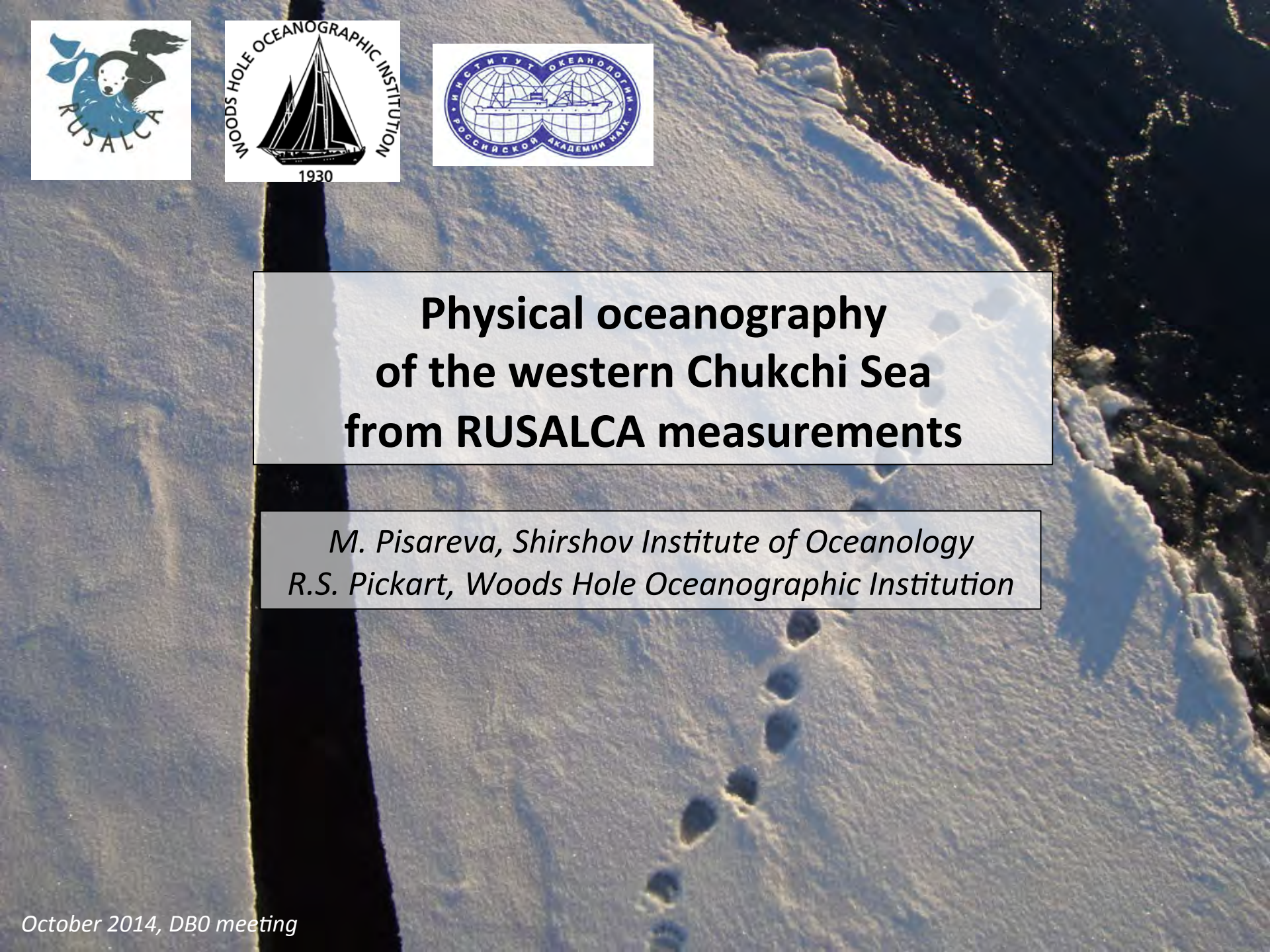
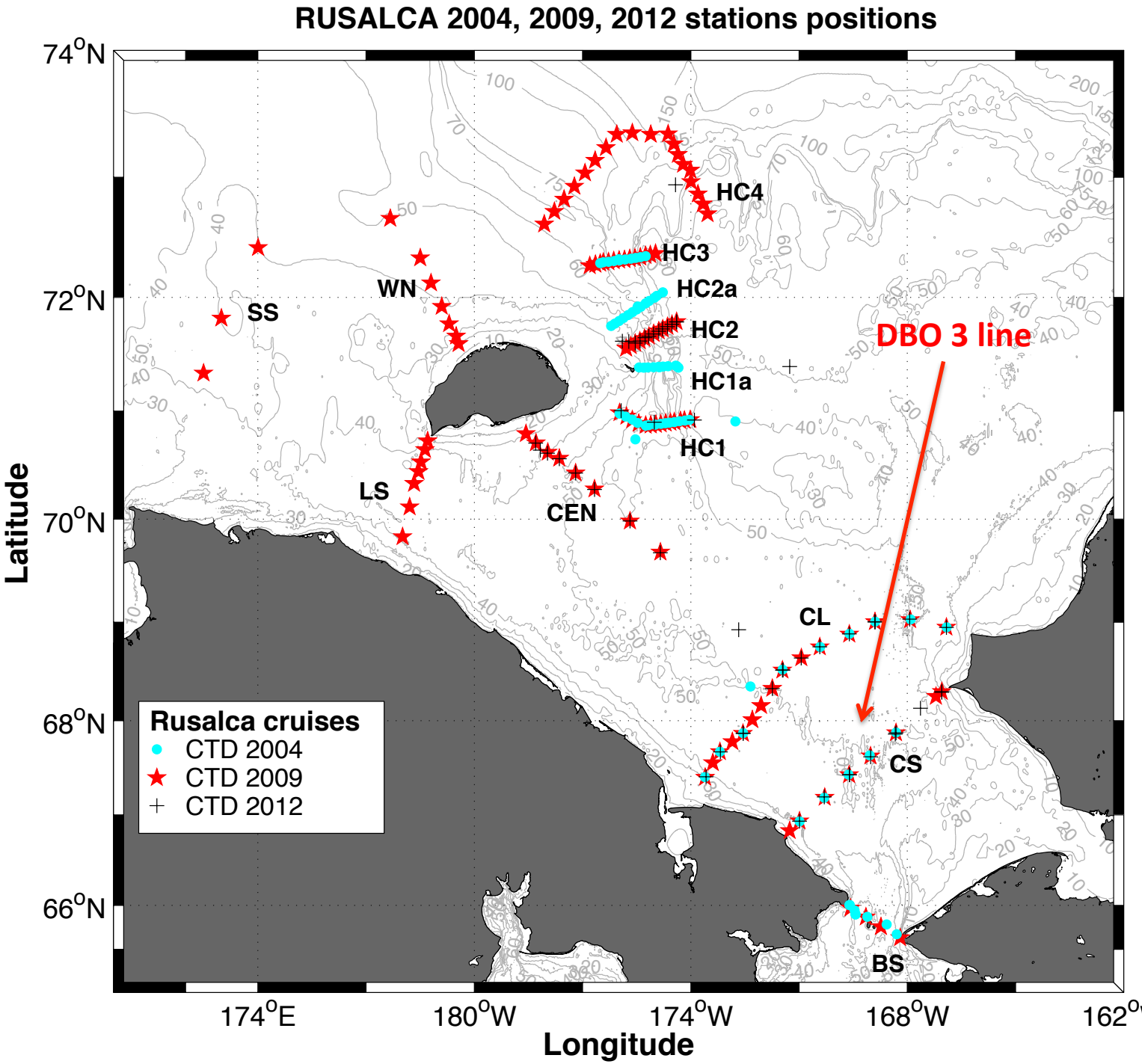


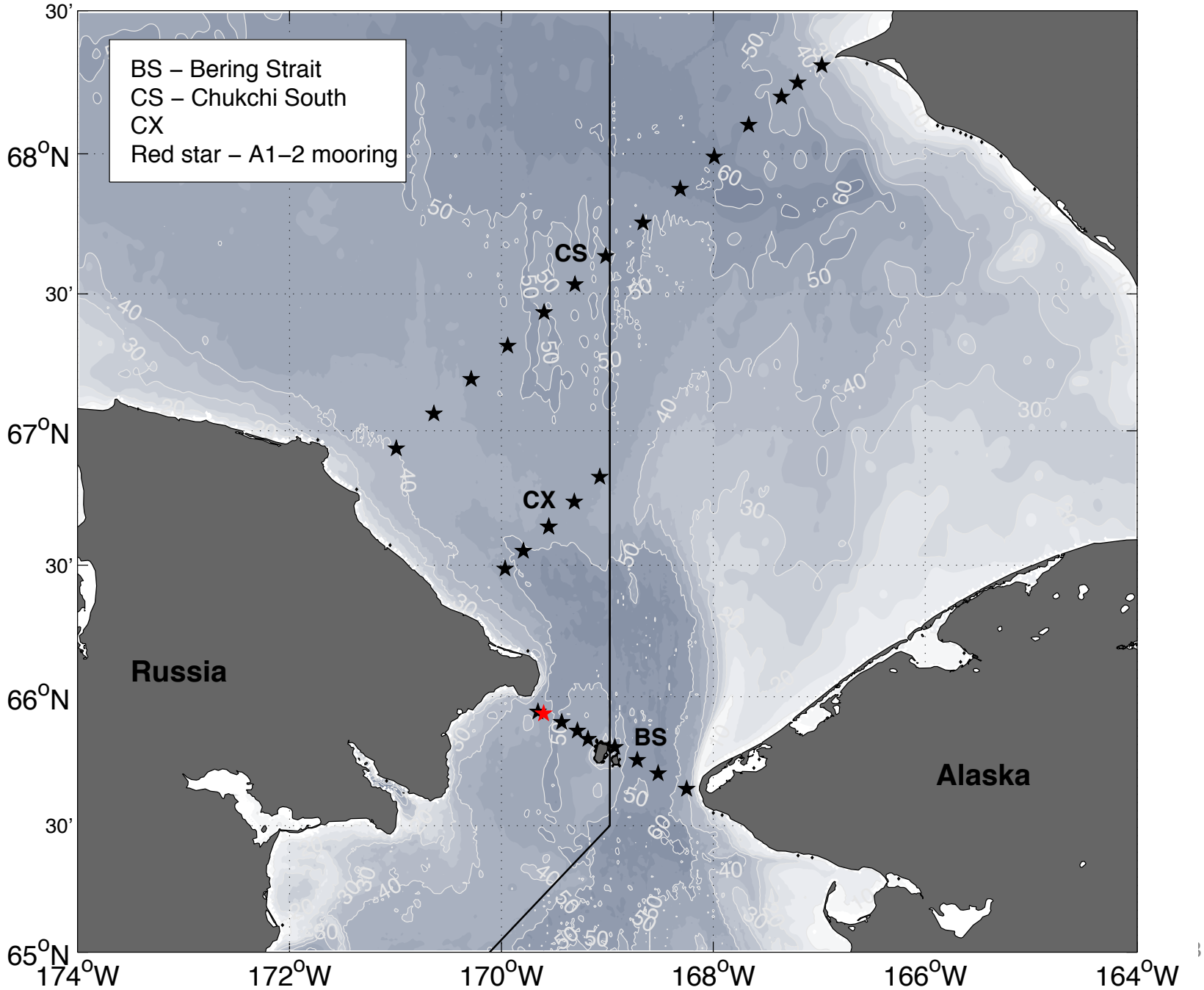
Physical oceanography of the western Chukchi Sea from RUSALCA measurements

