

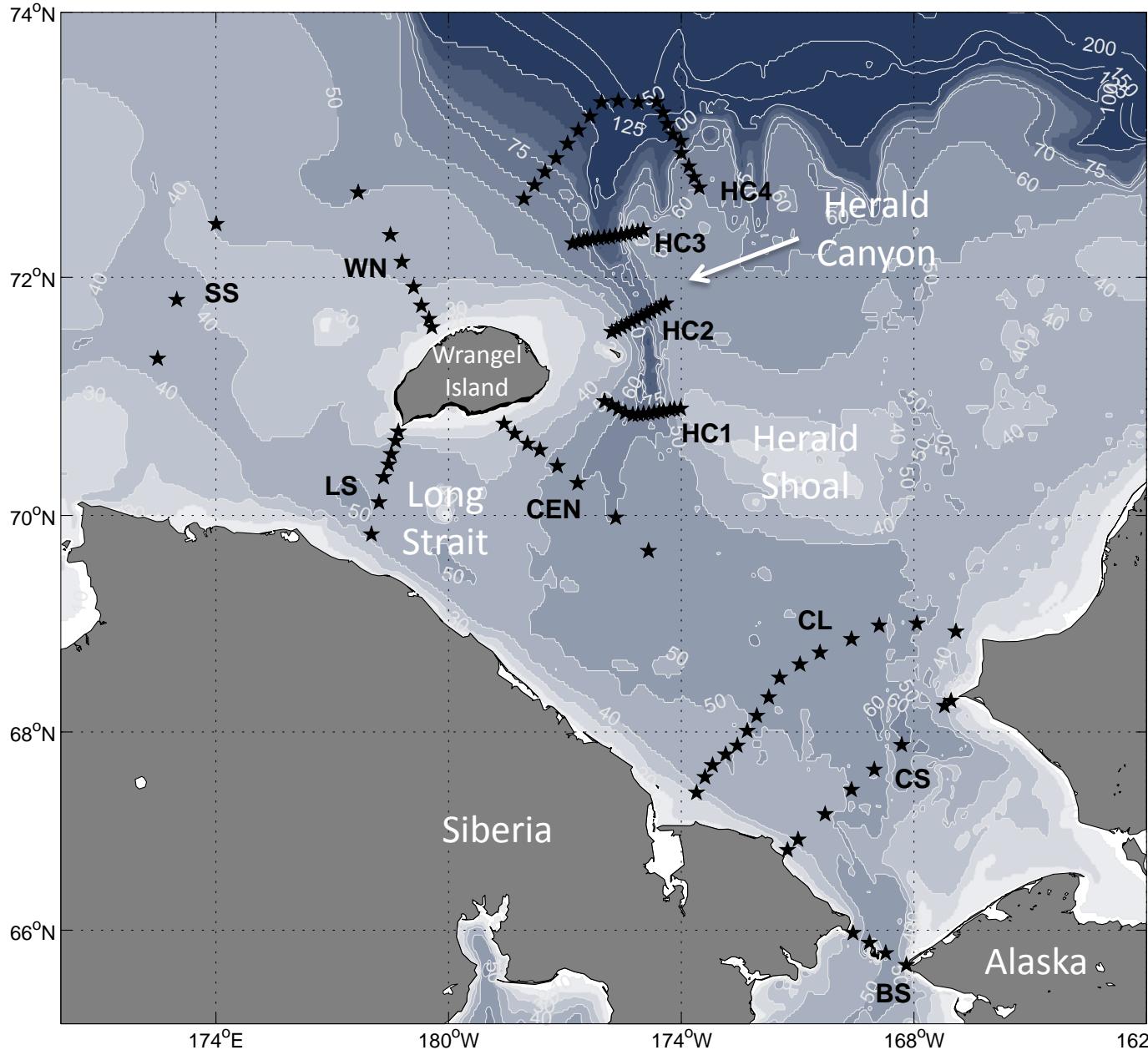
Water mass distribution and circulation in the western Chukchi Sea from RUSALCA measurements and historical data

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R.S. Pickart, Woods Hole Oceanographic Institution*

Outline

- I. Physical drivers of the Chukchi Sea
- II. Description of water masses in the Chukchi Sea
- III. Future steps

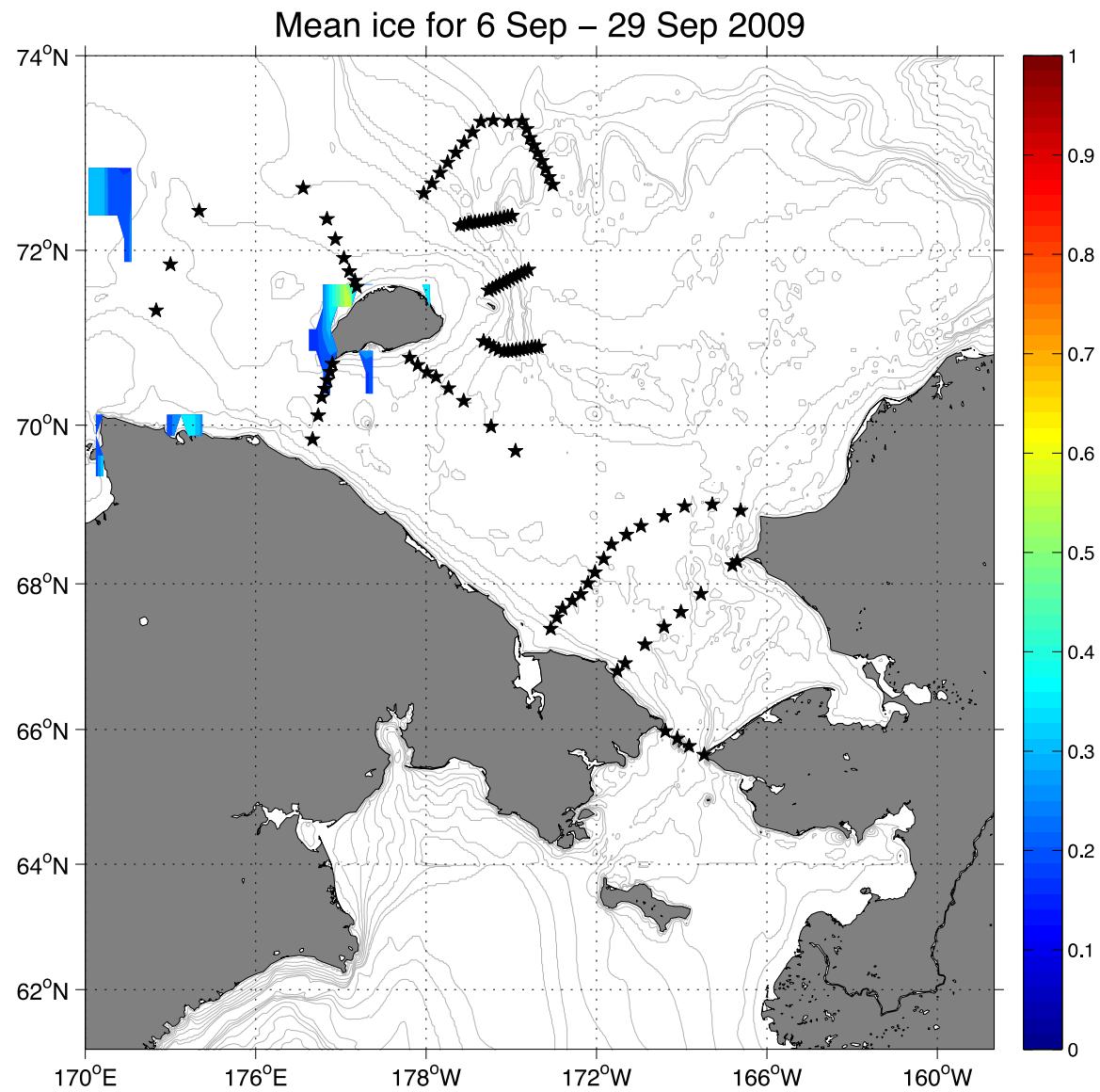
RUSALCA 2009 stations positions



Sections names:

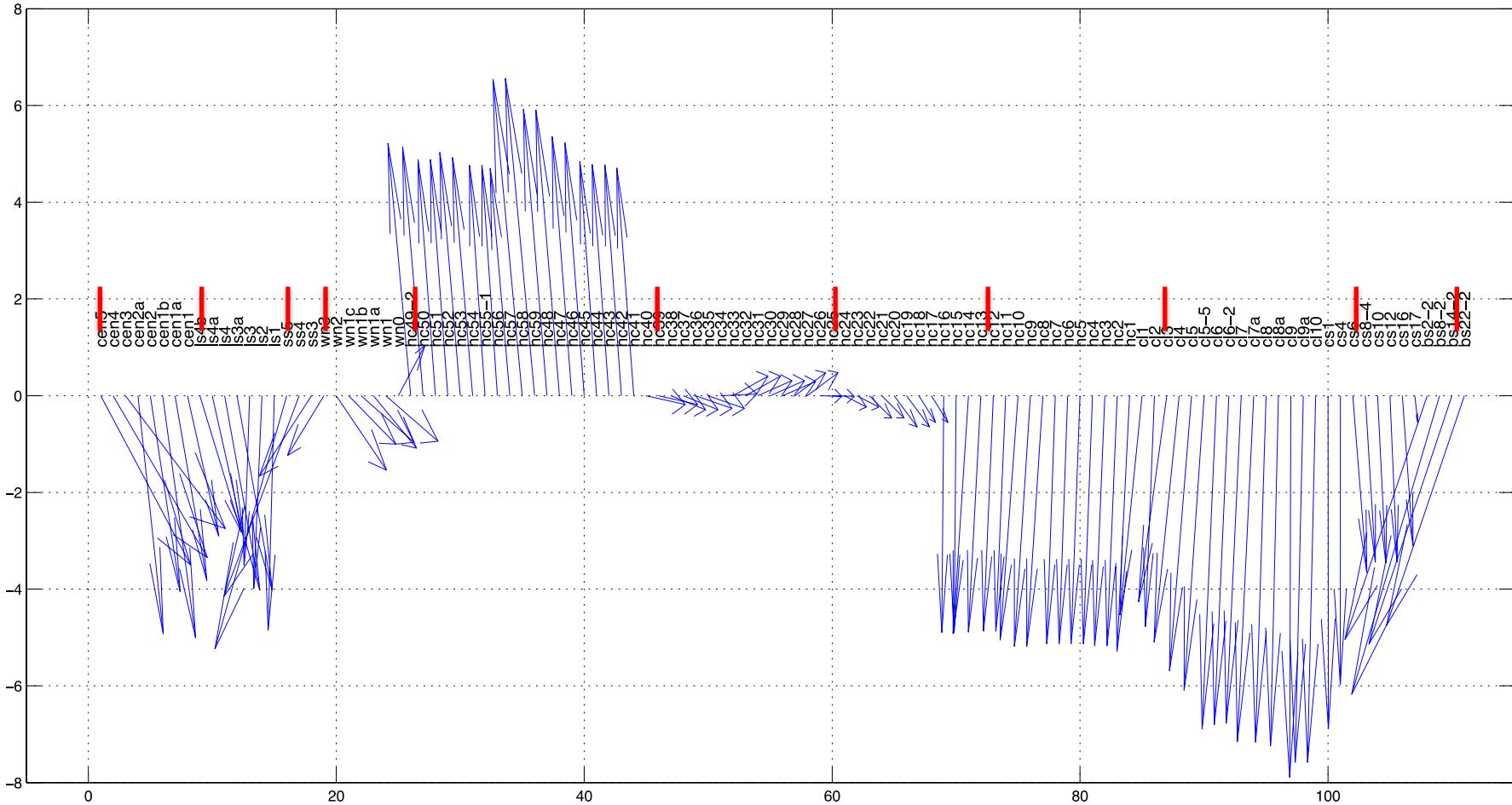
- BS – Bering Strait
- CS – Chukchi South
- CL – Cape Lisburne
- CEN – Central Chukchi
- LS – Long Strait
- WN – Wrangel North
- SS – Siberian Shelf
- HC – Herald Canyon

