Ross Sea Ice Data

Site #4 Core #1

Depth (cm)	Salinity (ppt)
Top	6.8
10	6.2
20	6.9
30	7.4
40	6.9
50	5.3
60	5.5
70	5.3
80	4.7
90	4.9
100	4.9
110	5.6
120	5.6
130	5.5
140	5.3
150	4.8
160	4.7
170	4.7
180	4.1
190	4.6
200	4.8
210	4.9
220	4.6
230	4.9
Bottom	6.8

Site #4 Core #2

Depth (cm)	Salinity (ppt)
30	7.5
60	7.5
90	5.9
120	5.4
150	5.4
180	4.9
210	5.1
Bottom	7.3

Site #7 Core #1

Depth (cm)	Salinity (ppt)
10	7.0
20	6.1
30	6.3
40	5.8
50	5.0
60	5.4
70	5.0
80	5.5
90	5.2
100	5.6
110	5.4
120	5.1
130	5.7
140	5.0
150	5.2
160	4.9
170	4.9
180	5.0
190	6.8

Site #2 Core #1

Depth (cm)	Salinity (ppt)
10	4.2
20	4.9
30	5.8
40	5.1
50	5.1
60	4.6
70	4.2
80	3.8
90	4.1
100	4.0
110	3.9
120	4.2
130	3.9
140	4.0
150	3.6
160	3.2
170	3.5
180	3.5
190	3.8
200	6.3

Site #23 Core #3

Depth (cm)	Salinity (ppt)
10	9.7
20	7.8
30	6.5
40	5.8
50	5.4
60	4.9
70	5.4
80	4.7
90	4.8
100	5.6
110	5.5
120	4.5
130	5.1
140	4.2
150	4.6
160	4.5
170	4.1
180	4.3
190	4.5
200	4.5
210	3.9
220	5.7

Site #23 Core #1

Depth (cm)	Salinity (ppt)
10	6.4
20	5.8
30	6.2
40	4.5
50	3.9
60	3.7
70	4.0
80	3.3
90	4.5
100	4.0
110	3.8
120	3.7
130	4.3
140	3.0
150	4.1
160	3.8
170	4.6
180	3.7
190	4.3
200	3.9
210	5.2

Site #22 Core #1

Depth (cm)	Salinity (ppt)
10	6.5
20	6.0
30	6.3
40	6.7
50	5.5
60	5.1
70	5.0
80	5.2
90	5.5
100	5.4
110	5.5
120	5.3
130	5.5
140	6.0
150	5.5
160	4.6
170	4.7
180	5.3
190	6.5
200	4.7
210	4.9
220	4.8
230	4.8
Bottom	6.7

