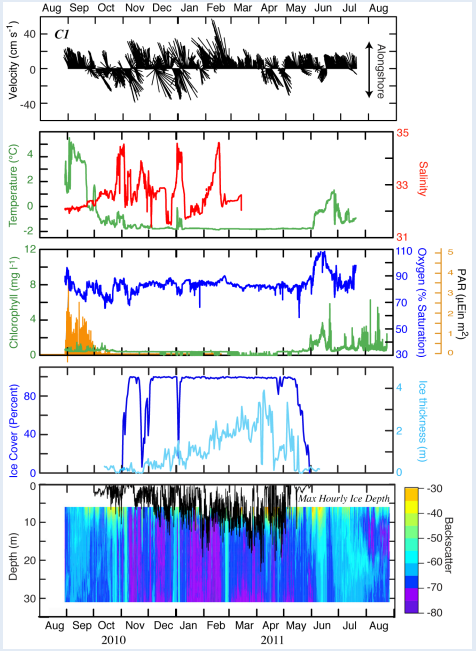
BOEM
Bureau of Ocean Energy Management




- CHAOZ – Chukchi Acoustics, Oceanography, and Zooplankton (Field years 2010, 2011)
  - Investigates distribution and abundance of whales in relation to changes in oceanography, prey density, and anthropogenic activities
- ArcWEST – Arctic Whale Ecology Study (Field years 2013, 2014)
  - Investigates the transport of krill and nutrients from the northern Bering Sea to Barrow Canyon
- CHAOZ-Extension ((Field years 2013, 2014)
  - Extension of CHAOZ to Hanna Shoal

Shipboard measurements  Biophysical moorings  Satellite-tracked drifters

# Observations



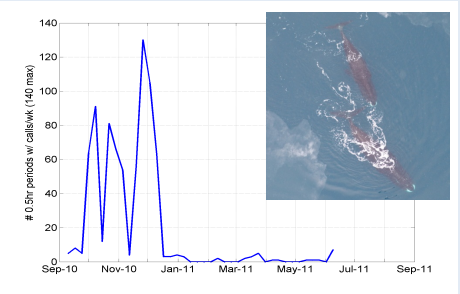

**Currents**

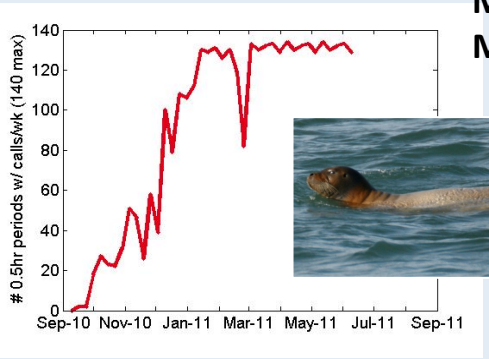
**Temperature**
**Salinity**
**Nitrate**

