

Unit 2 overview

In this unit, students explore how tropical cyclones develop and change with time. The following overview explains how the unit follows the 5-E learning cycle and gives tips for teaching specific activities.

Unit objectives

In this unit, students will

- identify basic tropical cyclone structure and rotation;
- identify the stages in the life cycle of a tropical cyclone, from tropical disturbance through hurricane;
- relate tropical cyclone images to data describing central pressure and wind speed; and
- show where Atlantic hurricanes form, how they move, where they die out, and how their location affects their wind speed.

Digging deeper

Encourage students who complete this section early to explore their own questions using the hurricane data.

Activity 2.1 – Observing tropical cyclones (Engage)

Students visit a NOAA website to learn about the tools scientists use to study tropical cyclones. They compare the strengths and weaknesses of each technology, and identify each tool as making either direct or indirect observations. They visit NASA’s Observatorium website to learn about how tropical cyclones develop and about the structure of the storms. If you have only one computer in the classroom, you might make color overheads of a few of the pictures or connect the computer to a projection unit for all to see. The web animations provide an excellent medium for learning about the physical characteristics of a cyclone. During the discussion, record students’ ideas on an overhead or a large sheet of paper. Save the list of questions and ideas students generate for later exploration.

Activity 2.2 – Tracking Hurricane Georges (Explore)

Students learn to recognize key features of tropical cyclones by following the developmental stages of an individual hurricane, Georges (pronounced *zhorz*). By interpreting false-color infrared satellite images of the storm, they begin to understand the vertical characteristics of the storm structure. Examining the storm’s rotational characteristics, they see how the Coriolis effect and the Bermuda High affect North Atlantic hurricane movement. Students also investigate basic geography of the Caribbean and the effects of the hurricane on populated areas of the region.

After studying Georges, students examine the starting and ending points of all of the Atlantic hurricanes occurring between 1950 and 2000 to discover patterns in where the storms formed, the paths they followed, and where they died out.

Activity 2.3 – Classifying tropical cyclones (Explain)

This section explains the characteristics of each stage of tropical cyclone development, introduces the Saffir-Simpson scale and briefly discusses the concept of storm surge. Students analyze data to look for a correlation between a storm’s intensity and the amount of damage it causes.

The questions in this section are good for checking students’ reading comprehension and may provide an opening for discussion of the reading materials. Discuss the concepts with students to ensure they have a firm understanding of them before going on to the next section.

Activity 2.4 – Monitoring cyclone growth (Elaborate)

This in-depth investigation focuses on determining a Saffir-Simpson scale ranking for each of the different images of Hurricane Georges, using the pressure and wind speed recorded at the eye of the storm. A second analysis involves determining how hurricanes' wind speeds change based on location. This requires a spatial overlay operation, with students selecting all the hurricane tracks within pre-defined regions of the Atlantic Basin. Calculating statistics for the selected tracks provides the mean wind speed, which illustrates the importance of warm ocean waters in perpetuating hurricanes.

Evaluation

Use the assessment provided in this manual to gauge how well students understand the concepts in the activity. Alternatively, you might ask students to construct a layout with maps, text, and charts to explain one or more of the key concepts in this unit.

Creating layouts

The **Educator's Guide to ArcView GIS** in the Docs folder on the Exploring Tropical Cyclones CD-ROM contains directions for creating layouts.