Temperature of Cores

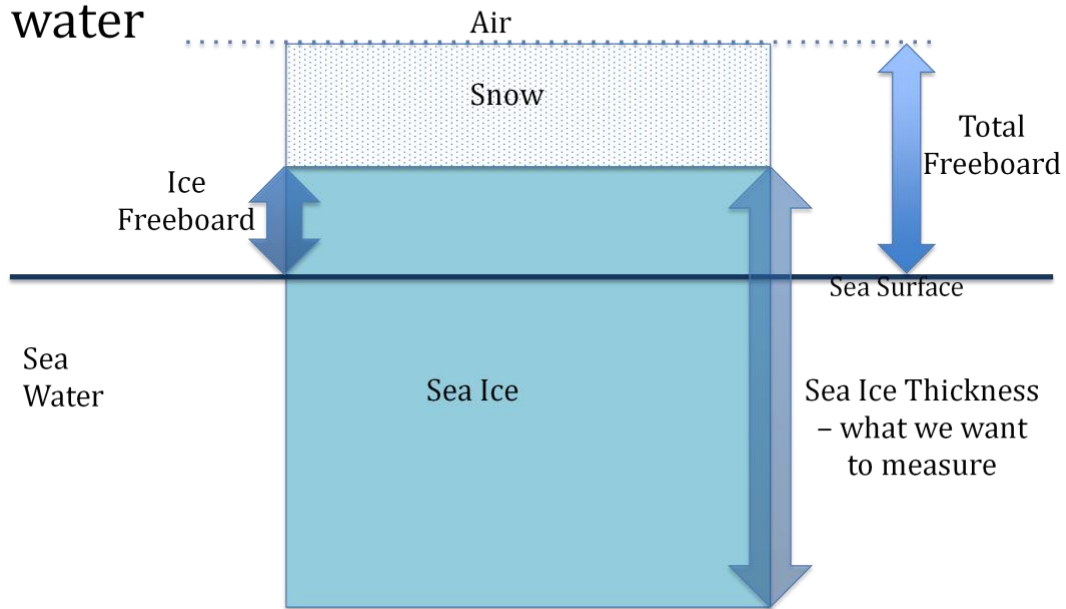| SITE 2	3/11/17	SITE 5	11/11/17
Depth (cm)	Temp (C°)	Length (cm)	Temp (C°)
10	-10.3	10	-10.5
20	-9.7	20	-10.2
30	-9.4	30	-9.8
40	-9.1	40	-9.3
50	-8.8	50	-9.1
60	-8.6	60	-8.6
70	-8	70	-8.3
80	CUT	80	-8.1
90	-7.5/BREAK	90	-7.9
100	-7.5	100	No measurement
110	BREAK	110	-7.1
120	-5.2	120	-6.7
130	-5	130	No measurement
140	-4.6	140	-6.4
150	-4.3	150	-5.6
160	-3.9	160	-5.1
170	BREAK	170	-5.0
180	-3.3	180	-4.3
190	-2.7 and -2.8	190	-3.6
200	-2.2	200	-3
		210	-2.6
		220	LONG