**$O_2$ % Saturation**
**Fluorescence, PAR**

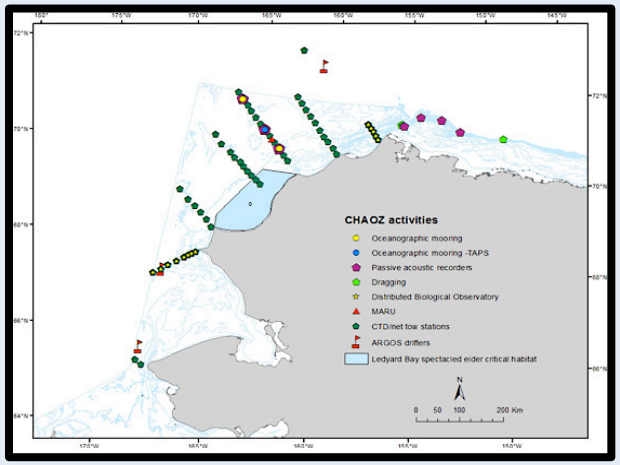
**Ice Concentration**
**Thickness**

Backscatter
**Max. Ice depth**

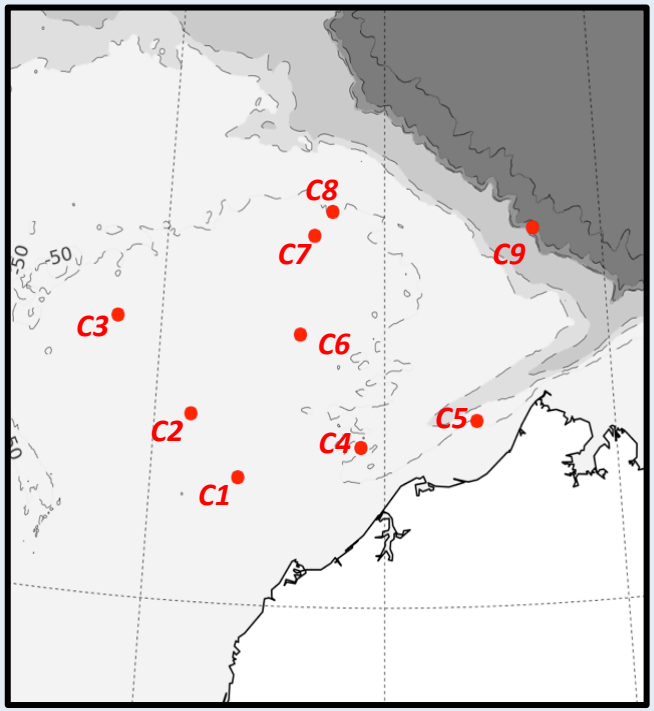


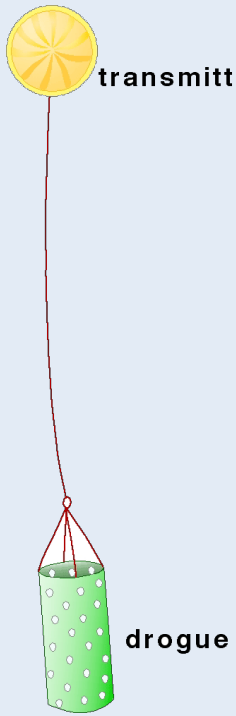




>25 sites
**Acoustic**
**Marine**
**Mammals**




*6 cruises (2010-2015 )*

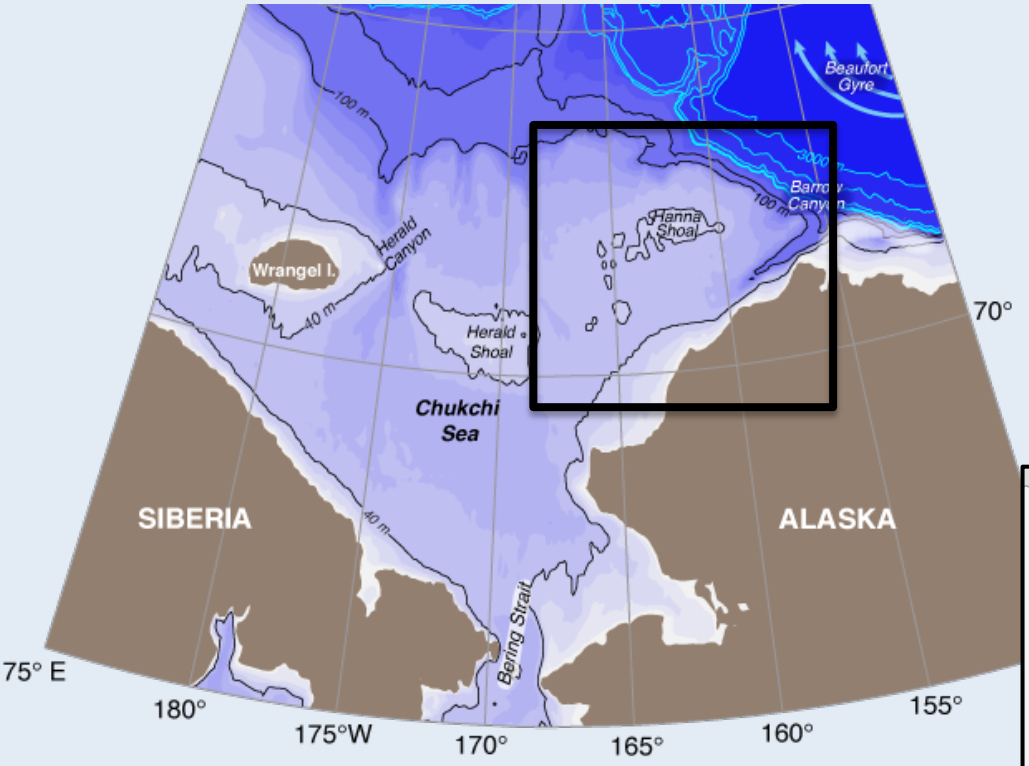


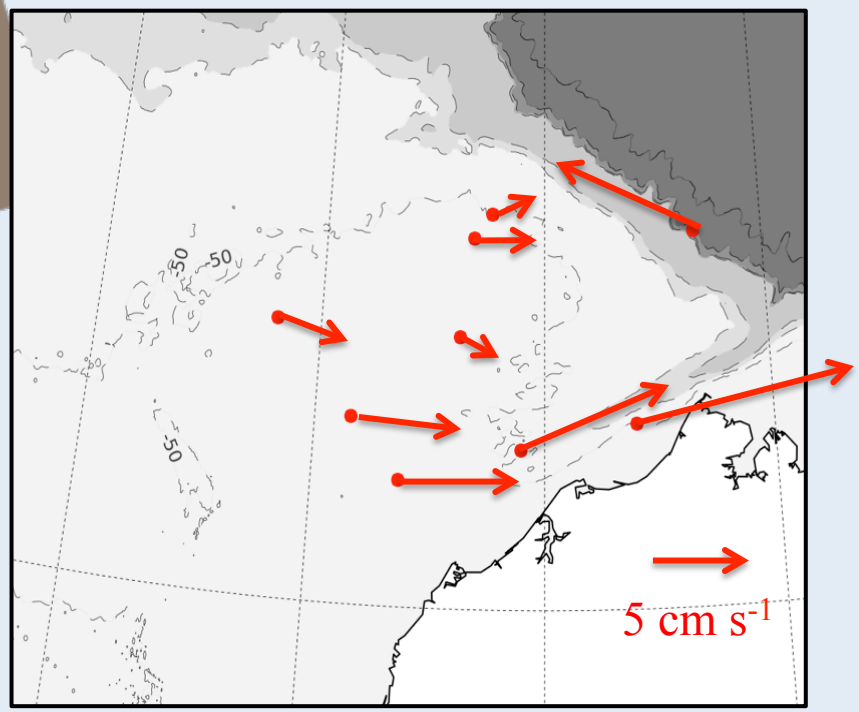




*>50 drifters deployed*

# Mean Currents from Moorings

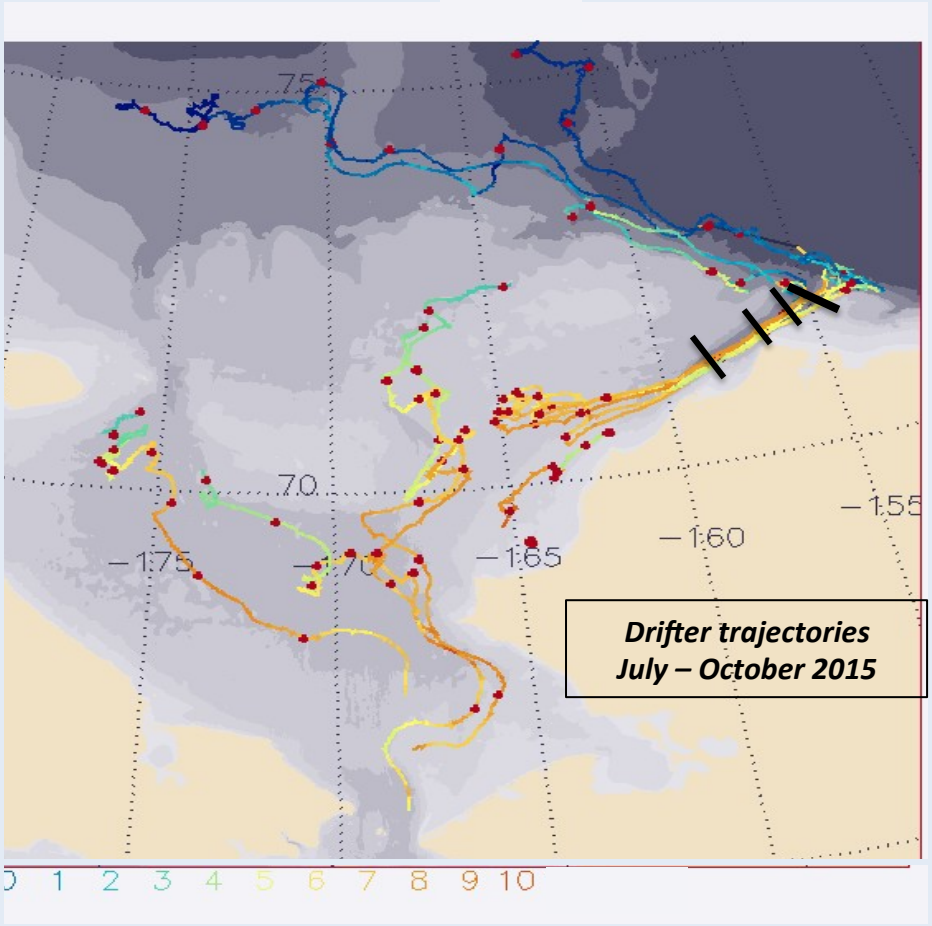
(~35 m)

