

## Our Dying Engine: Hydrosphere and Cryosphere



<https://www.youtube.com/watch?v=b4QjyrGkaUg>

1. The scientists in the video are studying the Greenland Glacier and how much it is melting. What exactly is a glacier?

A glacier is a collection of snow and ice (frozen fresh water, no salt) that sits on top of a land mass (Greenland in this case).

2. Glaciers tend to melt during the summer months and refreeze or collect snow and ice during winter months. In a stable climate these amounts are about the same.
  - a) We see a lot of melt water flowing down the moulin (hole in the glacier), where is that melt water going?

The melt water is falling through the ice and snow of the glacier to the Arctic and North Atlantic oceans (if it doesn't refreeze along the way).

- b) What are the potential consequences if glaciers like the one in Greenland continue to melt faster than they collect snow and ice?

Glacial melt water can contribute to global sea level rise. The water frozen in glaciers is not in the ocean and when it melts it increases the total amount of liquid water in our oceans (raising sea level).

The fresh water can also dilute the salty waters of the Gulf Stream and other ocean currents. If this happens the ocean currents may stop working and global climate could change dramatically.

3. Pack-ice is similar to glaciers but with an important difference, pack-ice floats on the surface of oceans. How are the consequences of pack-ice melting different from the consequences of glacial ice melting?

Since pack ice is already sitting in the ocean, it does not contribute to rising sea levels when it melts. However it is still fresh water and can still disrupt the thermohaline ocean currents.

4. Heat is distributed all around the planet through ocean currents that act like thermal conveyor belts.
- a) What is the name for this system of heat circulation?

### Thermohaline Circulation

- b) What are the two properties of ocean water that determine its density and keep the ocean conveyor system going?

<u>Salinity (Salt Concentration)</u>	<u>Temperature</u>
Salinity is the amount of salt in a given volume of water. This can also be described as how salty the water is or the <b>Salt Concentration</b> of the water in question.	The temperature of water changes depending on where it is on the globe. Water in the tropics receives a lot of sun light and tends to heat up. Whereas water close to the poles receives less sunlight and is generally cooler.

- c) How do these two properties affect the density of ocean water?

<u>Salinity (Salt Concentration)</u>	<u>Temperature</u>
The more salt there is in a given volume of water the higher its density will be. Higher salinity means higher density and <b>saltier water tends to sink.</b>	Water expands when it warms up and the same mass of water then takes up more space. This decreases the density of the water and causes it to rise. <b>Warmer water rises, Colder Water sinks</b>