An introduction to physical oceanography

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What is physical oceanography?

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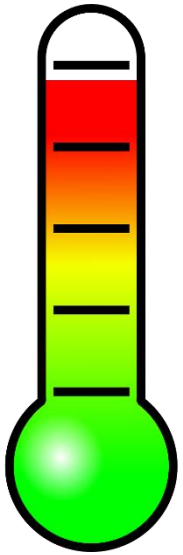
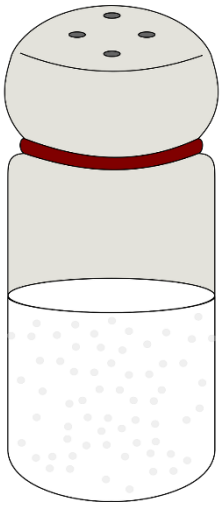


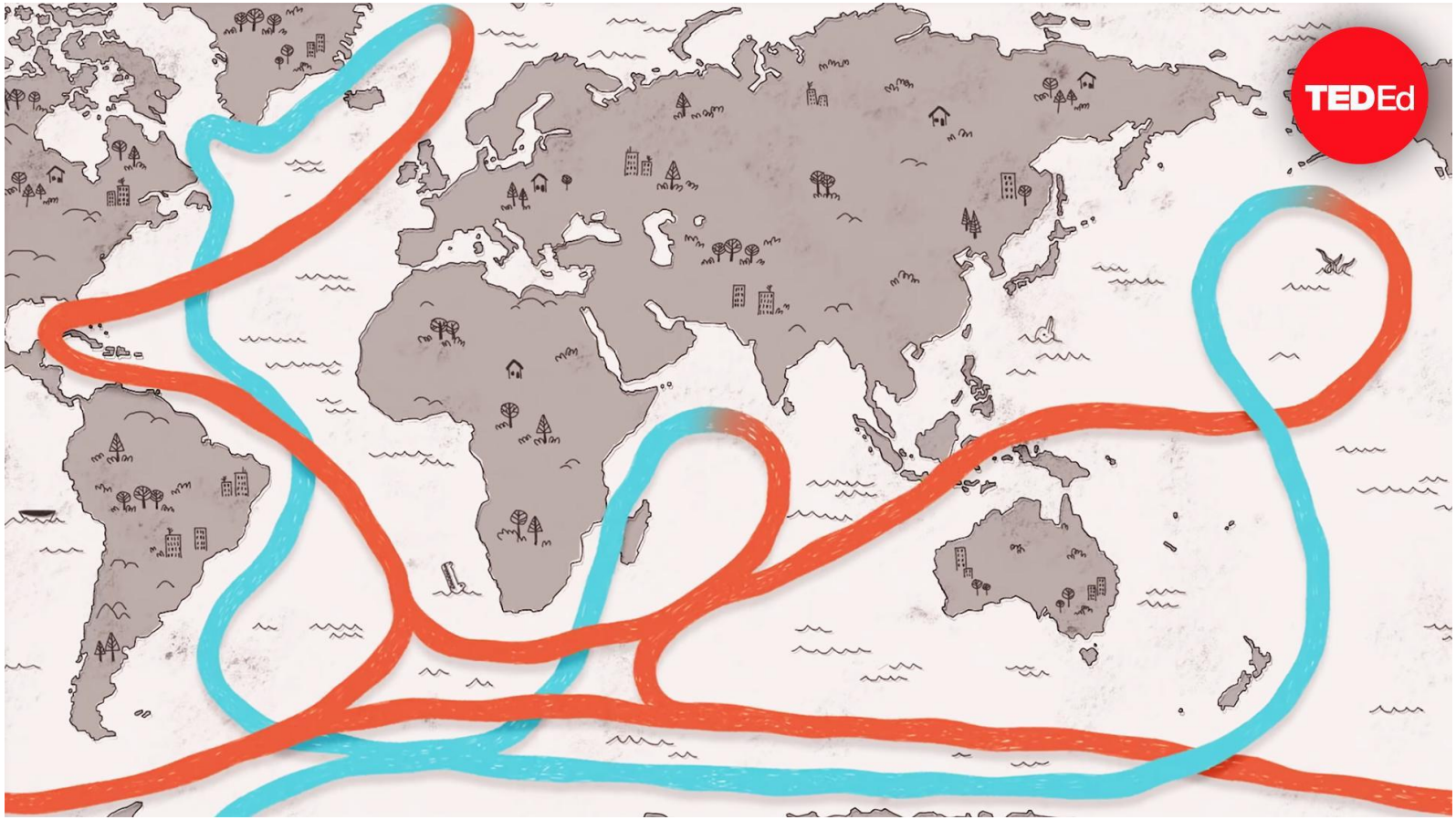