Physical Drivers of the Chukchi Sea: ice



Physical Drivers of the Chukchi Sea: wind

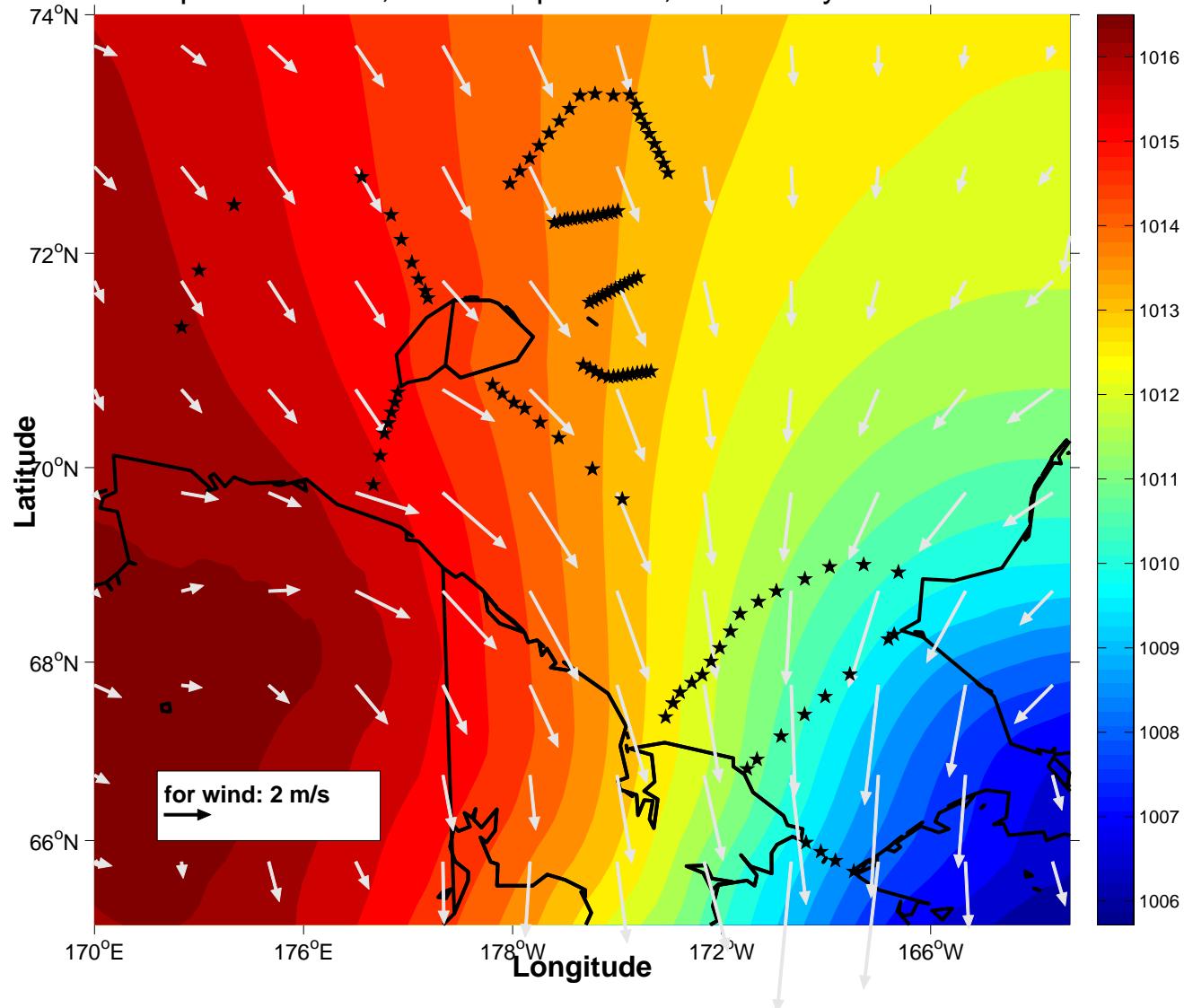
September 2009, mean wind speed at 10m at the day and position of the corresponding station



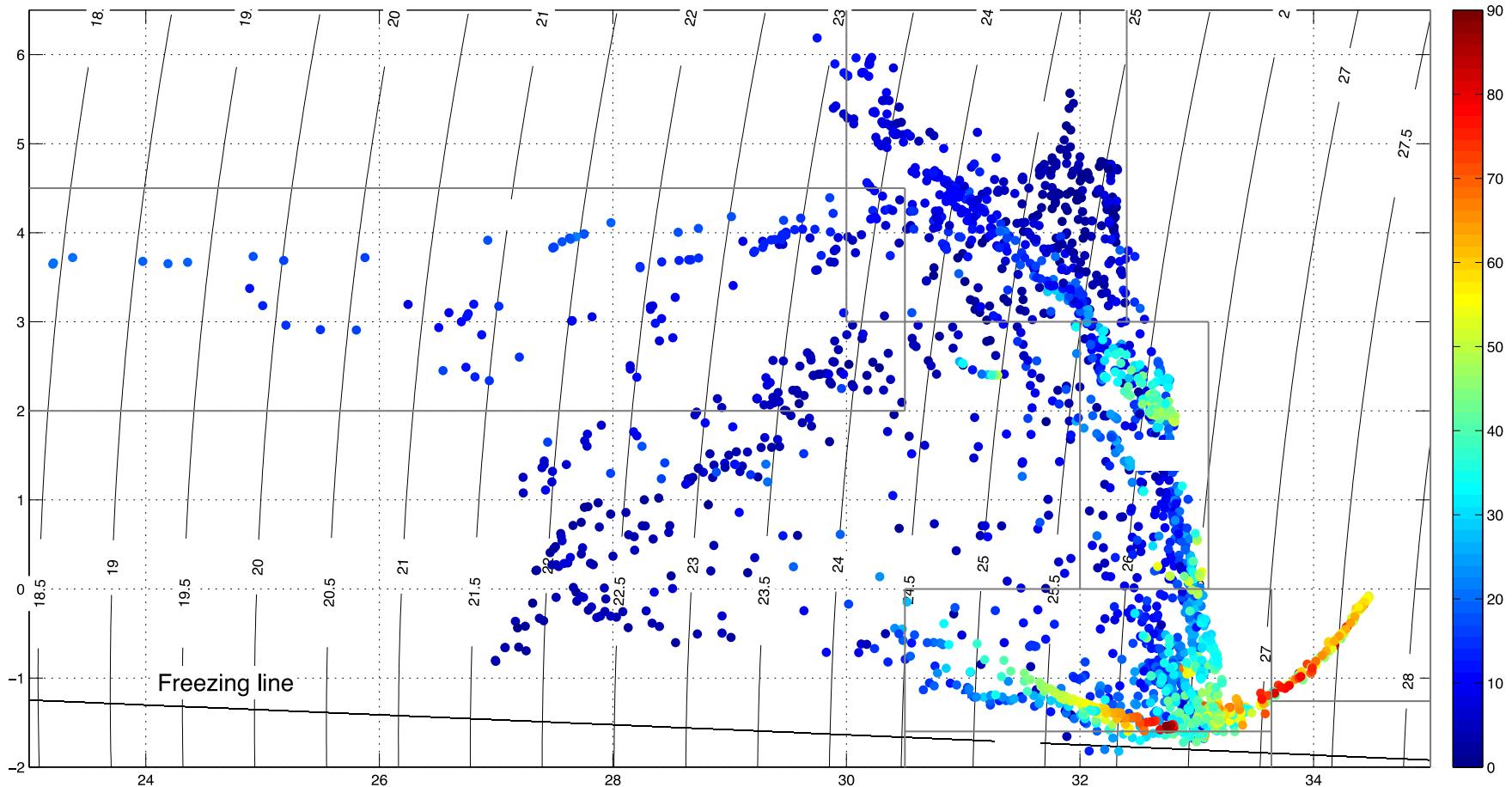
NARR data

Physical Drivers of the Chukchi Sea: wind

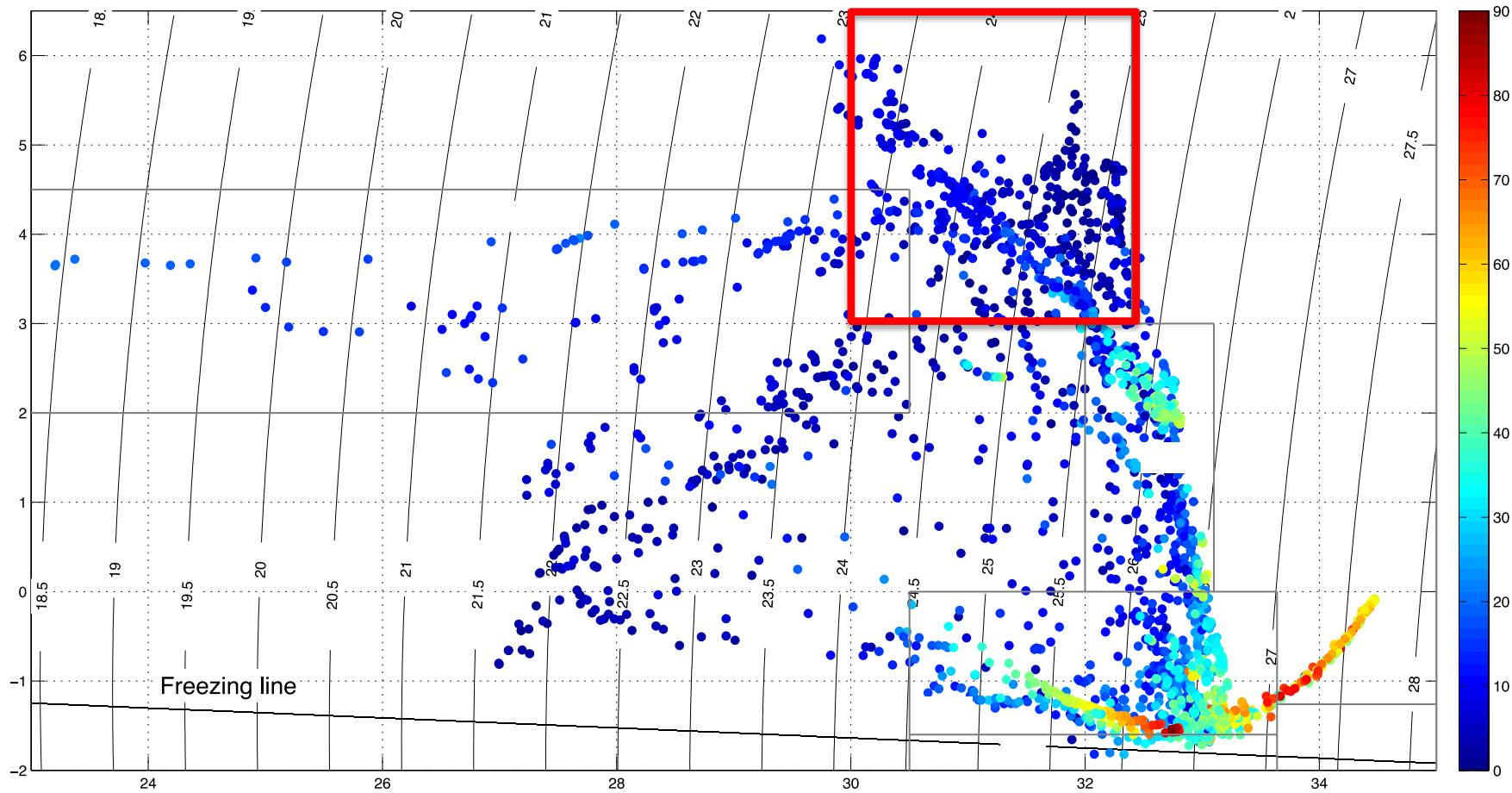
September 2009, sea level pressure, overlaid by wind at 10m