M. Pisareva, Shirshov Institute of Oceanology
R.S. Pickart, Woods Hole Oceanographic Institution

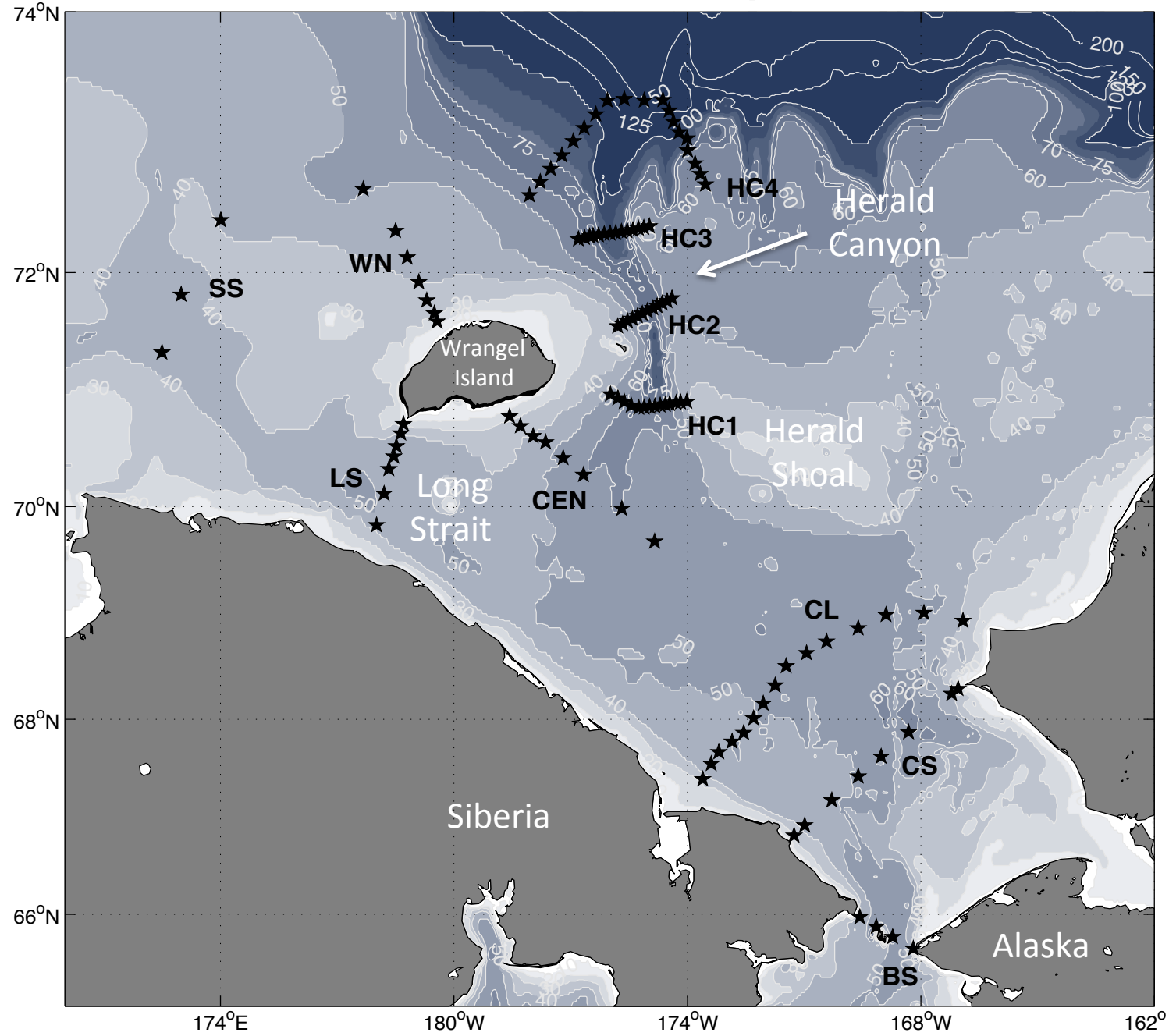
October 2014, DB0 meeting


RUSALCA 2004, 2009, 2012 stations positions
74°N
72°N
70°N
68°N
66°N
Latitude
174°E
180°W
174°W
168°W
162°W
Longitude
HC4
HC3
HC2a
HC2
HC1a
HC1
WN
SS
LS
CEN
CL
CS
BS
DBO 3 line
Rusalca cruises
CTD 2004
CTD 2009
CTD 2012

RUSALCA 2014 station positions

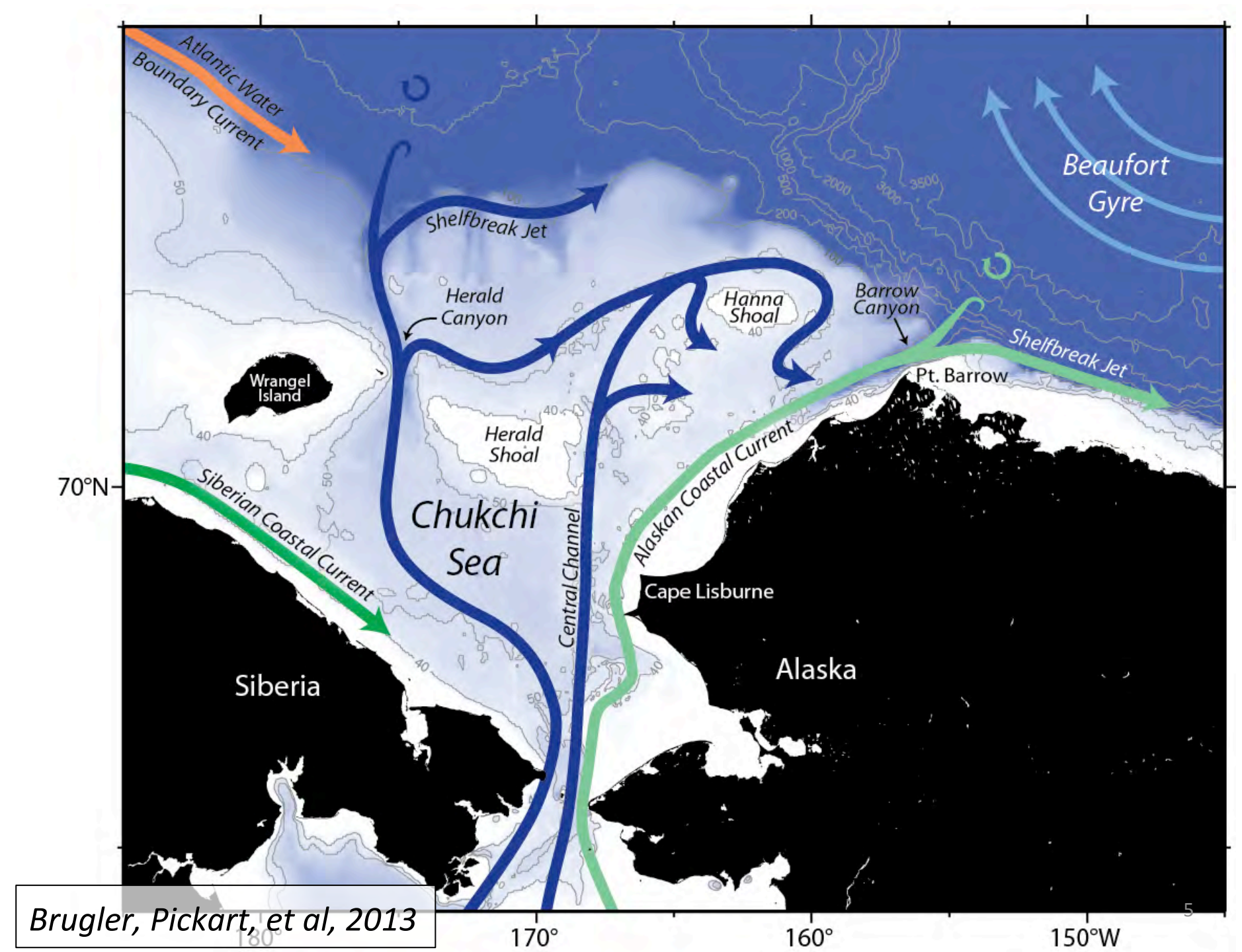


RUSALCA 2009 stations positions



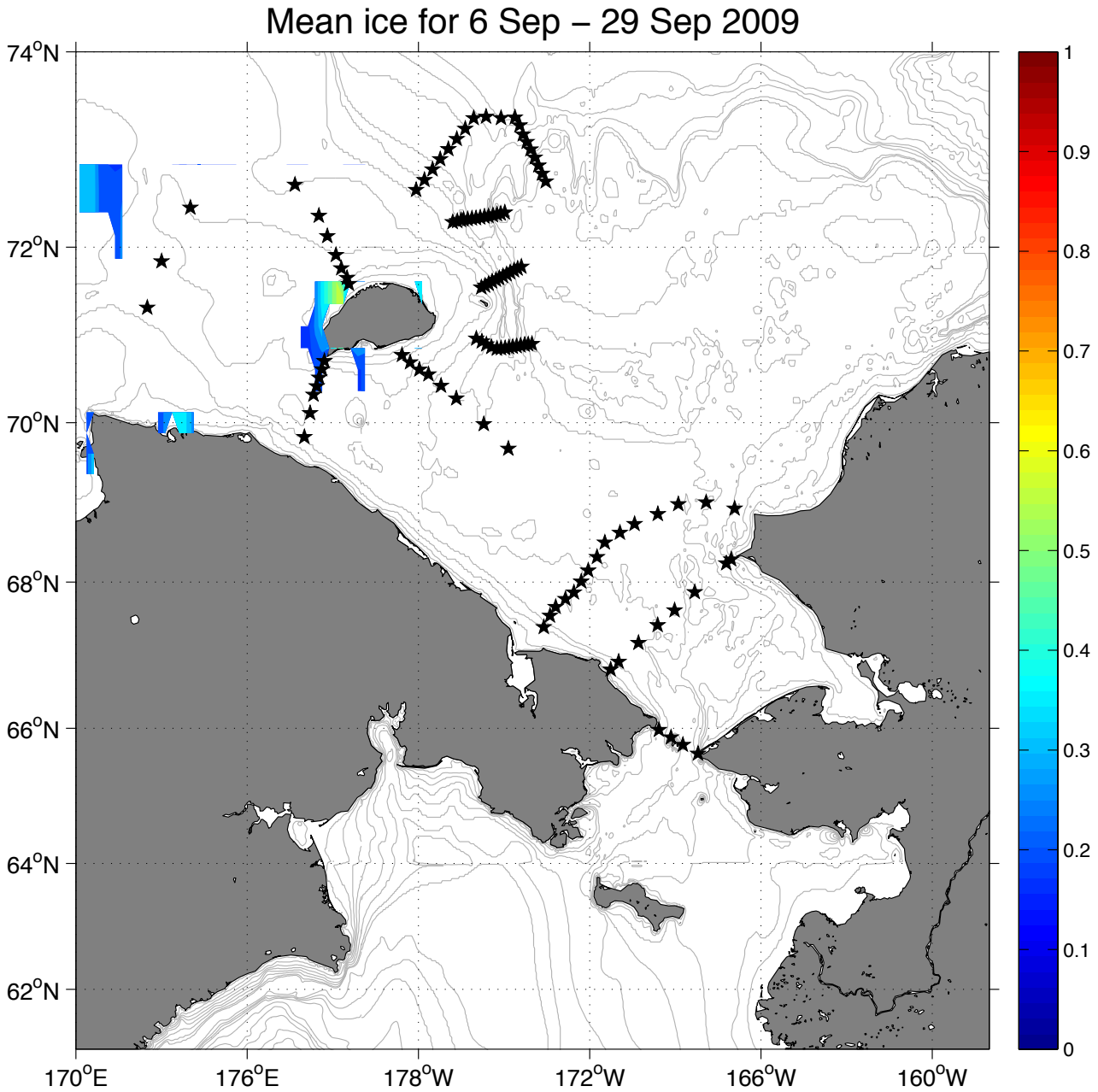
Sections names:

BS – Bering Strait
CS – Chukchi South
CL – Cape Lisburne
CEN – Central Chukchi
LS – Long Strait
WN – Wrangel North
SS – Siberian Shelf
HC – Herald Canyon



