

Science On A Sphere

Middle School Pre-visit Activities



hurricanes

National Science Education Standards:

Structure of the Earth System

- Clouds, formed by the condensation of water vapor, affect weather and climate.
- Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.

Earth in the Solar System *(This concept will not be emphasized, but will be discussed.)*

- The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's axis of rotation and the length of the day.

Maryland Voluntary Science Curriculum Topic E; Indicator 3; Objective B;

This will be tested on the MSA for grades 5 and 8.

Maryland State Indicators 2.8.13

ENGAGE	<ol style="list-style-type: none"> 1. Ask the questions, <ol style="list-style-type: none"> a. "What is a Hurricane?" b. What are some other names for hurricanes? c. How big is a hurricane? d. Where do most of the hurricanes that strike the US generally start? e. How do hurricanes form? f. How do we study the science of hurricanes? g. What would you like to learn about hurricanes." <p><i>See Teacher Notes below for some answers to these questions.</i></p> <ol style="list-style-type: none"> 2. Make a list of the "Facts" that your students "know" about hurricanes. Tell them that they will be learning more about hurricanes and that the class will come back to this list to see which 'facts' were correct and which were misconceptions. 3. Demonstrate the motion of a hurricane. <i>(Optional)</i> http://www.nationalgeographic.com/ngkids/trythis/tryfun3.html <i>(This will only take a minute or two if the teacher has this set up in advance. It is suggested that this be done as a teacher demo on an overhead projector for the whole class to see.)</i> 4. Show the visualization: http://svs.gsfc.nasa.gov/vis/a000000/a003200/a003282/wilma_sst_clouds_640x480.mpg This visualization shows sea surface temperatures and clouds for Hurricane Wilma. The data is from October 15 through 20, 2005. The false colors on the ocean represent the sea surface temperatures, and satellite images of the hurricane clouds are laid over the temperatures to clearly show the hurricane positions. Orange and red depict regions that are 82° F and higher.
EXPLORE	<p><i>If you have a computer:</i></p> <ol style="list-style-type: none"> 5. Go to http://svs.gsfc.nasa.gov/vis/a000000/a003200/a003228/hurricanes_640x480.mpg This narrated video includes a number of scientific visualizations that information on how hurricanes form, rainfall within a hurricane, dangers, conditions for hurricane genesis, etc. It is also available in Closed Caption at: http://svs.gsfc.nasa.gov/vis/a000000/a003200/a003228/hurricanes_video_cc.mpg <i>(The teacher might want to download this in advance rather than run as a streaming video. The download is free and may be used as often as the teacher would like to use it. The download is large, so it might be wise to download it overnight a couple of days in advance.)</i> As the students view this visualization have them take notes to help answer questions from the ENGAGE activity. 6. Hand out the reading materials provided with this lesson. Have the students read through the enclosed materials and continue to take notes that help answer the questions from the ENGAGE activity.

Science On A Sphere

Middle School Pre-visit Activities



	<p>7. Students should go to http://observe.arc.nasa.gov/nasa/earth/hurricane/intro.html (This is website tutorial on hurricanes with links to hurricane creation, seasons & prone areas, remote sensing, classifying, dangers, etc). Have the students navigate through this site and continue to add to their notes that help answer the questions from the ENGAGE activity. (The teacher may want to assign a few students to do this part while the others read the paper materials and then do the next EXPLAIN activity. This could be a good Jigsaw activity, albeit a short one.)</p> <p><i>If you do not have computer access:</i></p> <p>5. Hand out the reading materials provided in this lesson. Have the students read through and take notes that help answer the questions from the ENGAGE activity. The teacher may also want to have the students use their textbooks and any other materials that can be provided (i.e. a set of weather books from your library) to gather more information.</p> <p><i>*The teacher can go to the website in number 4 above and then print out the pages in advance of this lesson if computer access is not available in class.</i></p>
EXPLAIN	<p>6. After the video is done, and/or after the students are completed with the reading, have them share the information they have gathered. The students should take notes as the teacher puts all the information on the board, chart paper, computer, or some other method of collecting/gathering together the data into a place that can be referenced by class in the future. (This can be done within cooperative groups first; then, the groups can report out to the teacher.)</p>
EXTEND	<p>7. Have students complete Part A of the “Science on a Sphere Activities for Students No. 2”. This will help them to understand how satellite data is used to view a hurricane. Part B is included with these materials, but does not go along with the objectives of this lesson. It may be helpful to the teacher in another part of the study of hurricanes and helps in integrating graphing. http://www.fsl.noaa.gov/visitors/education/SOS_ActStudents_2.pdf</p> <p>8. Read biographies of hurricane scientists. http://www.nasa.gov/mission_pages/hurricanes/bios/index.html</p>

TEACHER NOTES:

- One way to look at a hurricane is as a group of thunderstorms associated with a low pressure system in the tropics that have joined together and become ‘organized.’ This organized group of thunderstorms is known as a tropical cyclone. In the northern hemisphere, cyclones spin in a counterclockwise motion due the Coriolis Effect. Another type of severe weather event that also comes from a thunderstorm, but forms over land, is a tornado – much smaller than a hurricane.
For a more thorough definition of a hurricane go to the following site and scroll down to ‘hurricane’.
<http://earthobservatory.nasa.gov/Library/glossary.php3?mode=alpha&seg=h&segend=>
- How do NASA and NOAA scientists study hurricanes?
 - Aircraft (during the CAMEX mission.)
 - UAV (Uninhabited Aerial Vehicles)
 - Satellites (Such as TRMM and QuickSat)
 - Hurricane Computer Models
 - Visualizations of Satellite Data
- Atmosphere** – The air surrounding the Earth, described as a series of shells or layers of different characteristics. The atmosphere, composed mainly of nitrogen and oxygen with traces of carbon dioxide, water vapor, and other gases, acts as a buffer between Earth and the sun. The layers, troposphere, stratosphere, mesosphere, thermosphere, and the exosphere, vary around the globe and in response to seasonal changes.
(For a more complete definition, go to: <http://earthobservatory.nasa.gov/Library/glossary.php3?mode=all>.)
- False color** - A color imaging process which produces an image of a color that does not correspond to the true or natural color of the scene (as seen by our eyes).
- Hurricane Season** – June 1 through November 30 in the northern hemisphere.

Science On A Sphere

Middle School Pre-visit Activities



6. **Hydrosphere** – The totality of water encompassing the Earth, comprising all the bodies of water, ice, and water vapor in the atmosphere.
7. **Satellite** - A free-flying object that orbits the Earth, another planet, or the sun.
8. **SST** – Sea Surface Temperature; The temperature of the layer of seawater (approximately 0.5 m deep) nearest the atmosphere.
9. **Tropical depression** - A tropical cyclone in which the maximum sustained wind speeds sp to 33 kt (38 mph, 17 m/s).
10. **Tropics** - The area between 23.5 degrees north and south of the equator. This region has small daily and seasonal changes in temperature, but great seasonal changes in precipitation.
11. **Water vapor** - the water present in the atmosphere in gaseous form.

hurricanes