

HW3 assignment

Due 16-Sep-21
by 11:59 pm

Corresponds to theme of Lecture 5: Biogeochemical and Ecological Dimensions



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TRAVEL AWARD

Vembu Subramanian
Ocean Scholars Award

A total of \$2,500 is available
for this opportunity.

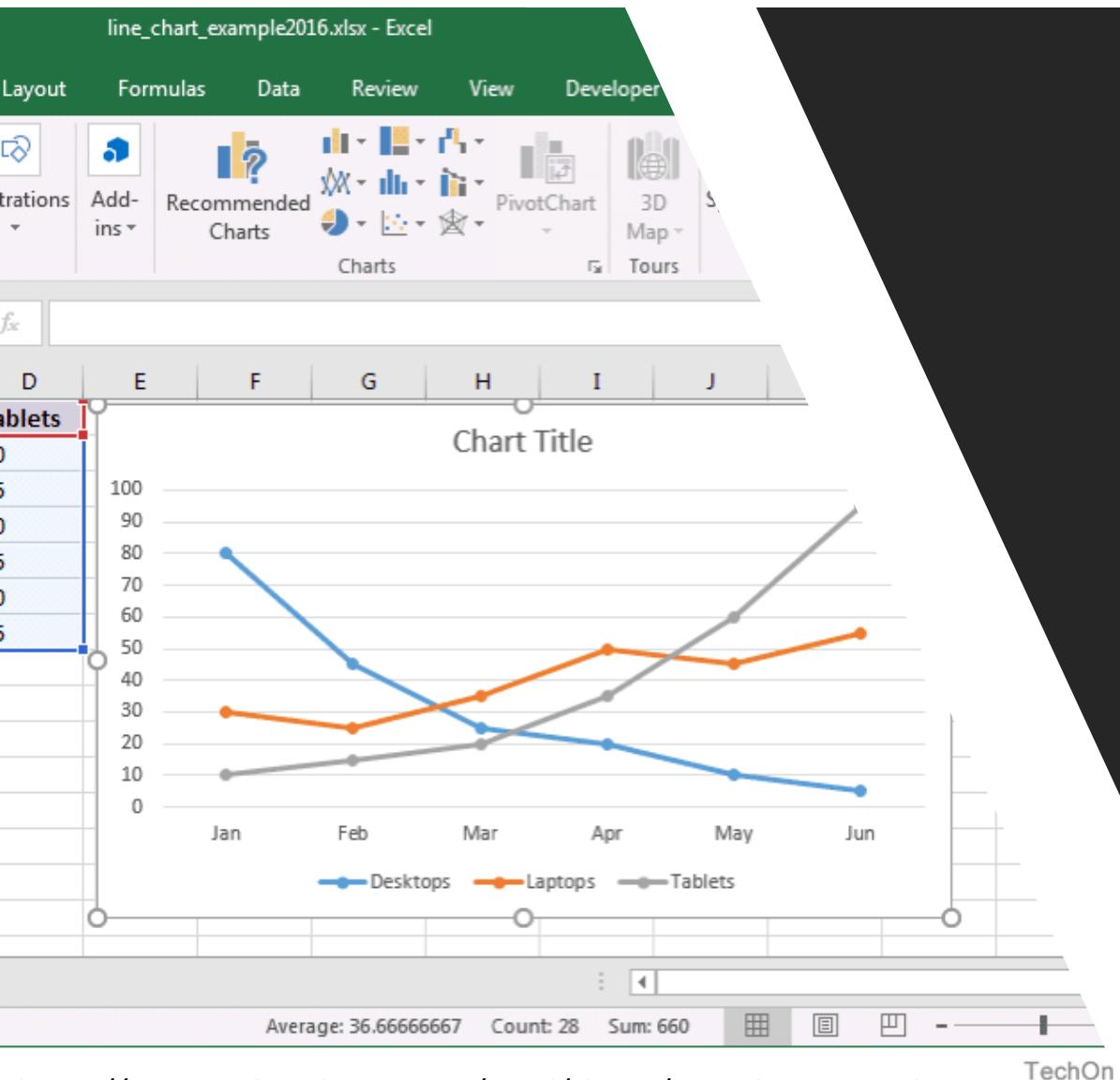


DATA CHALLENGE

Integrating Data to Understand a
Coastal Ocean Event

There are two \$3,500 prizes.





