

# Ocean Acidification



## Materials

- Device for students to complete background research
- Attached note sheet

## Background

- pH levels tell us whether water is acidic or basic, which will give us greater information on the health of the water and its impacts on the living organisms within it. The lower the pH level, the more acidic, and the higher the pH level, the more basic the water is.
- Although this may be difficult to understand in terms of the ocean as a whole, think about it in a pool. If you have a pool or have been to a pool, there are people who test the pH level in the pool to ensure that it is at a safe level for swimming. This is the same in the ocean - we want to know what the pH levels are and if they are changing.
- pH levels in the ocean are affected by many different factors, with the greatest being changes in the amounts of carbon dioxide being absorbed by the ocean.
- Carbon dioxide is emitted into the atmosphere and absorbed into the ocean, causing changes in acidification and overall ocean health.
- If ocean properties are changing, weather and climate will be affected, habitats will change, affecting organism health.
- If we analyze pH levels in the ocean, the areas with lower pH levels are more acidic, while areas with high pH levels are more basic.

**Now, let's take a look at our float data.**



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## Procedure

1. Give students time to research what a “normal” pH level is for the ocean. Have them make note of this level (or range of levels) to look back on and compare with their float data.
2. Using the data collected from the floats, students will look specifically at the pH levels of the part of the ocean that their float resides in.
3. Navigate to the “Explore Float Data” section on the GO-BGC website and choose your float: <https://www.mbari.org/adoptafloatviz/>
4. Graph 1:
  - a. X-variable: depth
  - b. Y-variable: pH level
5. Are the pH levels consistent at every depth?
6. What is the average pH level?
7. Graph 2:
  - a. X-variable: date
  - b. Y-variable: pH level
8. Are there differences in pH level between days?
9. What is the average pH level?
10. Now, looking back at the pH levels collected from research, how does the float pH data compare to the expected levels?

## Discussion

- Will we see a change in the acidity of the ocean water in the future? Why or why not?
- Why is there more carbon in the atmosphere than there used to be? How does that affect the pH levels?
- What are the issues that arise due to increased ocean acidification?
- How can we help reduce the amount of carbon that is put out into the atmosphere (and will ultimately be absorbed in the ocean)?



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### **Next Generation Science Standards:**

MS-ESS3-2 Earth and Human Activity

Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

MS-ESS3-3 Earth and Human Activity

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

### **Ocean Literacy Principles:**

#3 - The ocean is a major influence on weather and climate.

### **Climate Literacy Principles:**

#2 - Climate is regulated by complex interactions among components of the Earth system.

#4 - Climate varies over space and time through both natural and man-made processes.

#5 - Our understanding of the climate system is improved through observations, theoretical studies, and modeling.



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