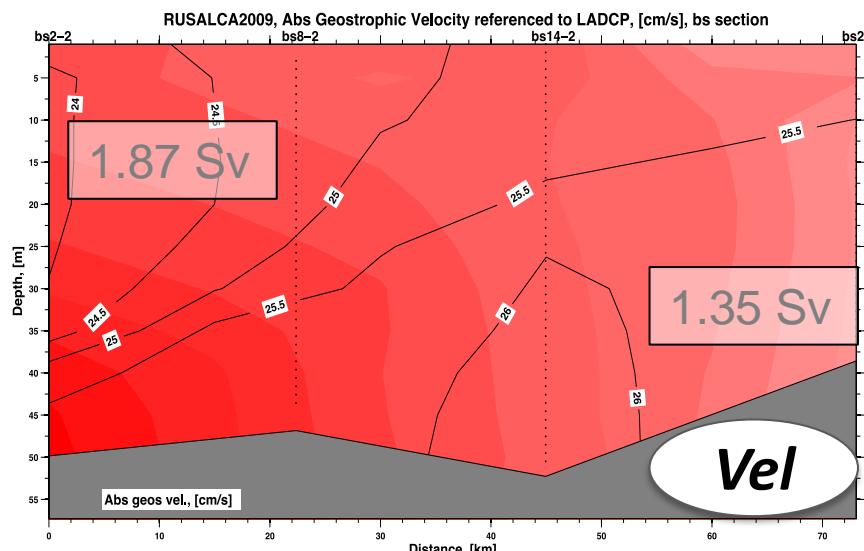
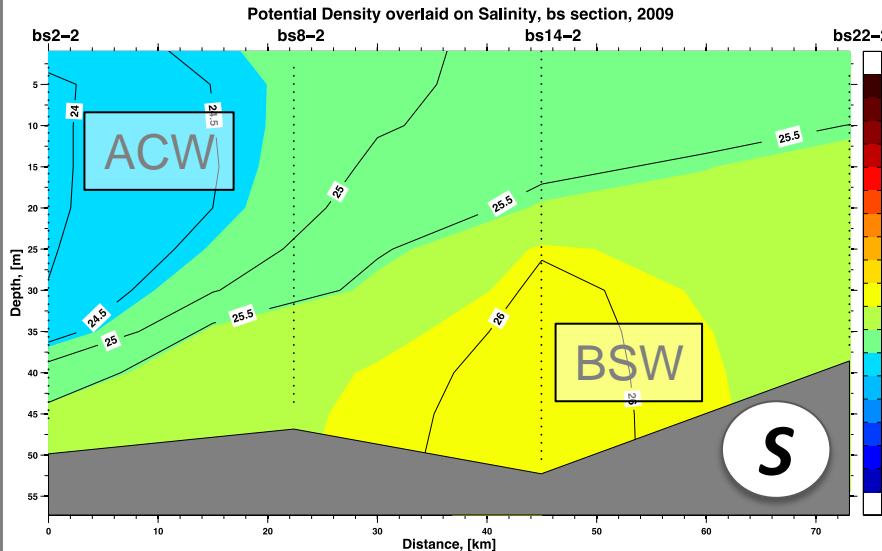
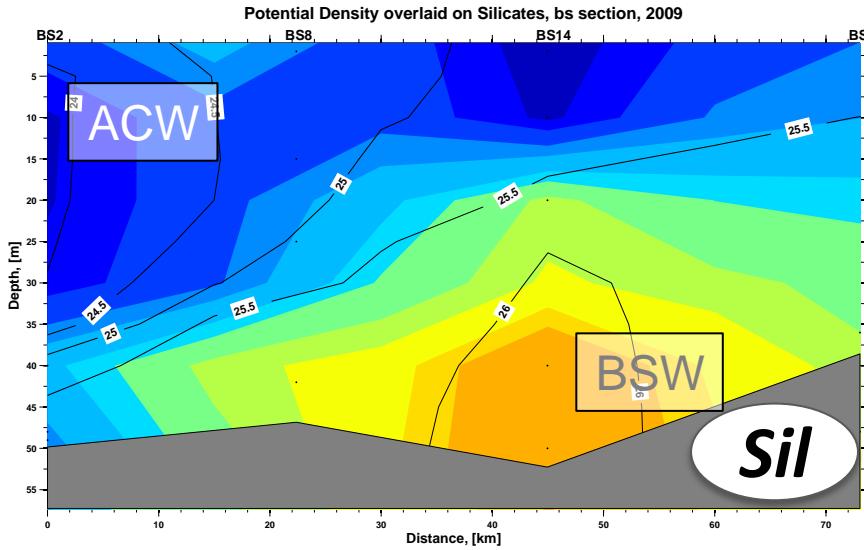
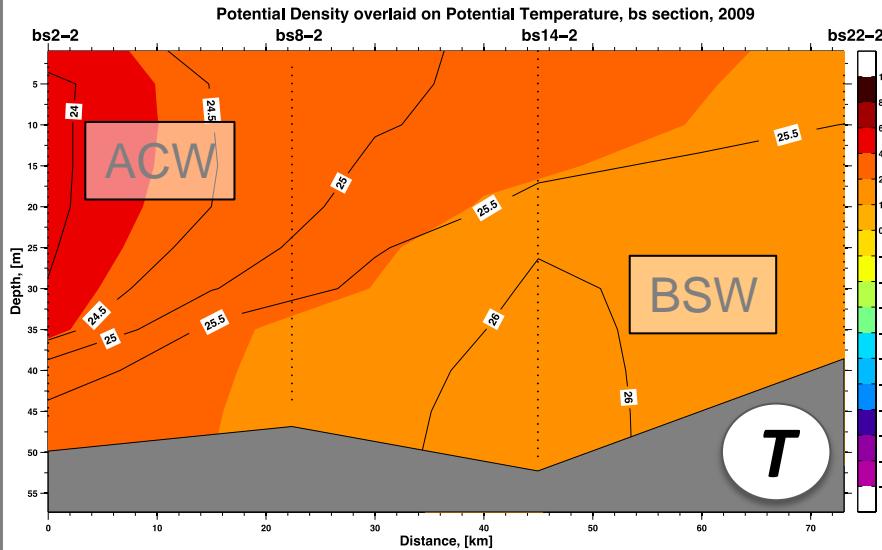
Water masses of the Chukchi Sea in September 2009. Silicate data is shown with color.



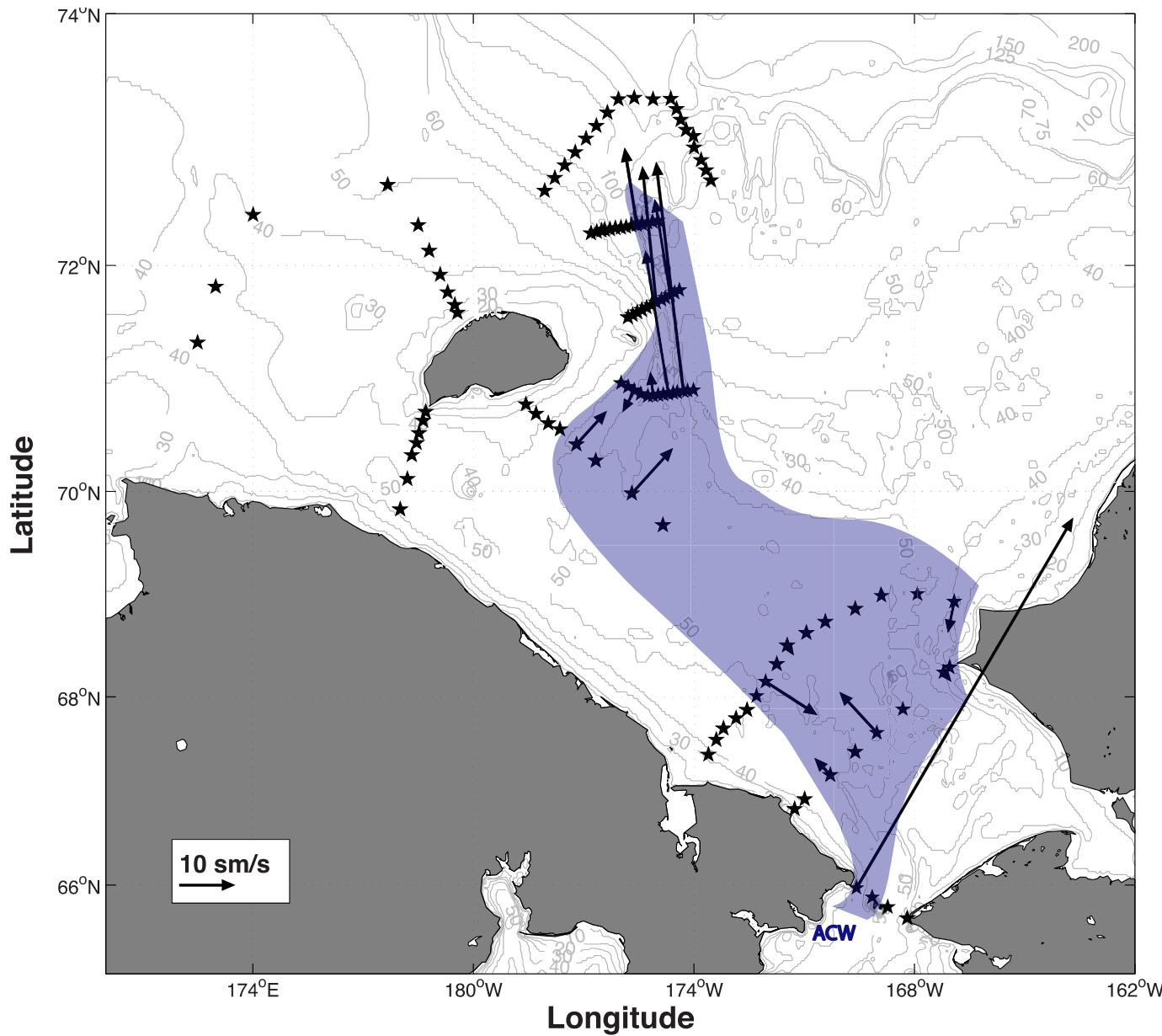
Alaskan Coastal Water (ACW) of September 2009: $T > 2 \text{ C}$ (3 C), $30 - 32.4$



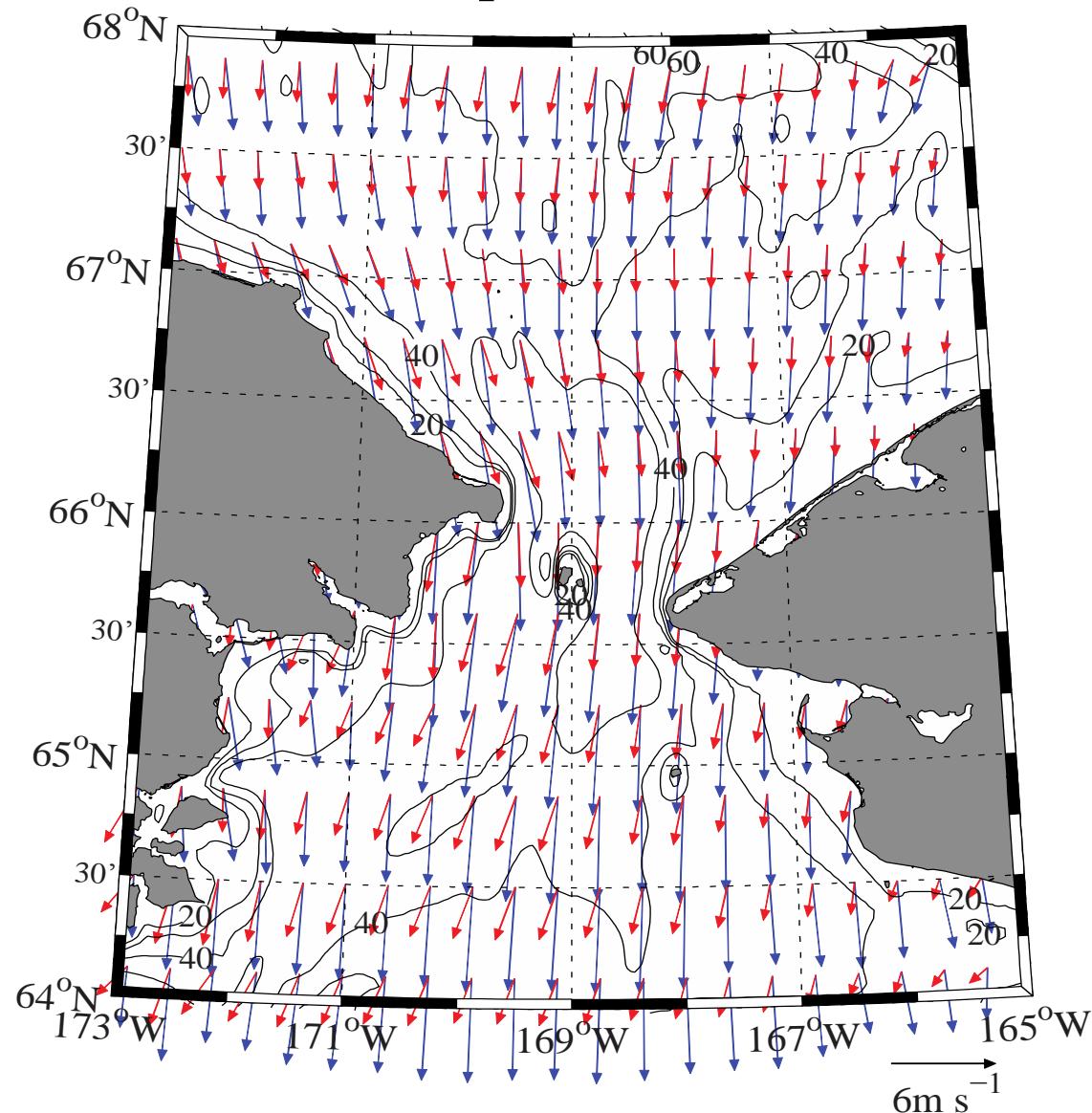
Bering strait transect



Distribution of ACW from RUSALCA 2009 survey



September 2009 winds (blue) are anomalously strong compared to climatological mean winds for September (red).



NARR data

Courtesy of K. Moore

ACW from WODB for August - September

Red:

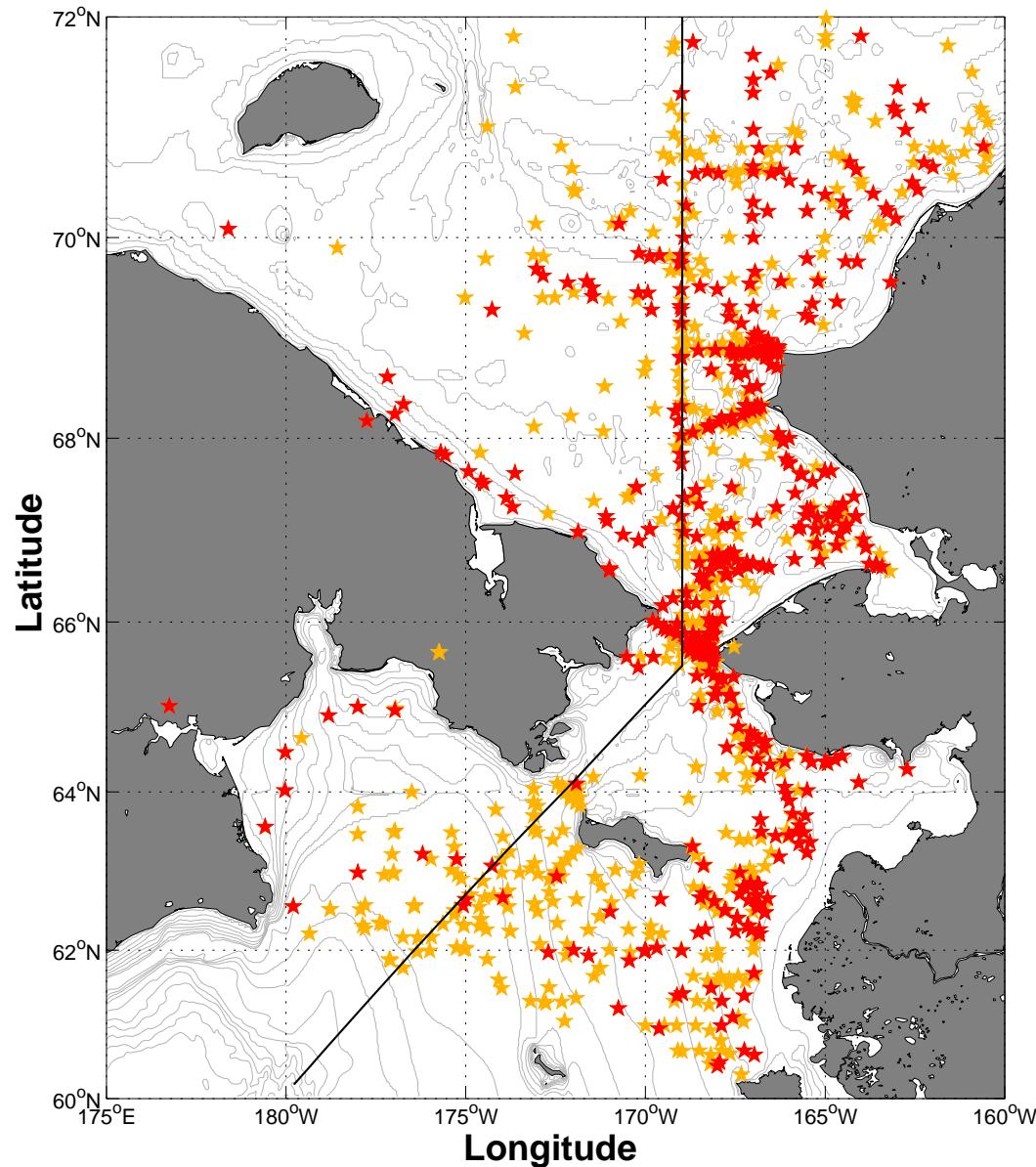
$T > 3 \text{ C}$

$30 < S < 31$

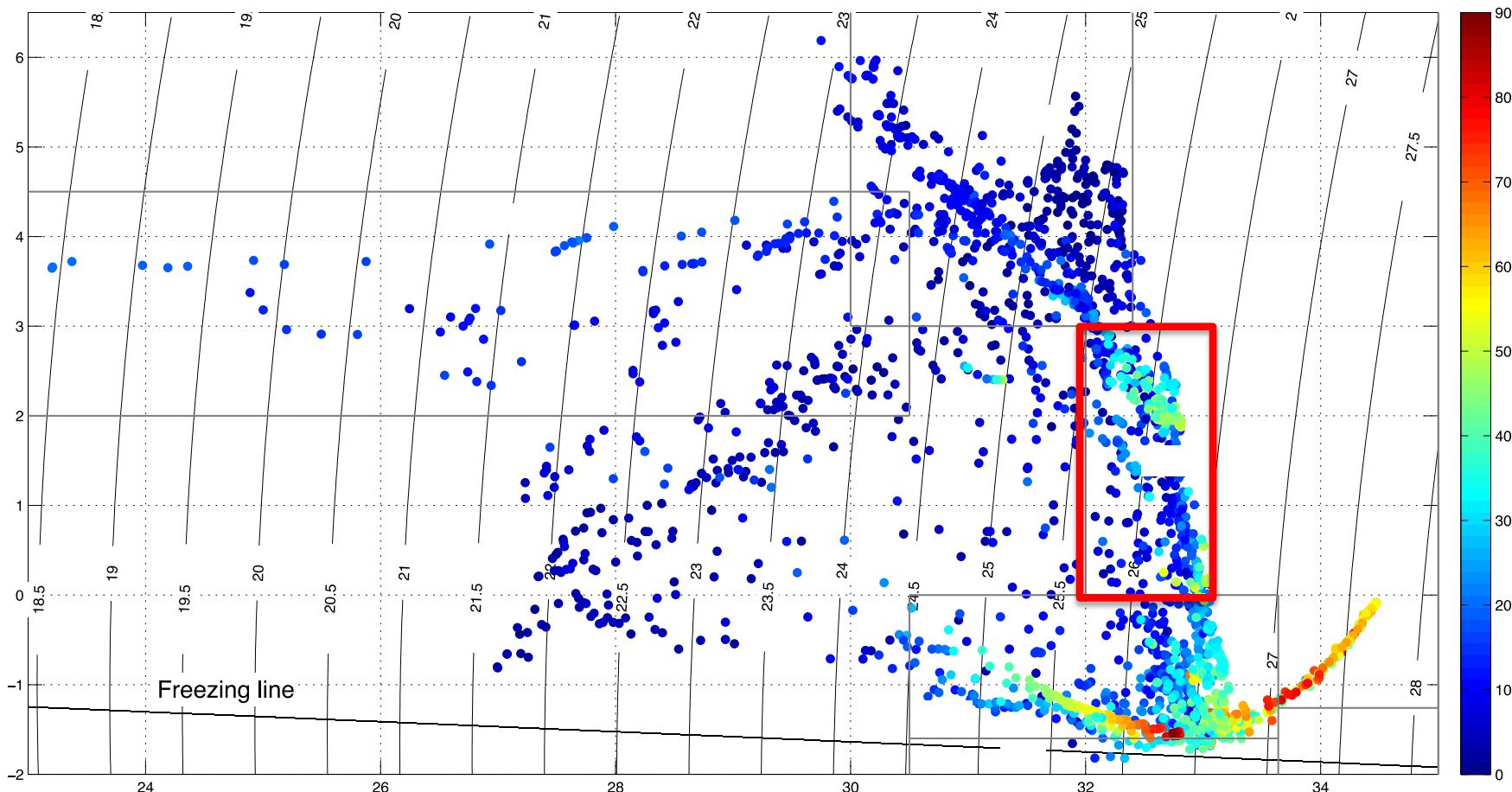
Yellow:

$T > 3 \text{ C}$

$30 < S < 31.5$

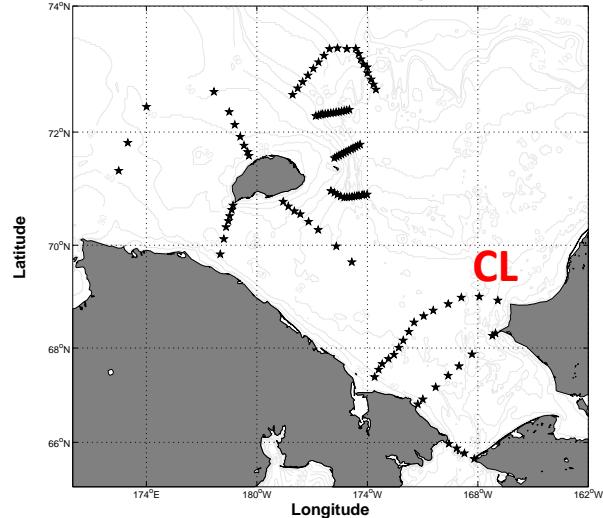


Bering Sea Water (BSW) of September 2009: $0 < T < 3$ C, $32 < S < 33.1$

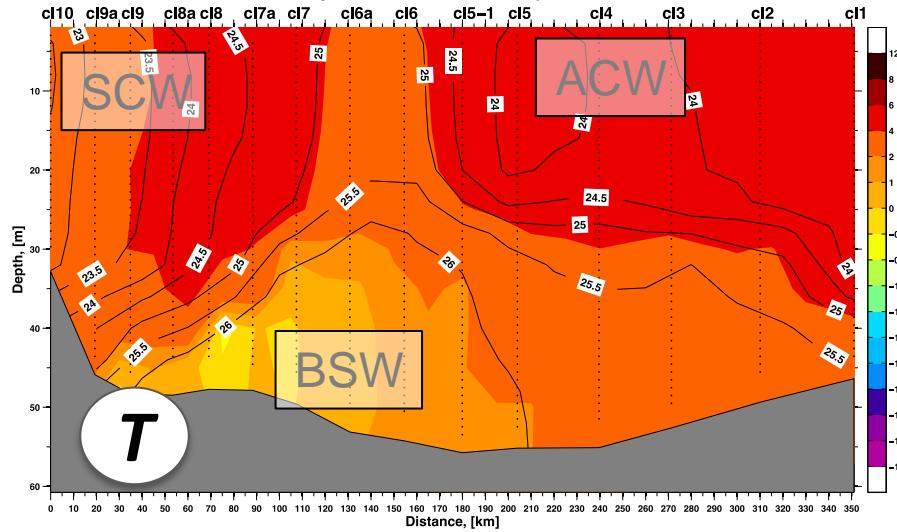


Cape Lisburne transect

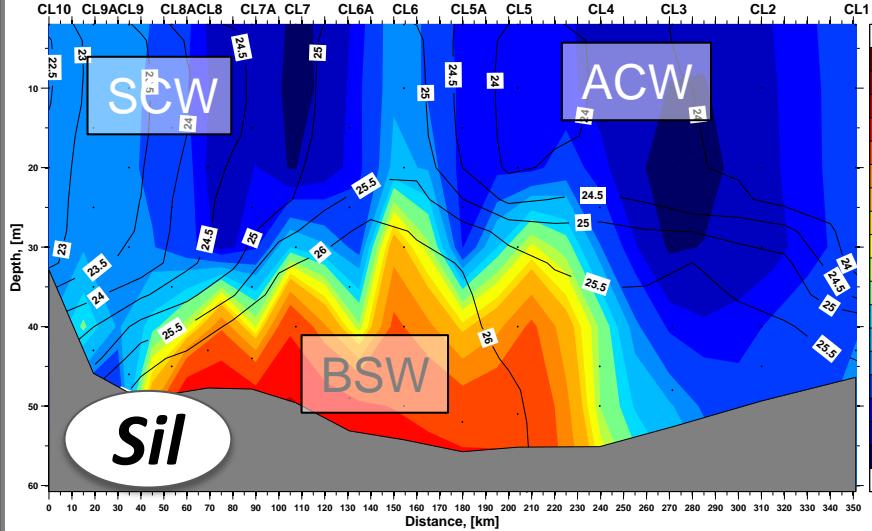
RUSALCA 2009 stations positions



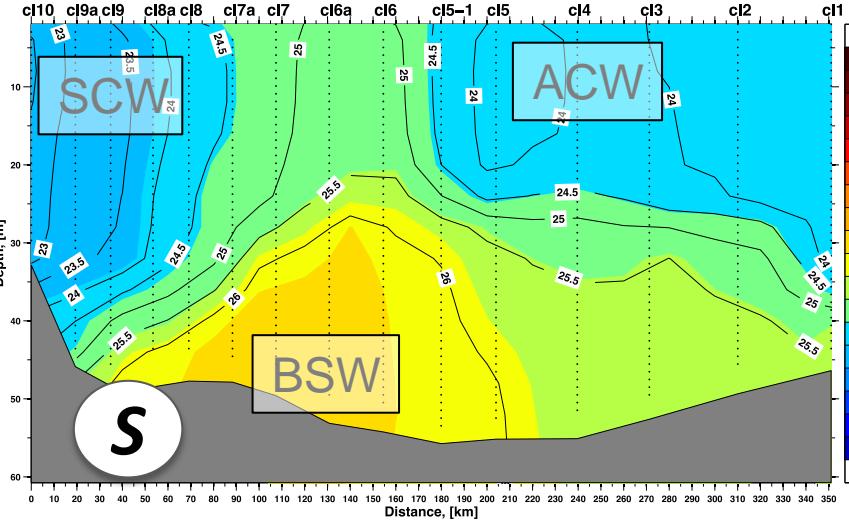
Potential Density overlaid on Potential Temperature, cl section, 2009



