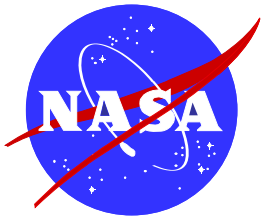
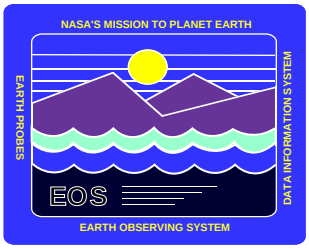


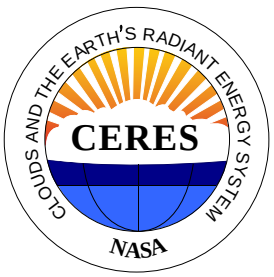
National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-2199



Clouds and the Earth's Radiant Energy System (CERES) Data Management System

View HDF User's Guide



Version 2.0
December 1999

Clouds and the Earth's Radiant Energy System (CERES)

Data Management System

View_Hdf User's Guide

Version 2.0

Primary Author

Kam-Pui Lee

Science Applications International Corporation (SAIC)
One Enterprise Parkway
Hampton, Virginia 23666

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1.0 Introduction

NASA has continuing long term projects to increase the understanding of the Earth's climate and environment. As part of these studies, NASA Langley Research Center has developed the Clouds and the Earth's Radiant Energy System (CERES) instrument to fly on multiple satellite platforms. The CERES Data Management System has been developed by the Atmospheric Sciences Division to generate science data products from the instrument measurements. This system is now operational at the Langley Distributed Active Archive Center producing archival data sets written in Hierarchical Data Format (HDF).

To help access data from HDF products, a visualization and analysis tool (view_hdf) has been written in Interactive Data Language (IDL) which uses a graphical user interface to manipulate the data. The view_hdf tool can select and subset variables from either Science Data Sets (SDS) or vdata structures in an HDF file, render both two and three dimensional graphics, and plot geolocated data onto various world map projections. Other features include multiple variable plots, difference plots, and simple statistics. Plots can be saved in PostScript, encapsulated PostScript and GIF or sent directly to a printer. Filtered subsets and statistical results can be written to a file in ASCII format for use in other analysis programs.

Examples are presented which include results from the CERES instrument recently launched on the TRMM satellite. Although developed mainly for the CERES project, this tool may be of more general use for other data sets written in HDF.

The tool was developed on a UNIX platform and has been transported to Sun and SGI workstations. It should be portable to any platform which supports IDL, the HDF libraries, and a C compiler.

Dr. Kam-Pui Lee of Science Applications International Corporation (SAIC) is a major author of the view_hdf tool and continues to add new features. Acknowledgment is also given to Ms. Sharon L. Gibson of SAIC and Mr. Larry E. Matthias of Computer Sciences Corporation (CSC) for their earlier development work on this tool.

2.0 Installation

The view_hdf tool is obtained from the compressed tar file, view_hdf.tar.gz. The file is first uncompressed with the command:

```
gunzip view_hdf.tar
```

view_hdf is extracted from the resulting tar file using the command:

```
tar xfv view_hdf.tar
```

The requirements for using the view_hdf tool include Interactive Data Language (IDL) with version 5.0 or above (URL = http://www.rsinc.com) and UNIX platform operating system. The view_hdf tool includes four IDL programs: view_hdf.pro, getinfo.pro, getinfo1.pro, and getinfoa.pro; a shared library, ies_bds_rel2.so; and a color table file, view_hdf_color.tbl. If view_hdf is used to look at any CERES Bi-Directional Scans (BDS) file, the Digital_Location.file, which lists the names of Raw Instrument Status Data, and the Analog_Location.file, which lists the positions of engineering measurement data, are also needed.

The view_hdf tool has been ported to several platforms, including SGI, HP, Sun, and DEC Alpha. Delivery packages have been developed for each of these platforms.

The shared library included in the delivery package, ies_bds_rel2.so, is generated from the C programs ies_bds.c, get_digital_data.c, and HDF_Interface.h, on the designated computer platform and operating system. For other operating systems, the compile and ld options need to be modified in the Makefile to build a system-specific shared library. Three environment variables must be defined, HDFINC, HDFLIB, and HDFLIBS, before compiling the C programs by using the "make" command. HDFINC defines the path of the include directory of HDF; HDFLIB defines the path of HDF library files; and HDFLIBS lists the names of HDF libraries. For example,

```
setenv HDFINC /usr/local/HDF4.1r1/include
setenv HDFLIB /usr/local/HDF4.1r1/lib
setenv HDFLIBS -lmfhdf -ldf -ljpeg -lz
```

The examples included in this guide use the CERES BDS, IES, ES8, ES4, and SSF Hierarchical Data Format (HDF) science archival products. For a description of these datasets, see the BDS Collection Guide (Ref. 1), the ES8 Collection Guide (Ref. 2), or the CERES Data Product Catalog (Ref. 3). For further information on HDF, see the HDF User's Guide (Ref. 4).

3.0 How to Start

The view_hdf tool is developed with a graphical user interface (GUI). Before starting the GUI, start IDL by entering **`idl`** at the system prompt. IDL will show a prompt with the string "IDL>". At the IDL prompt, type **`view_hdf`** or **`view_hdf, max_color=100`**. The first command sets the number of colors to a default value of 200, and the second command sets the number of colors to any specified value which is less than 256. The main menu, as shown in Fig. 3-1, pops up on the screen. The GUI is described in Section 4.0.

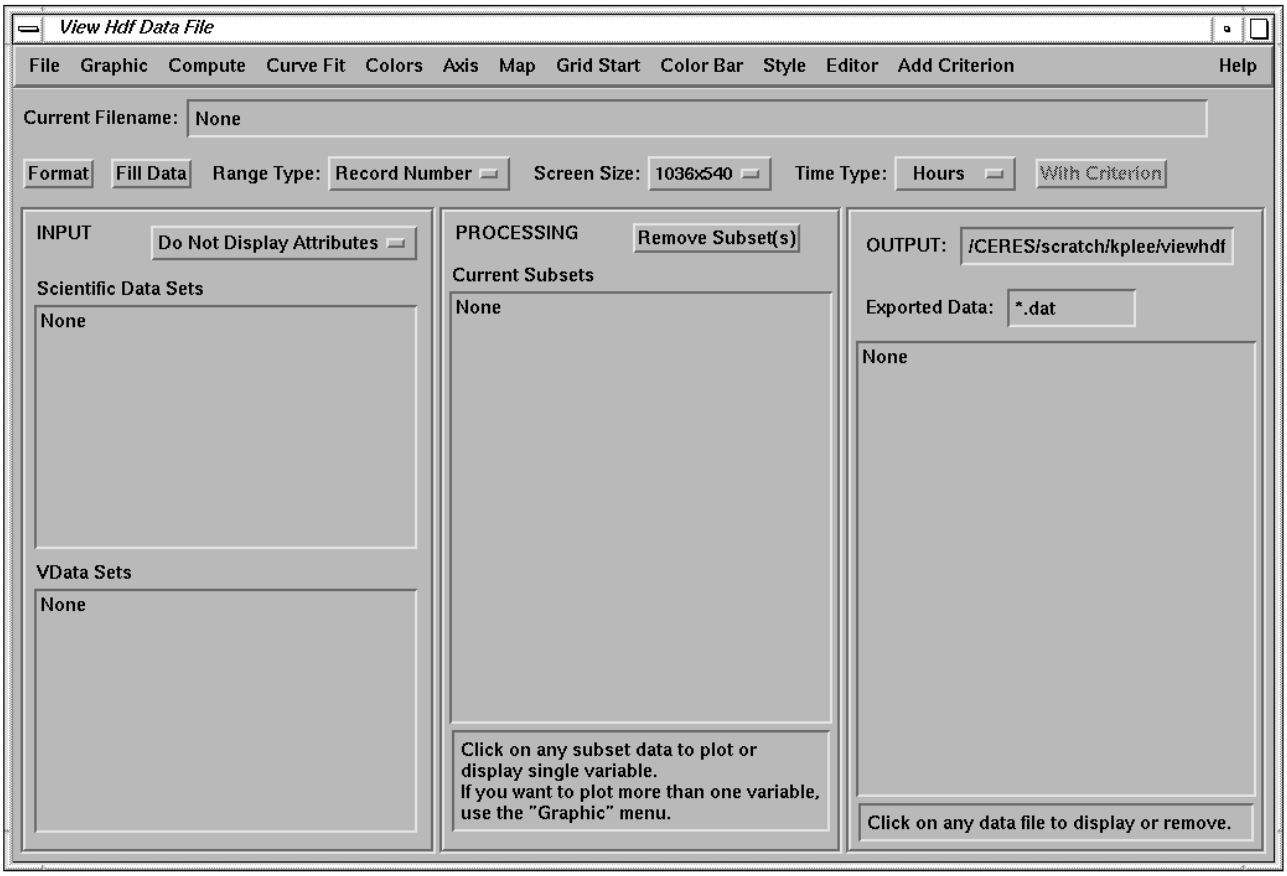


Fig. 3-1. Main Menu

The following procedure is used to select an HDF file:

Step 1: Select “File”. A pulldown menu pops up to display selections, as shown in Fig. 3-2.

