

**Chapter 1****NCSA DataScope Tutorial**

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## Chapter Overview

This chapter offers a simple tutorial that introduces and describes the basic steps involved in using NCSA DataScope:

- installing and invoking the program
- loading datasets images and palettes from files
- generating images
- saving your work
- using online help
- exiting the program

The following tutorial assumes that you know how to position the pointer, click and drag using the mouse, select items from menus, and locate files using directory dialog boxes. If you are unfamiliar with the Macintosh user interface or need more detailed information regarding these procedures, please refer to your Macintosh user's guide.

Chapter 2 offers a brief tutorial that explains how to prepare your data in a format compatible with NCSA DataScope.

The new features in NCSA DataScope 2.0, (1) using DataScope's notebook to apply external subroutines to DataScope datasets and (2) running programs on remote hosts then routing the output back to DataScope on the Macintosh, are complex. They are therefore covered in more detail in Chapters 4 and 5, respectively.

## Installing NCSA DataScope

NCSA DataScope does not require any unusual installation procedures. As you would for any new Macintosh software, create a new folder and copy the contents of the DataScope disk to your hard disk. NCSA DataScope may also be run from a floppy disk; however, datasets may exceed the capacity of floppy disks.

## Getting Started

This section outlines the steps needed for installing NCSA DataScope 2.0 and for performing some basic program operations.

### Running NCSA Telnet 2.3MacTCP

Before starting NCSA DataScope, you must first install Apple's MacTCP. If you don't, two successive dialog boxes (Figure 1.1) will appear on the screen telling you that the network isn't configured.

Figure 1.1 Configuration File Error Messages



For installation instructions and a description of NCSA Telnet 2.3MacTCP, refer to its manual. You may obtain both the program and the manual, as well as other NCSA applications by downloading them from FTP or by writing to NCSA. Refer to Appendix A for more information.

## Running NCSA DataScope

Figure 1.2 DataScope Program Icon

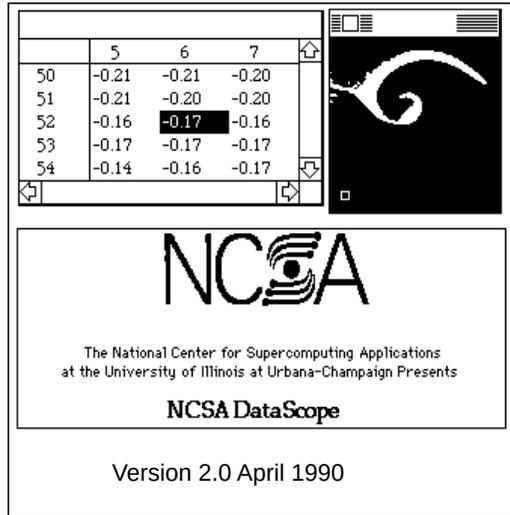


Invoke NCSA DataScope by double-clicking on the NCSA DataScope application or icon, or on any dataset that has been previously saved in NCSA DataScope. The DataScope program icon is shown in Figure 1.2.

A startup dialog box, shown in Figure 1.3, appears to introduce NCSA DataScope. Click anywhere on the screen to remove this box.



Figure 1.3 Startup Dialog Box

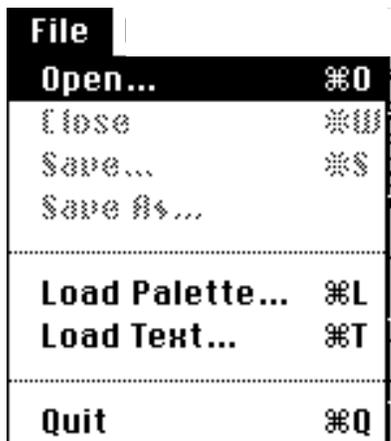


### Loading a Dataset

To load a sample dataset:

1. Select Open from the File menu, shown in Figure 1.4. A directory dialog box appears. For the purposes of this tutorial, several sample datasets have been saved on the NCSA DataScope disk within a folder named test\_files.
2. Select and open the test\_files folder.
3. Select and open the folder labeled Data.
4. Select and open the dataset labeled vortex.hdf.