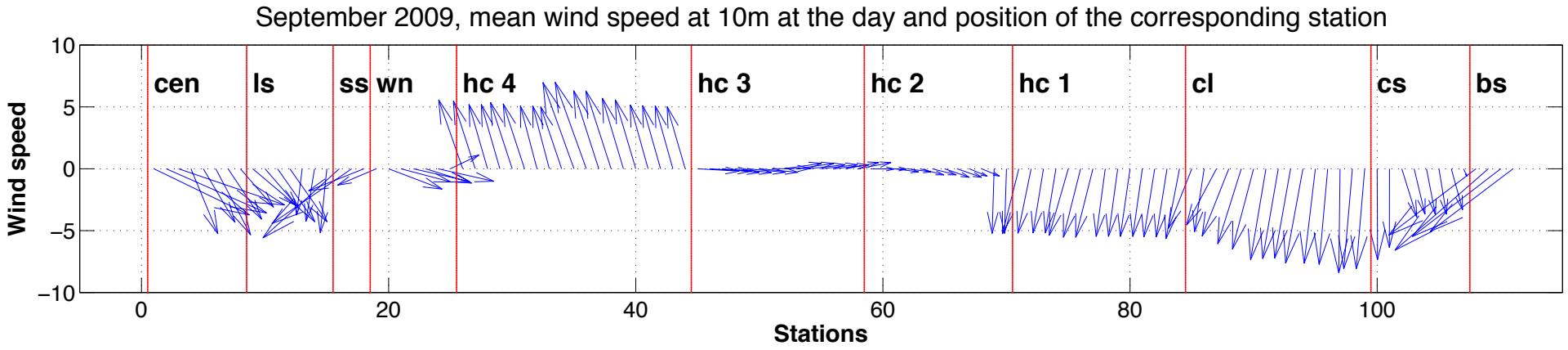
Brugler, Pickart, et al, 2013

Physical Drivers of the Chukchi Sea: ice



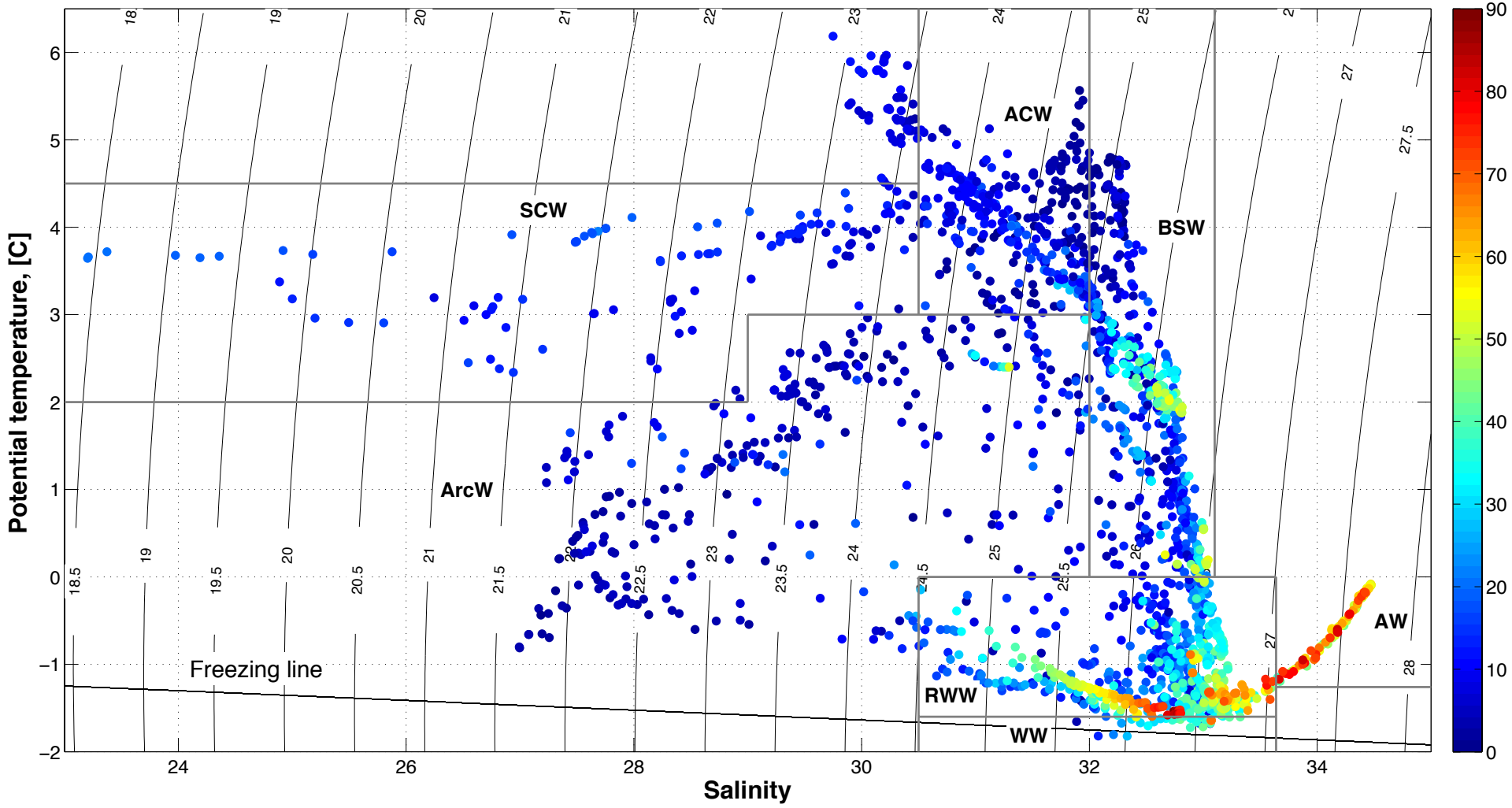
AVHRR-AMSR-E data

Physical Drivers of the Chukchi Sea: wind

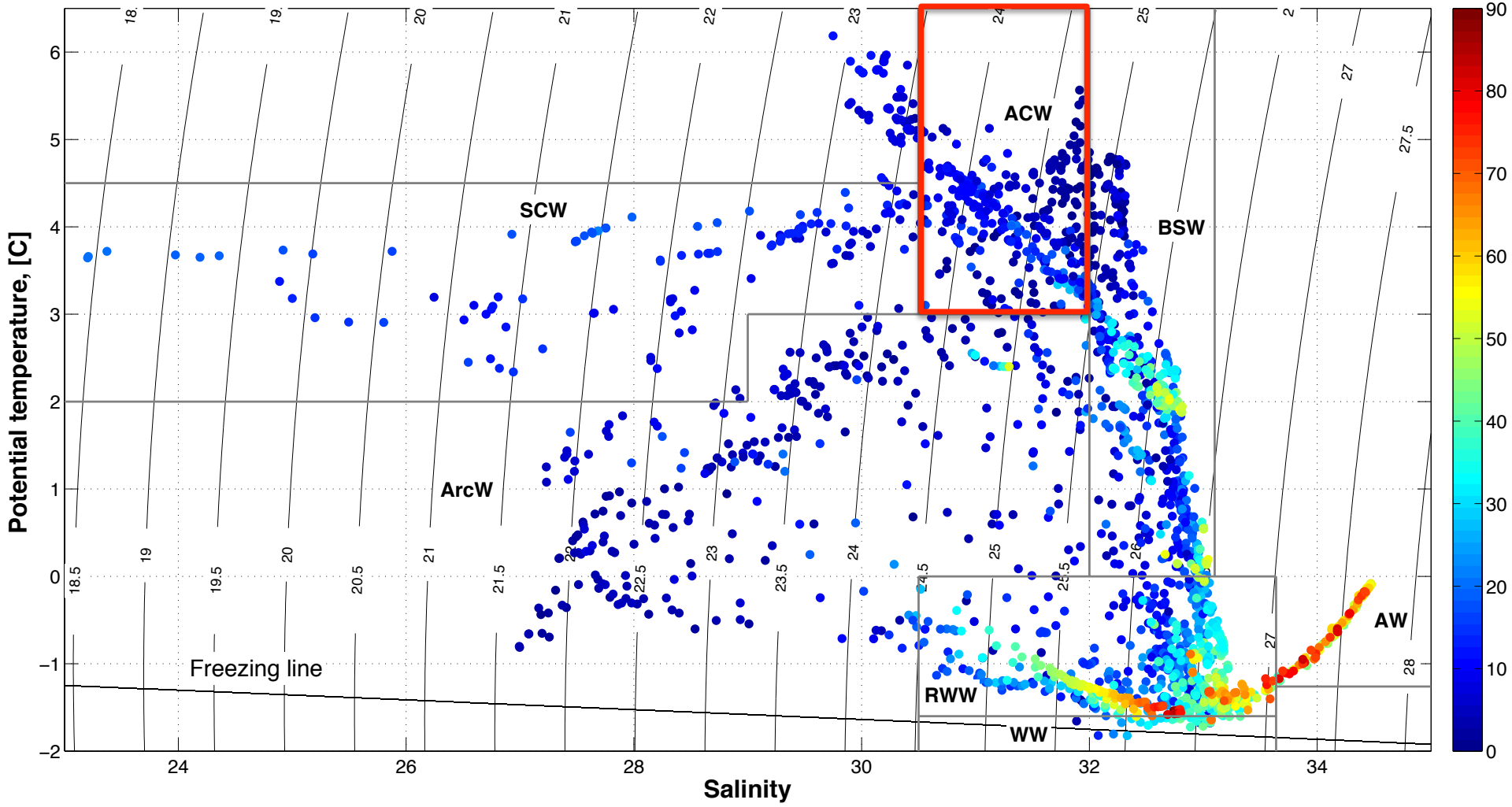


NARR data

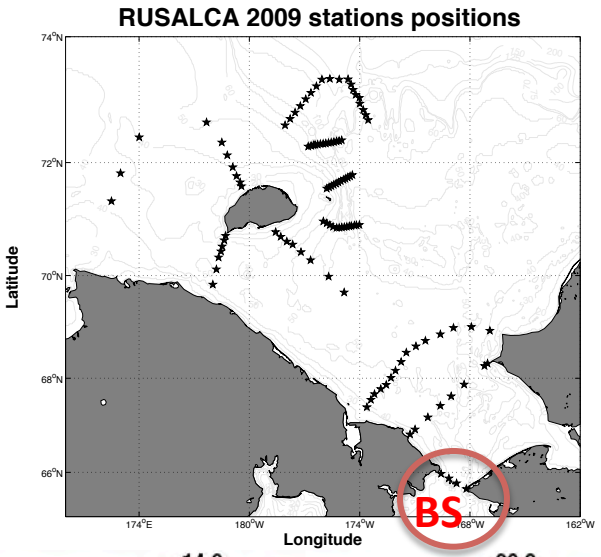
Water masses of the Chukchi Sea in September 2009. Silicate data is shown with color.