Step 2: Select “Open...Without Attribute”. This option displays on the Main Menu all the names of Science Data Sets (SDS) and Vdata in the HDF file (except attribute Vdata). To include all the attribute Vdatas, select “Open...With Attribute” instead.

After selecting this option, a Select File window pops up, as shown in Fig. 3-3.

Fig. 3-2. File Menu

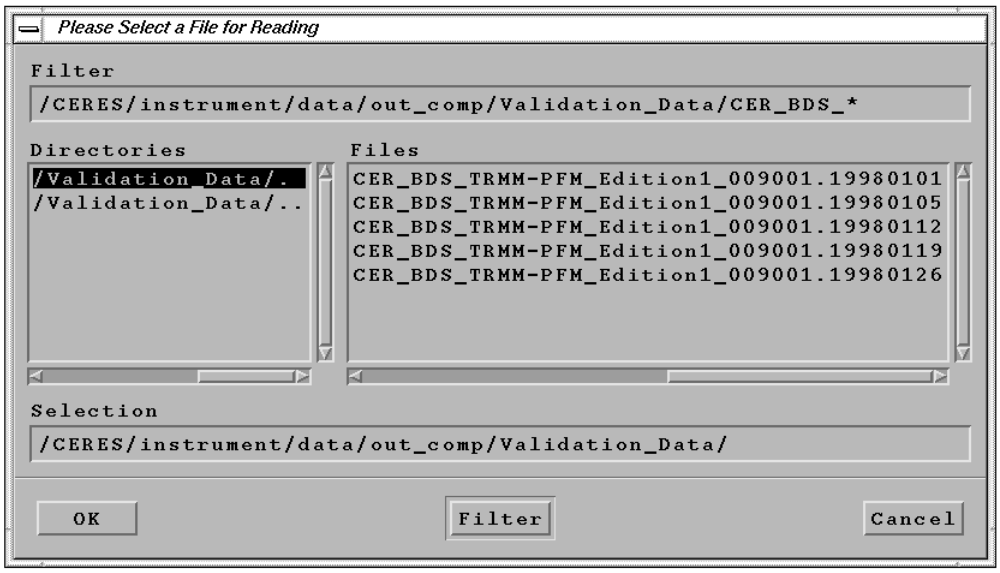


Fig. 3-3. Select File Window

Step 3: From the Select File window, select the file and click the “OK” button. The “Filter” button is used to refine the list of file names displayed. The filter can be edited in the filter area; for example from Fig. 3-3, the “CER_BDS_*” is added to select any files that begin with “CER_BDS_”. Only files starting with this pattern show in the Files area.

After a file is selected, view_hdf opens the HDF file, searches for the names of all the SDS and Vdata structures, and lists them in the SDS and Vdata data sets areas, respectively, as shown in Fig. 3-4.

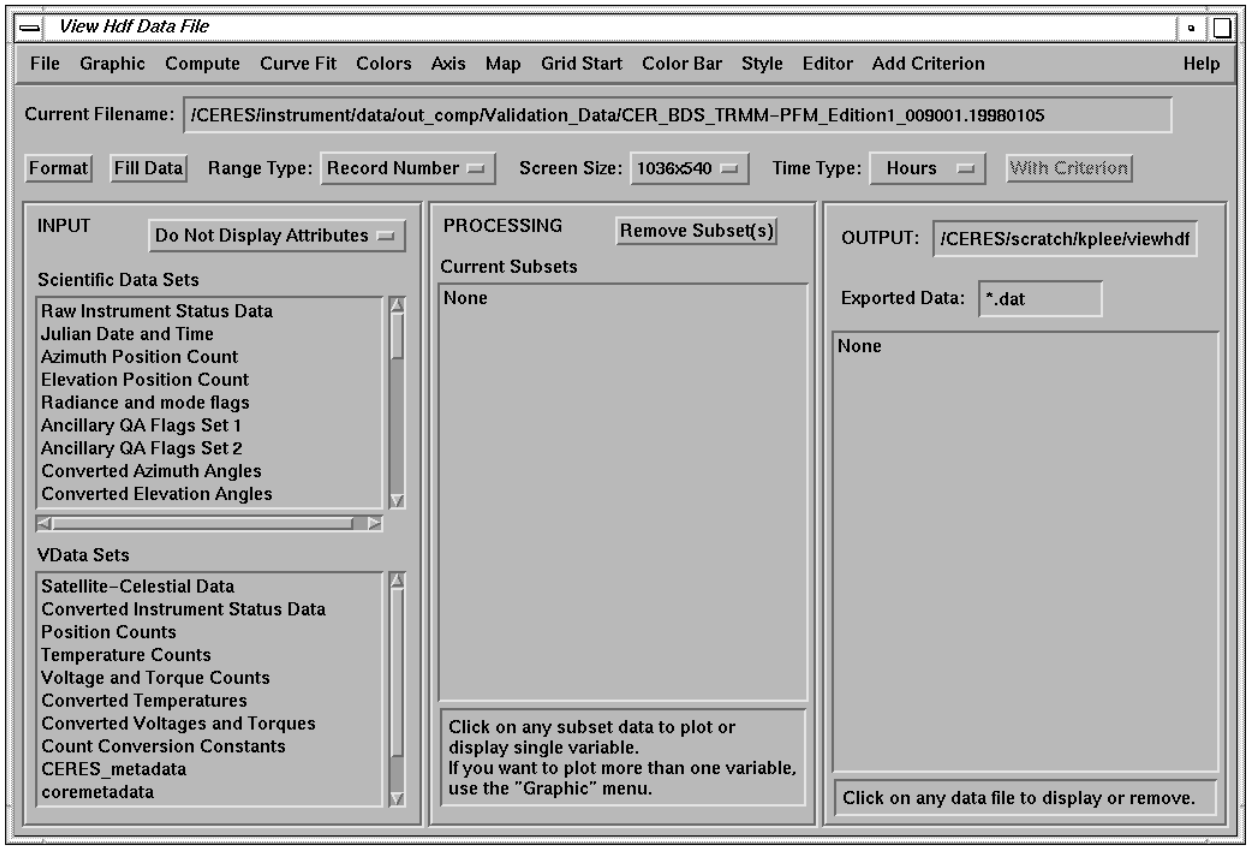


Fig. 3-4. List SDS and Vdata Names

Before any data can be accessed, the data must be imported to the Current Subsets area. For an SDS, the procedure is:

Step 1: Select SDS. Click on the desired SDS to import from the Scientific Data Sets area. For example, select “CERES TOT Filtered Radiances Upwards”. A Subset Data window, as shown in Fig. 3-5, pops up with Starting, Ending, and Increment fields for each dimension of the SDS array. A range of data can then be selected to import. The Increment field can be used to selectively subset each dimension.

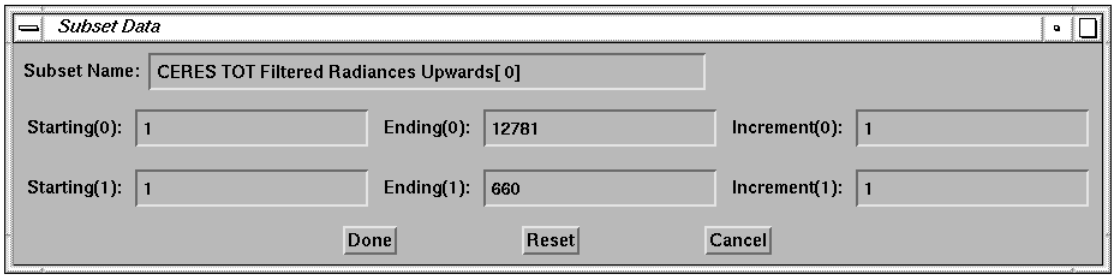


Fig. 3-5. SDS Range Input Window

Step 2: Input ranges. Input the range for data importing. For this example, the first dimension is for the number of records, and the second is the number of samples in each record. An increment integer n causes every n^{th} record to be selected. After finishing the input, click the "Done" button. The data are imported, and the SDS name will appear in the Current Subsets area, as shown in Fig. 3-6.