“I’m not that good
at Excel/coding”

1. First, no one expects you to be at this stage!
2. Ask lots of questions! You're here to practice and learn.
3. Practice Google queries
4. Help each other!
5. You're the best, don't worry, you got this

“I’m not that good at Excel or coding”

 Published

 Edit

⋮



Analytical Assignment Discussion Thread ↗

Sep 9 at 8:49am

Philip Bresnahan (He/Him)

All Sections

Post questions regarding analytical assignments here. Please try to help each other out! I will chime in, as will Bentley and Phyllis, to try to help as well. There are many similar questions among students, so the more we can help each other out in a public forum like this, the better! Please don't feel embarrassed to post questions here; I guarantee multiple of your classmates have the exact same questions.

Search entries or author

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Philip Bresnahan (He/Him)

8:50am

⋮

Reply to this thread for questions regarding the Excel Argo assignment

↪ Reply

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Argo analysis check-in

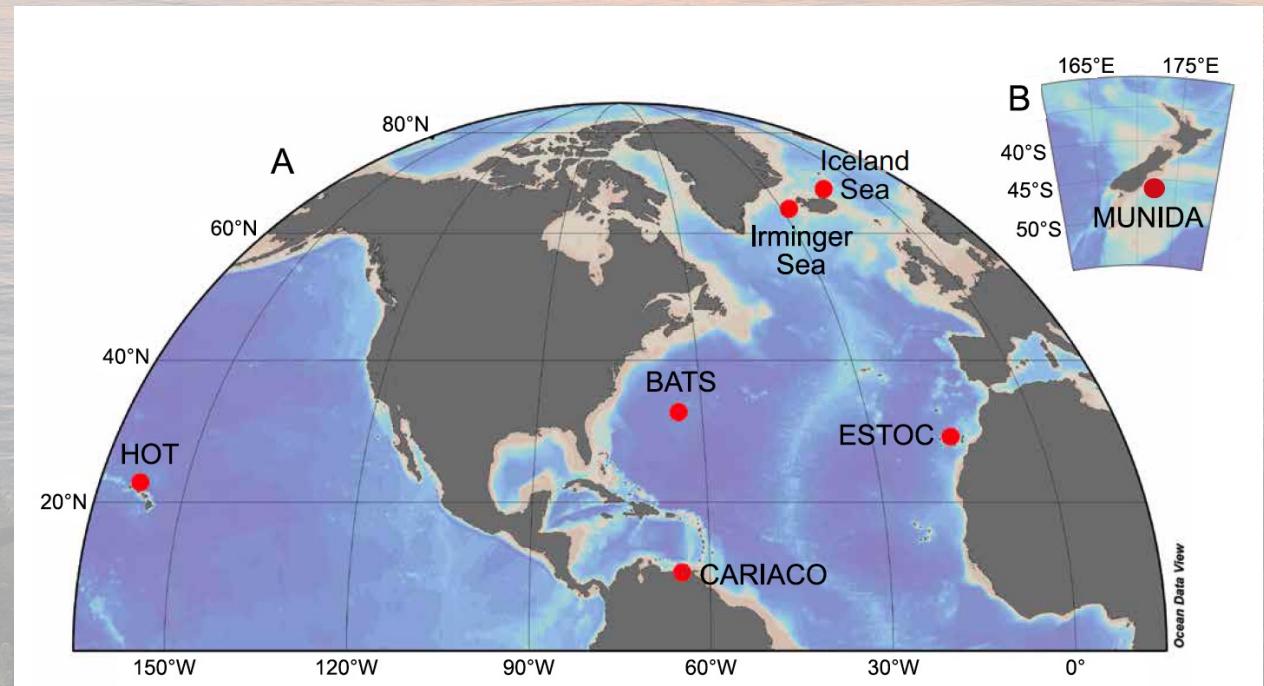
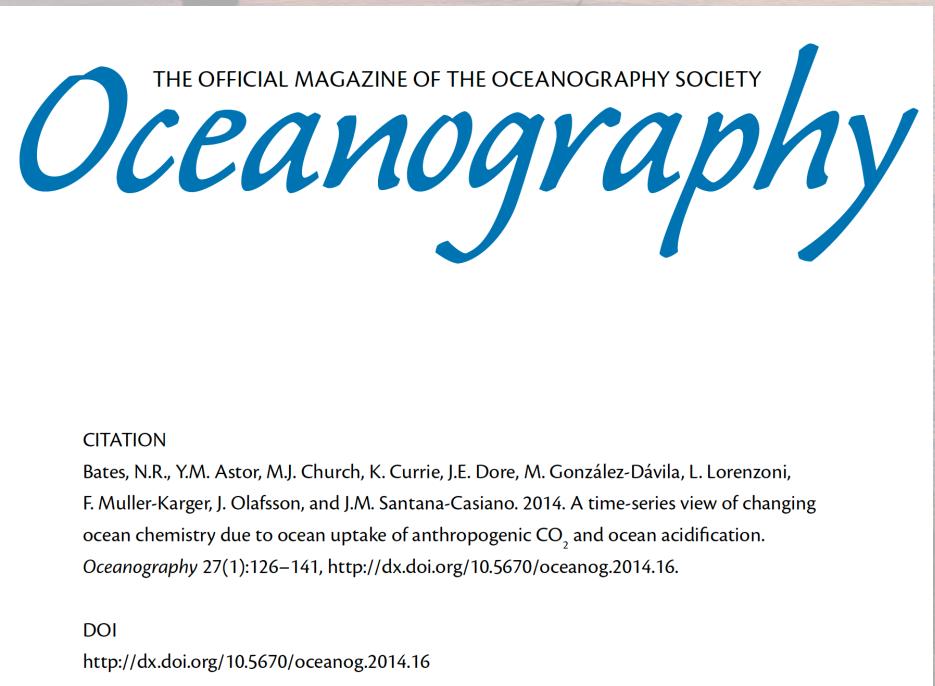
Questions/comments?

