

introduction to module 1: stratospheric ozone computer lab exercises

The set of exercises that follow were designed to explore characteristics of stratospheric ozone distributions using satellite data for the whole globe collected by the Total Ozone Mapping Spectrometer (TOMS) from 1978 to 1993. Students will use *SEE Image*, a version of “NIH Image,” to display and analyze the data sets.

The password for the secured *Instructor's Guide* is available from the Goddard DAAC User Support Office (301–614–5224, 1–877–794–3147, daacuso@daac.gsfc.nasa.gov)—you will need to provide proof that you are an instructor.

The exercises are inquiry based and designed for advanced high school or college level classes. Our electronic textbook on stratospheric ozone contains supporting scientific information that may be used to answer and explain the distribution and dynamics of stratospheric ozone that the students will be observing. Additional background information can be found by going to the Computer Lab Resources Data section, Satellite Data Information.

getting started

Before you begin to work on these exercises you will need to perform the steps outlined in Sections 1–4 of the tutorial, *Using SEE Image With TOMS Ozone Data*.

SEE Image

SEE Image is a modified version of NIH Image. NIH Image and thus *SEE Image* has limited capabilities for analyses of the satellite data. Results obtained may not be suitable for scientific publication.

To use the various functions necessary for the exercises, *SEE Image* must be configured properly. If you are unfamiliar with *SEE Image*, please work through the tutorial, *Using SEE Image With TOMS Ozone Data*. If you are familiar with NIH Image or *SEE*

Image and do not need the complete tutorial, please refer to the beginning of the tutorial to configure your system, and have the **SEE_macros** loaded before beginning the exercises.

important note on presentation

Because there are multiple data source possibilities, navigational paths for moving through the hierarchical directory structure of your computer and *SEE Image* materials are depicted in two different styles. The one you use will depend on your data source. Paths for users of the SEES CD and SEES Web materials appear as follows:

Desktop | HD | SEE Image | Data | Ozone | <exercise name> | <file name>

Paths (and instructions) that are different for users of the TOMS Ozone CDs are set in italics. See the example at left.

EXAMPLE

...title of procedure...

1—Insert ...

2—Select ...

3—Go to Desktop | HD | SEE Image | Data | Ozone | ozex1 | GA801001.N7T

Desktop | OPT_004A | Y80 | M8010 | GA801001.N7T

4—Click on ...

loading the data

For SEES Web site users, go to

<http://see.gsfc.nasa.gov/edu/SEES/>

Under Stratospheric Ozone, click Computer Resources. Then click Data and click on the exercise data set you want.

When the download is complete and the archive is unpacked, which will occur automatically, you'll see three new icons on your desktop for each set of data you downloaded. Two are document icons that will have one of these file name extensions: **.sea.hqx** or **.sea**. You may trash those files. The third is a folder icon. Drag that folder into

Desktop | HD | SEE Image | Data | Ozone

It's very important that you put the data in this directory because all instructions use this path.

For SEES CD-ROM users, go to

Desktop | SEES | data

then click and drag the chosen data set into the "Ozone" folder as described above.

list of exercises

- Exercise 1—Investigating Characteristics and the Display of TOMS Ozone Data
- Exercise 2—Comparing Daily Ozone Values Over the Globe to the Daily Average and Investigating Ozone Distribution Patterns
- Exercise 3—Comparing Polar and the Tropical Monthly Ozone Distributions Through Histograms
- Exercise 4—Observing Global Seasonal Variations in Total Column Ozone Values Using Monthly Average Images
- Exercise 5—Comparing Spring Antarctic (14 Octobers) Ozone Values and Spring Arctic (15 Marches) Ozone Values
- Exercise 6—Further Examination of Differences Between Spring Arctic and Spring Antarctic Ozone Distributions
- Exercise 7—Using Monthly and Annual Averages to Monitor Seasonal Changes in Total Column Ozone for 1979 and 1992
- Exercise 8—Investigating Ozone Distributions in 1979 and 1992 Using Monthly and Yearly Global Average Ozone Values

If you have comments, problems, or suggestions, please contact the NASA Goddard DAAC User Support Office.
(daacuso@daac.gsfc.nasa.gov)