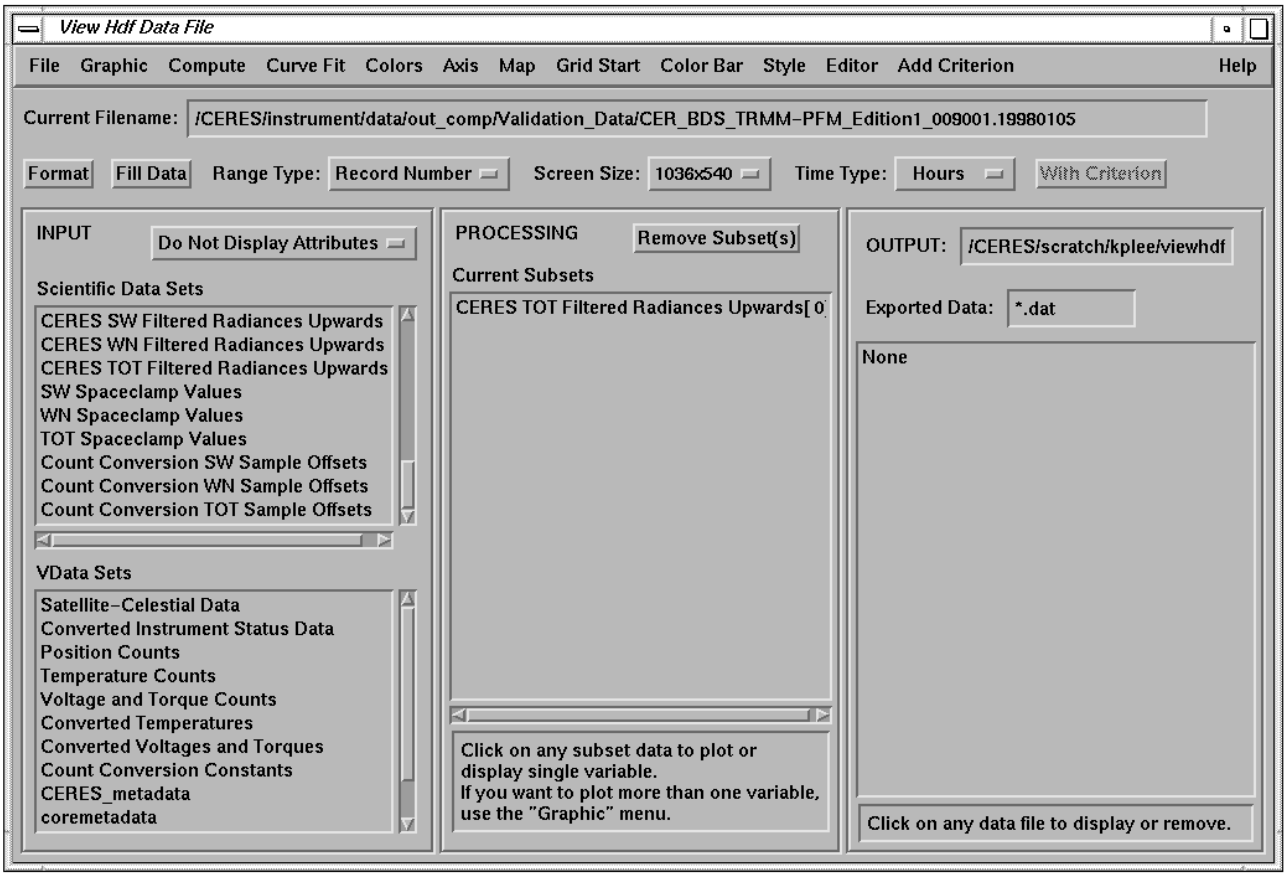


Fig. 3-6. Import SDS

The selected data range will be remembered so that this range will be shown on the next SDS Range Input Window. Click on the "Reset" button in this window to reset the range of data.

For importing a Vdata, the procedure is slightly different from an SDS because the fields in each Vdata are selected individually. The procedure is:

Step 1: Select Vdata. Click on the desired Vdata set to import from the Vdata Sets area. For example, select "Converted Temperatures". A Select Vdata Fields window, which lists all the fields under this Vdata, pops up, as shown in Fig. 3-7.

Step 2: Select field. Select the field from the window by clicking the button next to the field name. For example, select "WN Blackbody Temperature". A Subset Data window, as shown in Fig. 3-8, pops up with Starting, Ending, and Increment fields. A range of record numbers can then be selected to import. The Increment field can be used to selectively subset by record number. The second dimension is for the order of the field.

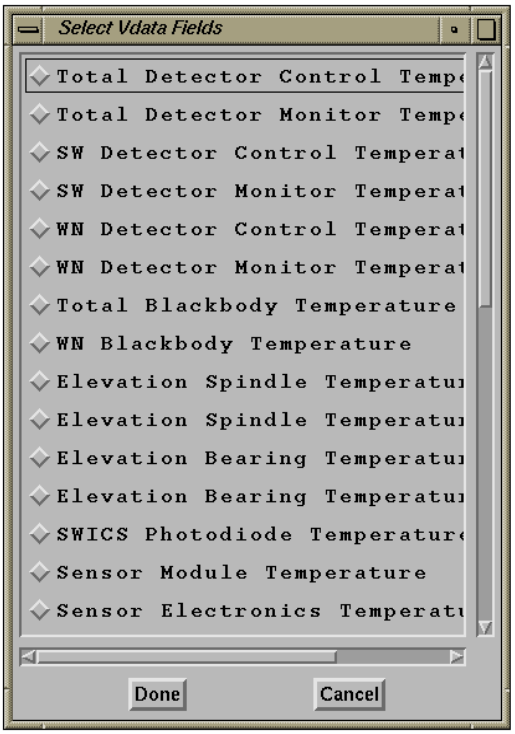


Fig. 3-7. Vdata Fields Window

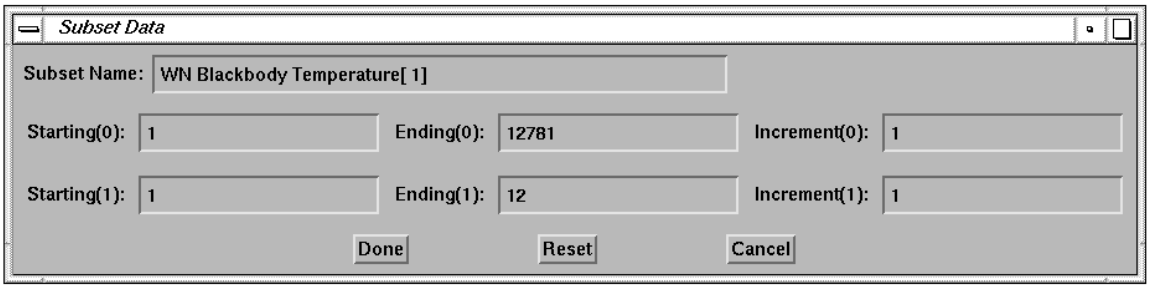


Fig. 3-8. Vdata Field Range Window

Step 3: Input ranges. Input the start and end record numbers and the increment value for data importing. After finishing the input, click the "Done" button. The data are imported, and the Vdata field name will show in the Current Subsets area, as shown in Fig. 3-9.

