Lab 6 – Ocean Waves: linking the marine atmosphere and ocean surface

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Section number \_\_\_\_\_\_\_\_\_\_\_\_\_

Complete the lab and use this form as your answer sheet. Type answers in the Text boxes which will expand as you type in them.

Lab 6.1 – How do atmospheric conditions change?

1. What is the maximum and minimum barometric pressure during this week?

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| Max. barometric pressure: |  |
| Min. barometric pressure: |  |

1. What is the day and time when the maximum and minimum occur?

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| Maximum |  |
| Minimum |  |

1. What is the barometric pressure on January 3, 2018 at 1800?

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1. Describe the barometric pressure between January 1 and the end of January 4.

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1. What is the maximum and minimum wind speed during this time period?

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| Maximum |  |
| Minimum |  |

1. Describe any relationship you see between the barometric pressure and wind speed.

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1. Recall that winds are generated by air moving from high pressure to low pressure. If the atmospheric pressure had dropped more on January 4th (e.g., to 945mb), do you think the winds would be weaker or stronger?

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1. As wind speed increased on January 4th, what do you think happened to the height of the waves at the location of the buoy?

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Lab 6.2 – How does the ocean react to changes in the atmosphere?

1. Calculate the total decrease in barometric pressure between January 4, 2018 0000 and January 4, 2018, 1800.

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1. How much did the winds increase during this same 18-hour time period?

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1. How many hours did the wind speed stay above 12 m/s?

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1. Identify the maximum wind speed and maximum wave height during the week. Do they occur at the same time?

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1. Is there a positive or negative relationship between wind speed and wave height?

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1. Do changes in wind speed and wave height happen at the same time or does one happen before the other?

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1. A storm like this is referred to as a 'bomb cyclone' if the atmospheric pressure drops by at least 24 mb in 24 hours. Does this storm fit the description of a bomb cyclone?

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1. If the winds had reached higher speeds, what do you think would have happened to the height of the waves near the buoy location?

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1. An 11 meter wave height is about the same size as a three-story building. What are the possible impacts of a wave this size?

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Lab 6.3 – Wave dynamics

1. What are the maximum and minimum values of significant wave period?

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1. Do the largest and smallest values of wave period and wave height happen at the same time?

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1. Compare the changes in wave height and wave period over time and determine if, in general, they have a positive or negative relationship.

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1. Using the equation above, find the wavelength (L) for the waves on January 5, 2018 at 0000 (remember, this was the time period of the largest wave height).

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1. How fast are the waves traveling at this location? Remember, just like the speed of your car is distance divided by time, the wave phase speed is the wavelength divided by wave period (speed = L/T).

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1. Explain how the speed of a wave changes with the wavelength.

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1. This buoy is located 260 km from the coast of New Jersey. Based on the wave speed at the time of maximum wave height it would take about 4.5 hours for these waves to travel from the buoy to the coastline. Does that seem slow or fast to you?

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Lab 6.4 – Wave dynamics

1. Do you see the same relationships between atmospheric pressure and wind speed that you saw from the single storm event in the first labs?

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1. Based on changes in atmospheric pressure and wind speed from the graph, identify three time periods when you would expect to see increases in wave height.

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1. Based on the relationship you found between wind speed and wave height in the previous exercise, when do you expect to see the largest wave height in the month of February?

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1. Compare the measured wave height to the three time periods you predicted would be greatest. How do they agree/disagree with your predictions?

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1. Was your prediction of when the largest wave height would occur correct?

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1. If there are time periods with large wave height that you did not predict, what do you think caused those waves? Where do you think they were generated?

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1. Waves are a potential source of renewable energy. How do you think the amount of wave energy a system could harness would change during this week?

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