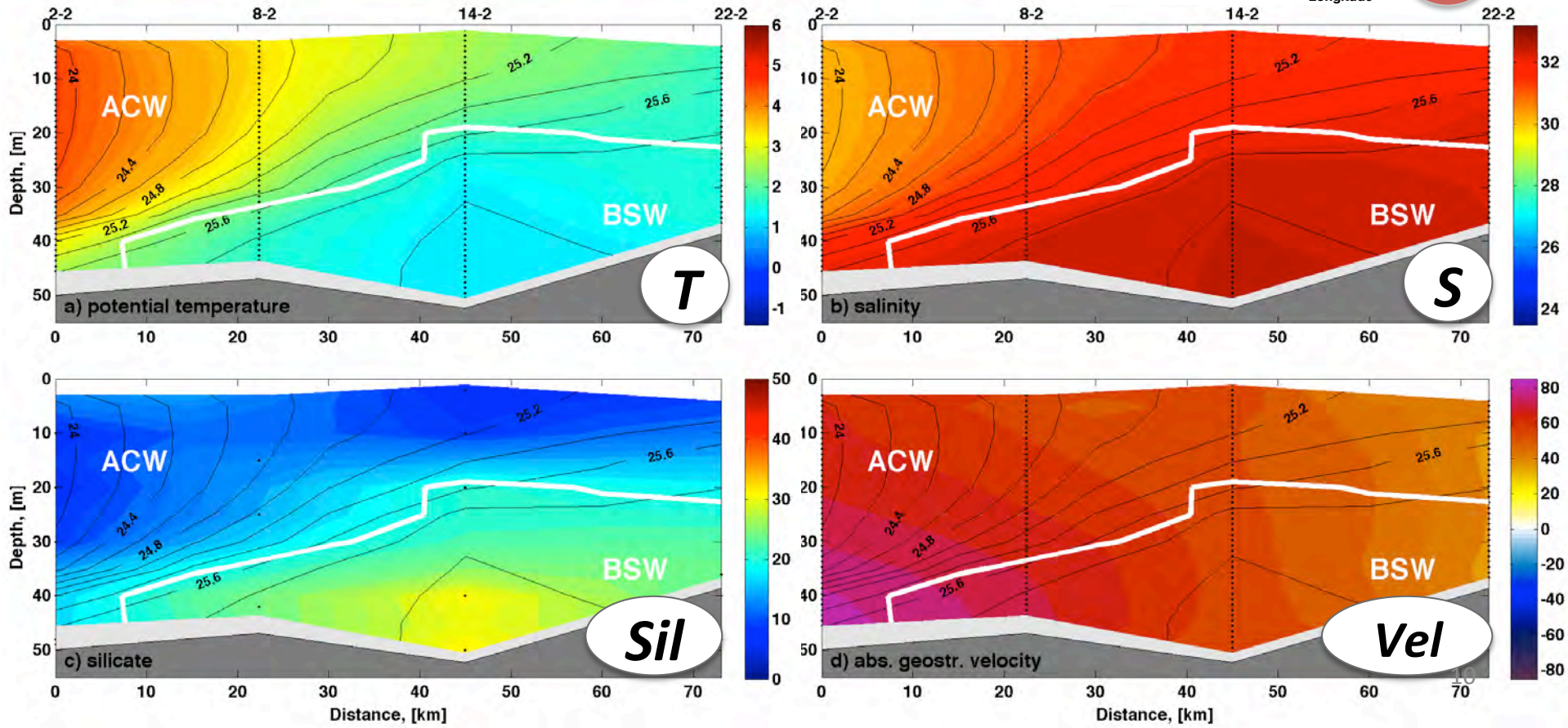


Alaskan Coastal Water (ACW) of September 2009: T > 3 C, 30.5 < S < 32

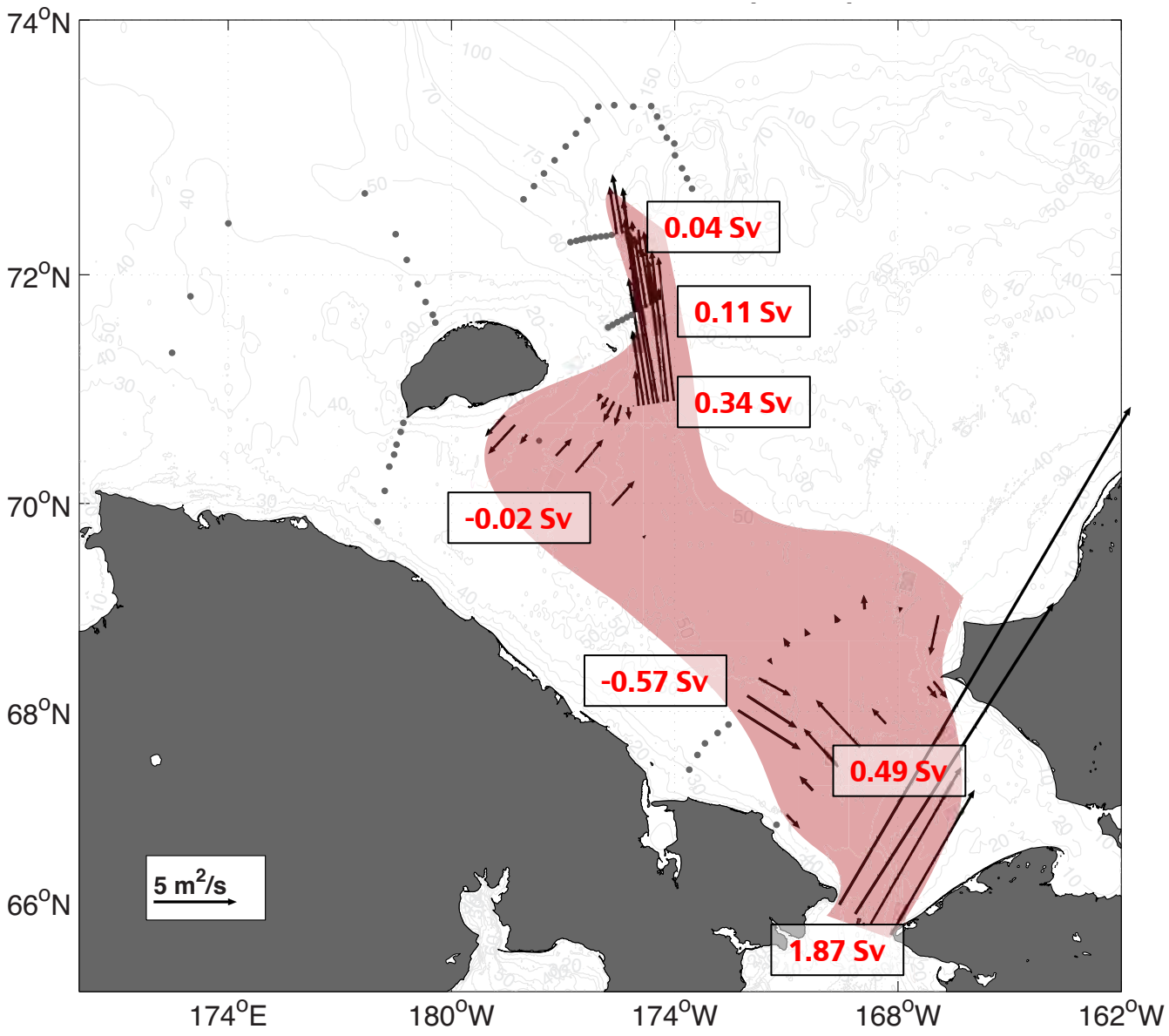


Bering strait transect

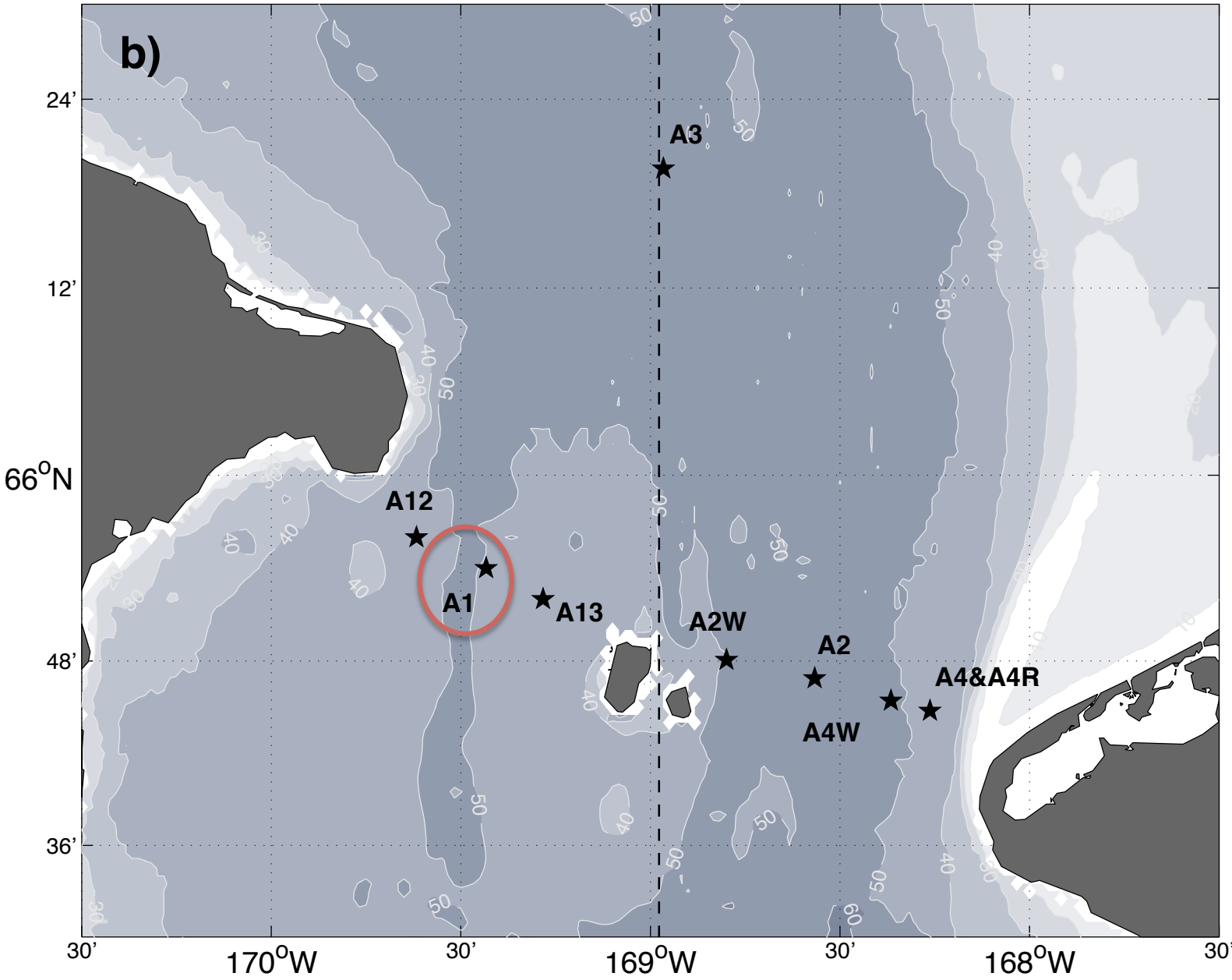


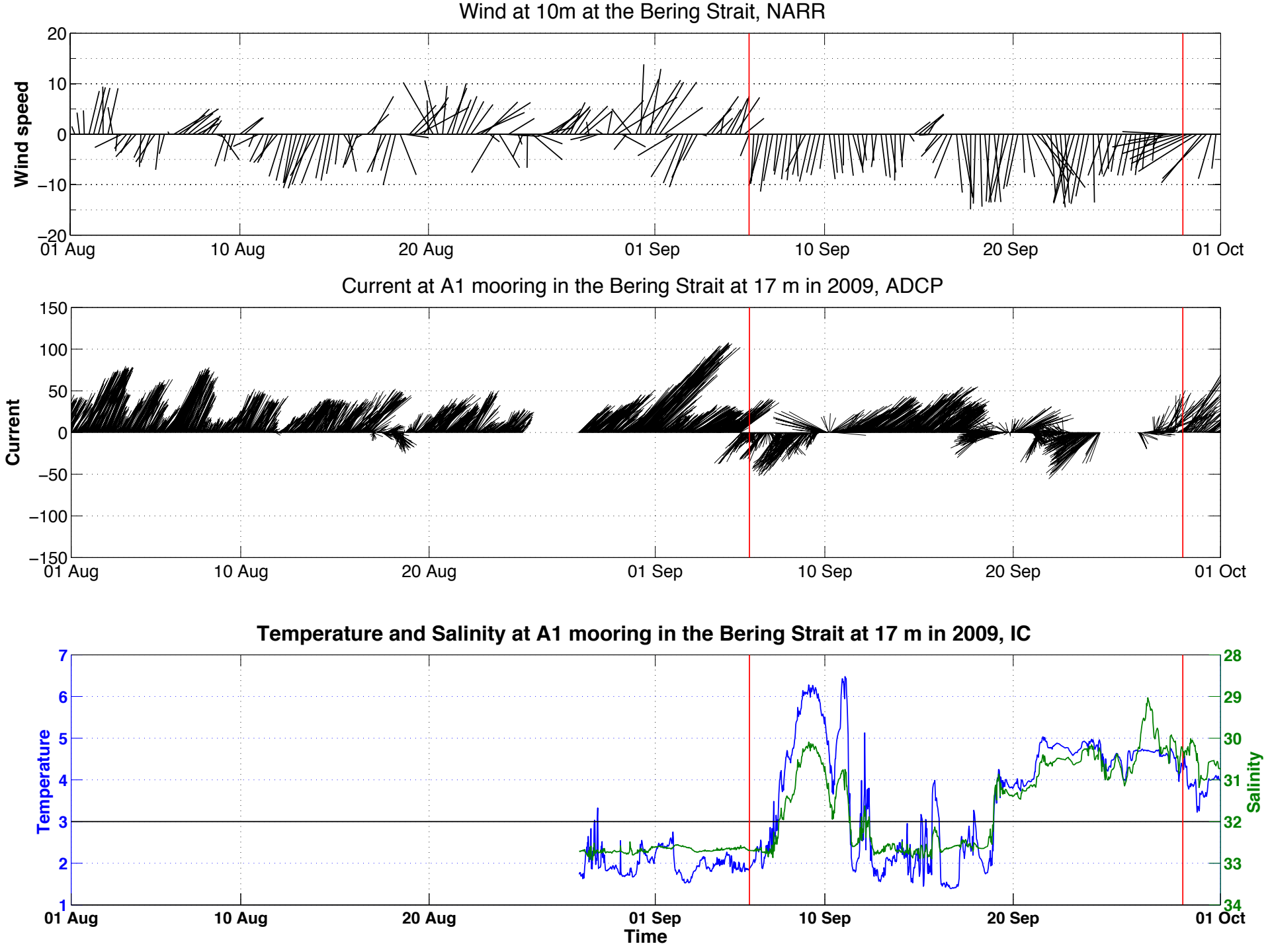


Distribution of ACW from RUSALCA 2009 survey

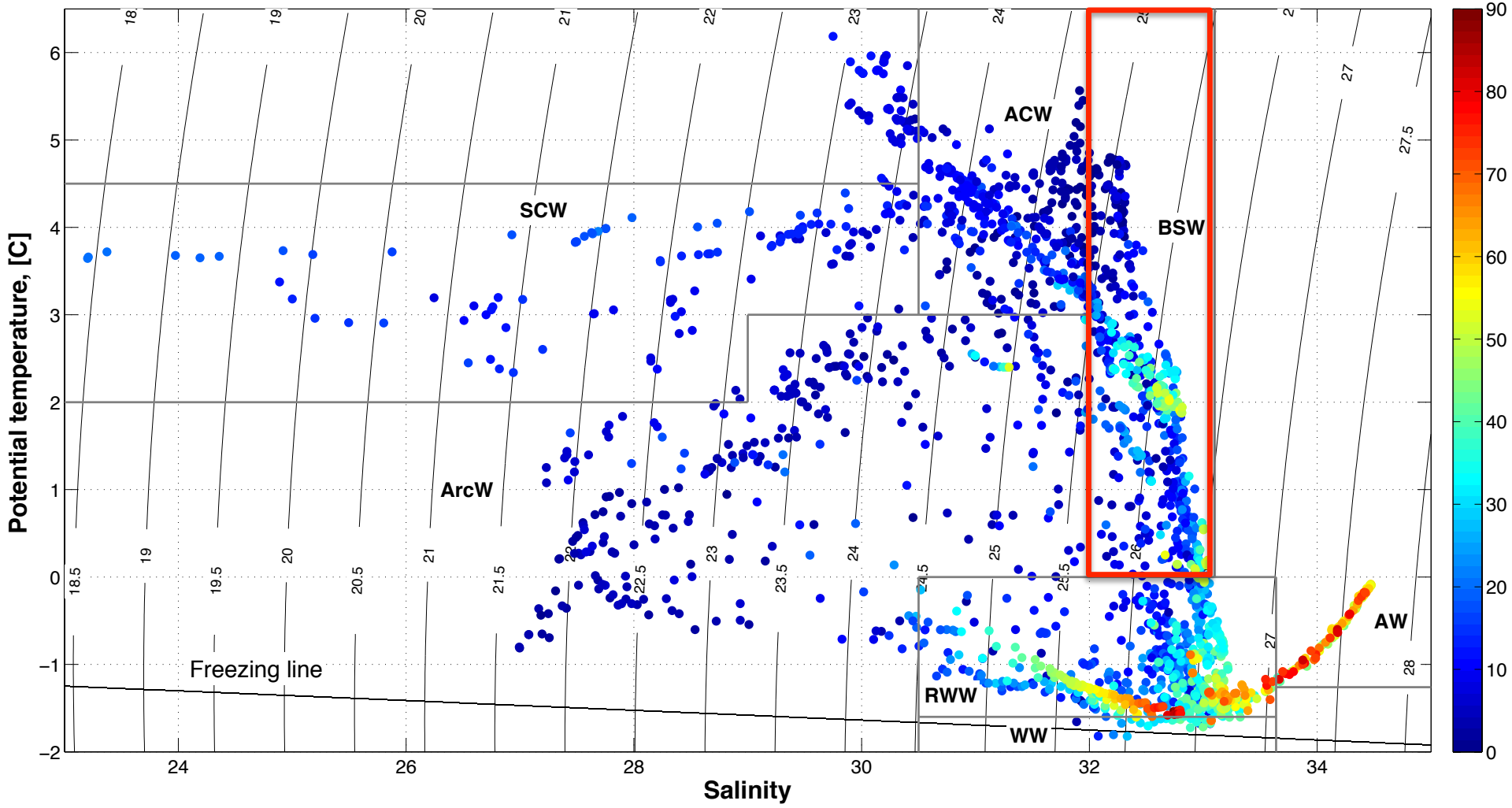


Moorings in Bering Strait in 2009

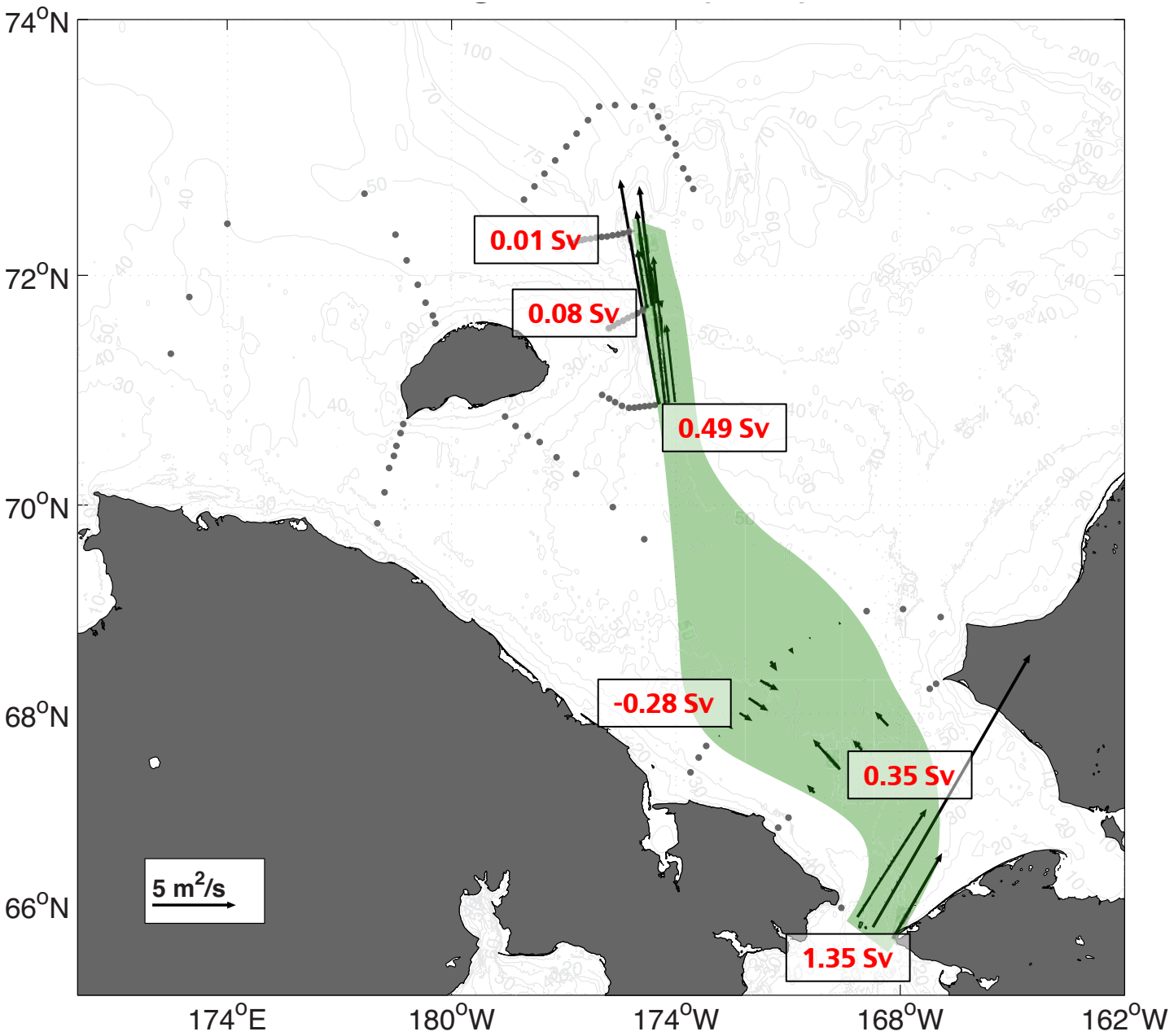



Wind at 10m at the Bering Strait, NARR
Wind speed
20
10
0
−10
