**NOVA Cloud Lab Worksheet**

*Hurricanes, cyclones, and typhoons threaten thousands of coastal communities each year. In the Cloud Lab, you will learn how scientists use sophisticated instruments and data to study the development of Earth’s most powerful storms and better predict their impacts.*

**Engage.** Introduction to Cloud Lab

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| **Instructions:**Visit [pbs.org/nova/labs](http://www.pbs.org/wgbh/nova/labs/) and click on the Cloud Lab. Log in with the account that your teacher has instructed you to use. If you do not have a Google or Facebook account, we recommend that you create a PBS account to save your work.  Watch the introductory video on the homepage of the Cloud Lab and answer the question below. |

1. What conditions do you think are necessary to produce severe storms like hurricanes?

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**Explore.** Inside a Megastorm

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| **Instructions:** Click on “CHALLENGE” to enter the Cloud Lab and then click on the “Inside a Megastorm” activity. In this activity, you will track the development of Hurricane Sandy.  Click on each storm icon to view an image, video, or data visualization of the storm’s growth. Use the chart below to collect data on the important characteristics of Hurricane Sandy at each stage of its development. Look for information about characteristics such as sea surface temperature, cloud temperature and height, and air pressure. The first stage has been completed for you.  Answer the discussion question after completing this activity. |

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| STAGE OF DEVELOPMENT | DATA |
| 1. TROPICAL DEPRESSION | OCTOBER 22, 2012 | * A cluster of thunderstorms is centered around a low-pressure area * Powerful thunderstorms called “hot towers” are near the center (14 km high) |
| 2. SANDY GETS HER NAME | OCTOBER 23, 2012 |  |
| 3. SANDY BECOMES A HURRICANE | OCTOBER 24–25, 2012 |  |
| 4. A "FRANKENSTORM" IS BORN | OCTOBER 26, 2012 |  |
| 5. RIDING THE GULF STREAM | OCTOBER 28, 2012 |  |
| 6. LEFT TURN | OCTOBER 29, 2012 |  |
| 7. LANDFALL | OCTOBER 29, 2012 |  |
| 8. THE STORM WINDS DOWN | OCTOBER 31, 2012 |  |

1. Based on the data that you’ve collected, what do you think were the most important factors for the development of Hurricane Sandy?

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**Explain.** Cloud Lab Videos

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| **Instructions:**Go back to the Cloud Lab homepage and click on “Video Library.” Watch the following videos and answer the corresponding questions. |

1. Clouds and Weather: How does the Sun's uneven heating of Earth drive the creation of clouds?

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1. Severe Storms: What are the ingredients for a severe storm and where do they come from?

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1. The Climate Wild Card: How do clouds influence the exchange of energy between Earth, the Sun, and space? How might climate change affect this process?

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1. The Coriolis Effect: Why do storms spin in different directions in the northern and southern hemispheres?

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**Elaborate.** Analysis & Reconstruction

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| **Instructions:**Enter the Cloud Lab and click on “Analysis & Reconstruction.” In this activity, you will analyze data about the development of three tropical cyclones to complete three challenges. You will reconstruct the path of each storm by placing the missing stages in the correct place. To do this correctly, you must read the descriptions of all the stages of each storm.  Once you have completed all the challenges, the icon for each challenge will turn gray. Make sure that you are logged in so that you can save your progress and email a screen capture of the completed activity to your teacher. To perform a screen capture, hold Command + Shift +3 (Mac) or use the PrtScn/PrtSc key (PC). |

**Evaluate.** Storm Prediction

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| **Instructions:**Click on the “MENU” button at the top of the screen. Then, click on “Storm Prediction.” Read the instructions for all the functions on the page.  In this activity, you will use the Storm Prediction tool to collect data on the past week of weather activity in the region you live. Explore the various overlays and use the table below to log your observations on changes in water vapor, cloud top temperature, cloud top pressure, land surface temperature, and precipitation. Finally, make a prediction of the weather for the next three days based on your observations. After four days, revisit your prediction using the Storm Prediction tool and evaluate its accuracy. |

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| DAY | OBSERVATIONS AND PREDICTIONS (use the overlays) |
| Day 1 (eight days ago) |  |
| Day 2 |  |
| Day 3 |  |
| Day 4 |  |
| Day 5 |  |
| Day 6 |  |
| Day 7 |  |
| What is your prediction for the next three days of weather? |  |
| ANSWER FOUR DAYS FROM NOW: Was your prediction accurate? |  |