



## **Ocean Acidification: Exploring data from ocean science**

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### **Summary**

- Audience: high school science, introductory environmental science courses
- Purpose: Assuming teacher has introduced basic concepts of [climate change](#) (NASA), [ocean acidification](#) and environmental impacts (CA Academy of Sciences) and the [pH scale](#) (CU Boulder PhET simulation), **students will explore recent and live data from buoys and oceanographic research vessels** (*scientists doing science*) - including calculating mean/median of a data set (*reinforcing basic statistics, reading and interpreting data and graphs*), making predictions about pH (*claim/evidence/reasoning*), understanding both natural and anthropogenic factors on oceanic pH (*variables in science*), and reviewing known impacts to marine ecosystems.

*TAGS: ocean acidification, ocean pH, teaching ocean acidification with data*

### **Attachments:**

1. Classwork handout
2. Classwork handout rubric (teacher version)
3. Sample spreadsheet (GOMECC-2) from download of ship data (teacher version, students download their own as part of exercise)

### **Key Concepts**

- Ocean acidification process, relationship to climate change
- Measurements of central tendency (mean, median) in pH data sets
- pH measurements and pH scale

### **Objectives**

Students will be able to explain ocean acidification, including researching pH data from oceanic buoys and prior underway NOAA research vessels. Students will analyze and interpret pH monitoring data and offer explanations for what-if scenarios in the worksheet.

- Ask questions and construct explanations
- Analyze and interpret data
- Use mathematics and computational thinking
- Engage in argument from evidence

- Obtain, evaluate, and communicate information

## **Materials**

- Teacher projector
- Class set of student worksheets with teacher rubric
- Laptop or PC stations with Excel or other suitable program and internet connection (for live data).

## **Procedure**

1. Introduce ocean acidification and review pH scale. Note videos and models above.
2. Students work in groups of 2-3 to answer the worksheet. Teacher roams and checks in with rubric.
3. Students use laptops with internet connection to research buoy data and ocean research vessel data (directions in worksheet).
4. Students answer questions about the data and submit answers to their worksheets to the teacher at the end of class.

## **Assessment**

- Student worksheet with rubric

## **Additional Resources**

- Mean, median tutorial  
<https://www.statcan.gc.ca/edu/power-pouvoir/ch11/5214867-eng.htm>
- Ocean Observatories Initiative <http://oceanobservatories.org/>
- Effects of Climate Change on Marine Ecosystems  
<https://www.nap.edu/read/12904/chapter/6>