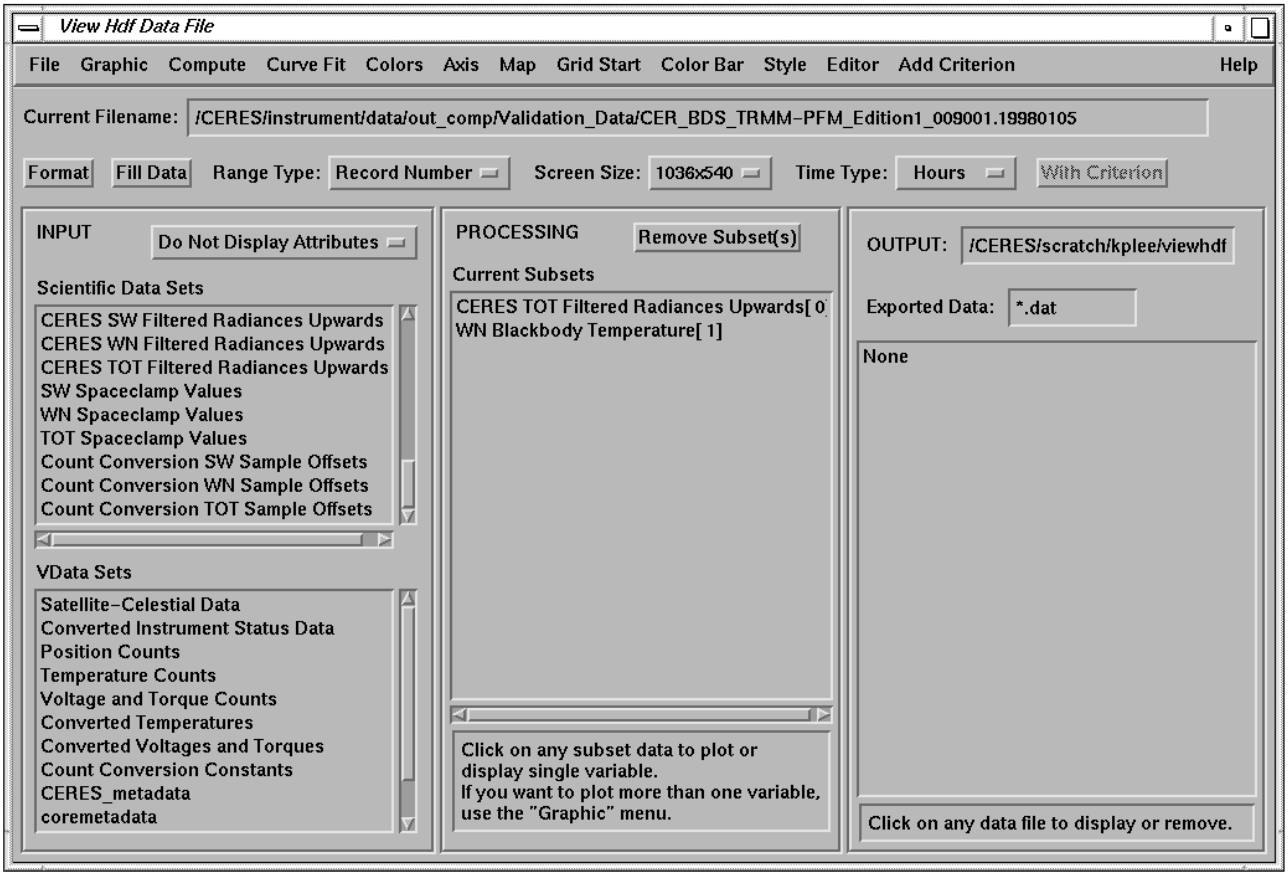


Fig. 3-9. Import Vdata

The selected data range will be remembered so that this range will be shown on the next Vdata Field Range Window. Click on the "Reset" button in this window to reset the range of data.

After the data are imported, click on the name of the data in the Current Subsets.

Clicking on the name in the Current Subsets area automatically pops up the function menu, as shown in Fig. 3-10. Select a function option. For example, select a “2D Graph” and click the “Done” button. A window with the plot pops up on the screen, as shown in Fig. 3-11.

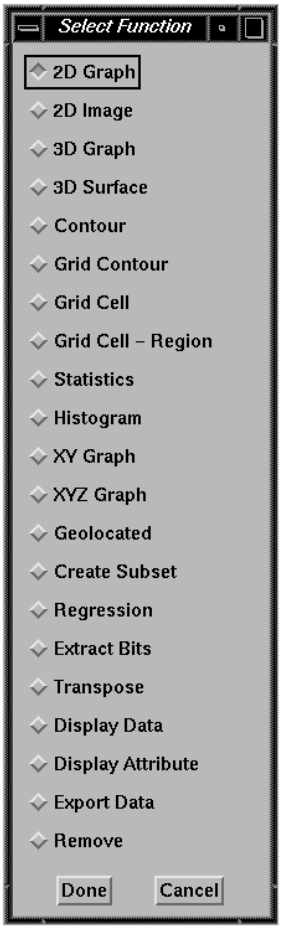


Fig. 3-10. Select Function Menu

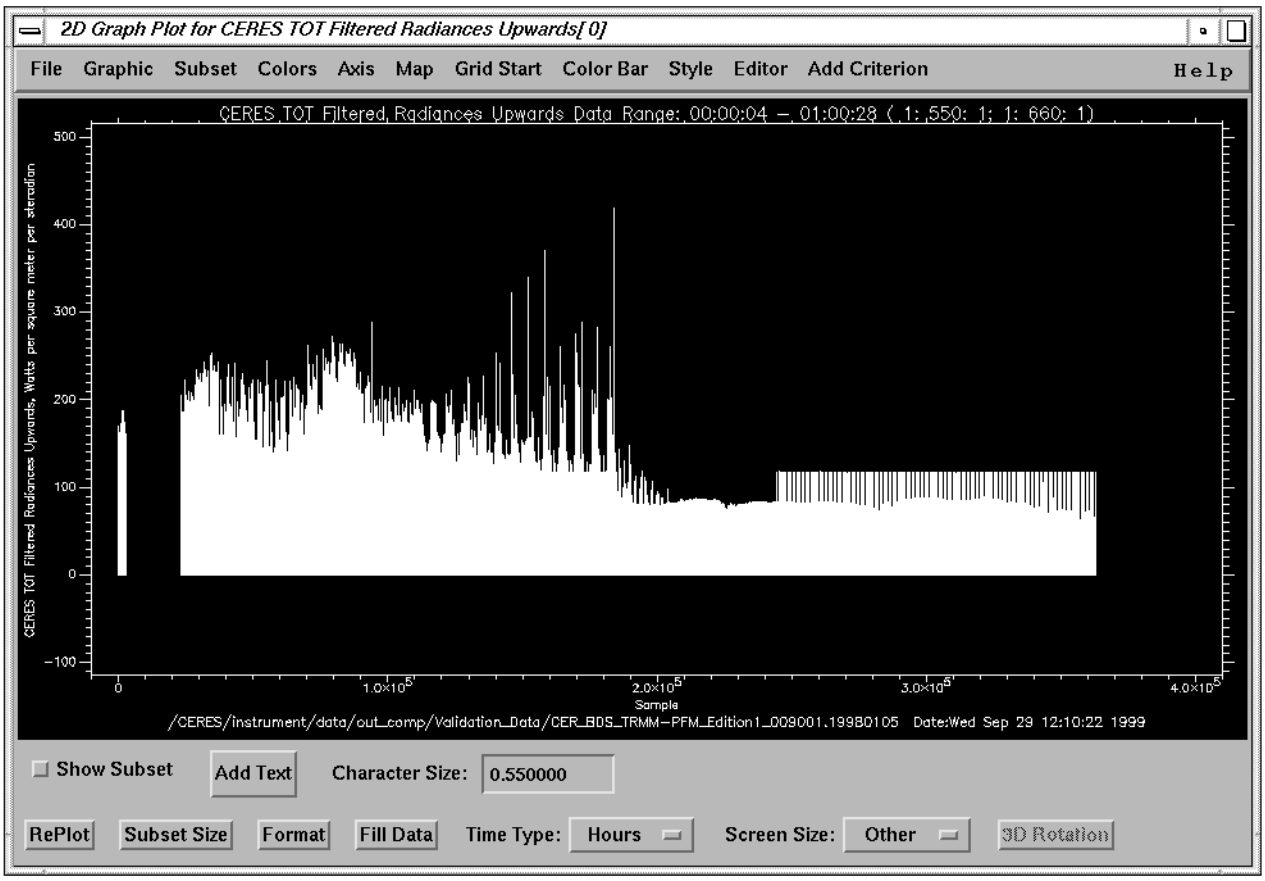


Fig. 3-11. Plot Window

The plot can now be saved as a Postscript or GIF file, or sent directly to a printer by clicking the "File" menu on the plot window. A pulldown menu, as shown in Fig. 3-12, pops up to display the options. The plot window can be closed by selecting the "Close" option in the pulldown menu. Note: more than one plot window can be manipulated in the same session. To select the current working window, click on the desired plot window.