−20
01 Aug
10 Aug
20 Aug
01 Sep
10 Sep
20 Sep
01 Oct
Current at A1 mooring in the Bering Strait at 17 m in 2009, ADCP
Current
150
100
50
0
−50
−100
−150
01 Aug
10 Aug
20 Aug
01 Sep
10 Sep
20 Sep
01 Oct
Temperature and Salinity at A1 mooring in the Bering Strait at 17 m in 2009, IC
Temperature
7
6
5
4
3
2
1
Salinity
28
29
30
31
32
33
34
01 Aug
10 Aug
20 Aug
01 Sep
10 Sep
20 Sep
01 Oct
Time

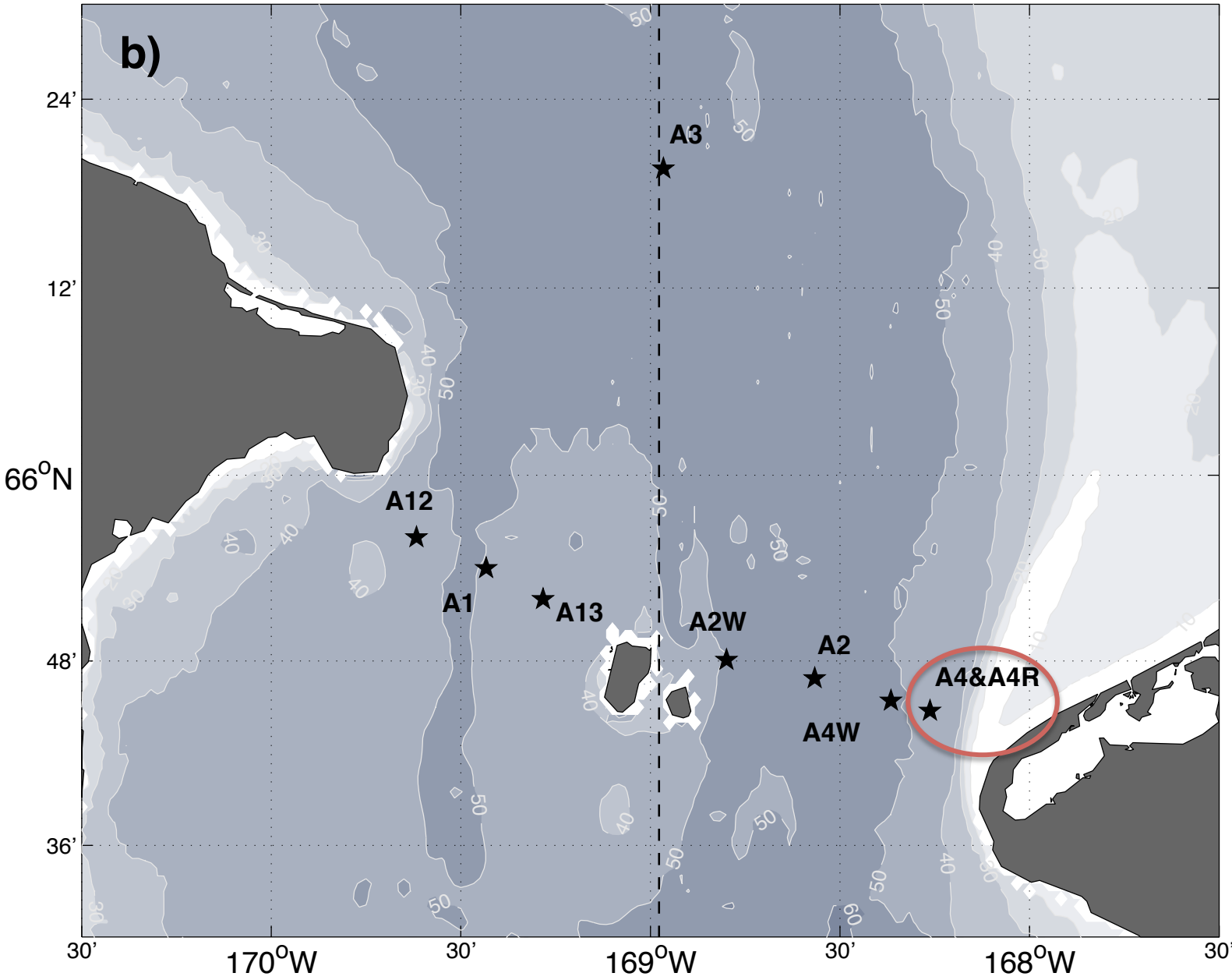
Bering Sea Water (BSW) of September 2009: T > 0 C, 32 < S < 33.1