Figure 1.4 File Menu



NCSA DataScope loads the dataset from this file and displays a generated image window and an interpolated image window, a text window, and a notebook window for this dataset. All three windows are now displayed because they were displayed the last time the file was saved. For more information regarding the three types of windows depicted in Figures 1.5 to 1.7, see Chapter 3, "Window Types."

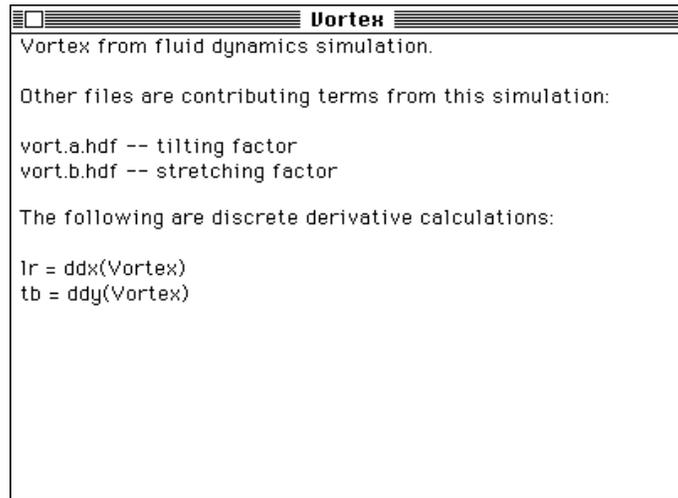
Figure 1.5 Image Window



Figure 1.6 Text Window

	1	2	3	4	5	6	
1	0.620	-0.670	0.030	-0.140	0.000	0.070	
2	-0.500	-1.340	-0.530	-0.070	0.360	0.320	
3	0.850	-0.360	-0.260	-0.500	-0.200	0.070	
4	0.420	-0.290	0.330	0.210	0.290	0.270	
5	0.120	-1.390	-0.530	-0.710	-0.410	-0.050	
6	0.660	-0.300	0.660	0.380	0.420	0.260	
7	0.430	1.660	0.980	0.700	0.320	0.100	
8	0.970	-0.430	0.720	0.360	0.500	0.080	
9	-0.220	-1.200	-0.920	-0.680	-0.340	0.330	
10	1.080	-0.730	0.760	0.390	0.530	-0.150	
11	-0.330	-1.200	-0.950	-0.780	-0.270	0.380	
12	1.490	-0.280	0.880	0.590	0.370	-0.170	
13	-0.140	-1.230	-1.100	-0.630	0.140	0.540	
14	1.930	0.900	1.050	0.630	0.020	-0.380	
15	1.040	0.140	-0.660	0.260	0.900	1.110	
16	2.000	2.010	2.020	1.270	0.570	0.120	
17	-0.480	0.460	0.980	1.840	2.610	3.040	

Figure 1.7 Notebook Window



```

Vortex from fluid dynamics simulation.

Other files are contributing terms from this simulation:

vort.a.hdf -- tilting factor
vort.b.hdf -- stretching factor

The following are discrete derivative calculations:

1r = ddx(Vortex)
tb = ddy(Vortex)

```

To view the data values in the array, resize, move, or scroll the text window. This data was generated by a thunderstorm simulation and stored in an HDF file. For instructions regarding loading data from text files, see "Loading Text Files" in Chapter 2.

## Generating Images

From the array of numbers displayed in the text window, you may generate any of three types of images, each of which is displayed in its own image window. The three image generation commands in the Image menu are as follows:

- *Generate Image* generates a simple image from the data. Individual data values create blocks of pixels, giving a chunky effect.
- *Interpolated Image*, generates a smoothed image by means of bilinear interpolation, which calculates an interpolated value for each pixel in the image window. (This operation requires more processing time than the others.)
- *Polar Image*, generates a simple color image for datasets that have the array mapped in polar coordinates ( $r$ ,  $\theta$ ), where  $\theta$  ranges from 0 to  $2\pi$ .

Each command creates a different image window on the screen. For example, to generate a simple color raster image, select Generate Image from the Image menu, shown in Figure 1.8.

