Oceanography GEOL-1550

Spring 2020

**Air-Sea Interactions**

At-home exercise

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Activity Objective:** Your objective for this activity is to examine how atmospheric processes affect surface oceanographic conditions. You may type your answers into this page and submit.

**I affirm that I completed this assignment INDIVIDUALLY: \_\_\_\_\_\_\_\_\_\_ (Initial)**

**Pre-Activity Questions – What do you remember from before Spring Break? 😊**

Everyone will remember a different amount of material from before Spring Break, especially since it was extended to TWO weeks! The goal of this assignment is to get you back into the “swing” of the topics we discussed prior to the break (Air and Ocean circulation, waves), and to assess what you already know about our next topic: tides. You will be assessed based on your answers in Part 2 of this assignment, not Part 1.

**PART 1:** Please answer the following questions based on what you REMEMBER. Do NOT use your phones, class notes, or other resources to answer these questions. If you don’t know remember specifics about the topic in the question, you can write that.This portion is for informational purposes ONLY and is not scored for a grade.

1. What is the underlying cause of global atmospheric and oceanic circulation?
2. Surface ocean currents are driven by what? Deep ocean currents are driven by what?
3. What factors influence surface waves development? List three if you can remember them!
4. High pressure systems mean \_\_\_\_\_\_\_\_\_\_\_ air masses and \_\_\_\_\_\_\_\_\_\_\_\_\_ weather. Low pressure systems mean \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ air masses and \_\_\_\_\_\_\_\_\_\_\_\_\_ weather.
5. Near-shore (coastal) ocean waters may be affected by what factors? Think holistically – geologic, astronomical, physical atmospheric and oceanic. List them according to which has the greatest effect, in your opinion.

**PART 2:**

Go to this Website <https://datalab.marine.rutgers.edu/explorations/2019/airsea.php?level=exploration> and answer the following questions. You may need to click on items in the Background Information to get started!

1. For this exercise, where are these data from? Be specific (name of ocean, name of array, off the coast of which state, and at what water depth).
2. What data is being shown in this graph? What are the minima and maxima for the variables shown on the Y-axes? Over what time frame are we looking?
3. Do the minimum values of each variable occur at around the same time? What about the maximum values? Based on your previous answers, what is the relationship between the two variables here?
4. Based on what you know (or have looked up in your textbook) regarding drivers of various wave properties, hypothesize some factors that could account for the relationship observed in #3.

We are now going to add more data over the same timeframe and location. Go to this website for the next set of questions: <https://datalab.marine.rutgers.edu/explorations/2019/airsea.php?level=concept_invention>

1. Click “Next” to add wind speed data, and again to add current speed. Explore how these two new variables change through time. How do wind speed and current speed EACH vary over the course of the week?
2. Look closely at the Jan 3-Jan 5 time frame for wave height, wind speed and current speed. When does the maximum wave height occur? Does this happen before or after the maximum wind speed? And before or after the maximum current speed? Which of these do you think is most responsible for driving wave height?
3. The current speed data show significant fluctuations throughout the sample period. What could be causing these daily fluctuations?

We are now adding a final data set over the same timeframe and location. Go to this website for the next set of questions: <https://datalab.marine.rutgers.edu/explorations/2019/airsea.php?level=application>

1. What are variables are the two new graphs illustrating? Include units.
2. What natural process is responsible for the collective air-sea changes that occur on January 4th? Describe in words and provide evidence from these datasets.
3. With your interpretation above, predict the pattern for the lowest graph on this page for Jan 4-6. Draw it in (your first attempt please) and take a screenshot. Submit the image with this assignment (label the file meaningfully – e.g. “your last name\_GEOL1550\_Q10”).
4. What questions (if any) do you still have about dynamic air-sea interactions?