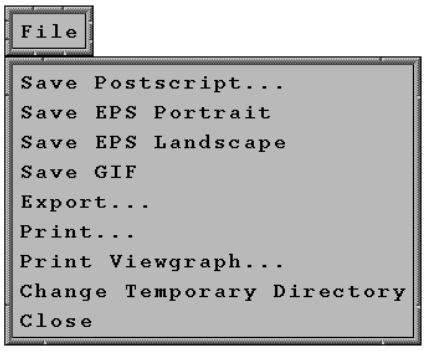


Fig. 3-12. File Menu

To exit view_hdf, click on the "File" menu in Main Menu and select the "Exit" option. All the IDL windows will be closed, and the IDL prompt will reappear. At the IDL prompt, type **`exit`** to exit IDL.

4.0 GUI Description

This section briefly describes different menus, functions, and buttons on the GUI. Table 4-1 lists all the functions and buttons available from the Main Menu, Table 4-2 lists all the graphic functions, and Table 4-3 lists all the functions and buttons available from the Plot Window. The Item Number column lists the functions and buttons with hyperlinks to descriptions of the items.

Table 4-1. Main Menu Functions and Buttons

Item Number	Menu and Button Description	Fig. Number
(1)	"File": Includes the options for opening file, exporting data to file, changing directories, and exiting view_hdf.	Fig. 4-1
(2)	"Graphic": Plots more than one variable or removes all the variables from the Current Subsets list.	Fig. 4-8
(3)	"Compute": Includes the options for doing simple arithmetic operations between two variables or between one variable and a constant,and extracting specific contiguous bits from an integer variable.	Fig. 4-17
(4)	"Curve Fit": Does curve fitting from one variable to another variable.	Fig. 4-24
(5)	"Colors": Includes the options for selecting different color tables, editing and saving the color map, and changing the background and foreground colors.	Fig. 4-32
(6)	"Axis": Includes the options for manual or automatic setting of the X, Y, and/or Z axes range. It also includes the options for producing grids.	Fig. 4-39
(7)	"Map": Includes the options for adjusting the display for any geolocated plot, such as the longitude to be mapped to the center of the map projection, type of map projection, labelling the meridians, and showing locations of satellite and Sun.	Fig. 4-46
(8)	"Grid Start": Selects the longitude location of the first grid for "Grid Cell" plot.	Fig. 4-57
(9)	"Color Bar": Includes the options to display or undisplay a color bar and adjust the location of the color bar, and how to map data values to colors.	Fig. 4-59
(10)	"Style": Includes the options for setting the line type, symbol type, and symbol size used to display the data.	Fig. 4-63
(11)	"Editor": Selects a text editor to display data or a file on the screen.	Fig. 4-68
(12)	"Add Criterion": Adds criterion based on the value of a variable listed in the Current Subset list. This criterion is used for calculating statistics.	Fig. 4-70
(13)	"Help": Calls up this user guide or IDL on-line help menu.	Fig. 4-73
(14)	"Current Filename": Displays the name of current file.	
(15)	"Format": Changes the format for exporting data to a file.	Fig. 4-74
(16)	"Fill Data": Changes the fill data values.	Fig. 4-75
(17)	"Range Type": Uses record number or time to select the range of imported data.	Fig. 4-76
(18)	"Screen Size": Adjusts the size of draw window.	Fig. 4-77
(19)	"Time Type": Sets the X axis to hour, minute, or second if data is plotted against time.	
(20)	"With Criterion": Displays "Add Criterion" option as on or off.	Fig. 4-78

Table 4-1. Main Menu Functions and Buttons

Item Number	Menu and Button Description	Fig. Number
(21)	“INPUT”: Displays the names of SDS and Vdata sets in the current HDF file.	Fig. 3-4
(22)	“PROCESSING”: Displays the names of the imported data sets.	Fig. 3-6
(23)	“OUTPUT”: Lists the names of the files that match the filter.	Fig. 3-9

Table 4-2. Graph Style Menu

Item Number	Graph Style	Fig. Number
(24)	“2D Graph”: Plots data against the index of the data array.	Fig. 3-11
(25)	“2D Image”: Displays data as an image.	
(26)	“3D Graph”: Draws a wire-mesh representation of a two-dimensional array projected into two dimensions.	
(27)	“3D Surface”: Creates a shaded-surface representation of a gridded surface with shading from a light source model.	Fig. 4-82
(28)	“Contour”: Draws a line contour plot from the data.	
(29)	“Grid Contour”: Creates a filled contour plot on a map projection.	
(30)	“Grid Cell”: Displays gridded data region by region on map projection.	Fig. 4-84
(31)	“Grid Cell - Region”: This option is similar to “Grid Cell”, (30), except the gridded data are arranged in terms of region number.	Fig. 4-85
(32)	“Statistics”: Calculates the mean, standard deviation, maximum, minimum and number of samples for one- or two-dimensional arrays.	Fig. 4-88
(33)	“Histogram: Does a sample histogram of data with an option to write the result to a file.	Fig. 4-90
(34)	“XY Graph”: Displays data against time, sample number, record number, or packet number.	
(35)	“XYZ Graph”: Displays data (Z) against two variables (X,Y) from the Current Subsets list.	
(36)	“Geolocated”: Displays data on map projection.	Fig. 4-98
(37)	“Create Subset”: Creates a subset of the data based on the range of another criterion variable.	Fig. 4-101
(38)	“Regression”: Does a multiple linear regression fit.	Fig. 4-102
(39)	“Extract Bits”: Extracts specific contiguous bits from an integer variable.	
(40)	“Transpose”: Transposes a two-dimensional data array.	
(41)	“Display Data”: Displays data on the screen.	Fig. 4-105
(42)	“Display Attribute”: Displays the attributes of the data set on an editor window.	Fig. 4-106
(43)	“Export Data”: Exports data to a file.	
(44)	“Remove”: Removes the name of the variable from the Current Subsets list.	

Table 4-3. Plot Window Menu

Item Number	Menu and Button Description	Fig. Number
(45)	“File”: This menu includes the options for saving the plot in Postscript, encapsulated Postscript, or GIF, exporting data to file, printing the plot, making viewgraphs, changing temporary directory, and closing the plot window.	Fig. 4-108
(46)	“Graphic”: Redisplays the data with a different type graphic. The user can use this menu to redisplay the data with a different style of graphic.	Fig. 4-113
(47)	“Subset”: Zooms, locates or views a subset of a plot. This menu allows any particular portion of the plot to be viewed.	Fig. 4-114
(48)	“Colors”: Selects color table, edit and save the color map, and changes the background and foreground colors.	
(49)	“Axis”: Sets the ranges of the X, Y, and/or Z axes manual or automatically, or produces a grid.	
(50)	“Map”: Selects the longitude to be mapped to the center of the map projection, type of map projection, labels the meridians, and shows locations of satellite and Sun.	
(51)	“Grid Start”: Selects the longitude location of the first grid for “Grid Cell” plot.	
(52)	“Color Bar”: Select to display or undisplay a color bar and adjusts the location of the color bar; sets mapping of data values to colors.	
(53)	“Style”: Sets the line type, symbol type, and symbol size to display data.	
(54)	“Editor”: Selects a text editor used to display data or a file on the screen.	
(55)	“Add Criterion”: Adds criterion based on the condition of a variable listed in the Current Subset list; for use in calculating statistics.	
(56)	“Show Subset”: Varies the displayed subset.	
(57)	“Add Text”: Adds text on the plot.	Fig. 4-120
(58)	“Character Size”: Changes the character size on the plot window.	
(59)	“RePlot”: Replots the graph.	
(60)	“Subset Size”: Resizes the subset plot window for “Select Region” with “Geolocated Plot” option.	Fig. 4-123
(61)	“Format”: Changes the format for exporting data to a file.	
(62)	“Fill Data”: Changes the fill data values.	
(63)	“Time Type”: Sets the X axis to hour, minute, or second if data are plotted against time.	
(64)	“Screen Size”: Adjusts the size of the draw window.	
(65)	“3D Rotation”: Sets the angles of rotation for “3D Graph” and “3D Surface”.	Fig. 4-124

4.1 Main Menu

This section describes the menus, functions and buttons on the Main Menu (Fig. 3-1):

(1) "File": This menu includes the options for opening a file, exporting data to a file, changing directories, and exiting view_hdf. The menu is shown in Fig. 4-1.