Figure 1.8 Image Menu



For more detailed information about these commands and the images they generate, refer to Chapter 3.

### Selecting Values

NCSA DataScope allows you to simultaneously select numbers in the data array and their corresponding points in the image window.

For example, click the mouse in one of the *image* windows. Notice that both the text window and image window highlight a selection area. The text window highlights one of the numbers in the array while the image window draws a small square around the corresponding point in its window.

To select more than one number from the array, drag out a rectangle on either the text or image window. The text window highlights all of the numbers in the region. The image window draws a rectangle around the selected region. The automatic highlighting of corresponding ranges in the two windows helps you match the array values with the corresponding areas of the image window.

### Using the Notebook for Calculation

In the notebook window for this sample dataset are several sample equations that can be applied to the array of numbers. (If the notebook window is no longer on the screen, select See Notebook from the Numbers menu.) Each equation defines a new variable to be created by calculating a formula on each point in the existing dataset.

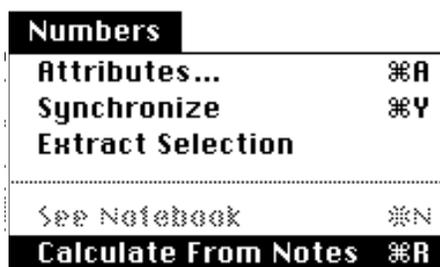
To create a new dataset using the notebook window:

1. Select the formula to be calculated. For example, select  $lr=ddx(\text{Vortex})$ .
2. Select Calculate From Notes from the Numbers menu, shown in Figure 1.9. A watch cursor appears while the calculations take place, and then a new text window appears displaying the

calculated results. It is named with the variable name assigned to the result of your calculation—in this case, *lr*.

The new text window represents a new and fully independent dataset that can be used to generate images. You can save the new data and its associated notebook and images into a new data file, as instructed in the following section. (Refer to Chapter 4, "Notebook Calculations" for more information on using the Notebook.)

Figure 1.9 Numbers Menu

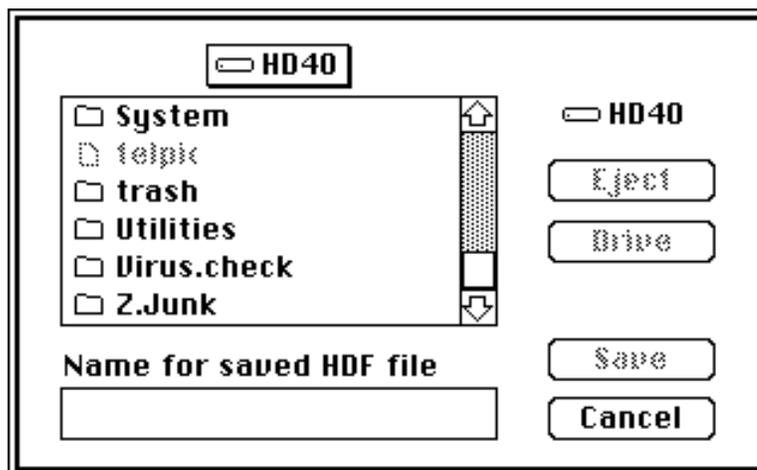


## Saving a New Dataset

To save the contents of a data array along with its associated notebook and any images created from that data:

1. Choose Save or Save As from the File menu. The Save dialog box appears (see Figure 1.10).
2. Enter a name for the file.
3. Click Save.