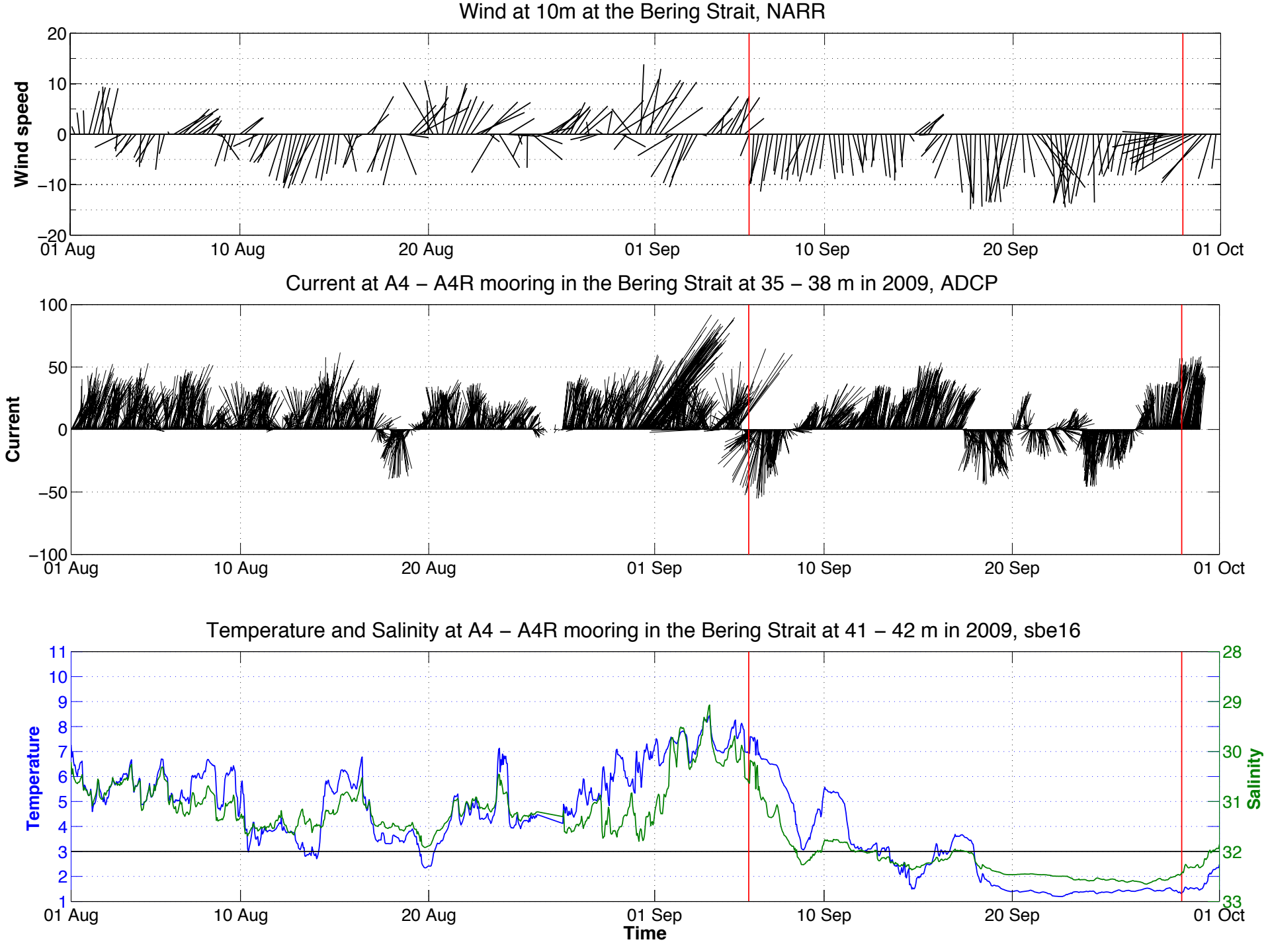


Distribution of BSW from RUSALCA 2009 survey

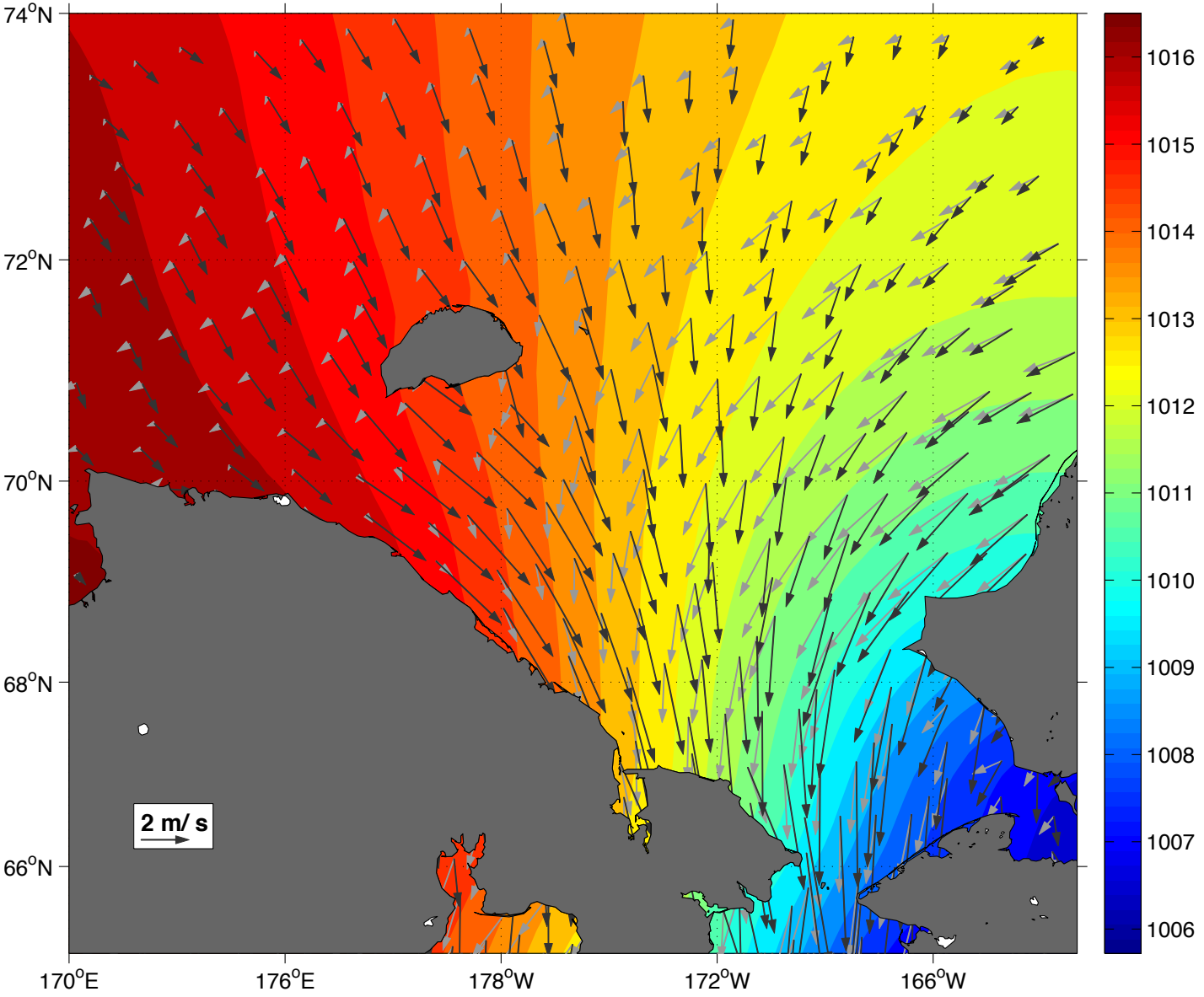


Moorings in Bering Strait in 2009



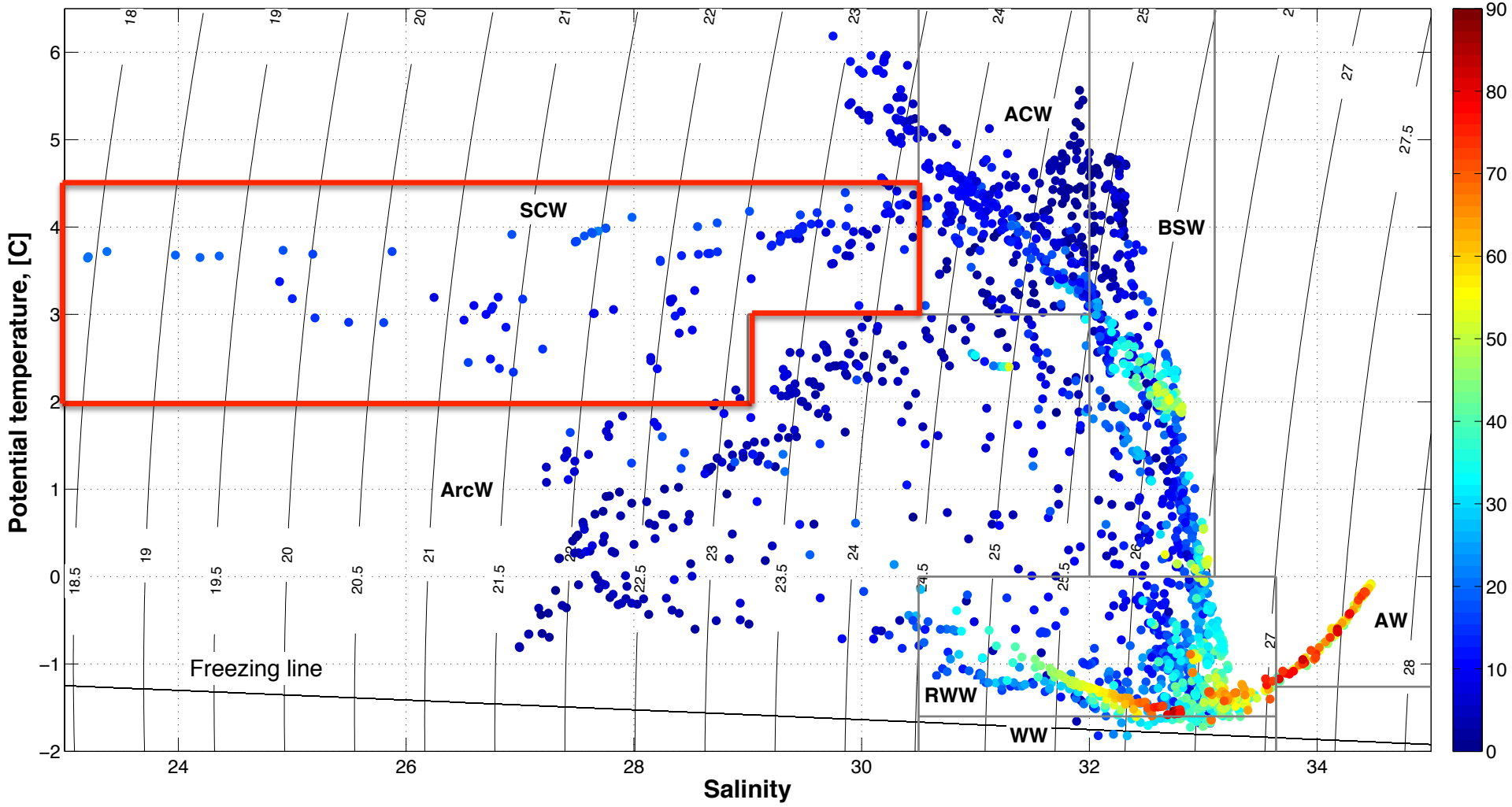

Wind at 10m at the Bering Strait, NARR
Wind speed
20
10
0
−10
−20
01 Aug
10 Aug
20 Aug
01 Sep
10 Sep
20 Sep
01 Oct
Current at A4 – A4R mooring in the Bering Strait at 35 – 38 m in 2009, ADCP
Current
100
50
0
−50
−100
01 Aug
10 Aug
20 Aug
01 Sep
10 Sep
20 Sep
01 Oct
Temperature and Salinity at A4 – A4R mooring in the Bering Strait at 41 – 42 m in 2009, sbe16
Temperature
11
10
9
8
7
6
5
4
3
2
1
Salinity
28
29
30
31
32
33
01 Aug
10 Aug
20 Aug
01 Sep
10 Sep
20 Sep
01 Oct
Time

September 2009 winds (black) are anomalously strong compared to climatological mean winds for September (grey).

