The North Atlantic Current Investigation Activity Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Teacher Key

1. Describe the contents of each jar:

Jar 1: Blue Temperature (Cold)

Jar 2: Red Temperature (Warm)

Jar 3: Green Salinity (salt water)

Jar 4: Yellow Salinity (freshwater)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Time (min) | Red Top/Blue Bottom | Blue Top/Red Bottom | Green Top/Yellow Bottom | Yellow Top/Green Bottom |
| 0-2 |  |  |  |  |
| 2-4 |  |  |  |  |
| 4-6 | Colors do not mix | Colors blend | Colors blend | Colors do not mix |

Answer the following questions:

1. What is density?

Density is the measurement of compactness. For solids, this is usually measured as mass per unit volume. For substances dissolved in water, this is usually measured as parts per thousand or million.

1. In water, high density objectives are more likely to sink/float and low density are more likely to sink/float.
2. Based upon your observations, the cool water is (more/less) dense than the warm water.

Why do you think this is?

When you heat up water, the water molecules start moving around faster and faster. They bounce off each other and move farther apart. Because there's more space between the molecules, a volume of hot water has fewer molecules in it and weighs a little bit less than the same volume of cold water.

1. Based upon your observation, the freshwater is (more/less) dense than the salt water.

Why do you think this is?

Seawater has a higher density than fresh water. Sea water contains many dissolved substances and these add mass to the water within which they are dissolved, thereby producing a greater mass per unit volume, or a density, higher than that of pure water.

1. Based upon the diagram below and what you know about density, label where you would find warm water (red), cool water (blue), freshwater (yellow), and saltwater (green)

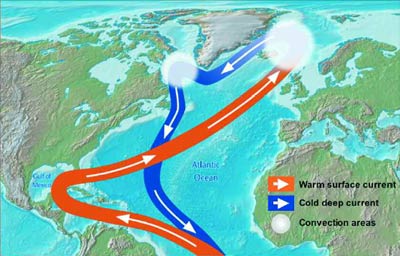
Warm, fresh- top; cool, salty- bottom



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You have just discovered the mechanism that drives the **North Atlantic Current!**

The North Atlantic Current is a phenomenon known as *thermohaline circulation* or the “great conveyor belt.” In the North Atlantic, surface water surface water moving north from lower latitudes (near equator) becomes saltier (due to evaporation) and colder as it moves northward. This causes the density of the water to increase, and the water eventually sinks as it enters the North Atlantic. **When the water sinks, it drives a current that plays a significant role in global ocean circulation.** The sunken water (it’s colder and more dense) slowly flows along the bottom of the ocean back toward the lower latitudes (near equator) where it eventually rises, like a conveyor belt, to the surface and starts the journey north again.



1. What would disrupt this circulation? In other words, what might cause the water NOT to sink in the North Atlantic? (assuming that the temperature in the North Atlantic is constant)

The addition of freshwater

1. Where would this source come from on Earth?

Melting Glaciers (the poles)

1. What may have caused this source?

Global warming causes glacial melting!

LETS PUT IT ALL TOGETHER! Remember the terms described in the clip from *The Day After Tomorrow*? Based you’re your newly discovered knowledge, number the following terms in a logical, cause and effect order: (Hint: 1 is pollution of fossil fuel)

* Melting glaciers
* Release of green house gases
* Shutting down the North Atlantic current
* Climate change crisis
* Global warming
* Addition of freshwater
* Pollution of fossil fuels

Pollution of fossil fuels- release of green house gases- Global warming- melting glaciers- addition of freshwater- shutting down the North Atlantic current- climate change crisis