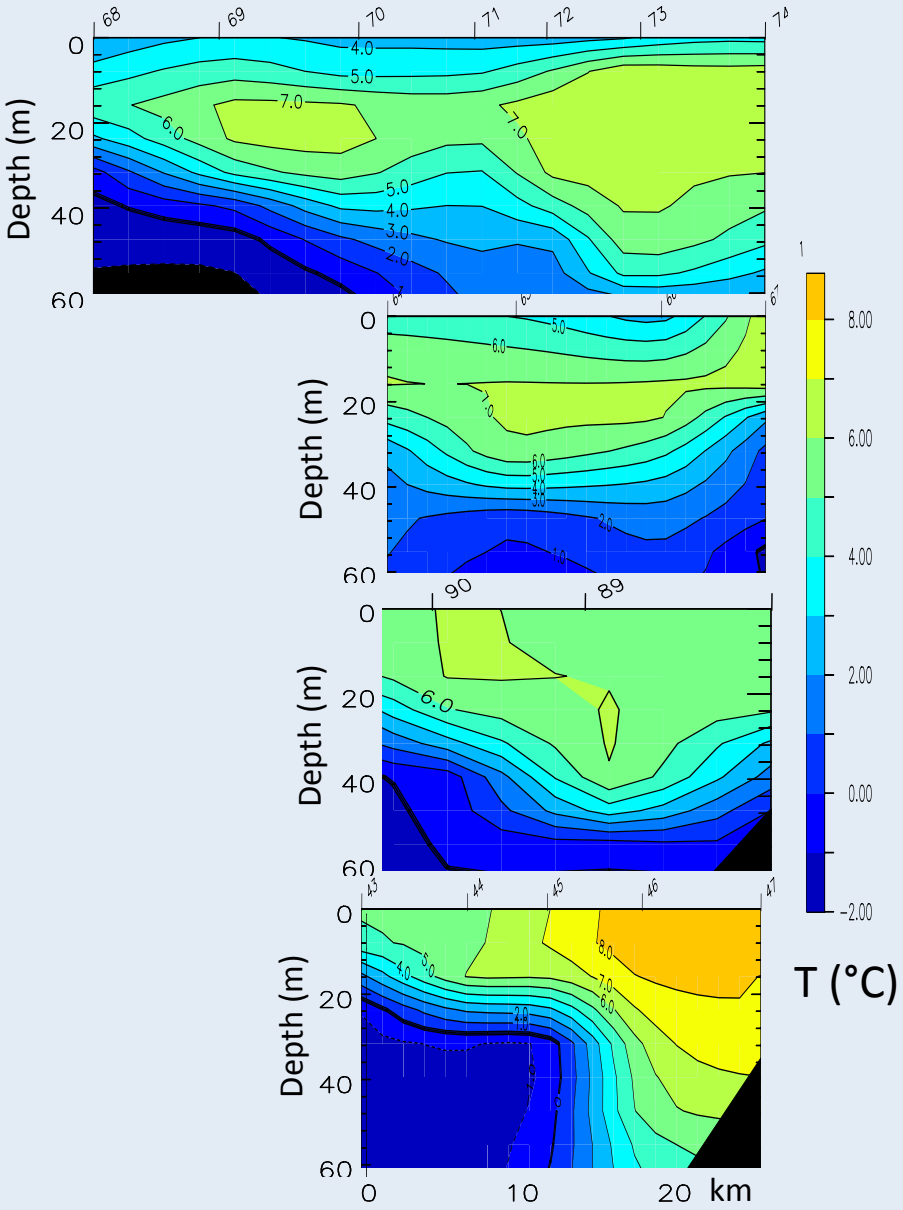


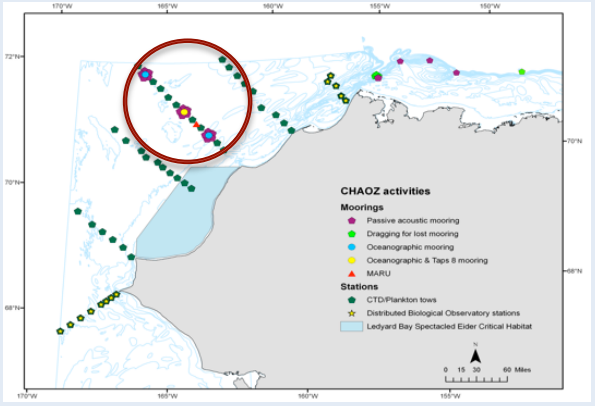
Satellite-tracked drifters (drogue depth: 30 m)

