

## 7<sup>th</sup> Grade Atmosphere and Weather Hazards Class

Objective: Students will examine weather hazards and their causes using technology to create models and predict damage. Students will also learn how emergency managers communicate dangers.

Grade level science competency objectives:

3.01 Explain the composition, properties and structure of the atmosphere:

- Stratified layers.
- As altitude increases, air pressure decreases.
- Equilibrium.

3.05 Examine evidence that atmospheric properties can be studied to predict atmospheric conditions and weather hazards:

- Humidity.
- Temperature.
- Wind speed and direction.
- Air pressure.
- Precipitation.
- Tornadoes.
- Hurricanes.
- Floods.
- Storms.

3.06 Assess the use of technology in studying atmospheric phenomena and weather hazards:

- Satellites.
- Weather maps.
- Predicting.
- Recording.
- Communicating information about conditions.

Before your RENCi Rover visit

Your students should be familiar with the vocabulary of weather hazards. The visit is best used as an in-depth investigation, but can serve as an introduction or review. Please let the Outreach Coordinator know if this visit will be an introduction to the unit.

On-Site Activity (50 minute visit)

This program is designed to be partly in the classroom and partly outdoors at the ROVER.

- Educator introduces the science underlying atmospheric science and severe weather with a focus on hurricanes.
- Students will have a hands-on extreme weather simulation activity.
- Students will use weather station equipment to measure current conditions and compare to weather hazards.
- Students will use handheld GPS and satellite mapping to gain an understanding of weather maps and storm prediction.
- Educator will demonstrate amateur radio equipment and hazards communication.

The planned time frame is 50 minutes, but can be extended for greater in-depth experiences or divided into subunits. Call 252-737-1773 or email [covim@ecu.edu](mailto:covim@ecu.edu) to talk to the educator about your specific needs.

Pre-visit Activity-

Measuring Weather Vocabulary lesson

Match the atmospheric property with how it is measured:

- |                                 |   |
|---------------------------------|---|
| 1. Atmospheric Pressure:        | a. Measured by rain gauge, calibrated in centimeters or inches. Floods are caused high amounts of rain or snow melt which overwhelm streams and rivers.   |
| 2. Wind Speed:                  | b. An increase in sea water height from the level that would occur under calm conditions, measured in meters or feet, contributes to floods in coastal areas.   |
| 3. Humidity (relative humidity) | c. An event of relatively short duration characterized by thunder, lightning, gusty winds, turbulence, precipitation (including hail), and under the most severe conditions, tornadoes. (no measurement scale)                |
| 4. Temperature                  | d. Measured with thermometers that may be calibrated to a variety of scales. In most of the world (except for the United States, and a few other countries), the degree Celsius scale is used.                                |
| 5. Precipitation                | e. The Saffir-Simpson Scale is used to measure the intensity of this tropical cyclone with sustained winds of 74 miles per hour or greater. The 1-5 scale includes measures of central pressure, wind speeds and storm surge. |
| 6. Storm surge                  | f. The rate of change of wind speed or direction within a relatively short distance. The vertical kind contributes to formation of tornadoes and sustains thunderstorms. Can be hazardous for aircraft near ground.           |
| 7. Thunderstorm                 | g. A violently rotating column of air extending between a cloud and the surface of the earth is measured on the F-scale (Fujita) based on wind speed and destruction (F0-F5).   |
| 8. Tornado:                     | h. Measured by a hygrometer, it is the ratio of the partial pressure of water vapor in a parcel of air to the saturated vapor pressure of water vapor at a specific temperature, expressed as a percentage                    |
| 9. Hurricanes:                  | i. Measured with anemometer, may be reported using different units including knots, miles per hour, or meters per second.   |
| 10. Wind Shear:                 | j. Measured by a barometer in millibars or inches of mercury.   |

Extension Activity

Hurricane Simulation Activity-

Objective: Students take the roles of mayor, civic officials and other community members of the city of Nags Head, North Carolina. Hurricane Isabel is developing/approaching in the Atlantic Ocean. The students must how to respond to the storm.

1. Teams of up to 10 students will work together. First they must determine their roles. The unique role will be the mayor who will not only make the final decision, but will create the press release for the public and present it at a press conference.

2. Student roles:

Role	Responsibility	Written work
Mayor	Decides whether to call a mandatory evacuation and how the city responds to the storm	Press release
Police Chief (staff)	Safety of citizens and police officers. In a hurricane police officers will be called to rescue people, which puts the officers at risk, after hurricanes, there is the danger of looting, crime and accidents to people that are in damaged homes and businesses.	Memo to mayor with opinion on evacuation
Tourism Director (staff)	Promote tourists business in the area. You spend \$2million dollars each year to promote the area. Although the summer season is just over, you don't want people to be scared away by storms	Memo to mayor with opinion on evacuation
Emergency Manager (staff)	To get people to safety in a storm. You plan for storms and know that there are few evacuation routes from the barrier island. The risk of loss of life due to storm surge is great if the storm is strong.	Memo to mayor with opinion on evacuation
Mayor's assistant (staff)	To best inform the mayor of the history of hurricanes and the risks of mandatory evacuation. The mayor wants to be re-elected in the next year.	Memo to mayor with opinion on evacuation
Long-time resident	Your family and property. You have seen storms come and go and want to stay put. You are afraid that if you leave someone will steal from your home or business.	Letter to mayor
Fisherman's Association Director	Commercial fishermen's interests. An evacuation will disrupt fishing activity if not necessary and homes and vessels will be vulnerable.	Letter to mayor
City Council member (up to 3)	The citizens of your district. City council members will hear from residents and business owners, but also need to protect people from the storm.	Letter to mayor with opinion

Students read news reports about the storm. They develop opinions based on their role and the data they have gathered from the articles.

News about the storm at the time:

September 7, 2003: [http://www.usatoday.com/weather/hurricane/2003-09-07-isabel-henri\\_x.htm](http://www.usatoday.com/weather/hurricane/2003-09-07-isabel-henri_x.htm)

September 12, 2003: <http://www.cbsnews.com/stories/2003/09/13/world/main573108.shtml>

September 14, 2003: [http://www.baltimoresun.com/news/weather/hurricane/bal-te.isabel14sep14\\_0\\_61300.story](http://www.baltimoresun.com/news/weather/hurricane/bal-te.isabel14sep14_0_61300.story)

The student will use their research on hurricanes and their impacts to write memos to the mayor or letters. The mayor will call a meeting with city council and staff to decide whether to call for a forced evacuation. Other citizens may sit in on the meeting. The mayor will make the final decision and submit a press release and hold a brief press conference announcing the decision.

Links to background on hurricanes:

<http://weathereye.kgan.com/expert/hurricane/basics.html>

[http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/hurr/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/hurr/home.rxml)

This exercise is modified from <http://weathereye.kgan.com/expert/hurricane/intro.html>