Fig. 4-1. File Menu

The options are:

(a) "Open...Without Attribute": Open an HDF file and display in the Main Menu all the names of SDS and Vdata sets without including any attribute Vdata.

(b) "Open...With Attribute": Open an HDF file and display in the Main Menu all the names of SDS and Vdata sets including all attribute Vdata.

(c) "Open...With Vgroup": Open an HDF file which is grouped with vgroups. A window, as shown in Fig. 4-2, pops up with all the names of vgroups inside the file. Click on any vgroup and another window similar to Fig. 4-2 will pop up if other vgroups are grouped under this vgroup; otherwise, all SDS and Vdata sets will be displayed in the INPUT column, see item (21).

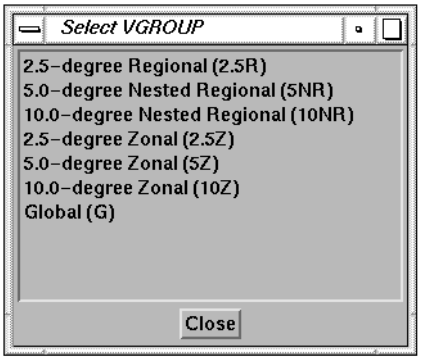


Fig. 4-2. Select Vgroup Window

(d) "Open File Filter": Set a filter to refine the list of file names displayed. A window, as shown in Fig. 4-3, pops up for entering the filter. Click the "Done" button if filtering is completed or click the "Cancel" button to close the window.

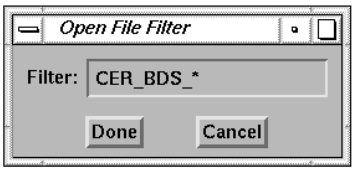


Fig. 4-3. Open File Filter

(e) "Export List...": Export one or more variables from the Current Subsets list to a file. A window, as shown in Fig. 4-4, pops up for entering the filename. The default output path is the current directory. The "Change Output Path" option, item 1(h), can be used to reset the default path. The variables should have same type, same rank, same dimensions, and same order.

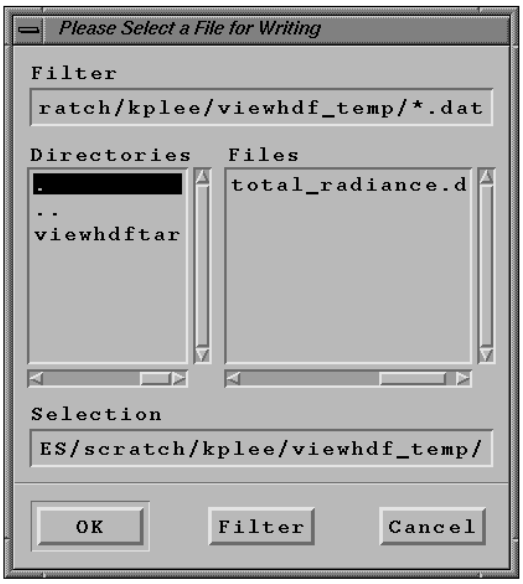


Fig. 4-4. Enter Export List File Window

(f) "Export Tecplot...": Export one or more variables from the Current Subsets list to a file in Tecplot data input format. A window, as shown in Fig. 4-4, pops up for entering the filename. The variables should have same type, same rank, same dimensions, and same order. The first column in the output file is the time of the day in seconds.

(g) "Change Open File Path": Change the path for opening a file. If this option is selected, a window, as shown in Fig. 4-5, pops up for entering the new open file path. Click the "Done" button to apply the new path, or click the "Cancel" button to close the window. When open a file by selecting either "Open...Without Attribute", item 1(a), or "Open...With Attribute", item 1(b), the files in the new directory will be displayed in the Select File Window.

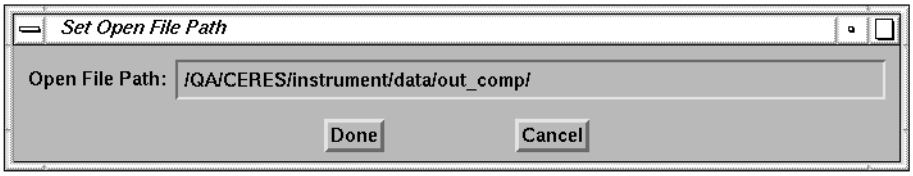


Fig. 4-5. Open File Path Window

(h) "Change Output Path": Change the path for exporting data. If this option is selected, a window, as shown in Fig. 4-6, pops up for entering the new output path. Click the "Done" button to apply the new output path, or click the "Cancel" button to close the window. The "OUTPUT"

Fig. 4-6. Output Path Window

screen area on the Main menu will list the files matching the output file filter in the new directory.

(i) "Change Temporary Directory": Change the directory for storing temporary files. A temporary file is created when a plot is sent to a printer (see item 35(f)) or data is displayed on the screen (see item (41)). If this option is selected, a window, as shown in Fig. 4-7 pops up for entering the new temporary directory. Click the "Done" button to apply the new temporary directory, or click the "Cancel" button to close the window.

Fig. 4-7. Temporary Directory Window

(j) "Restart": Restart view_hdf.

(k) "Exit": Exit the view_hdf program and return to the IDL prompt.

(2) "Graphic": This menu is for plotting one or more variables or removing all the variables from the Current Subsets list. The menu is shown in Fig. 4-8.

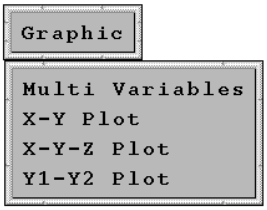


Fig. 4-8. Graphic Menu

The options are:

(a) "Multi Variables": Plot one or more variables on the same graph. If this option is selected, a window, as shown in Fig. 4-9, pops up to select all or some variables from the list.

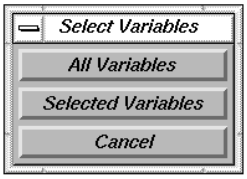


Fig. 4-9. Select Variables Window

If only some variables are selected, another window, shown in Fig. 4-10, will pop up to select the variables. Click the "Done" button when the selection is made or the "Cancel" button to cancel. For this example, the top two variables are selected.

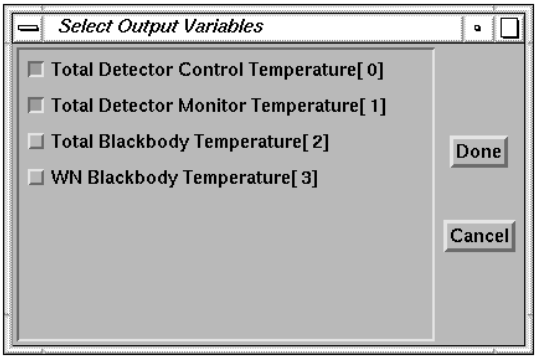


Fig. 4-10. Select Multiple Variables Window

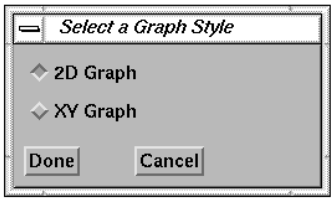


Fig. 4-11. Select Graph Type Window

After the "Done" button is clicked, the Select a Graph Style window, shown in Fig. 4-11, pops up. The "2D Graph" is plotted against the index of the arrays. The "XY Graph" is plotted against time, record number, sample number, or packet number.

After clicking the "Done" button, the plot will display on the screen as shown in Fig. 4-12.