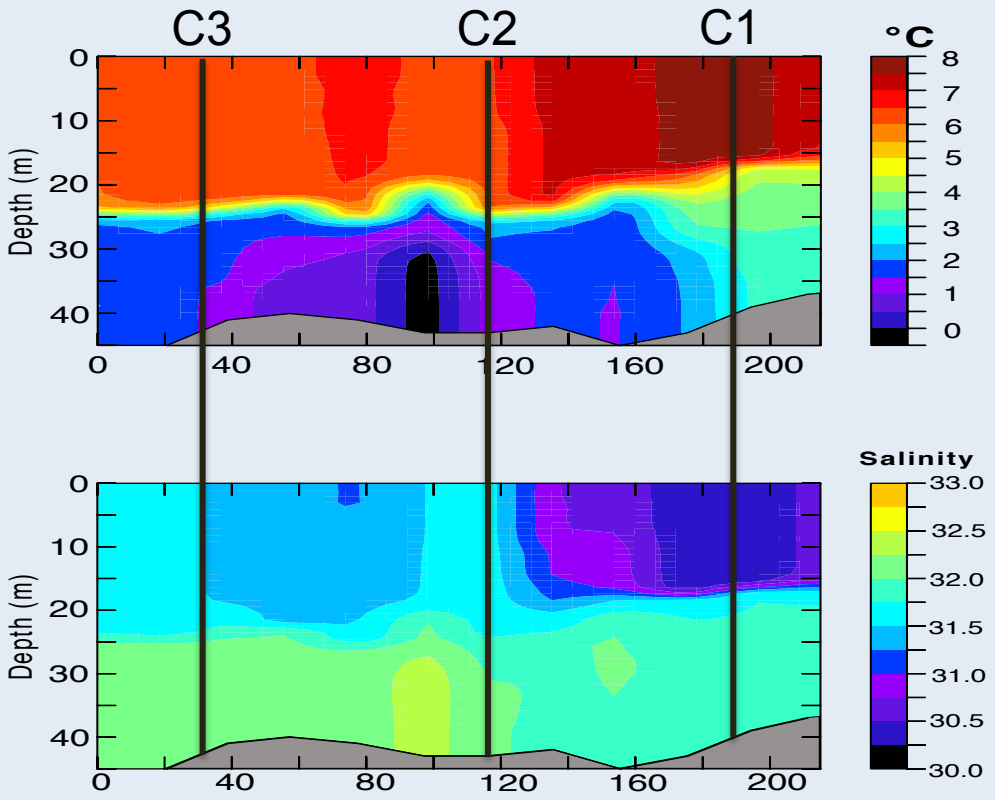
# Off shelf flow



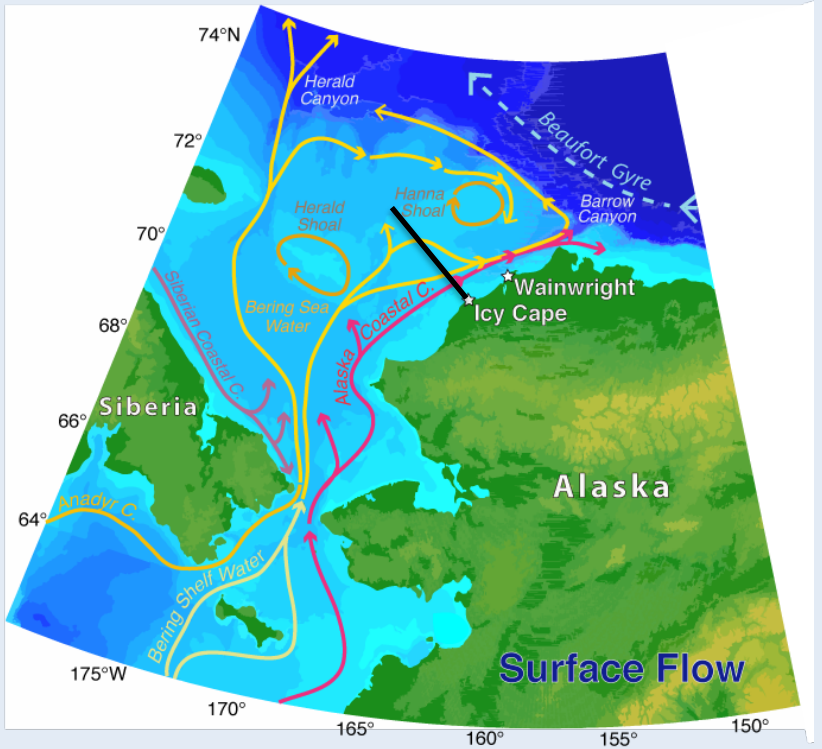



# Mooring Locations: Icy Cape



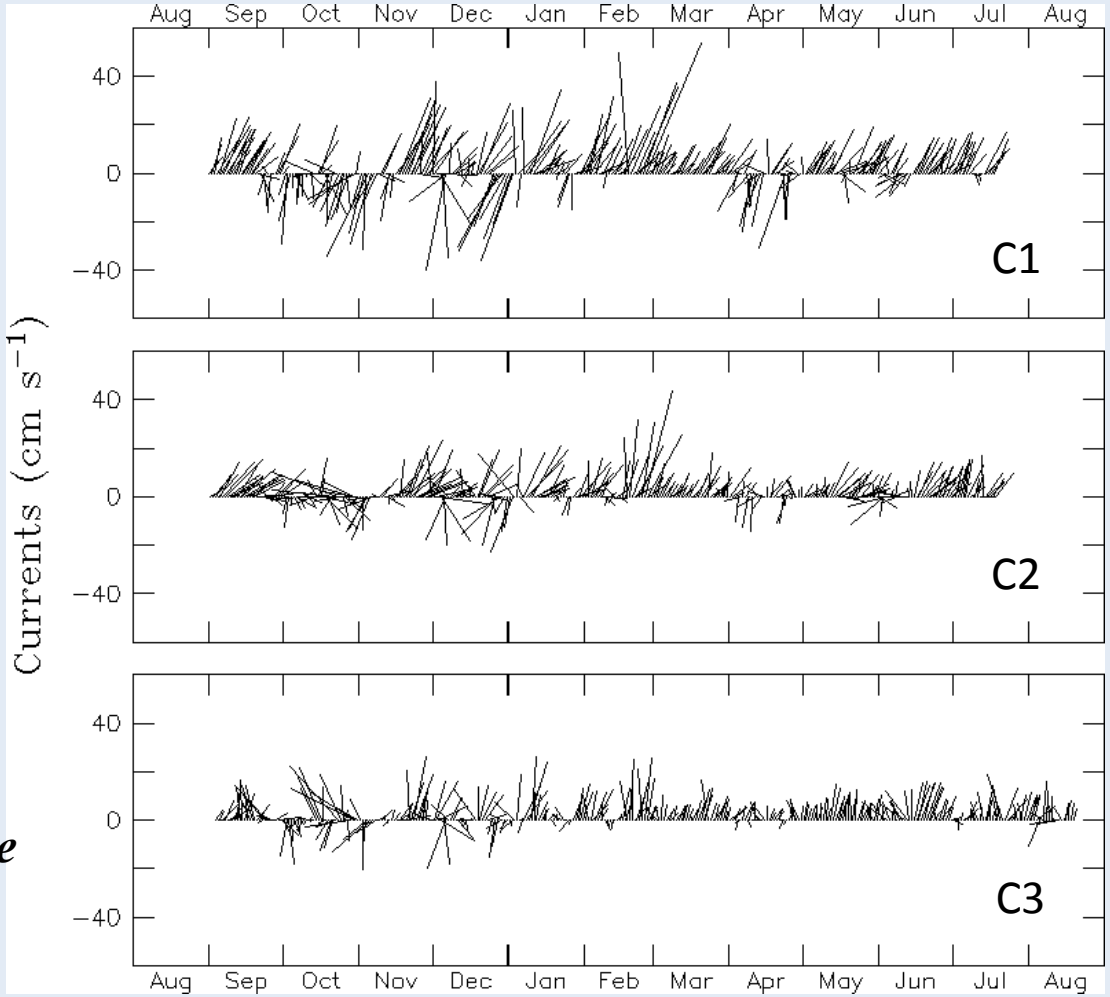




*August 2011*



# Currents Icy Cape

*In shore*




*Off shore*

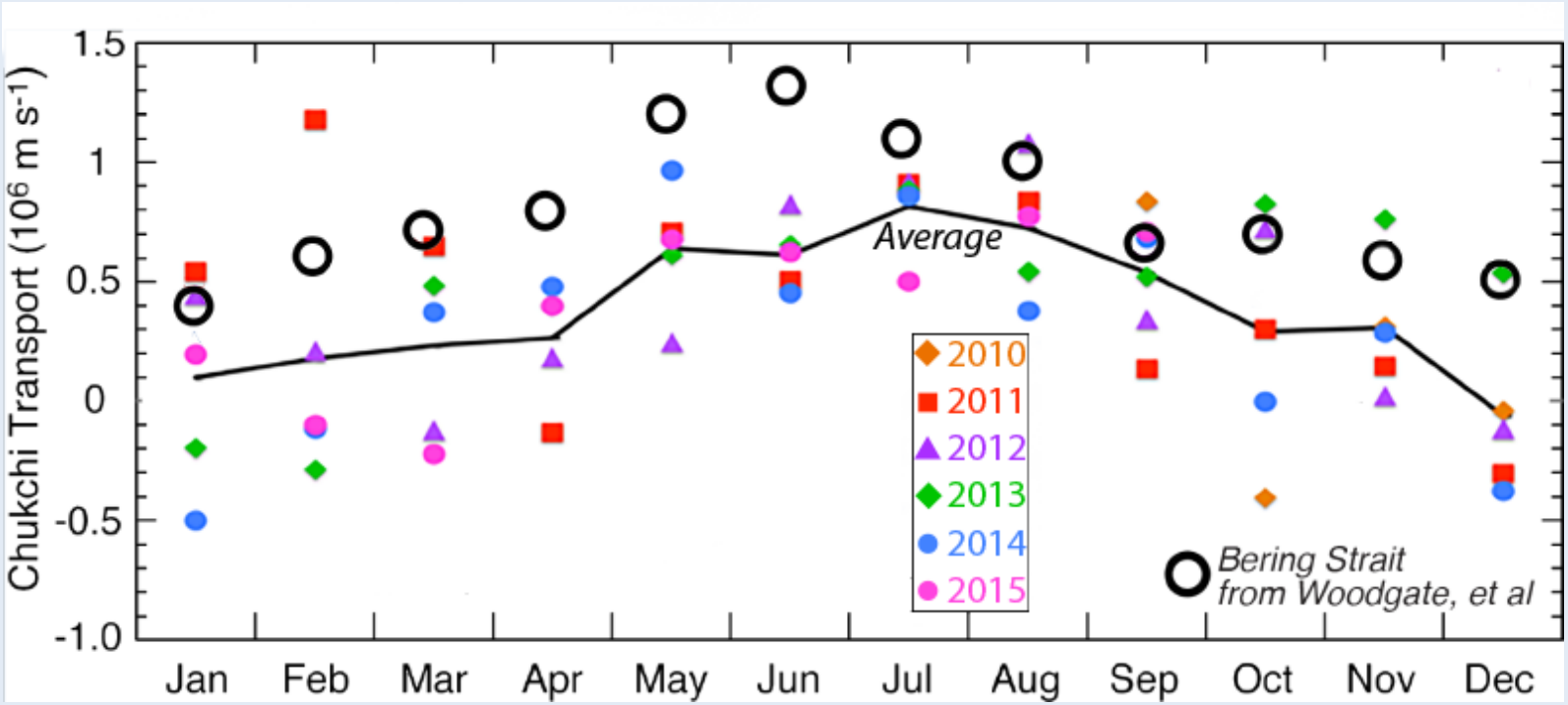
*Correlations*