temperature

salinity



density

What is physical oceanography?



What drives ocean currents?

a) Wind

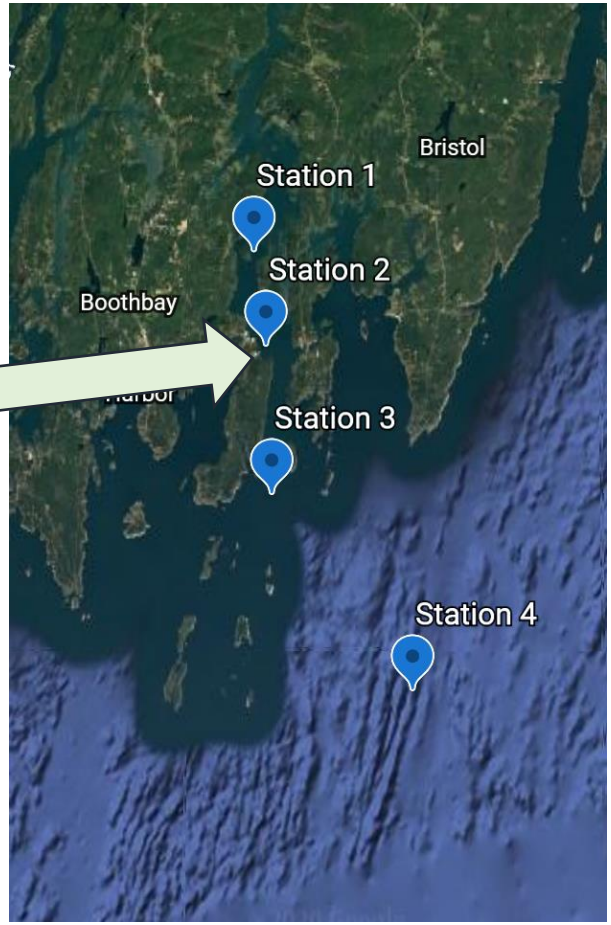
b) Temperature

c) Tides

d) All of the above

Let’s explore some data

Bigelow



Let’s explore some data

Go to the Google Drive then:

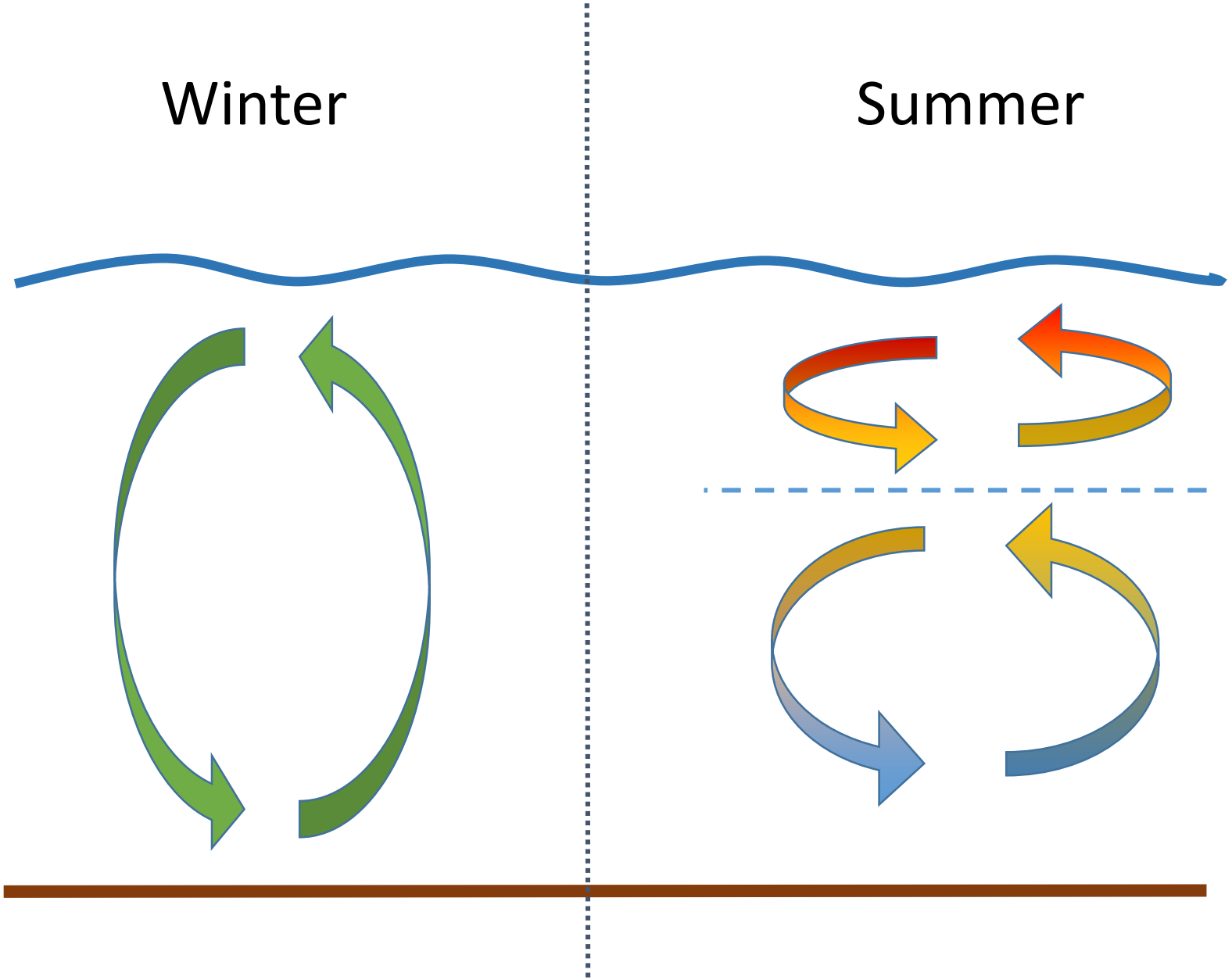
Computing in Oceanography

-> Data

-> Tuva Dataset Links

Let’s explore some data: station1

1. What can we say about the temperature of the water?
2. What is/are the difference/s between the two different days?
3. Why do you think we might see these differences?


Winter
Summer

Let's explore some data: station4, 20170912, 20171109

1. What can we say about the two temperature profiles in the station4 dataset?
   Think about differences and what this tells us about the ocean at that time

2. How are the station4 profiles different or similar to the station1 profiles?

3. What are the differences between all the stations on 09/12/2017?
   Hint: check the 20170912 dataset, and use station as the color

4. What are the differences between all the stations on 11/09/2017?
   Hint: check the 20171109 dataset, and use station as the color

1 - What can we say about the two temperature profiles in the station4 dataset?

- Bigger change in temperature in the September profile
- Warmer surface waters in September compared to depth
- Upper 70m of the November profile is well mixed, but still cooler in the deepest waters
- In September, the water is still stratified
- In November, the water is almost fully mixed

2 - How are the station4 profiles different or similar to the station1 profiles?

- At station 4 there is a bigger range in temperature
- The station 4 profiles are deeper
- The station 1 and station 4 profiles in November have a similar temperature in the upper portion
- Station 4 has much colder water at the bottom of the profile in the September
- It takes longer for deeper water to become fully mixed at the end of the summer
- The larger the full depth of the water, stronger stratification is possible

3 - What are the differences between all the stations on 09/12/2017?