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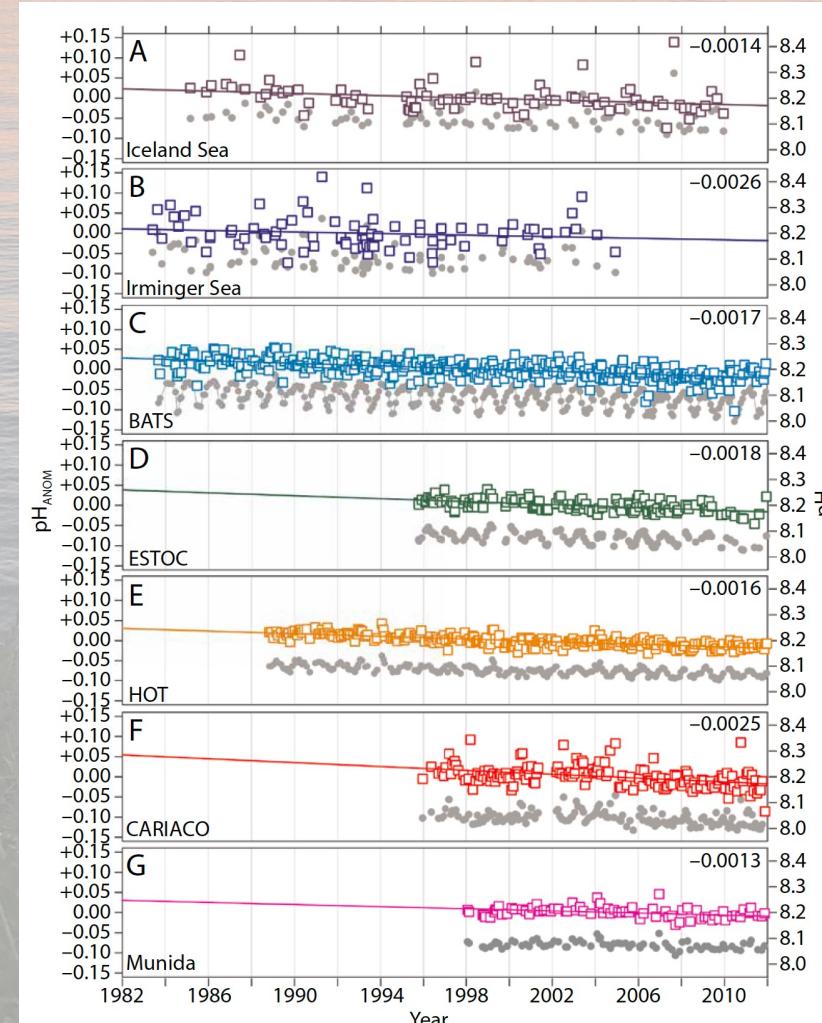
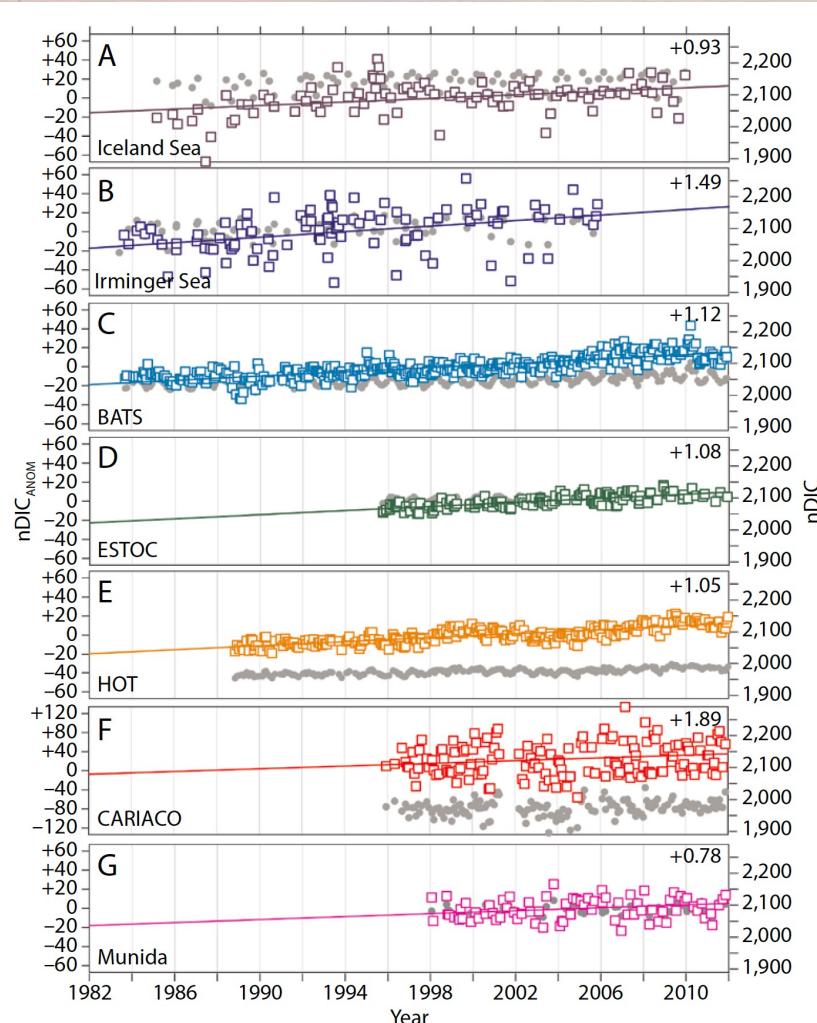
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Ch 1, reference 1: Bates et al. 2014