***0.82***

***0.64***

***0.70***

# Transport at Icy Cape

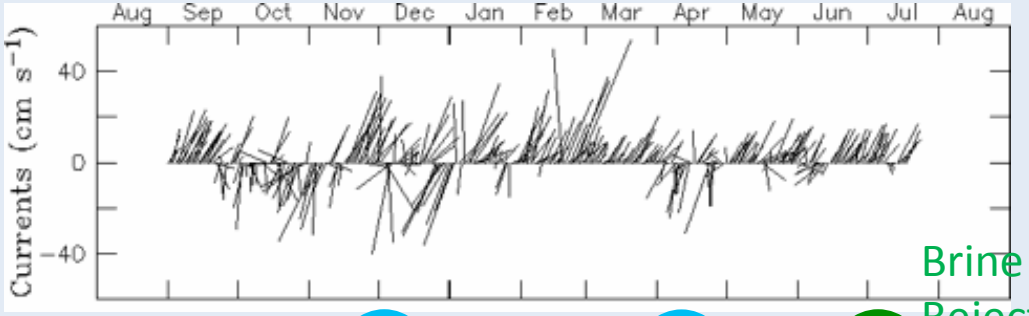



**Annual Transport (x $10^6$ $m^3$ $s^{-1}$)**

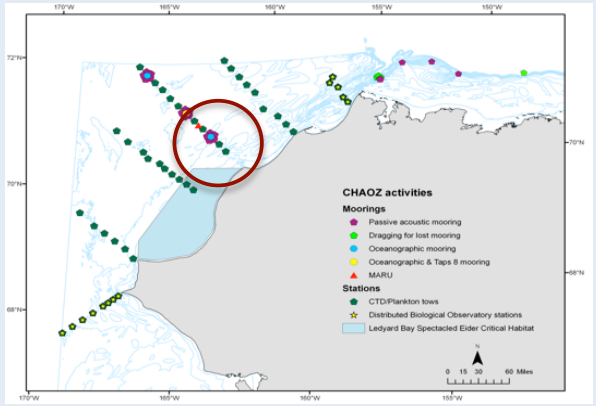
*2010-2011 - 0.50*
*2011-2012 - 0.35*
*2012-2013 0.36*
*2013-2014 0.48*
*2014-2015 0.30*

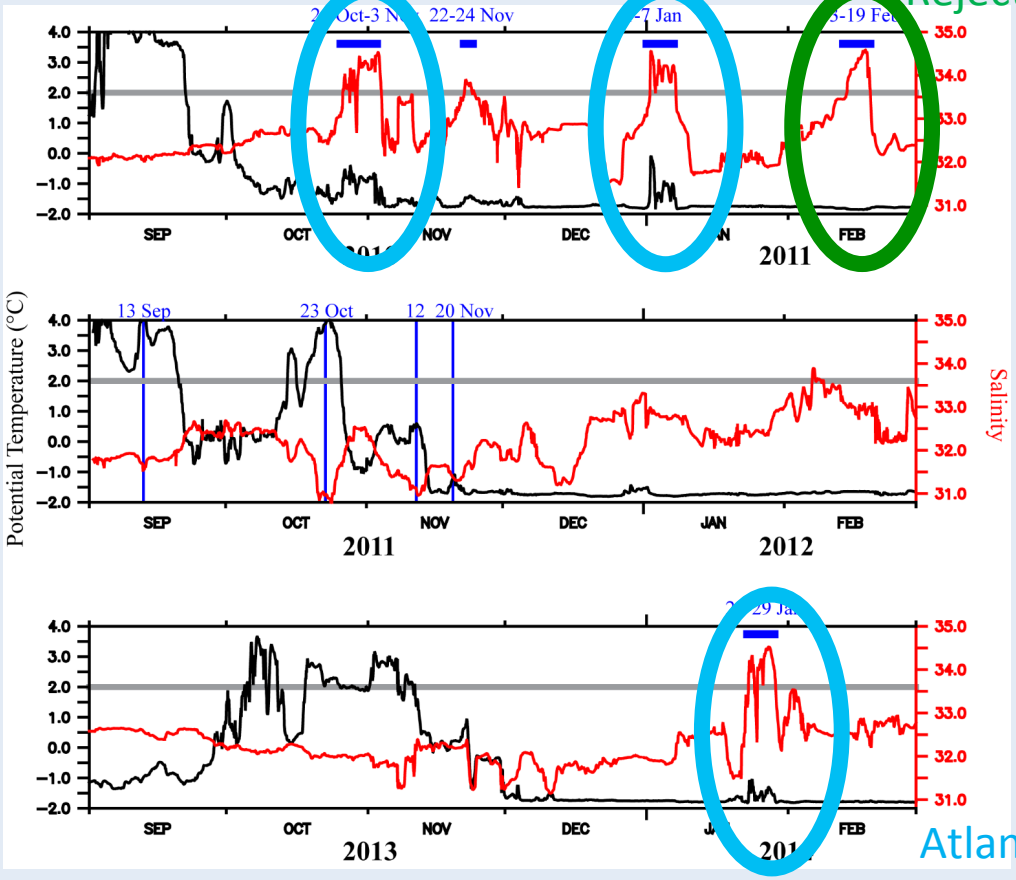
***Average - 0.40 x $10^6$ $m^3$ $s^{-1}$***