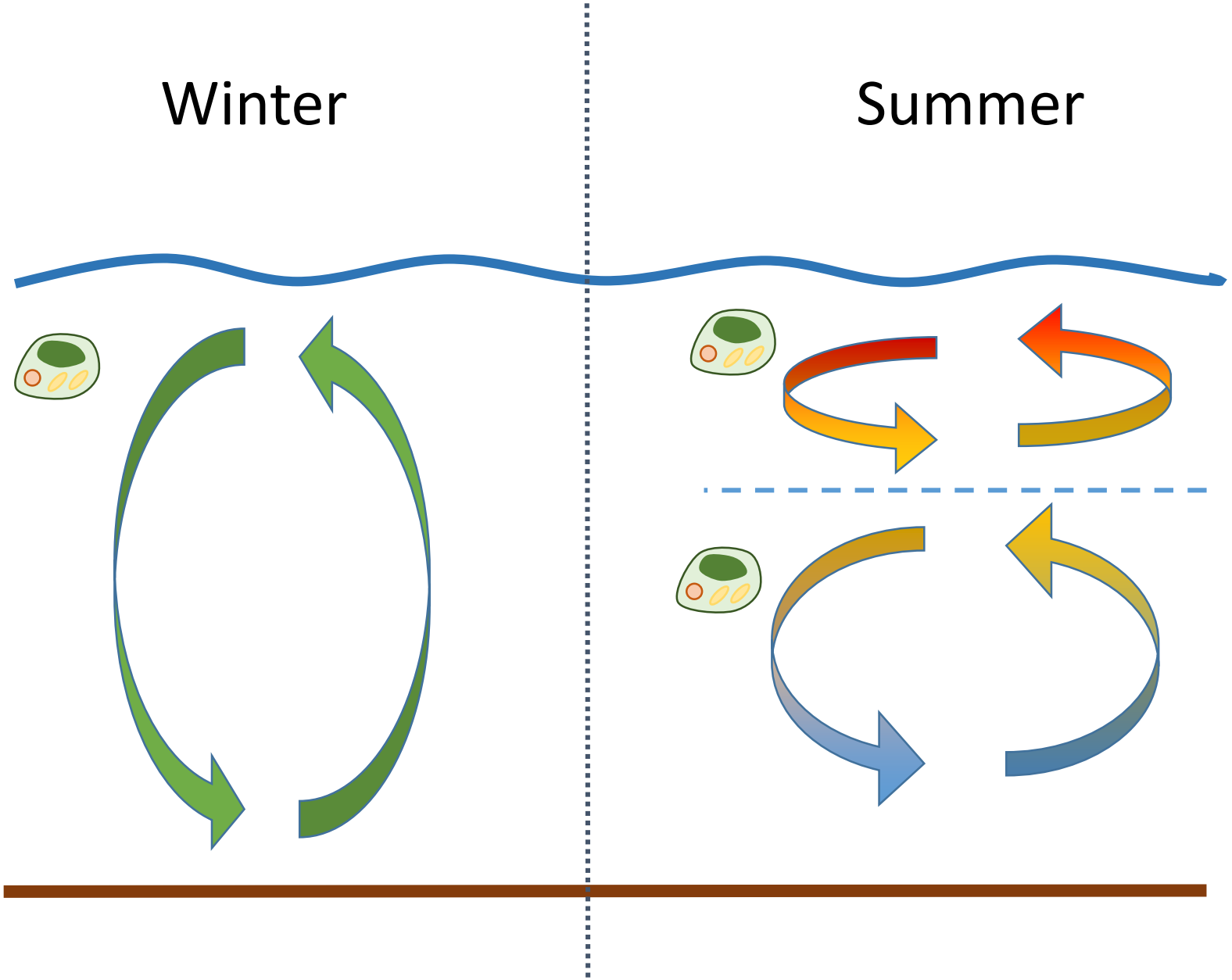
- The stations are all different depths
- The surface temperature is similar apart from at station 2
- The deeper stations (3 and 4) have a similar structure
- The shallower stations (2 and 4) have a similar structure

4 - What are the differences between all the stations on 11/09/2017?

- The stations are all different depths
- The surface temperature is similar
- Stations 1, 2 and 3 have a similar structure
- Station 4 has a large warm layer in the middle of the profile
- In the winter, in the Gulf of Maine, the surface waters are often colder than the deep waters

Why do we care about temperature?

What does it mean for the microbes?


Winter
Summer