

## Identifying Ozone Variations

**Purpose:** Students use real ozone data to answer questions.

**Grade Level:** 7 – 12

### Prerequisite:

Introduction to Ozone

Familiarity with accessing websites

### Tools:

Computer with Internet access

### National Standards:

- MS-ESS3-5 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century
- MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems
- HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate

### Vocabulary:

Dobson unit ozone ozone layer

### Lesson Links:

Ozone Watch

<http://ozonewatch.gsfc.nasa.gov/>

### Background:

The depletion of the ozone layer is recognized as one of the Earth's most important environmental issues and the Antarctic ozone hole is recognized as one of the most striking indicators of ozone depletion. During the long winter months of darkness over the Antarctic, temperatures in the stratosphere drop to below  $-70^{\circ}\text{C}$  causing thin clouds of ice crystals to form and trap chlorine-containing compounds. When the sun rises over the Antarctic in the

Spring (September), ultraviolet light rapidly releases free chlorine atoms into the stratosphere starting a cycle that destroys ozone molecules. In this activity, you will study real ozone data and answer questions about ozone levels.

### Procedure:

Assemble into groups of 2-4 students.

Part I: Explore seasonal ozone hole data

Using the Daily Animation from 2013 answer the following questions:

([http://ozonewatch.gsfc.nasa.gov/education/ozone\\_movie.mp4](http://ozonewatch.gsfc.nasa.gov/education/ozone_movie.mp4))

1. During what months do the highest values of ozone occur over the Antarctic?
2. During what months do the lowest values of ozone occur over the Antarctic?
3. How long does the ozone hole typically last?

Part II: Observing the latest seven-day total ozone images, answer the following questions:

1. Estimate the range of Dobson units over the Antarctic pole.
2. Estimate the range of Dobson units over the rest of the map excluding the Antarctic pole.