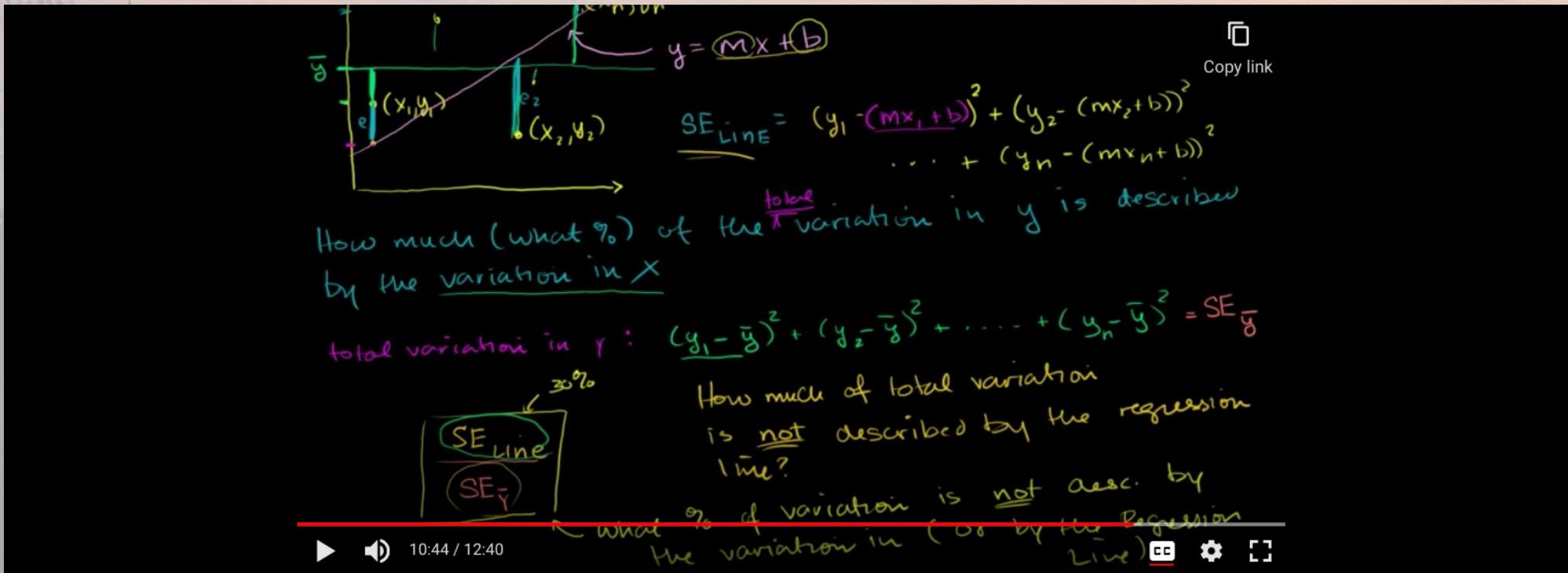


A globally consistent picture

DIC and pH as functions of time



Linear Regression & R²



R-squared or coefficient of determination

AP.STATS: DAT-1 (EU), DAT-1.G (LO), DAT-1.G.4 (EK)

<https://www.khanacademy.org/math/ap-statistics/bivariate-data-ap/assessing-fit-least-squares-regression/v/r-squared-or-coefficient-of-determination>

The assignment

- As with HW2, submit a Word document or PDF with the following graphs and calculations as well as answers to the following questions

Part 1 (of 2): BATS data exploration

- An examination of BATS (Bermuda Atlantic Time-series Study) data
- First, familiarize yourself with the information available at <http://bats.bios.edu/significant-findings/>
- Download the data that I hyperlinked in the HW assignment description on Canvas (right-click and Save Link As...)
- Examine the column header definitions in the first few rows

Part 1 (of 2): BATS data exploration

1. Plot CO₂ (y-axis) vs. decy (x-axis) and include plot in your report.
 - Label both axes and include the units for the y-axis (x-axis is self-explanatory; time is the one exception to the rule to label axes)
 - IMPORTANT: the file currently has a lot of bad data (-999) AKA lots of flags
 - You must remove those values prior to plotting or it will ruin the results
2. Calculate the slope and intercept of a linear regression fit of the data. Report these in your submission. Include these metrics in the figure you submit in a place where they are readable.
3. Answer the following:
 - What units does the slope have?
 - What is the significance of the slope and its units?

Part 2 (of 2)

Visit <https://coast-lab.org/interactive-pages/marine-co2-equil.html> to complete the following tasks

Create a new heading in your report and call it “Part 2” then respond to the following prompts.

1. Bring the cursor to a pH of 8.1 (the current average pH of our surface ocean). What are the concentrations of the various ions? Write the ions in proper chemical compound format and also write their common names (e.g., CO_3^{2-} is carbonate; include that and the others). Use proper superscripts and subscripts.
2. In general, calcifying organisms need carbonate ions to produce shells ($\text{Ca}^{2+} + \text{CO}_3^{2-} = \text{CaCO}_3$). What change in pH, relative to current conditions, would be favorable for calcifying organisms? More carbonate ion is better for many organisms.
3. Immediately prior to the industrial revolution, average surface ocean pH was 8.2. Although this is only a decrease of 0.1 on the pH scale, why might it have a large impact on calcifying organisms? To answer this better, compare the concentration of the ions when the pH is 8.2 compared to 8.1. What is the change in the relevant ion’s concentration when pH goes from 8.2 to 8.1?
4. The graph above is based on an unchanging value of total dissolved inorganic carbon (2,200 $\mu\text{mol/kg}$). However, we know that total dissolved inorganic carbon concentrations are increasing globally due to the influx of anthropogenic/human-made CO_2 . How do you think the lines on this graph might change as total dissolved inorganic carbon concentrations continue to rise? Do you think all of the lines will change in the same way? Why/why not?