

Lessons from the Ocean: Science on the Water Planet, SCED 530
Missed Class Reflection (July 11, 2019) Session III by: Dr. Megan Marrero
Hilary Penner
June 14, 2019

Main topics for Session III: Ocean/ Geosciences, upwelling, weather and climate including El Nino, and seafloor/ plate tectonics. (Focus on EP 3)

Upwelling: Upwelling is generally has a “season.” The coriolis effect pulls water away from the coast, in addition the wind from the north helps this process too. The cold, deep water underneath is pulled up. It brings nutrients (dead stuff). I LOVE how you referred to this as mulch on a garden. That really helped me understand the concept as well as it being relatable to students. You also said, “fertilizer,” and “banquet” of food for the animals migrating by the California Current such as birds and grey whales. The nutrients are one limiting factor to how much food is available in the food chain. This is a great way to show a food chain different than a deer to mountain lion or seal to shark.

Focusing on Ocean Literacy Principle 3:
How is climate change affecting the ocean?
How is the ocean related to climate change?
How do we understand climate change?

These are three great questions that you showed us on how we could analyze with students. I love how you give us resources and guide us how to prompt our students to look at the data and through that, make decisions. This is always important, but perhaps more important for the topic of climate change. From the questions above, there are two main ways that the ocean is related to climate change- storage of heat and storage of CO 2

Storage of Heat: warming sea surface temperatures and melting sea ice.

- ***IDEA:*** Have students find and compare data on SST’s. These sites are great for accessing data: NASA, NOAA, USGS.

Sea ice= frozen ocean water (the top layer of the ocean freezes and salt seeps underneath it)

Ice pack= Glacier on land (Ex: North Atlantic, Greenland)

WOW- thank you for clarifying that. It seems like those words get thrown around interchangeably. I personally would not have been able to tell you the difference before this class.

- ***IDEA:*** Investigating Sea Level Rise Lab/ Demo
Materials: 2 buckets, or large beakers, brick, ice cubes, tape to measure water level.
Optional: hair dryer.

Procedures: Place ice into beaker with water (to resemble sea ice), place ice onto top of brick in second beaker (also filled with water but have some brick / land exposed to resemble Greenland)

Either use a hair dryer or time to let ice melt.

Ask: What will happen to the water level when the ice melts?

Discussion: Thermal expansion occurs (access prior knowledge) so as the water is getting more heat, it is expanding. Therefore with sea surface temperatures rising, the water level is rising due to thermal expansion.

I am doing this lab! I love this resource and I think it a fantastic visual that will solidify ideas for students.

Albedo of ice: (I have never heard of this before.) Since ice and snow are light colored, the sun bounces off of these substances. Albedo is a measure of the reflectivity of a surface. The ocean absorbs the energy which melts the ice making the water warmer which melts more ice. I am going to research this further to make sure that I really understand this topic in a way that I can translate it to my students.

Storage of Carbon Dioxide: Ocean Acidification

The ocean is basic on the ph scale but due to the fact that is has absorbed so much of the carbon is has turned slightly acidic. Like you said, it won't turn vinegary, but it still has repercussions. With ocean acidification comes coral bleaching where the corals are stressed and they expel their symbiotic zooxanthellae. They then lose their color, become more fragile and lose potential to buffer the coast from storms.

- ***IDEA:*** Coral Reef Watch - for real time data of future and current coral bleaching events due to warmer ocean temperatures and ocean acidification.

Effects of ocean acidification:

Changing migration patterns

Changing habitats

Changing food availability

EL Nino: Is a natural occurrence that occurs anywhere from 2-7 years. The most destructive event was in 1997-1998. Spanish fisherman named it many years ago when fishing near Christmastime.

Take away for me: Scientists don't know how the trade winds reverse! (WOW!) and that El Nino suppresses upwelling.

- ***IDEA***: Use Trade wind data to show students prevailing winds and currents. UCAR, Center for Science Education has excellent resources. Also use data from 1997- 1998 to show effects of the El Nino year.

Seafloor and Plate tectonics: The various layers of the earth shape the ocean and events such as earthquakes and volcanoes. The two types of crust are continental crust and oceanic crust, the latter being more dense. A great way to prompt students to think about the plate boundaries and how they are connected with earthquakes and volcanoes is to use DEEP Earth Academy resources.

Thank you! As always, your live sessions are extremely informational and applicable to our classrooms.