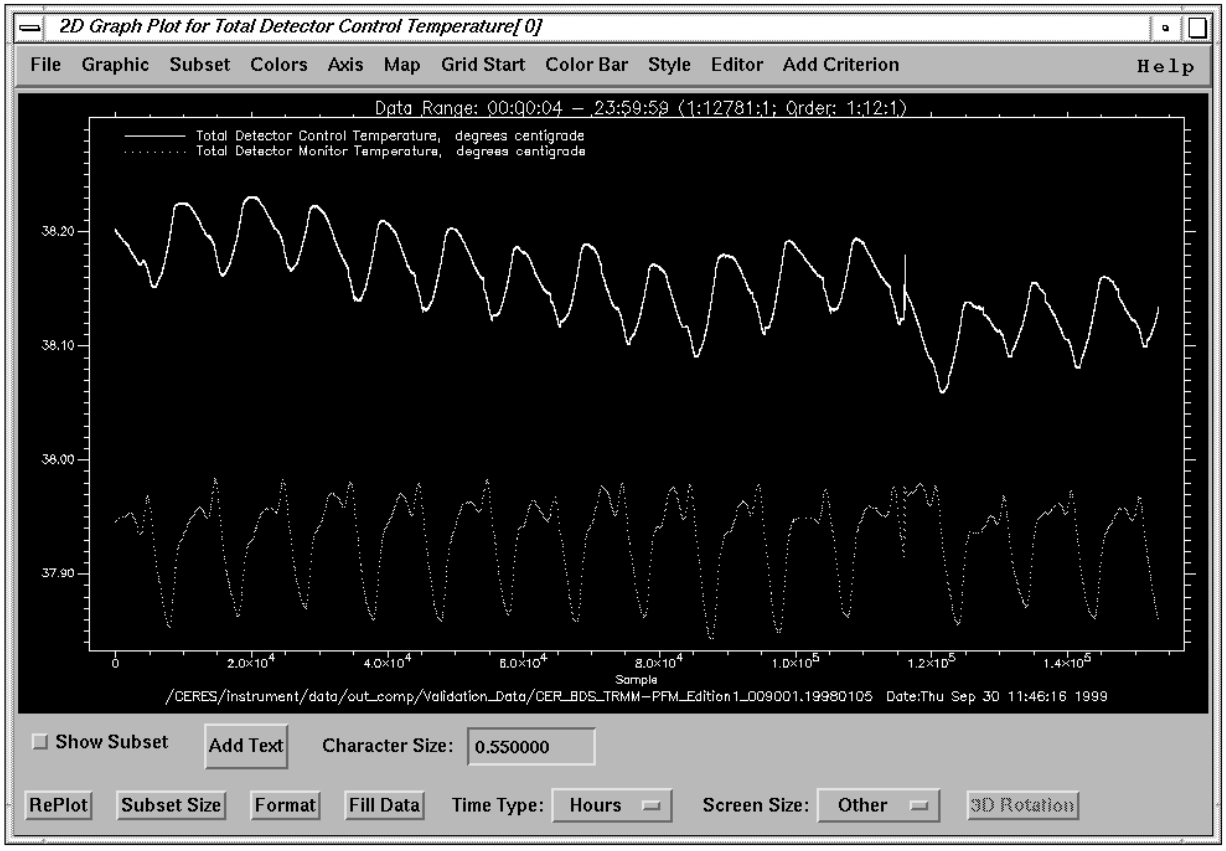


Fig. 4-12. Multiple Variables Plot

(b) "X-Y Plot": Plot one variable against another variable. If this option is selected, a Select Plot Fields window, as shown in Fig. 4-13, pops up for selection. Click the "Done" button when the selection is completed.

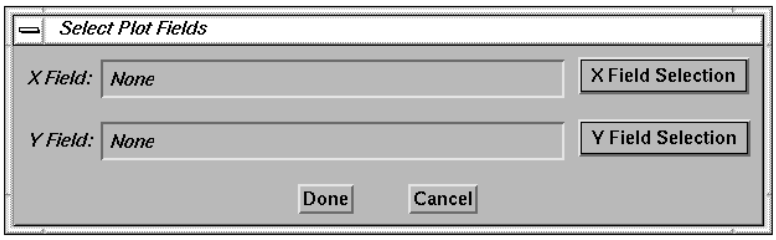


Fig. 4-13. Select X and Y Fields Window

(c) "X-Y-Z Plot": Plot one variable (Z) against two variables (X,Y). The Z values are represented by color. If this option is selected, a Select Plot Fields window, as shown in Fig. 4-14, pops up. After selecting the variables, click the "Done" button, and the X-Y-Z plot will display on the screen as shown in Fig. 4-15.

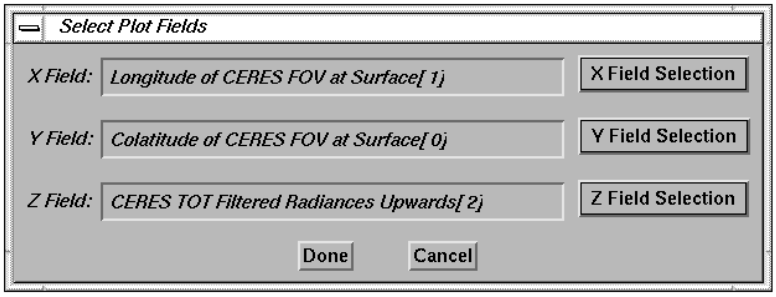


Fig. 4-14. Select X, Y, and Z Fields Window

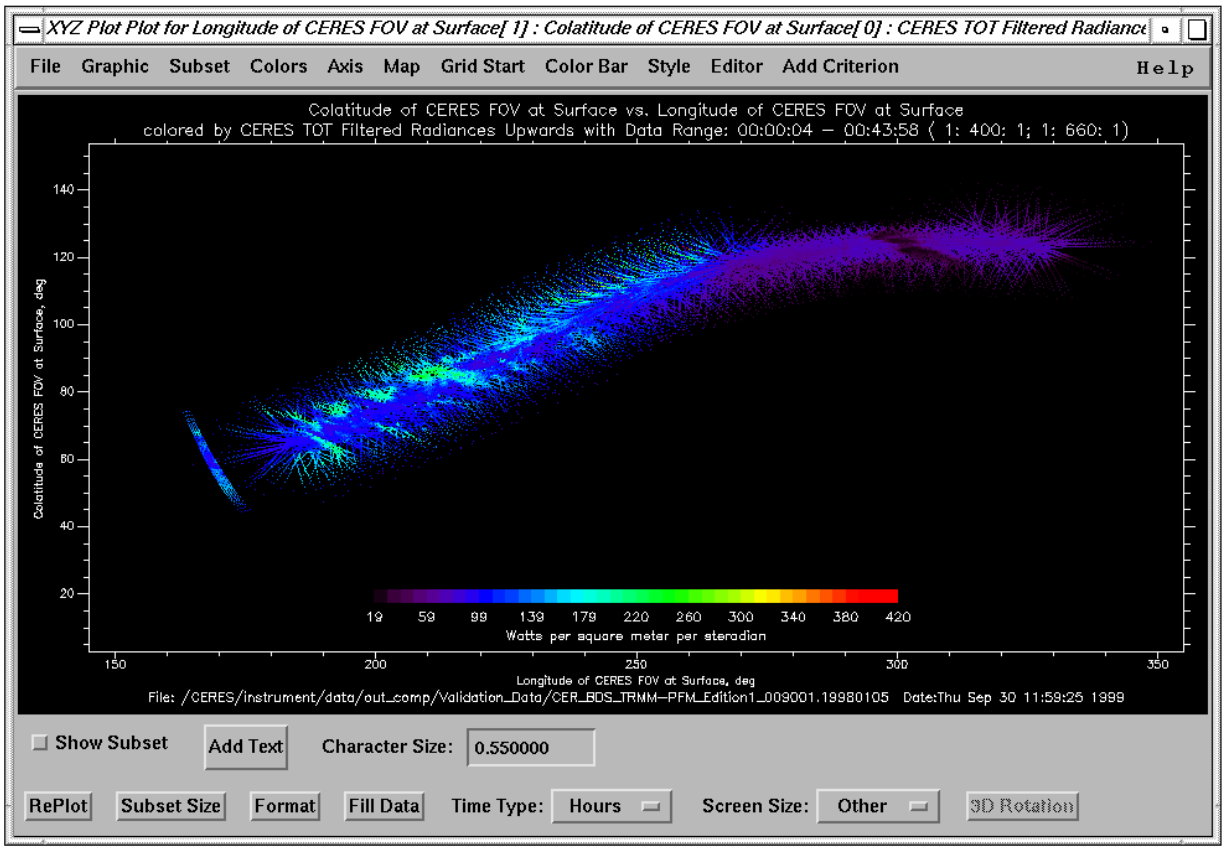


Fig. 4-15. X-Y-Z Plot

(d) "Y1-Y2 Plot": Plot two variables against the index of the arrays or time on the same graph with two different Y axes. The procedure is same as "Multi Variables"; see item 2(a). An example plot with the same variables in Fig. 4-12 is shown in Fig. 4-16.