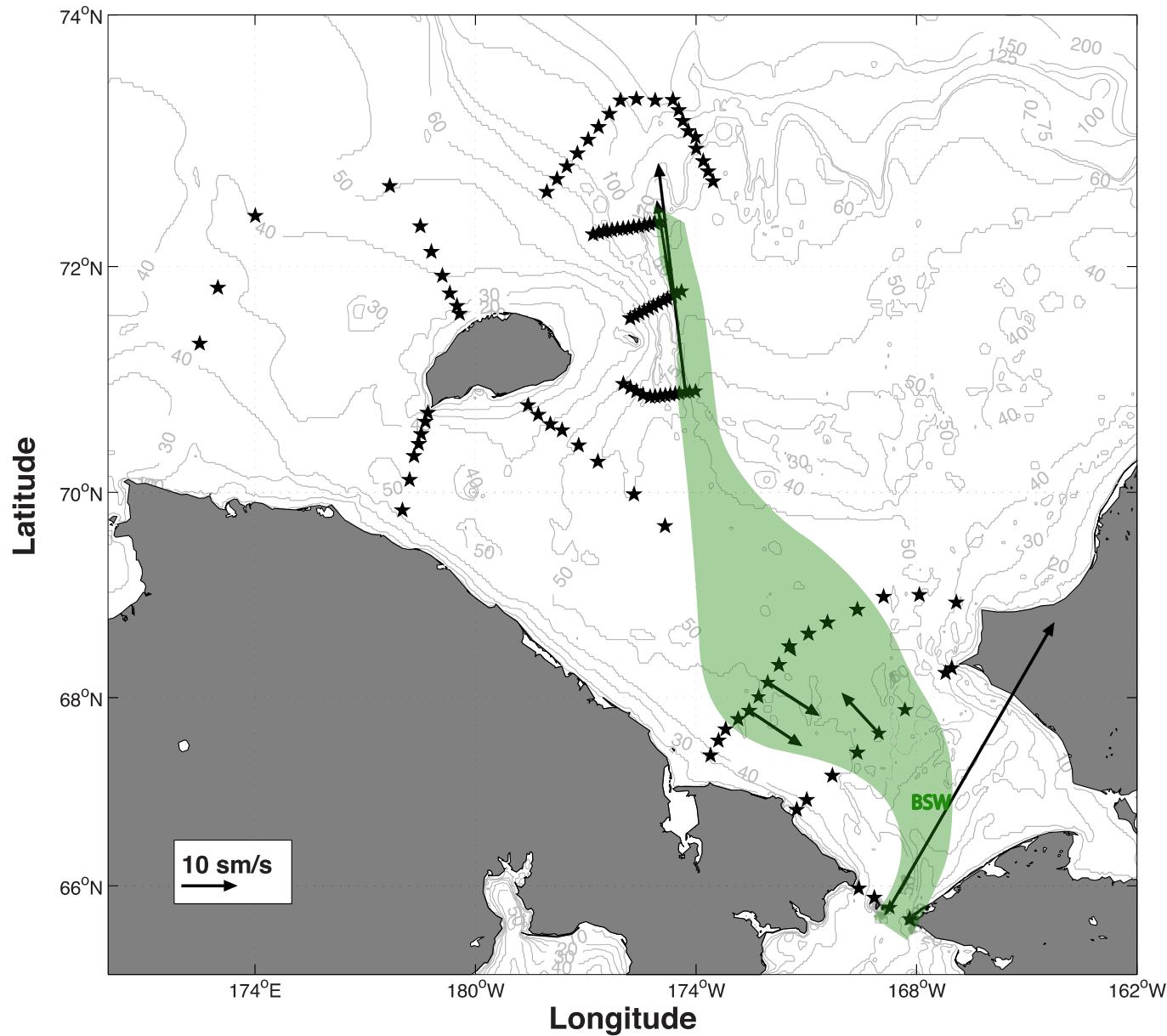
Potential Density overlaid on Silicates, cl section, 2009



Potential Density overlaid on Salinity, cl section, 2009



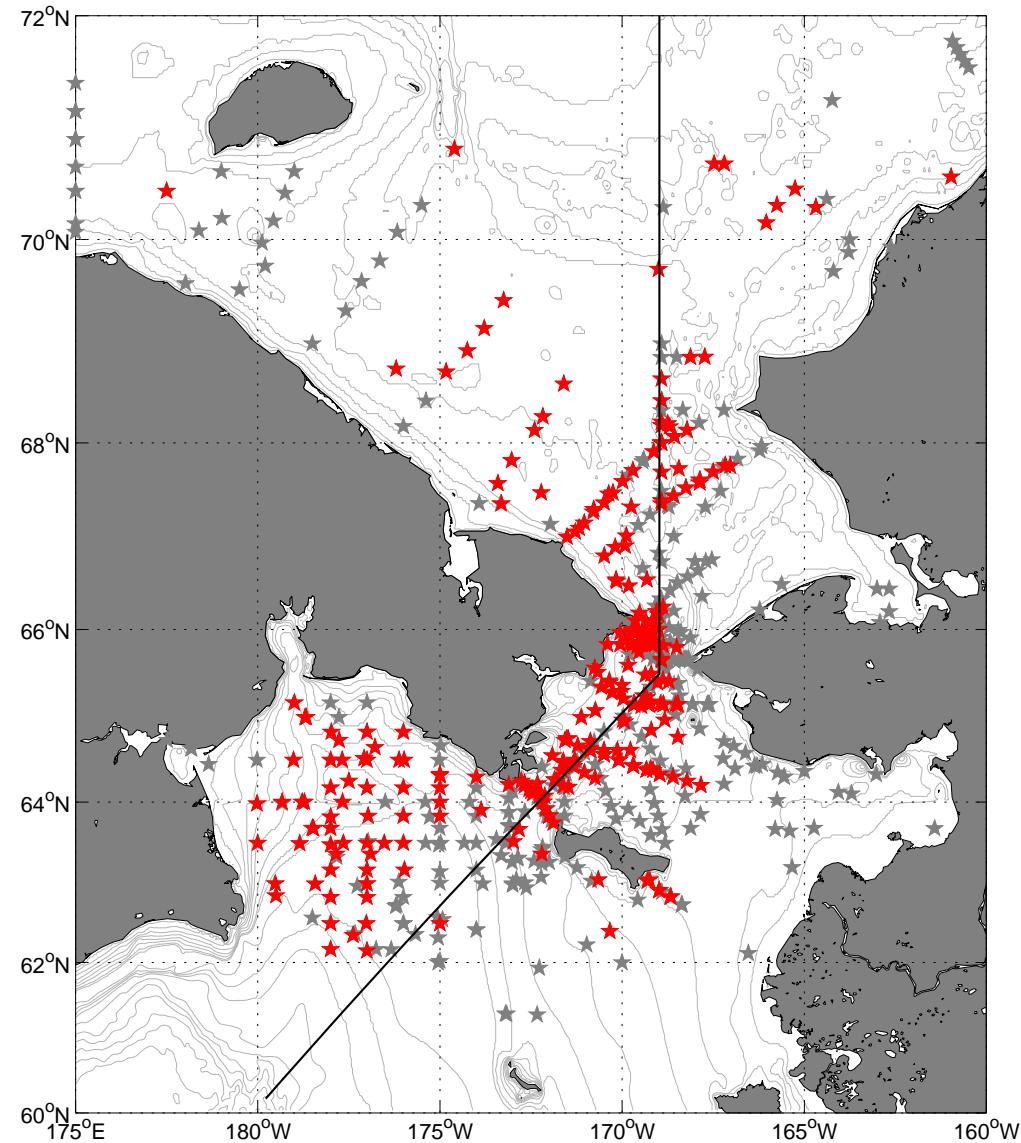
Distribution of BSW from RUSALCA 2009 survey



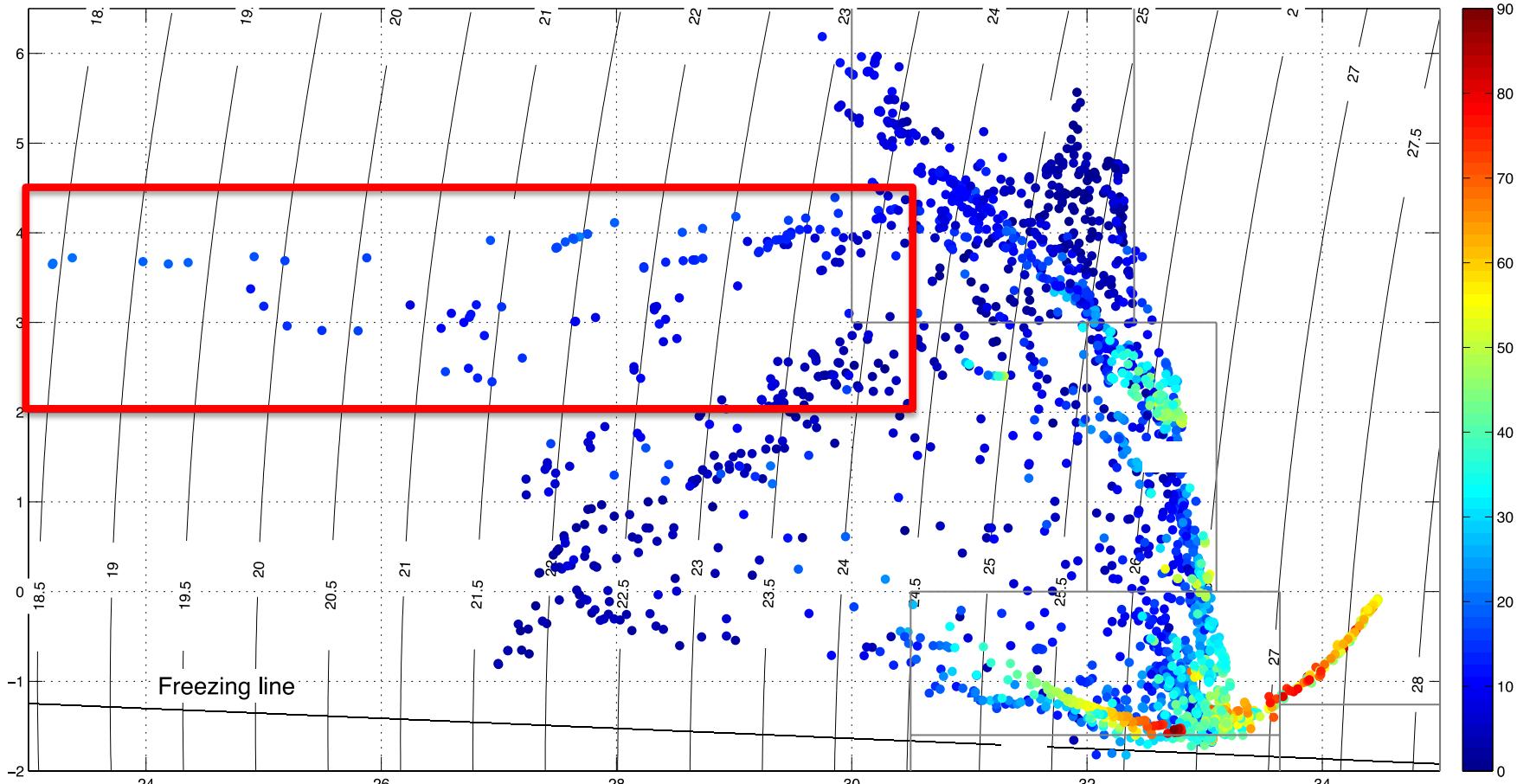
BSW from WODB for August - September

$0 < T < 3 \text{ C}$
 $32 < S < 33.1$
 $\text{Sil} > 20$

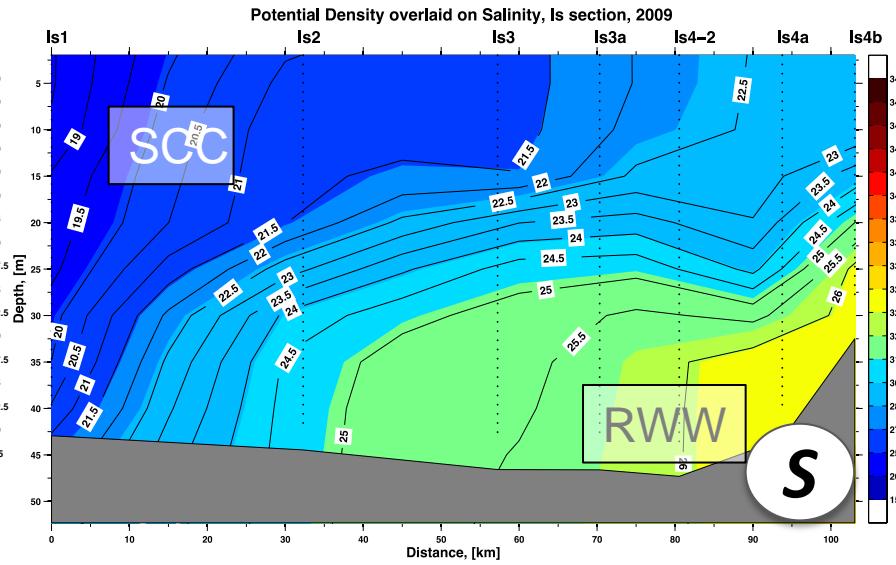
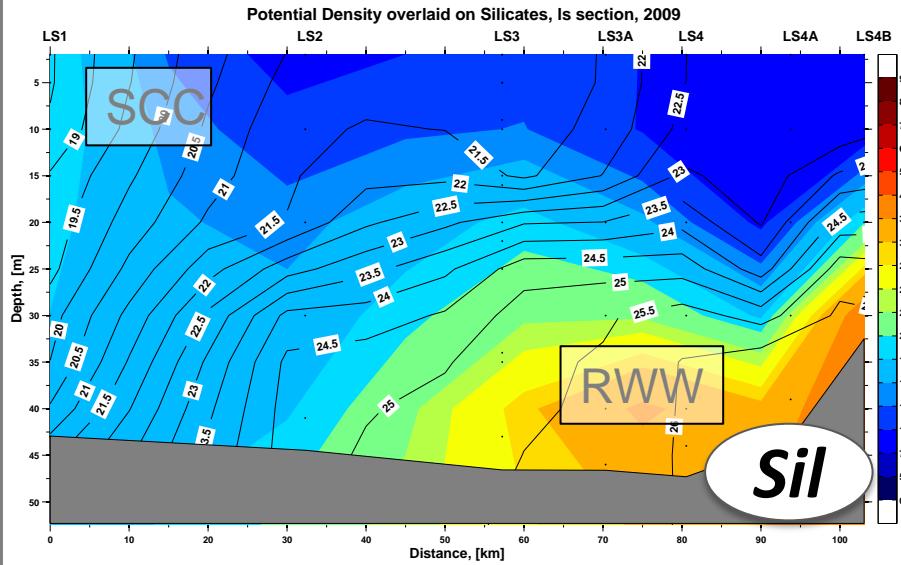
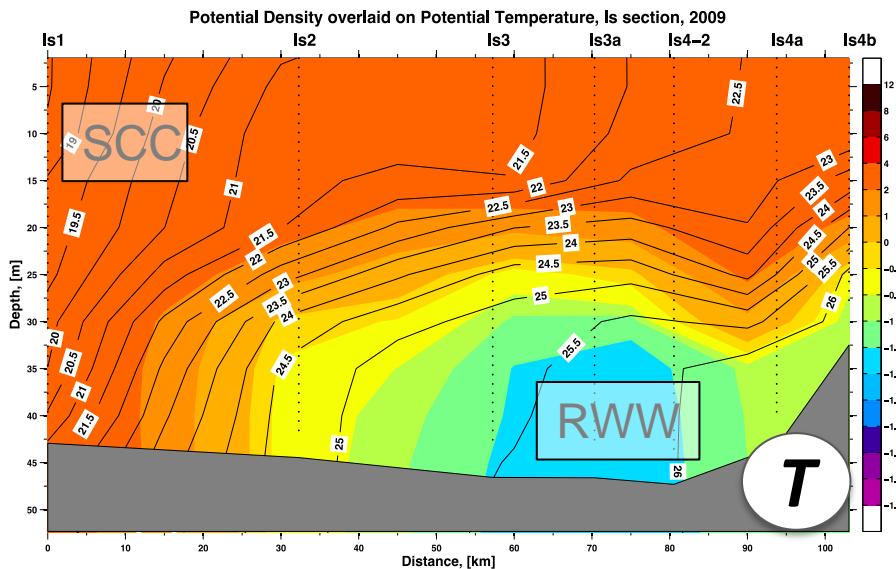
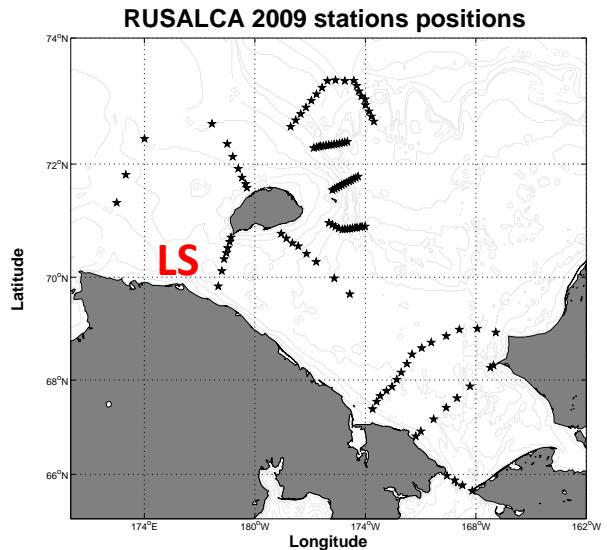
Grey stars represent data,
that have silicate