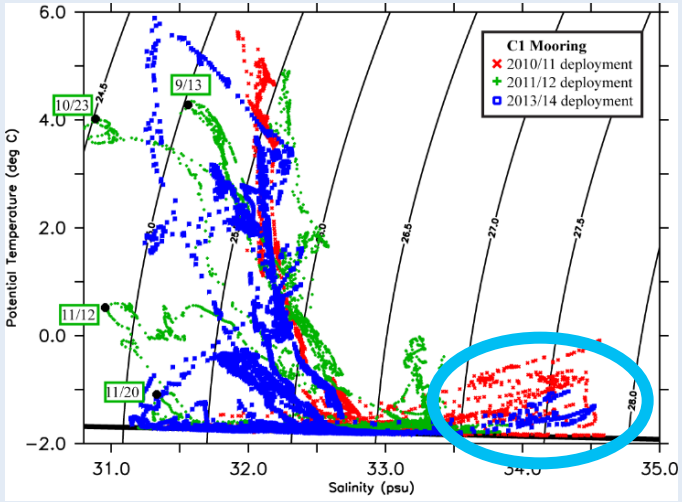
# Inflow at Barrow Canyon: C1




Brine Rejection

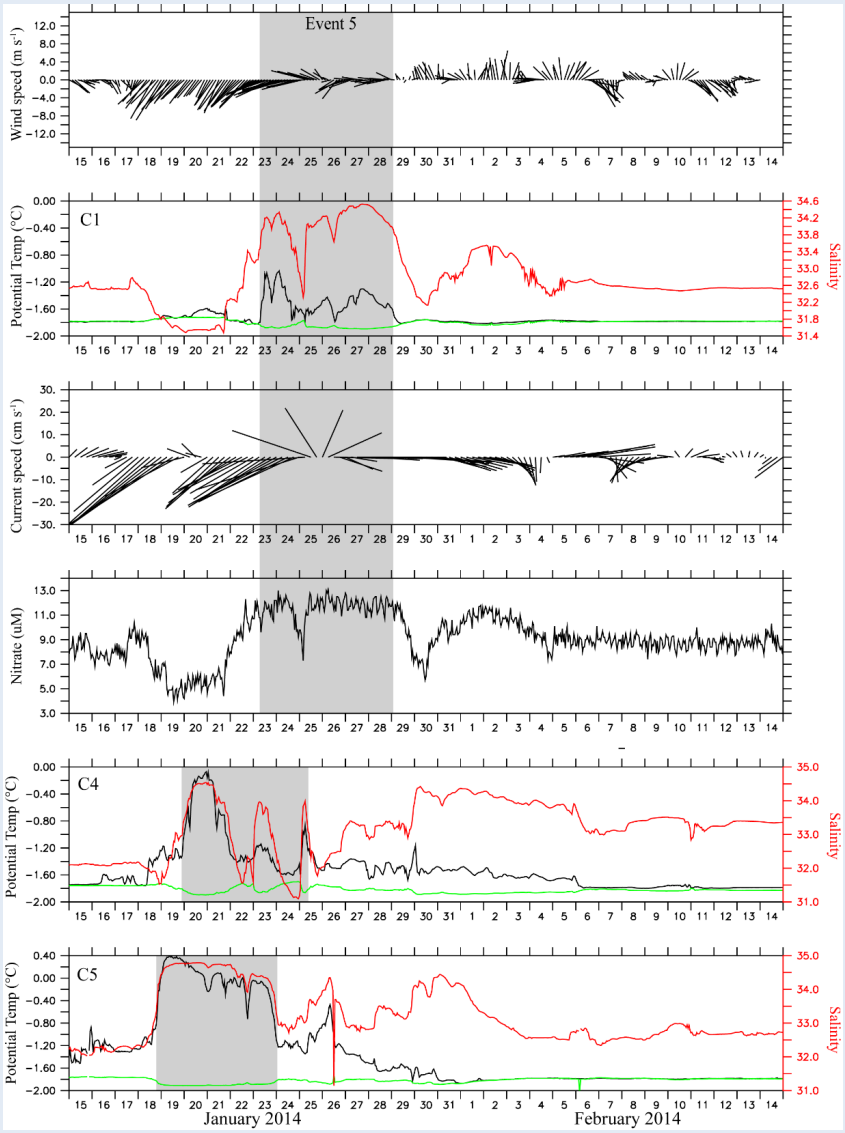


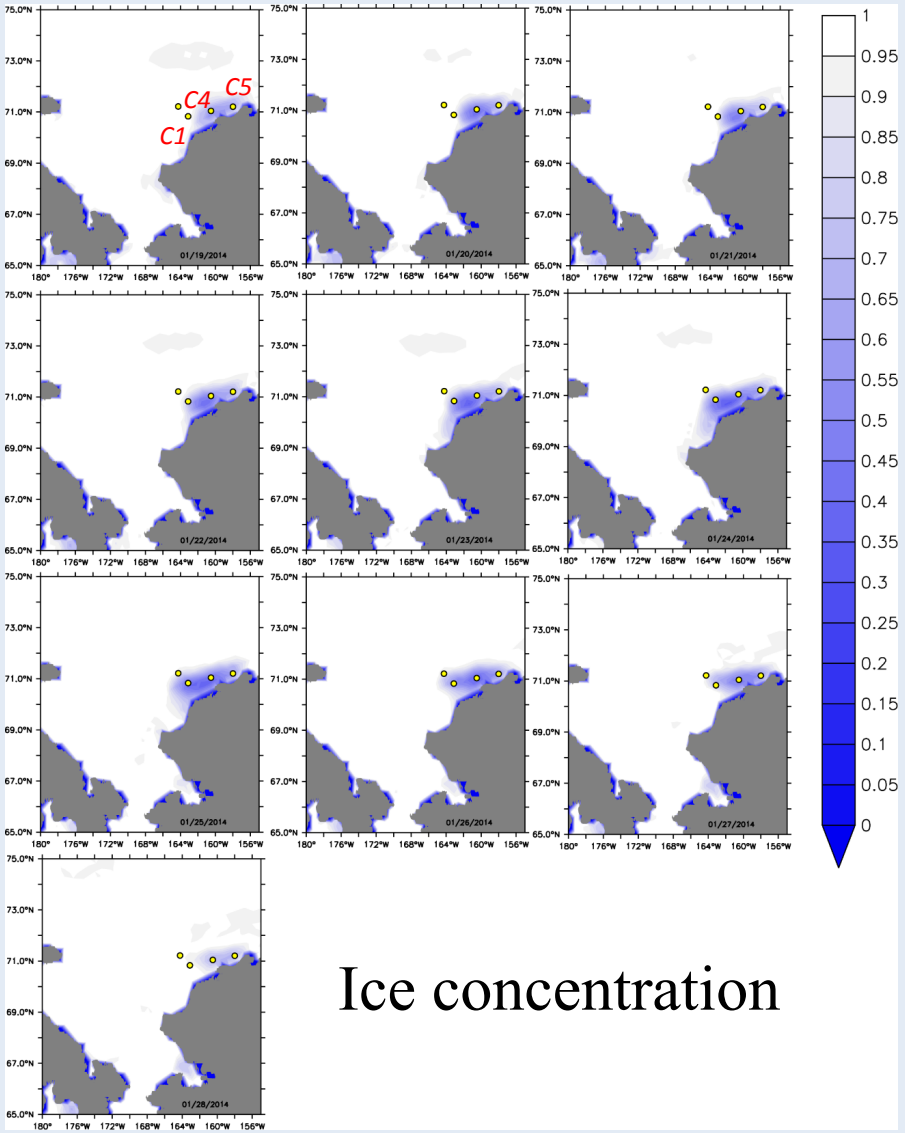




Atlantic Water

# Atlantic Water: 2013 - 2014

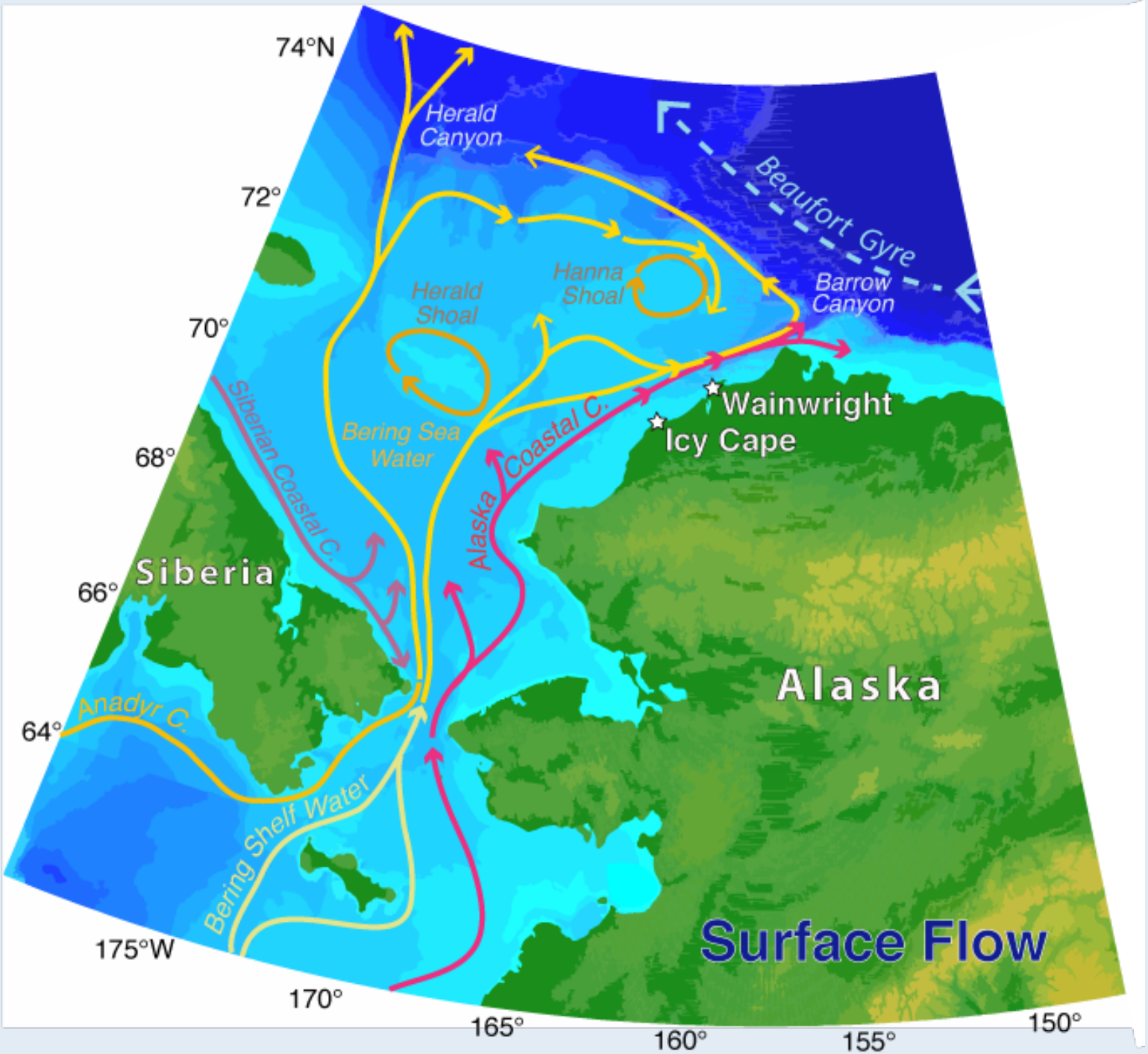


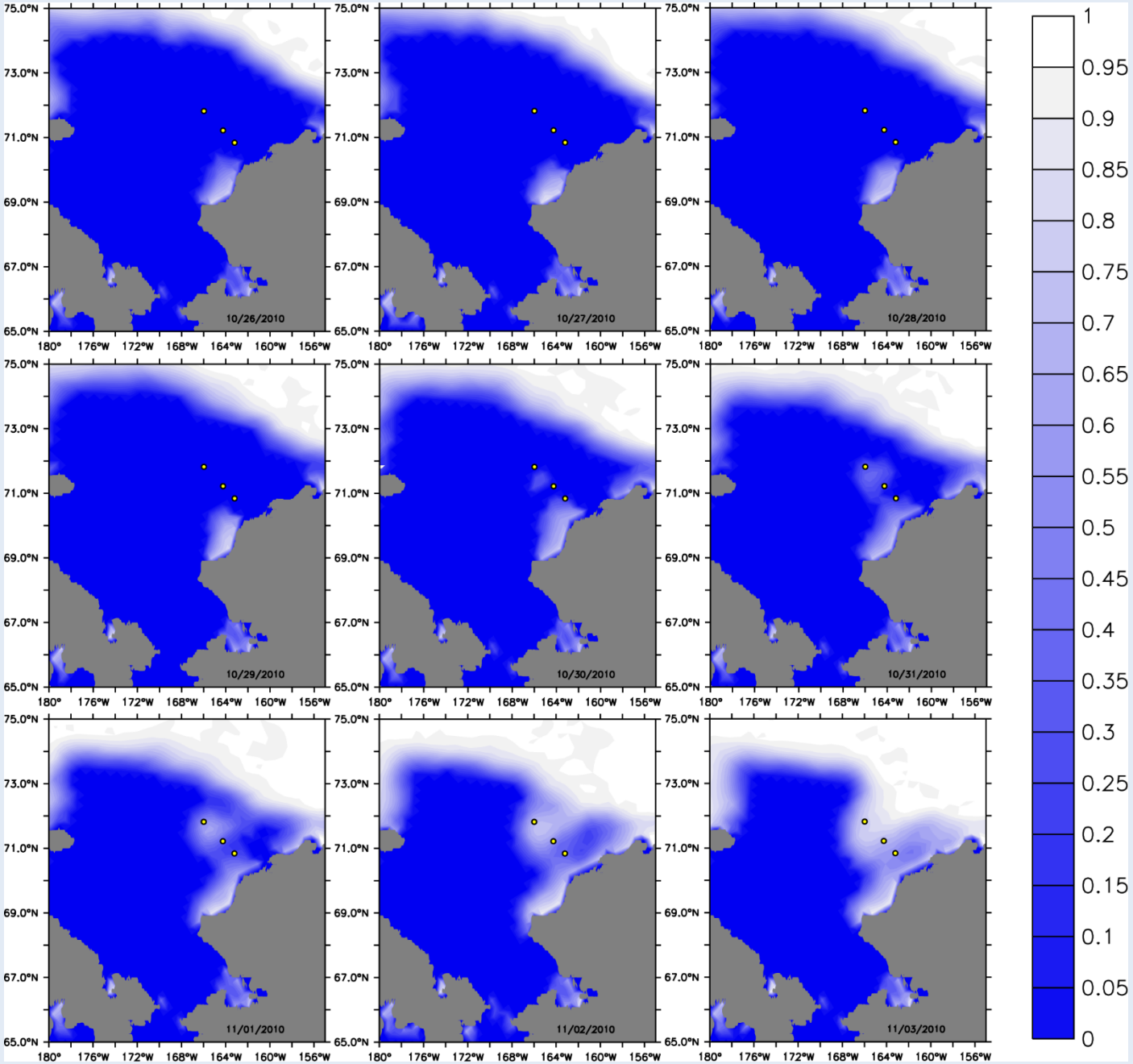



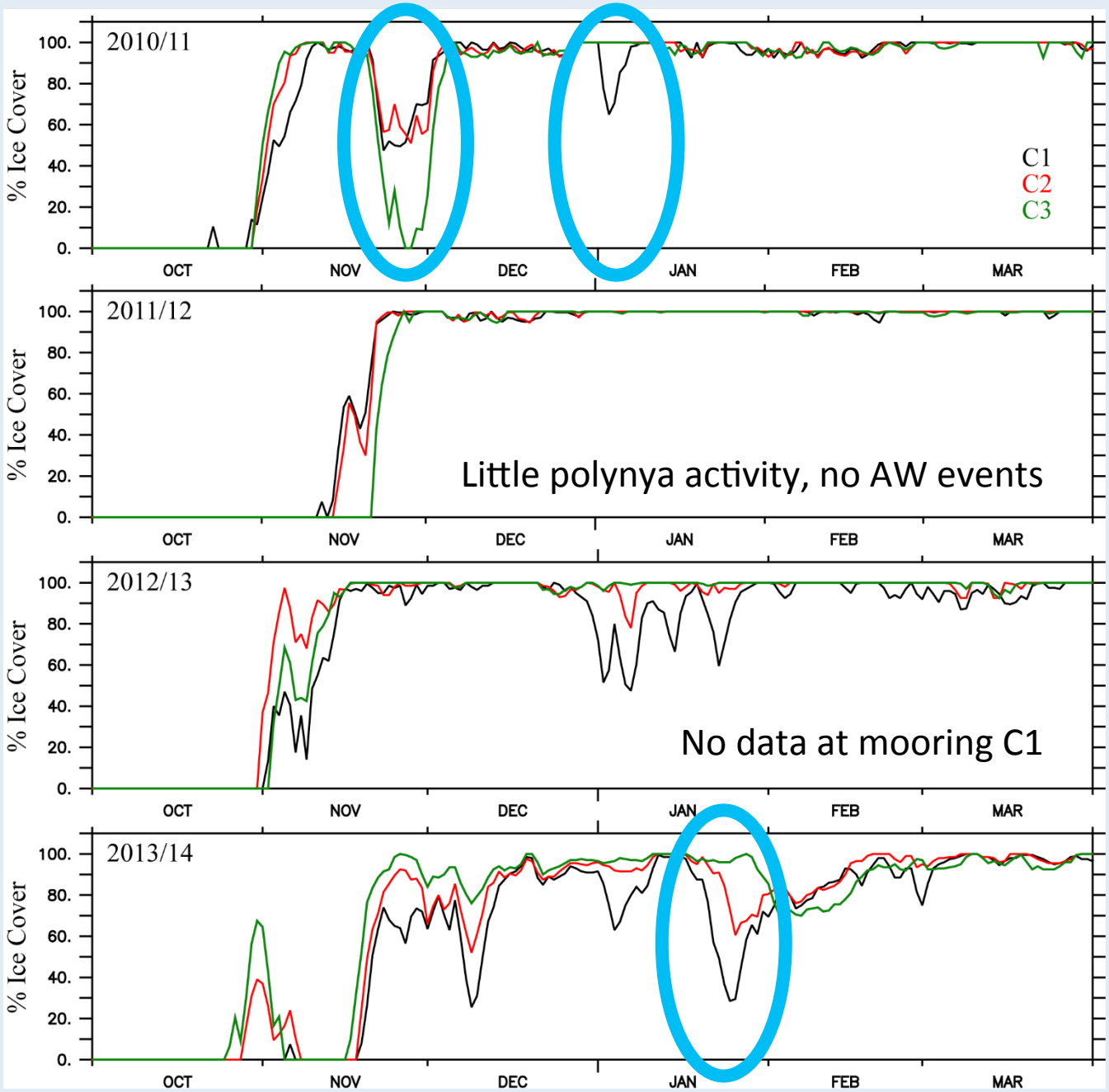

Ice concentration

# Summary

- **Transport varies strongly during winter and fall, but is less variable in spring – summer.**