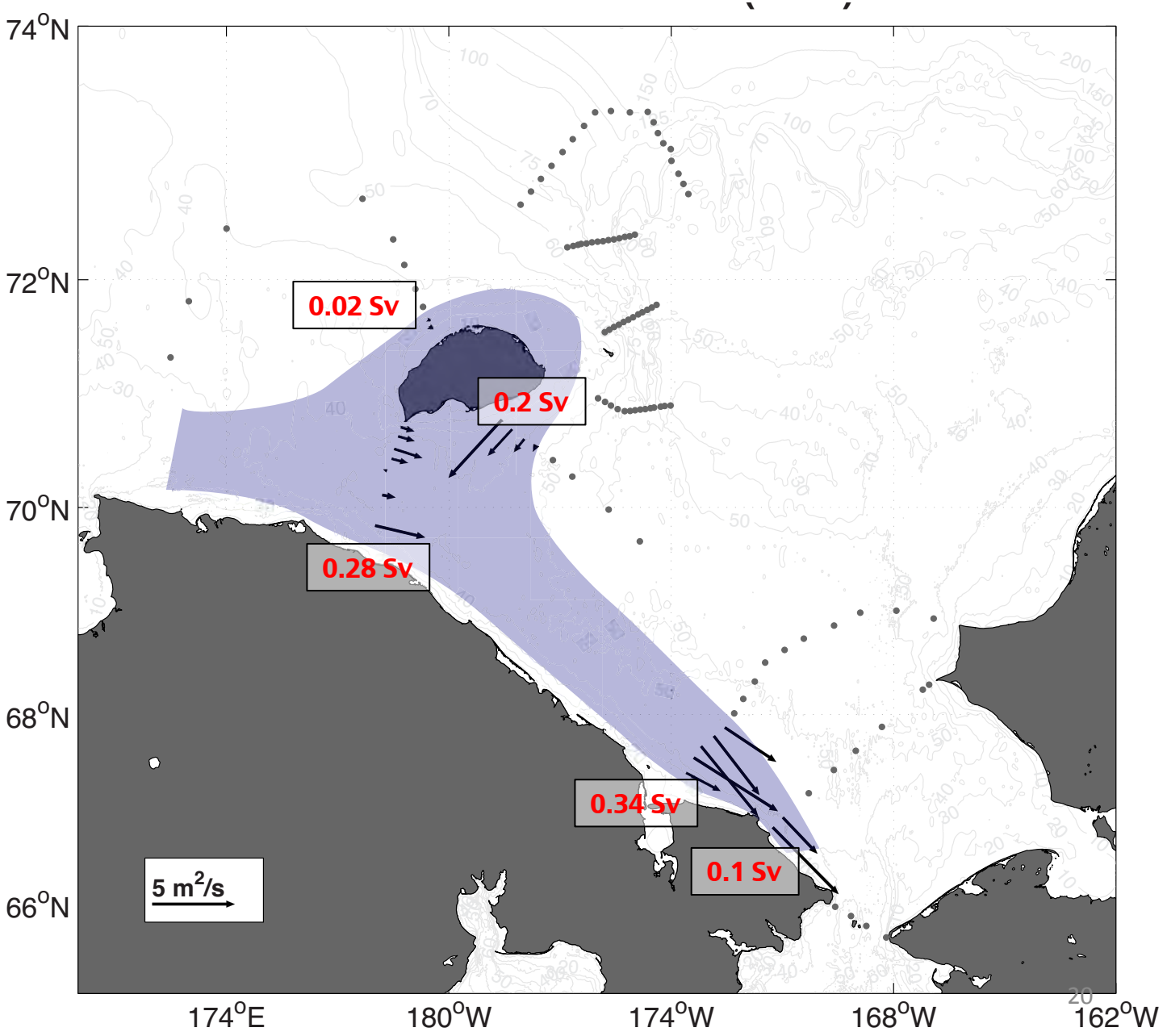


AVHRR-AMSR-E, NARR data

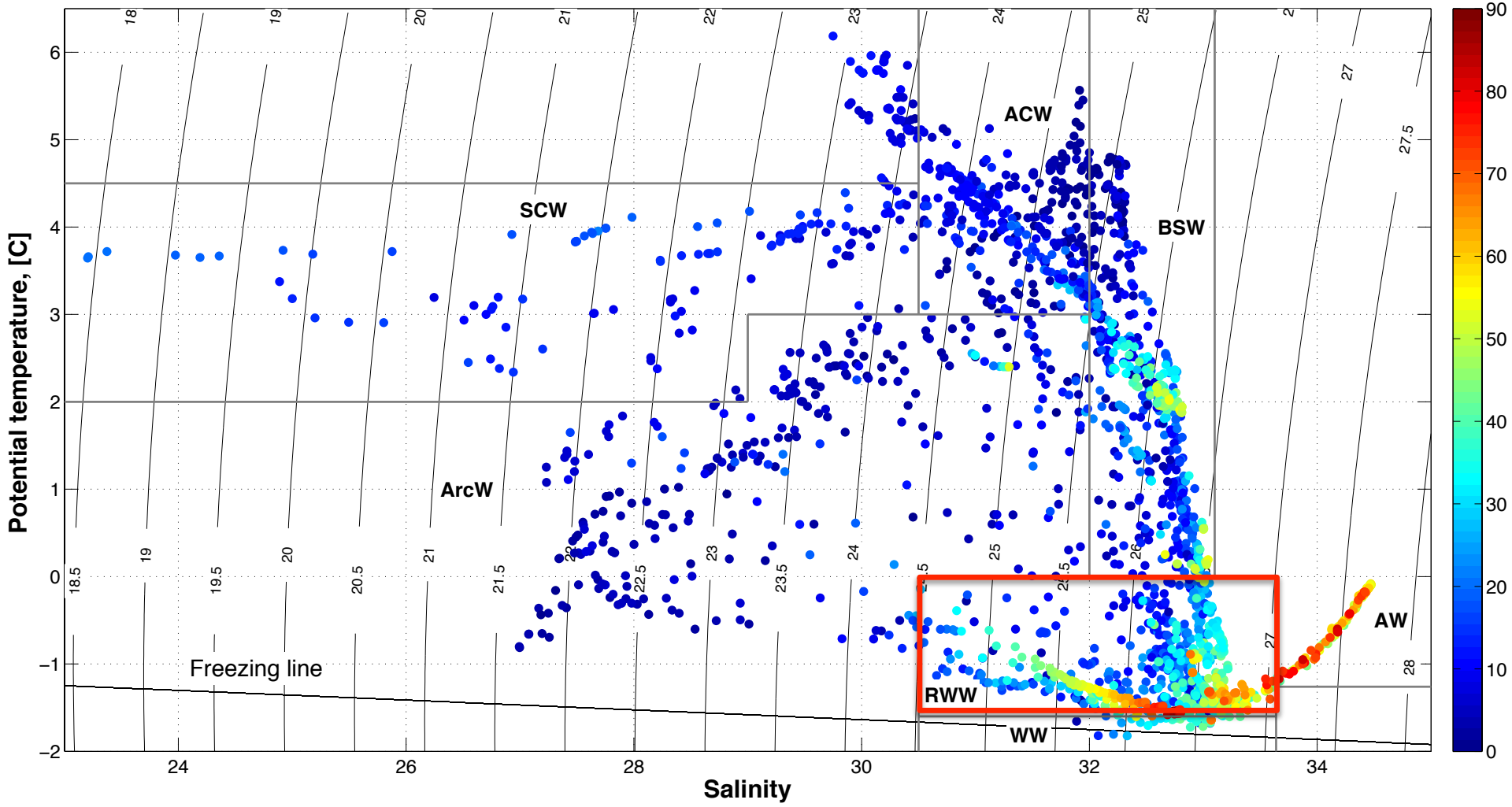
Siberian Coastal Water (SCW) of September 2009: 2 < T < 4.5 C, 23 < S < 30.5



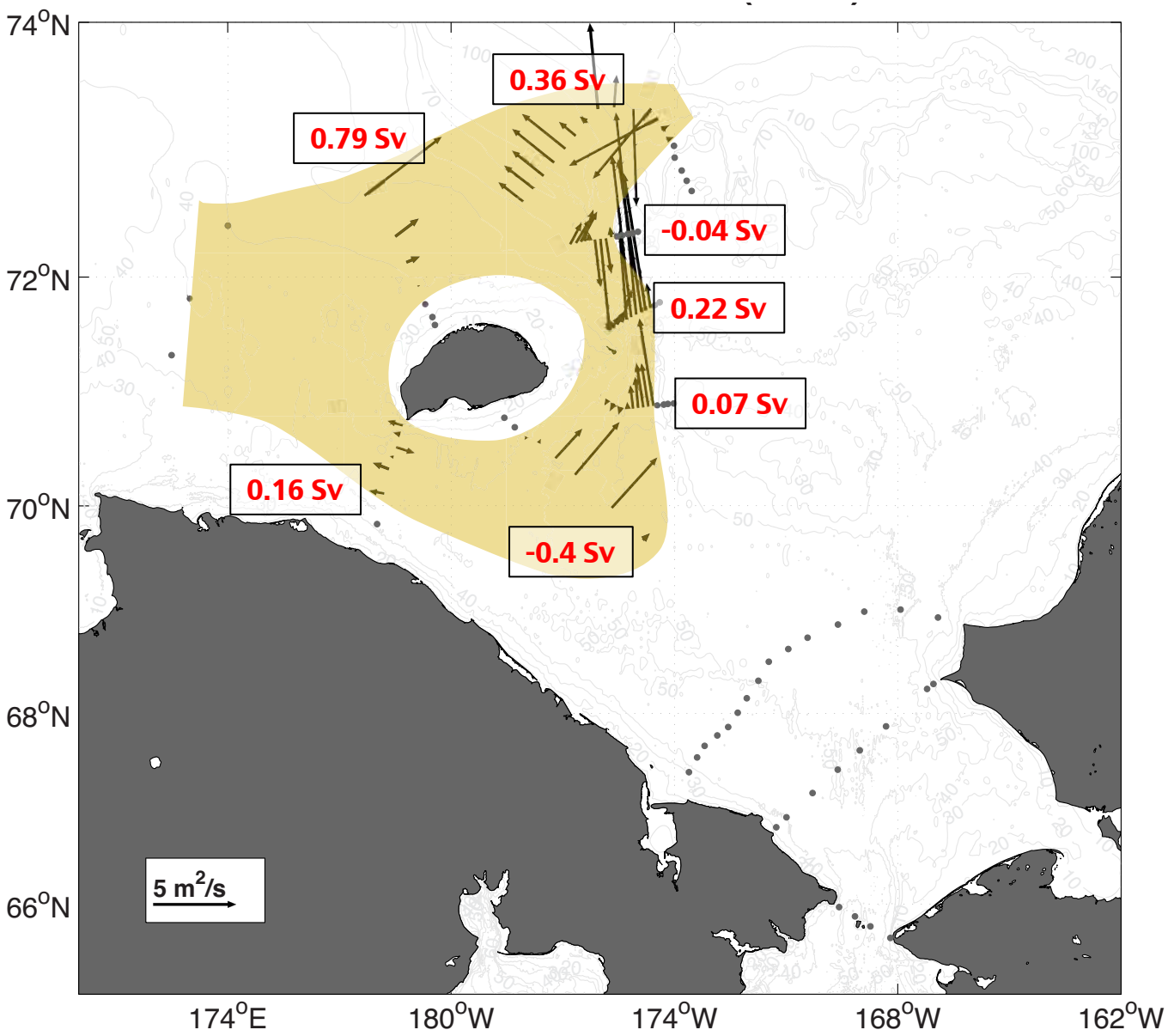
Distribution of SCW from RUSALCA 2009 survey



Remnant Winter Water (RWW) of September 2009: T < 0 C, 30.5 < S < 33.5



Distribution of RWW from RUSALCA 2009 survey



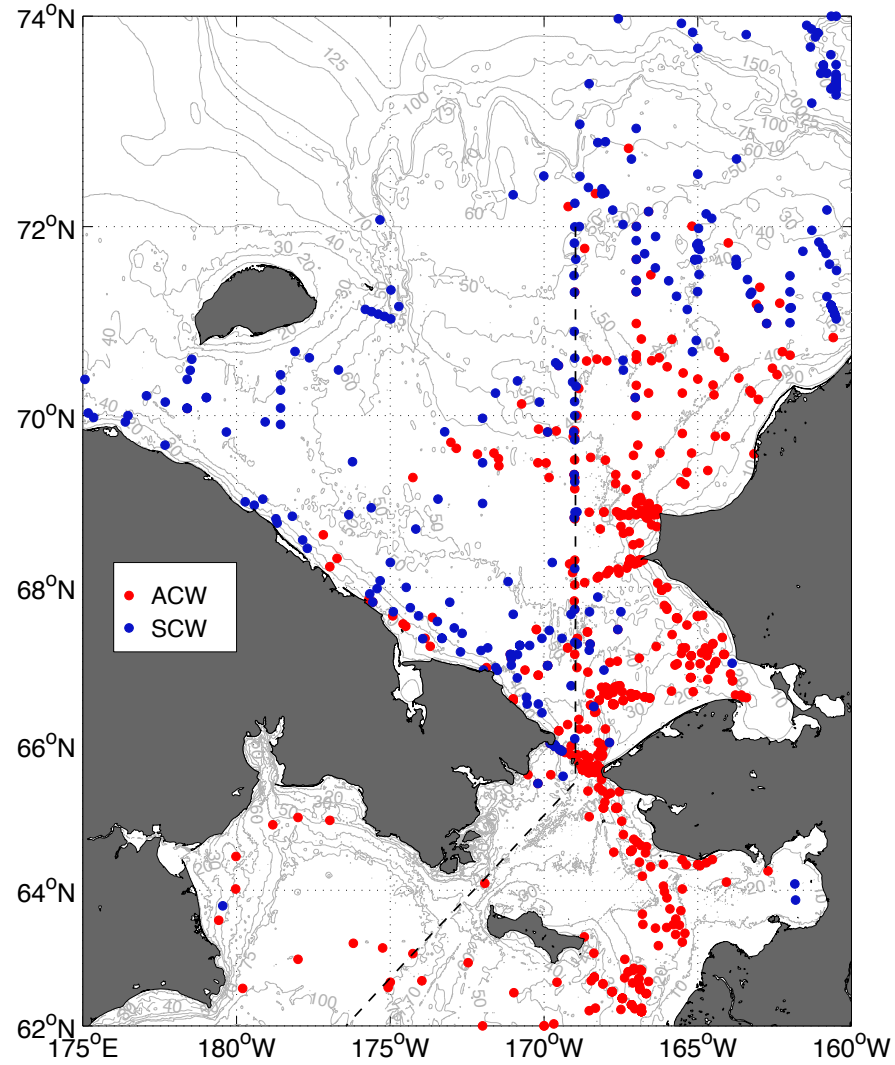
WODB data:

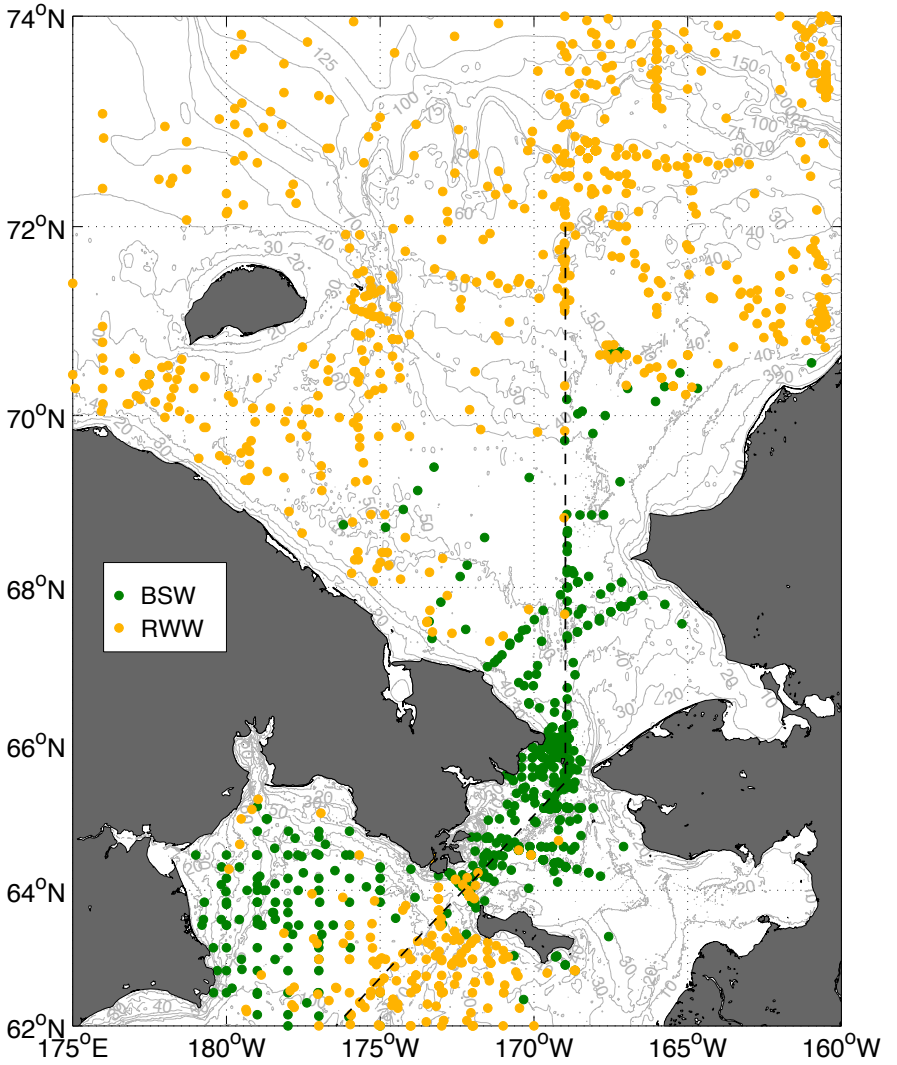
ACW (red): T > 3 C; 30 < S < 31

SCW (blue): 2 < T < 4.5 C; 23 < S < 30

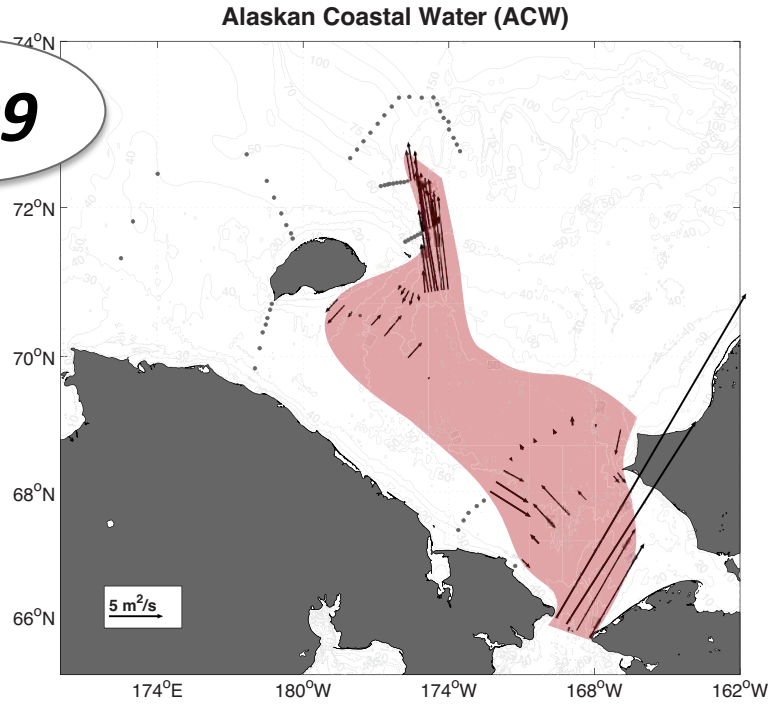
BSW (green): 0 < T < 3 C; 32 < S < 33.1; Sil > 20; aug – sep

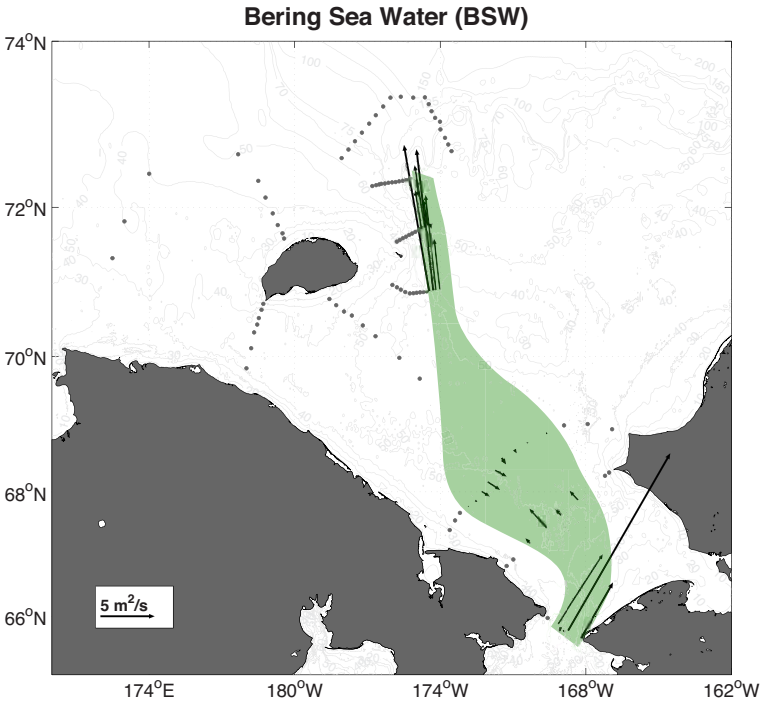
RWW (yellow): -1.64 < T < 0 C; 30.5 < S < 33.5; D > 40; aug - sep

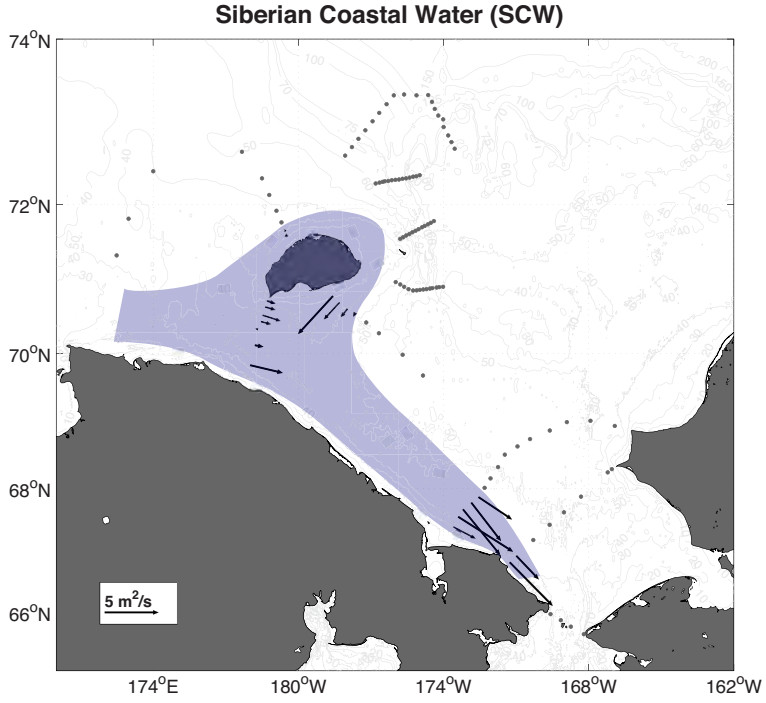


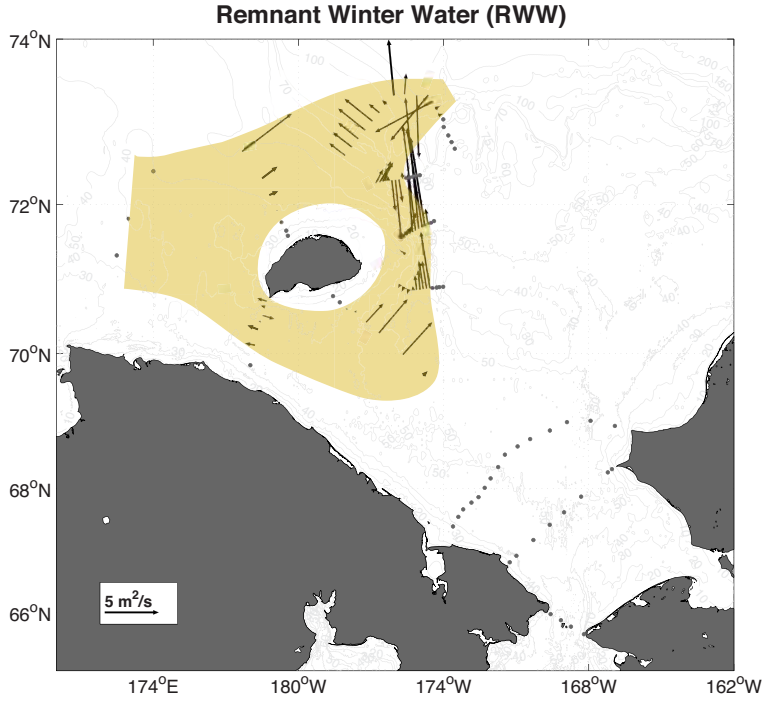


2009


Alaskan Coastal Water (ACW)
74°N
72°N
70°N
68°N
66°N
5 m²/s
174°E
180°W
174°W
168°W
162°W


Bering Sea Water (BSW)
74°N
72°N
70°N
68°N
66°N
5 m²/s
174°E
180°W
174°W
168°W
162°W


Siberian Coastal Water (SCW)
74°N
72°N
70°N
68°N
66°N
5 m²/s
174°E
180°W
174°W
168°W
162°W


Remnant Winter Water (RWW)
74°N
72°N
70°N
68°N
66°N
5 m²/s
174°E
180°W
174°W
168°W
162°W