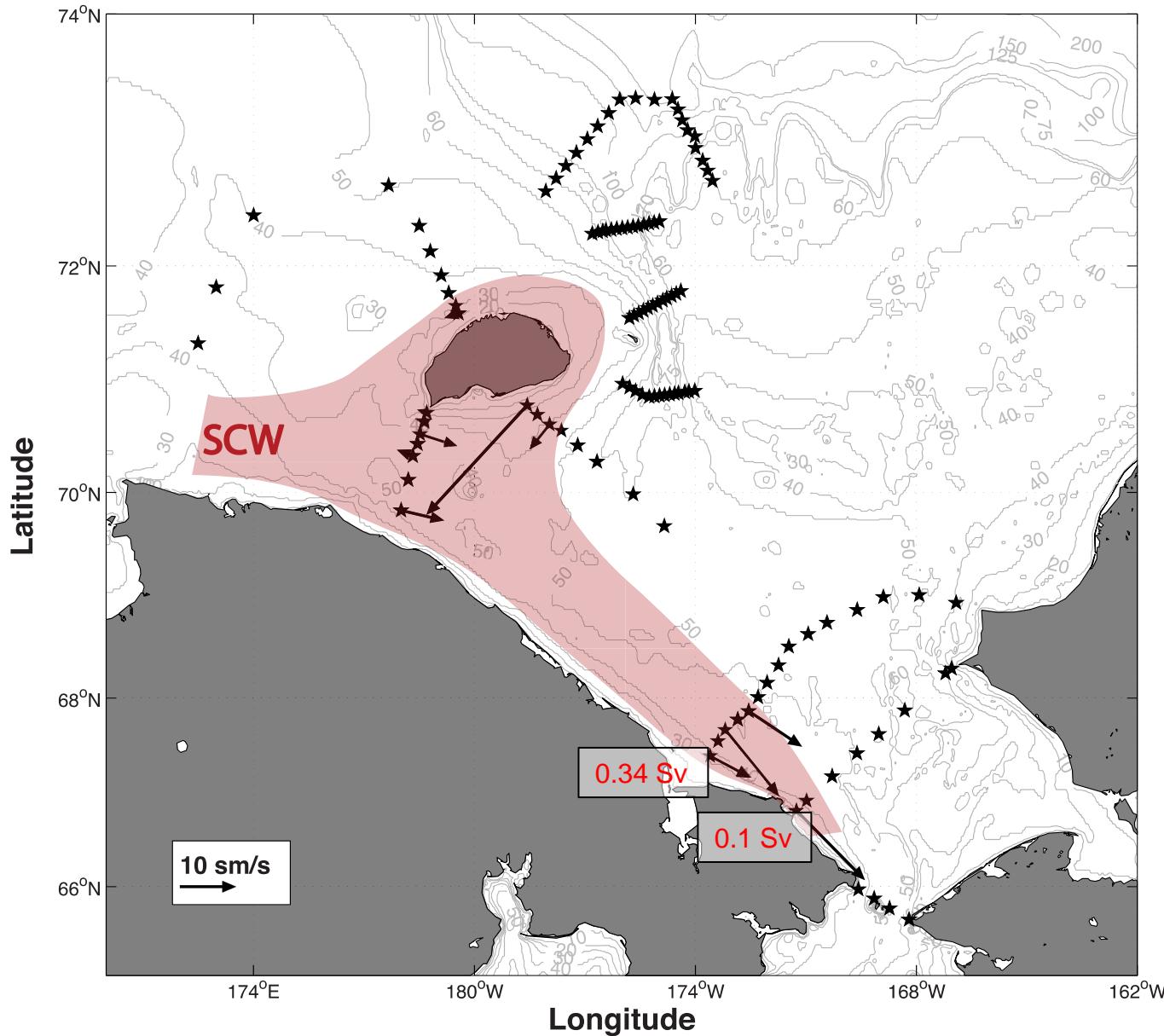
Siberian Coastal Water (SCW) of September 2009: $2 < T < 4.5 \text{ C}$, $23 < S < 30$



Cape Lisburne transect

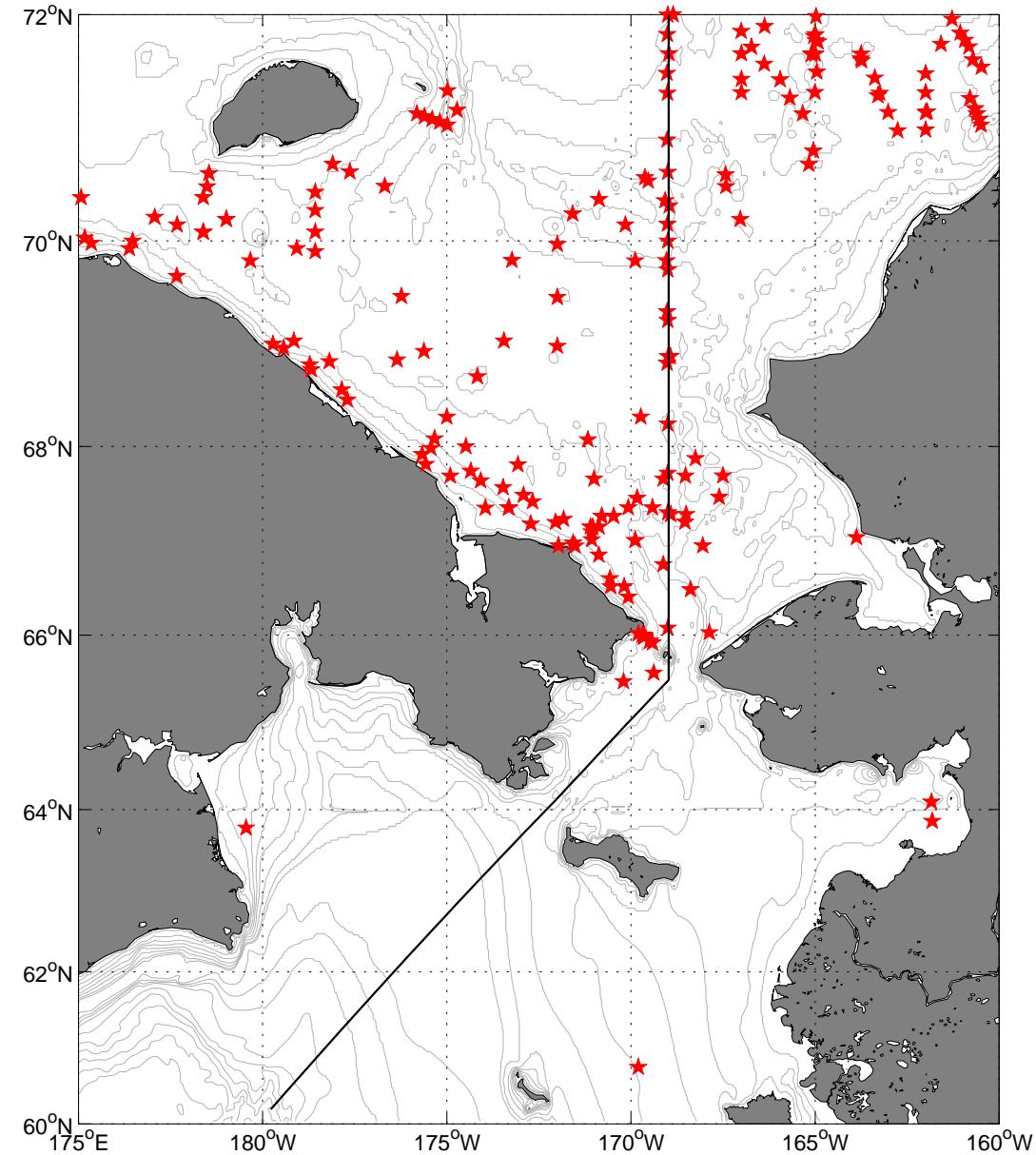


Distribution of ACW from RUSALCA 2009 survey

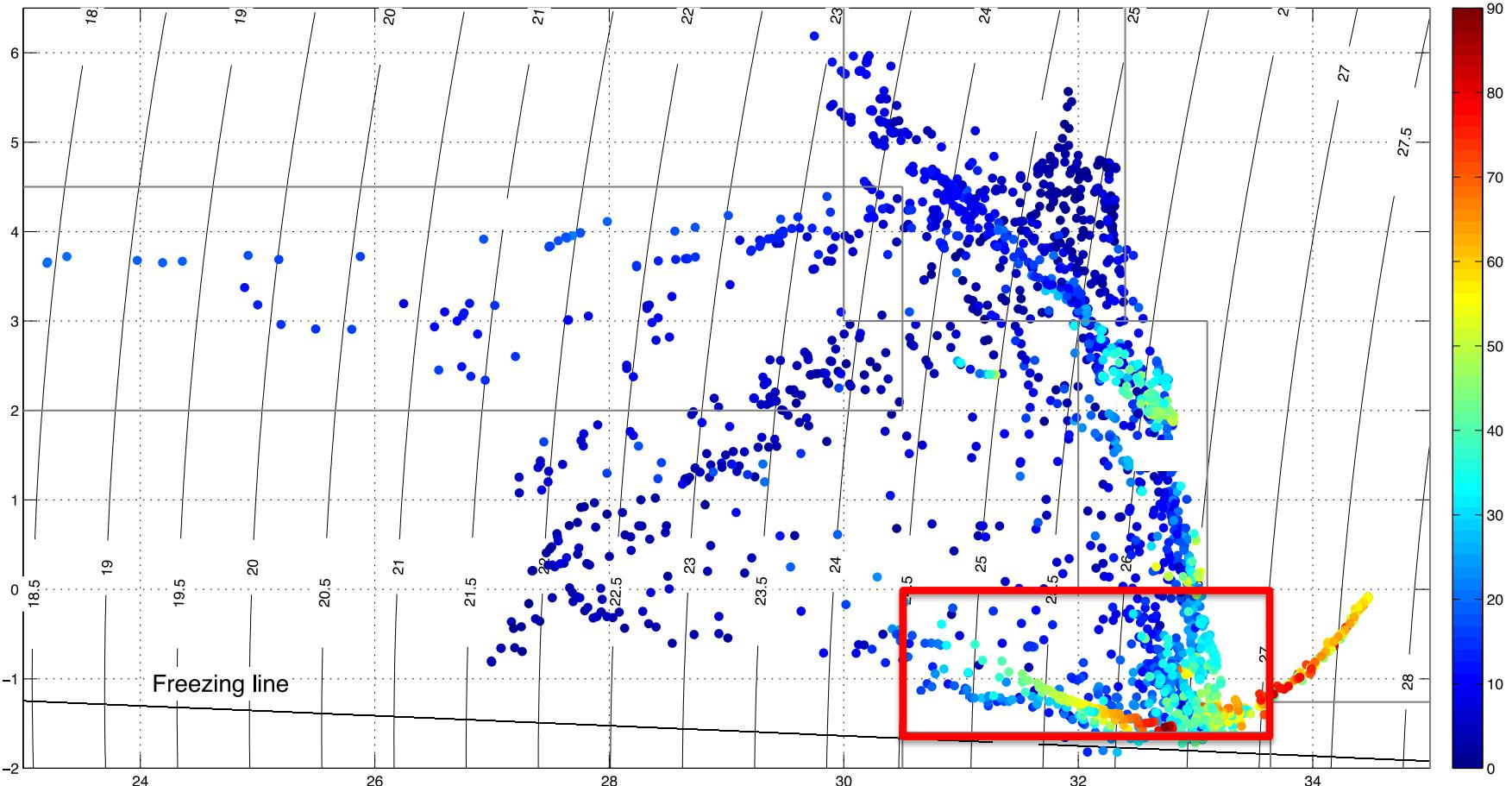


SCW distribution from WODB

$2 < T < 4.5 \text{ C}$
 $23 < S < 30$

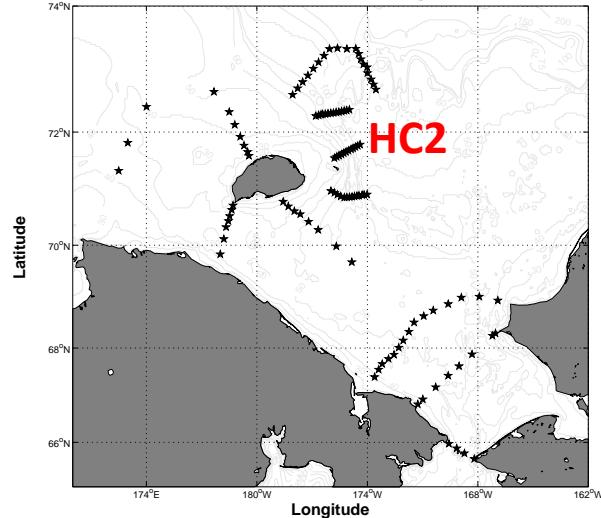


Remnant Winter Water (RWW) of September 2009: $T < 0 \text{ C}$, $30.5 < S < 33.5$