Background Information

Salt plays a vital role in ocean circulation (thermohaline). In polar areas, salinity differences affect ocean density more than changes in temperature. As sea ice forms, salt is pushed out or ejected and enters the surrounding water. This increases the salinity of the surrounding water. Salt water is more dense (heavier) and sinks towards the bottom of the ocean. This in turn causes upwelling as cold, dense water sinks and drives warmer, less dense water upward carrying with it nutrients.
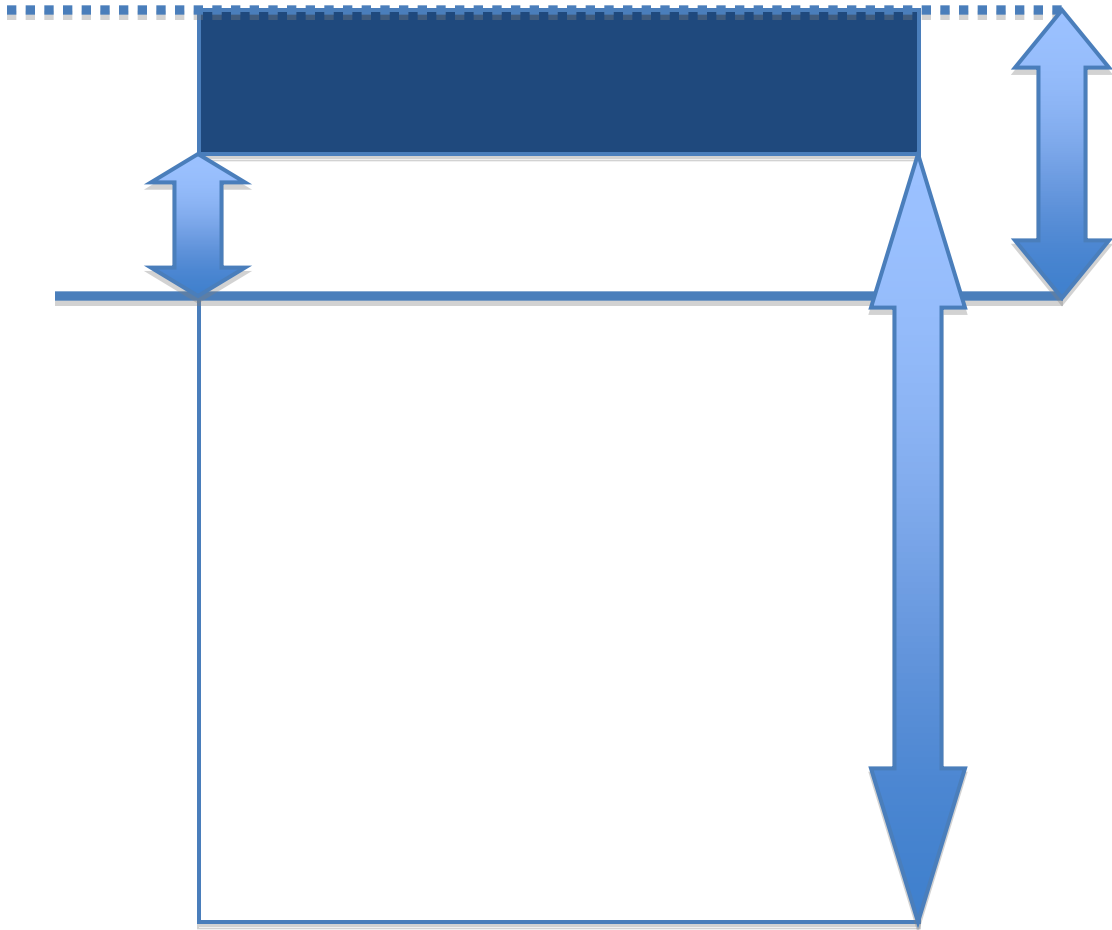
Salinity is measured in parts per thousand (ppt) or in practical salinity units (psu). Values reported in ppt or psu are nearly identical. Average ocean salinity is measured around 35 ppt. For every 5 ppt increase in salinity, the freezing point of water decreases by 0.28 C˚. So, in the ocean, when salinity is 35ppt, the freezing point drops to -1.8 C˚.

Measuring the Ice

Freeboard – section of ice and snow above water

Air

Snow

Total Freeboard

Ice Freeboard

Sea Surface

Sea Water

Sea Ice

Sea Ice Thickness – what we want to measure

Measuring Sea Ice

Sea Ice and Thermohaline Circulation

Visit the following websites and answer the questions that follow:

https://oceanservice.noaa.gov/education/tutorial_currents/05conveyor1.html

http://www.pik-potsdam.de/~stefan/thc_fact_sheet.html

https://nsidc.org/cryosphere/seaice/index.html

Questions:

1. What is the general salinity of the ocean water in parts per thousand (ppt)?
        a. 35ppt   b. 3.5 ppt   c. 350 ppt   d. 0.35ppt

2. Does sea ice contain more or less salt than the water surrounding it?
        More   Less

3. At what temperature does sea water freeze?
        a. 0°C   b. 32° C   c. 0.28° C   d. -1.8° C

4. Which has a more substantial effect in driving ocean circulations in polar regions?
        a. changing salinity
        b. changing temperature
        c. changing seasons
        d. sea life

5. Define thermohaline circulation:
        _____
        _____
        _____
        _____

6. What is upwelling?
        _____
        _____
        _____
        _____

7. How does the freezing of ocean water in polar regions contribute to deep ocean circulation?

_____
_____
_____
_____

8. How does melting of polar sea ice disturb ocean currents?

_____
_____
_____
_____

9. What effect might a warming climate have on polar regions and consequently on ocean circulation? How might this affect humans?

_____
_____
_____
_____

10. When salt accumulates into droplets of meltwater, it is most commonly referred to as

     a. ocean water   b. brine   c. saline solution   d. frazil

What questions do you have about sea ice or the effects of melting of sea ice in ecosystems?

Where might you find answers to these questions?