- **Year-long average transport ranged from 0.30 - 0.50 Sv, with average of 0.40 Sv ~ 40% transport through Bering Strait**
- **Upwelling events in Barrow Canyon can influence the shelf far (~130 km) from the canyon.**
- **Each of the occurrences of Atlantic water were associated with polynyas.**


74°N
72°
70°
68°
66°
64°
175°W
170°
165°
160°
155°
150°
Herald Canyon
Beaufort Gyre
Barrow Canyon
Hanna Shoal
Herald Shoal
Bering Sea Water
Siberian Coastal C.
Alaska Coastal C.
Wainwright
Icy Cape
Siberia
Alaska
Anadyr C.
Bering Shelf Water
Surface Flow


75.0°N
73.0°N
71.0°N
69.0°N
67.0°N
65.0°N
180°
176°W
172°W
168°W
164°W
160°W
156°W
10/26/2010
10/27/2010
10/28/2010
10/29/2010
10/30/2010
10/31/2010
11/01/2010
11/02/2010
11/03/2010
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0


2010/11
2011/12
2012/13
2013/14
% Ice Cover
100.
80.
60.
40.
20.
0.
OCT
NOV
DEC
JAN
FEB
MAR
C1
C2
C3
Little polynya activity, no AW events
No data at mooring C1