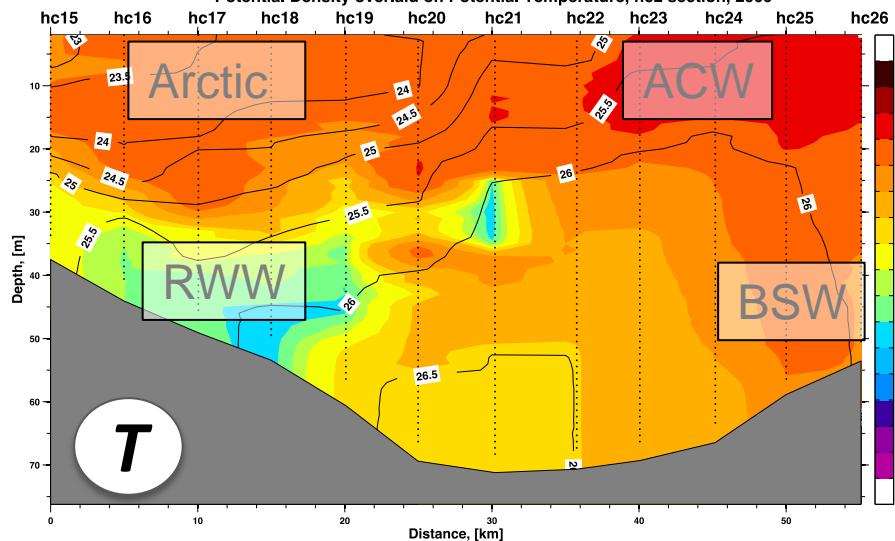


Herald Canyon 2 transect

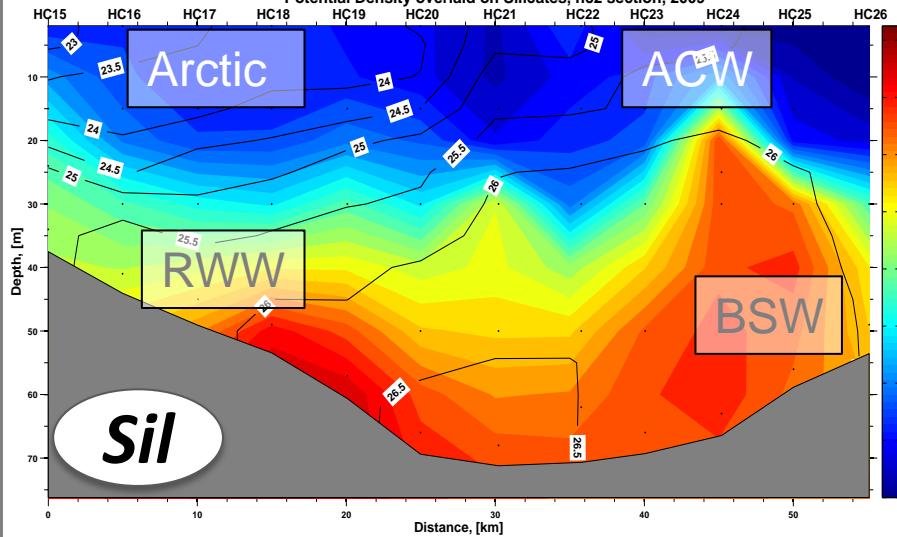
RUSALCA 2009 stations positions



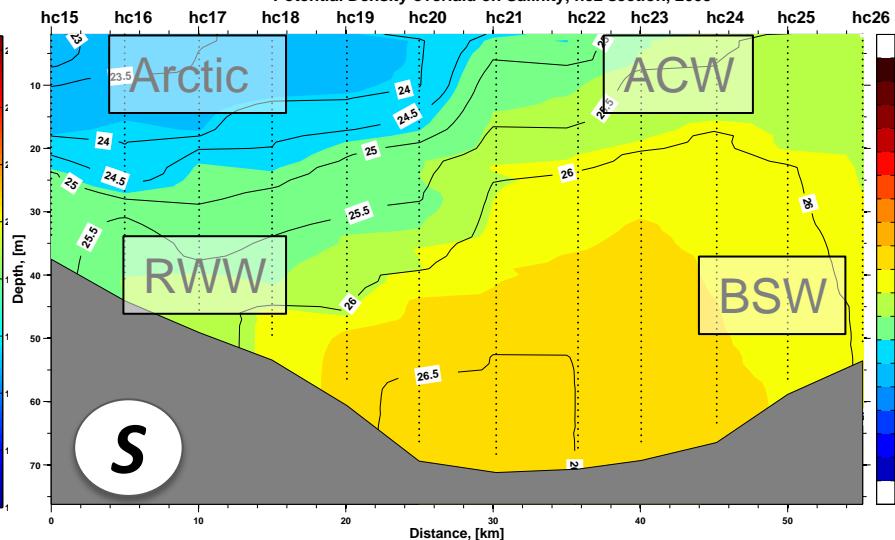
Potential Density overlaid on Potential Temperature, hc2 section, 2009



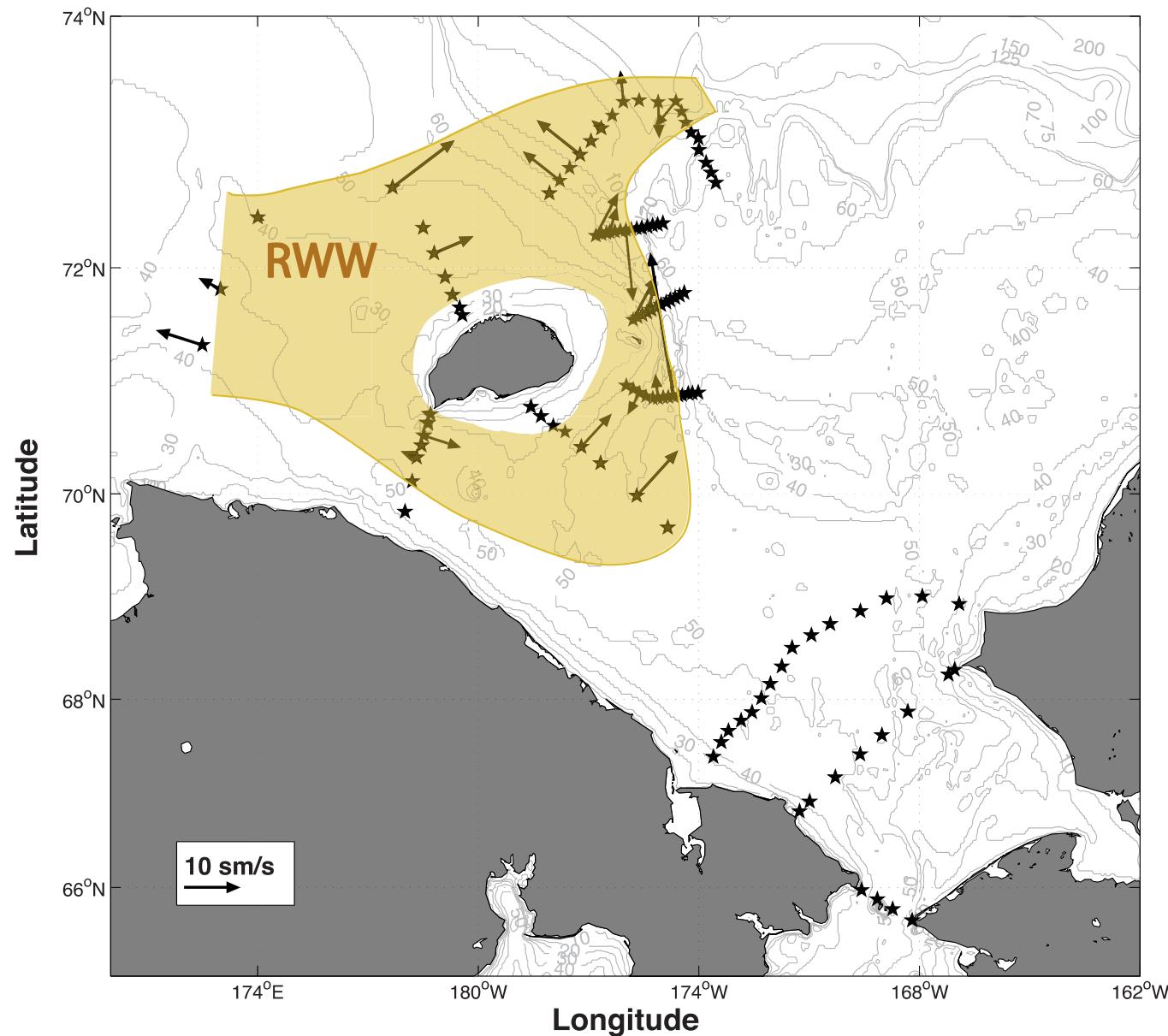
Potential Density overlaid on Silicates, hc2 section, 2009