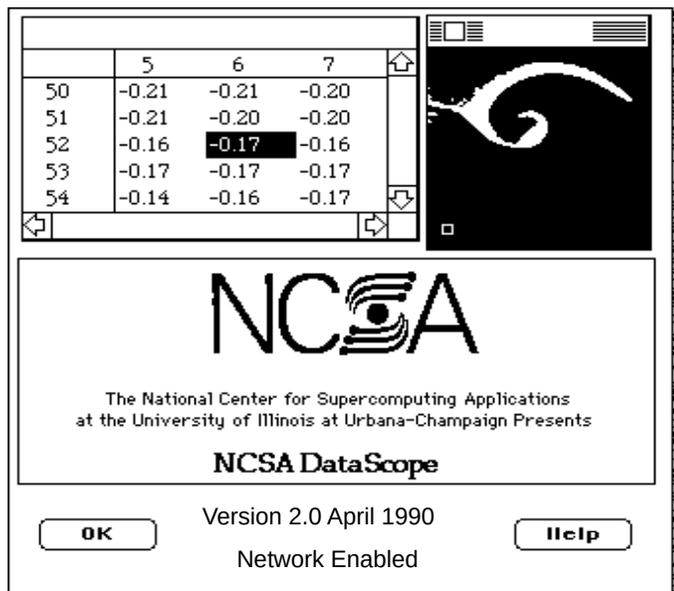
Figure 1.10 Save Dialog Box



## Using Online Help

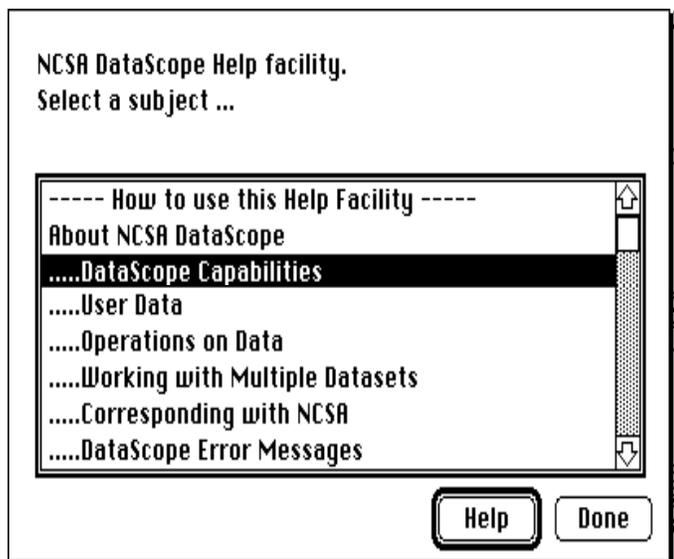
NCSA DataScope provides online help that you may access at any time while using the application. To access online help, choose About DataScope from the Apple menu. In the dialog box that appears, shown in Figure 1.11, click the Help button.

Figure 1.11 About Box



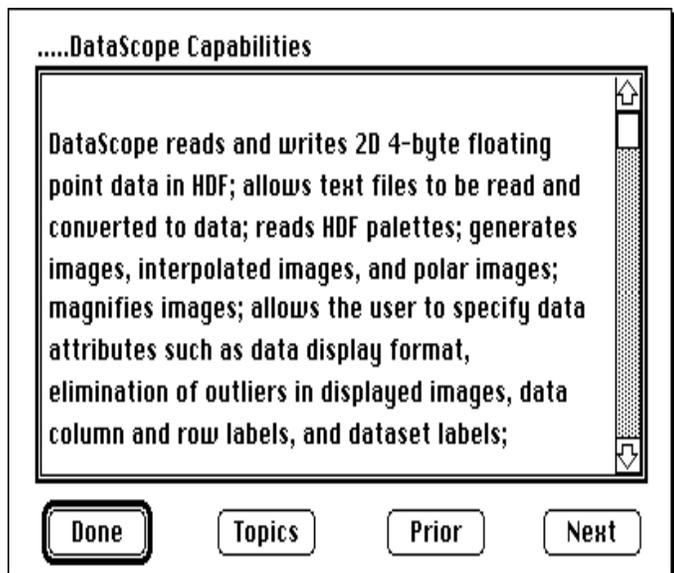
The Help menu appears, shown in Figure 1.12. To select a topic from this menu, click on the subject heading and click Help or press RETURN; or simply double-click on the heading. For example, double-click on the heading *DataScope Capabilities*.

Figure 1.12 Help Menu



The corresponding help screen appears, shown in Figure 1.13. From the help screen, you may proceed to the next or preceding topic, or to the *topics*—the main menu. To exit Help and return to the main application, click Done.

Figure 1.13 Sample Help Screen



## Exiting the Program

To exit NCSA DataScope, choose Quit from the File menu.

If you have generated a new dataset and not yet saved it, a dialog box appears. To save the dataset, click Yes or press RETURN.