Potential Density overlaid on Salinity, hc2 section, 2009

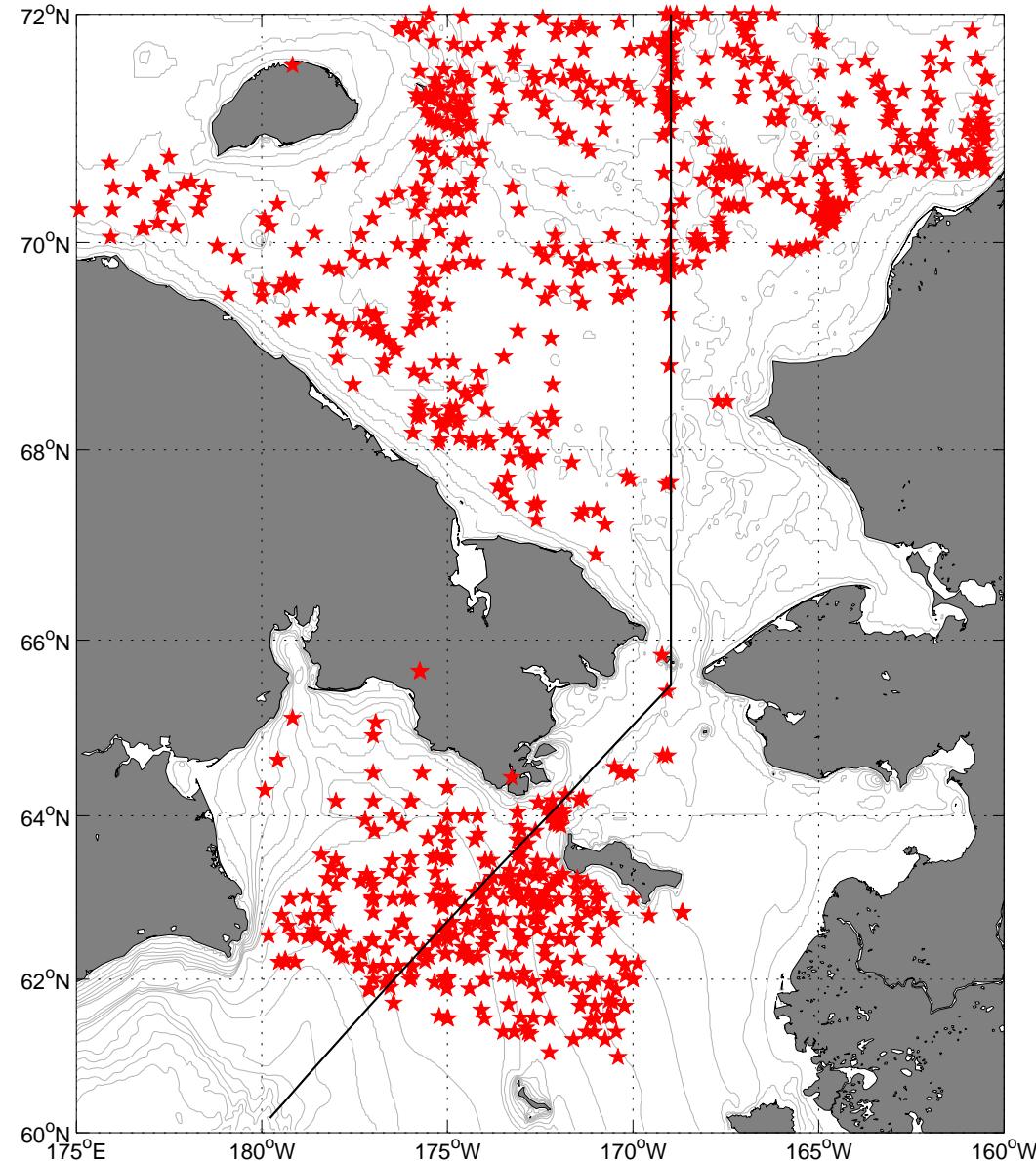


Distribution of RWW from RUSALCA 2009 survey

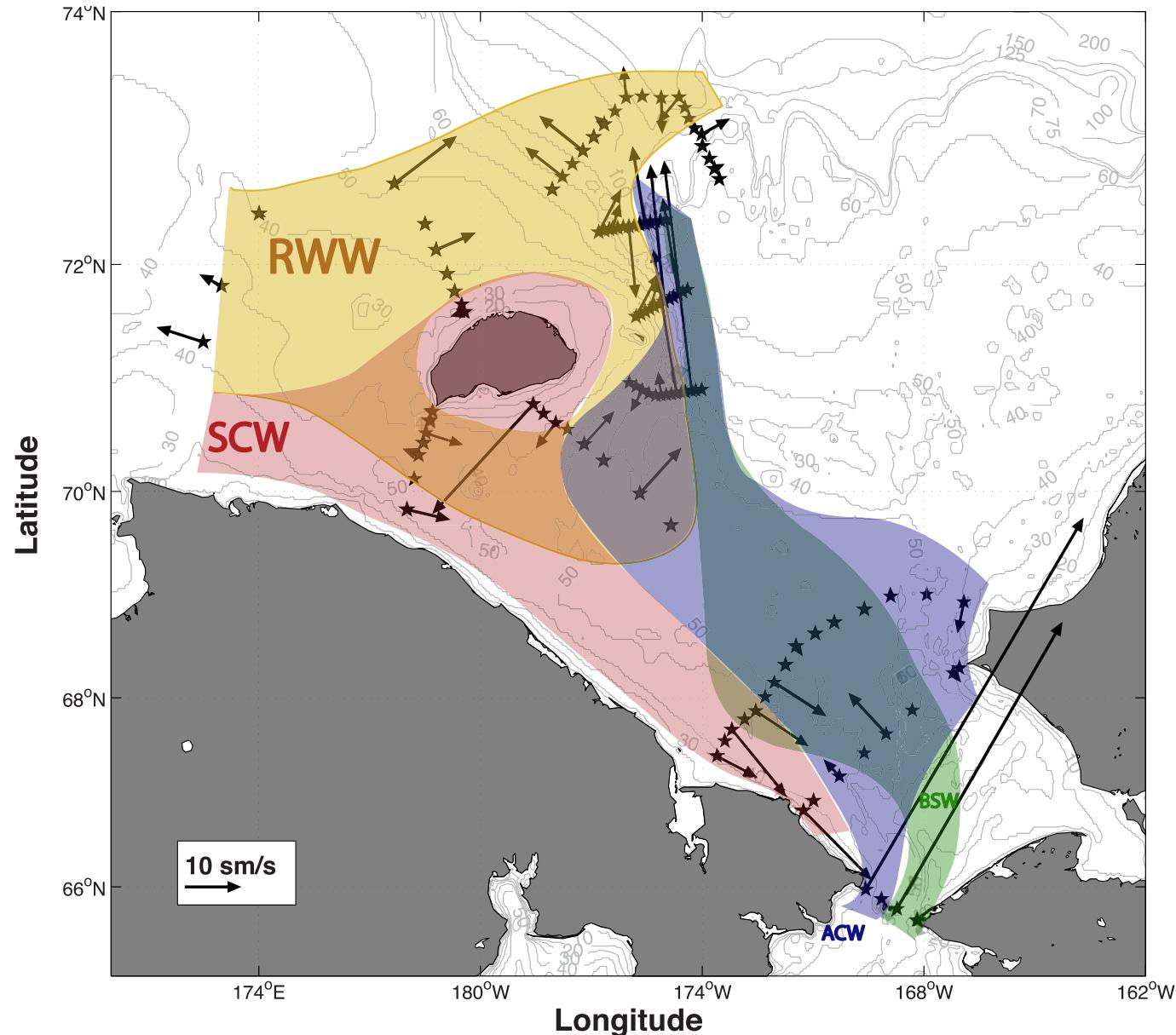


Remnant winter water distribution from WODB

$-1.64 < T < 0 \text{ C}$
 $30.5 < S < 33.5$
 $D > 40$
August,
September



Water masses distribution in the Chukchi from RUSALCA 2009 survey



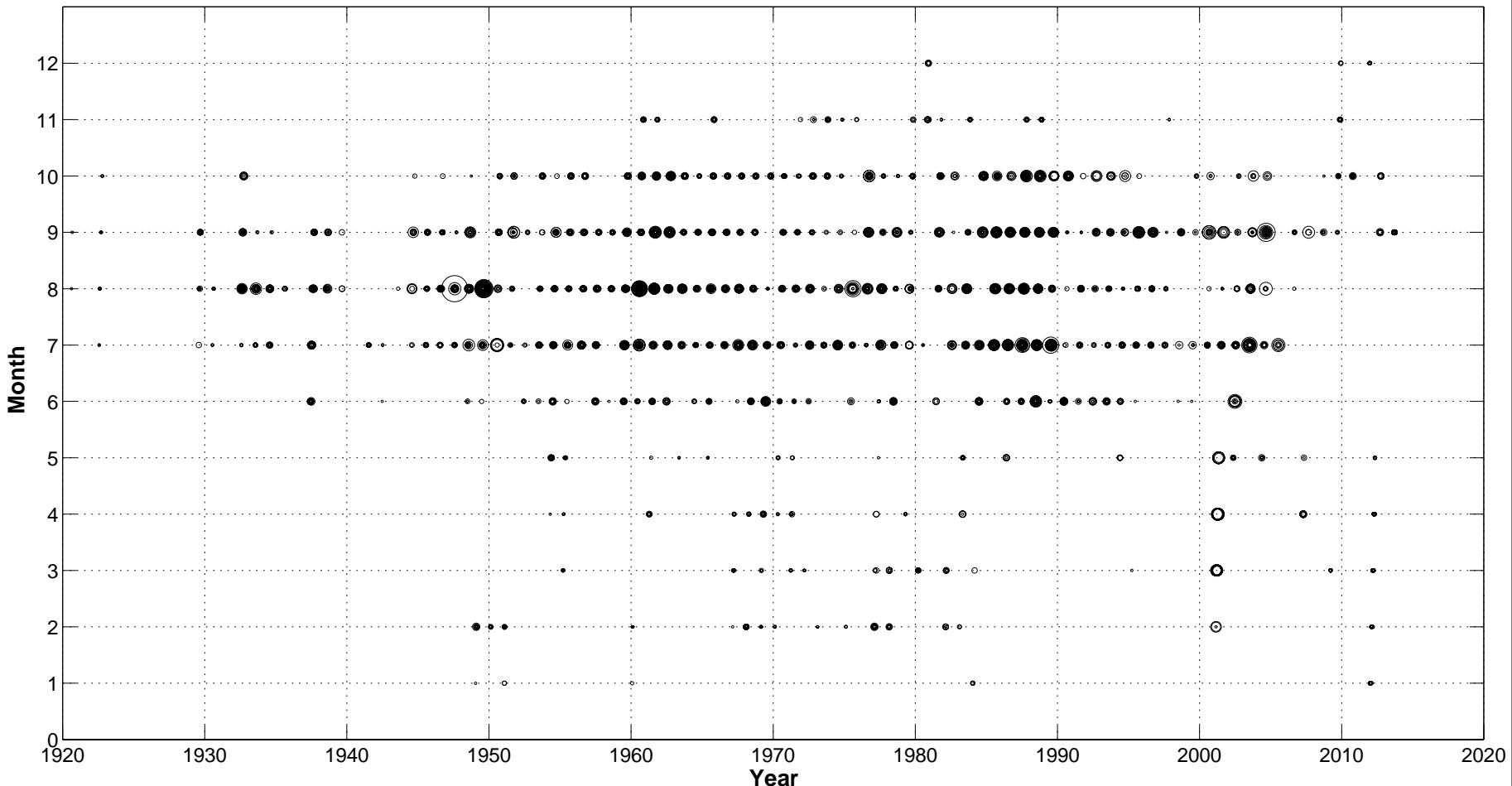
Future steps

1. Investigate why BSW and ACW switched sides in Bering Strait using the mooring data, and determine the reasons that ACW spread into Herald canyon
2. Compare the water mass and circulation patterns with the 2004 survey
3. Learn more about the origins of the water masses in the Bering sea, Anadyr and Chirikov Basins

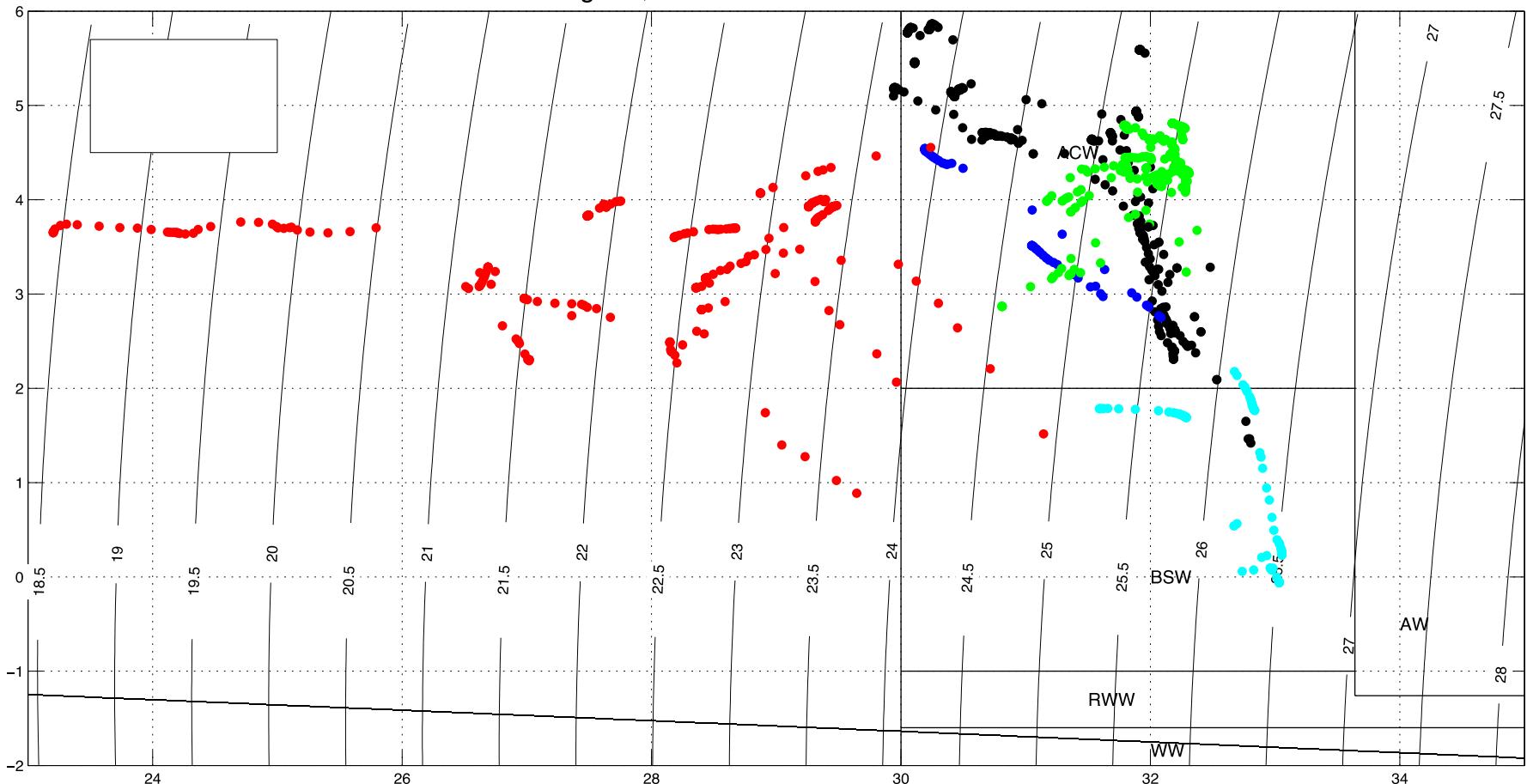
Thank you!



WODB, data distribution plot. 30036 measurements



TS diagram, different water masses with color



SST for 4th of September 2009, AVHRR data