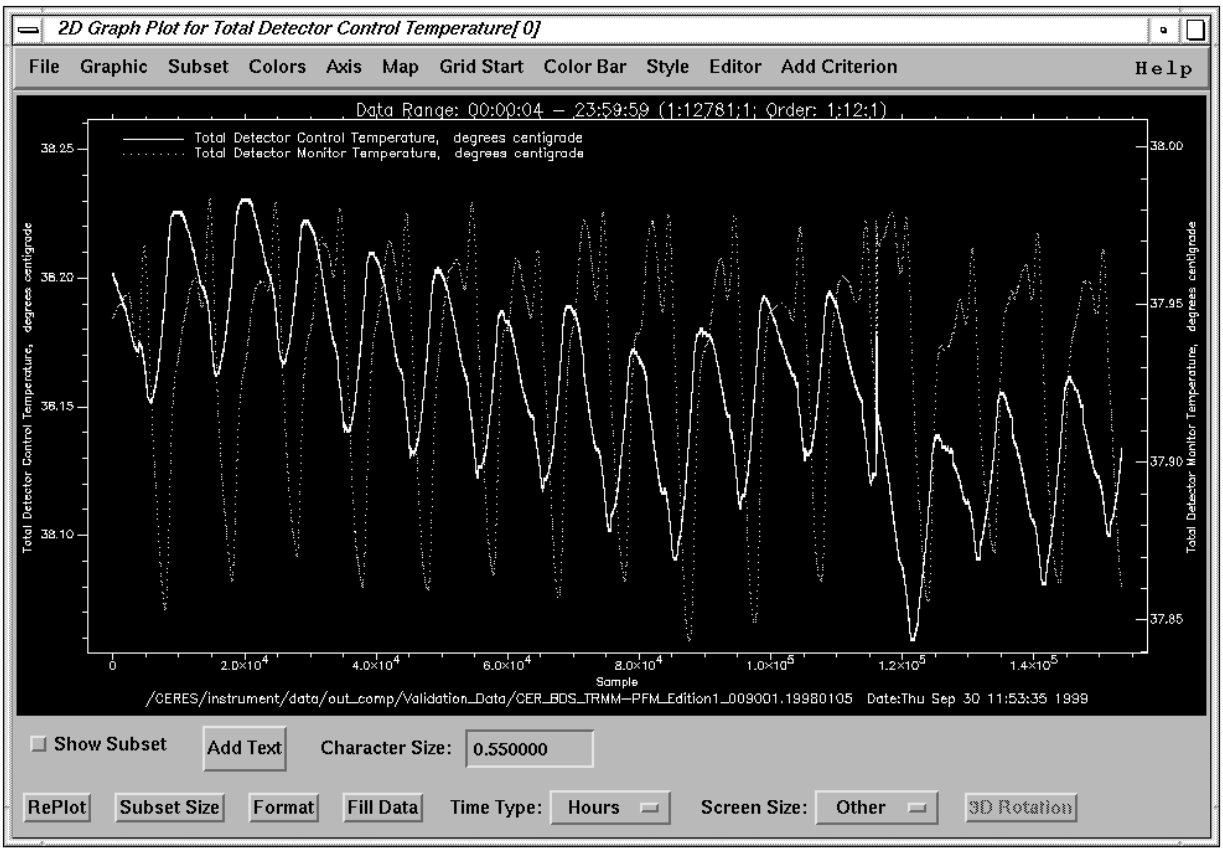


Fig. 4-16. Y1-Y2 Plot

(3) "Compute": This menu includes the options for doing simple arithmetic operations between two variables or between one variable and a constant, and extracting specific contiguous bits from an integer variable. The variables need to be imported into the Current Subsets list before selecting this option. The result is added to the Current Subset list. The options in this menu are shown in Fig. 4-17.

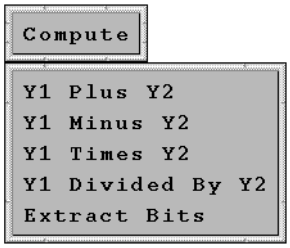


Fig. 4-17. Compute Menu

The options are:

(a) "Y1 Plus Y2": Calculate the sum of two variables or one variable and a constant value. If this option is selected, a window, as shown in Fig. 4-18, pops up to select the operands from the list.

.

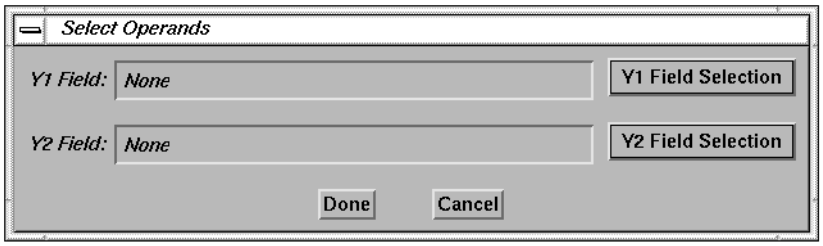


Fig. 4-18. Select Operands Window

If one of the operands is constant, another window will pop up for entering the constant value, as shown in Fig. 4-19. Click the "Done" button after entering the constant value, or click the "Cancel" button to close the window. An error message will be given if both operands are selected as constant. After selecting the operands, click the "Done" button on the Select Operand Window. A window will pop up for entering the name of the variable for the result of this operation, as shown in Fig. 4-20.

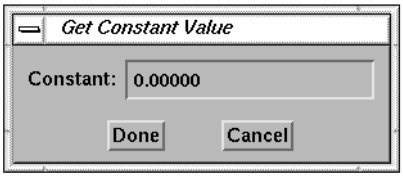


Fig. 4-19. Get Constant Value Window

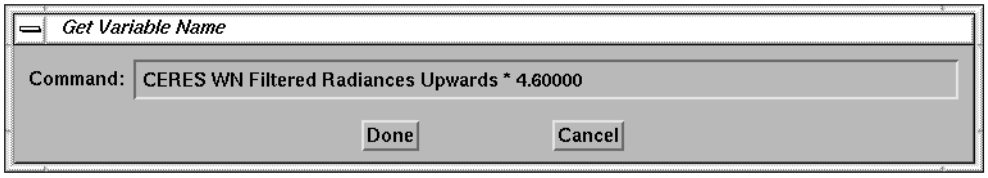


Fig. 4-20. Get Variable Name Window

To accept or change the default variable name, click the "Done" button after accepting or changing variable name. A window, as shown in Fig. 4-21, pops up.

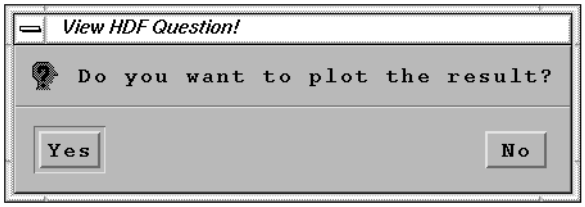


Fig. 4-21. Question for Displaying Plot

Click the "Yes" button to display the result and another window, as shown in Fig. 4-22, will pop up for selecting the type of plot. The "Sample" is plotted against the index of the array, and the "Time" is plotted against the time. Click the "No" button if you decide not to display the result.

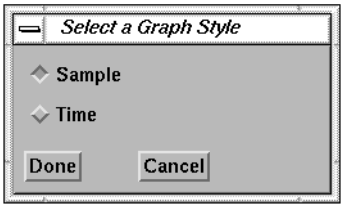


Fig. 4-22. Select Graph Stype

(b) "Y1 Minus Y2": Calculate the difference of two variables or one variable and a constant value. This procedure is the same as "Y1 Plus Y2"; see item 3(a).

(c) "Y1 Times Y2": Calculate the product of two variables or one variable and a constant value. This procedure is the same as "Y1 Plus Y2"; see item 3(a).

(d) "Y1 Divided By Y2": Calculate the quotient of two variables or one variable and a constant value. This procedure is the same as "Y1 Plus Y2"; see item 3(a).

(e) "Extract Bits": Extract specific contiguous bits from an integer variable. This is useful for isolating flag bit fields that are packed together in a single variable. If this option is selected, a window, as shown in Fig. 4-23, pops up for selecting the variable and for entering the location bit and how many bits to extract. Click the "Done" button after entering the values. Follow similar procedures for "Y1 Plus Y2"; see item 3(a), to enter the variable name and plot the result.

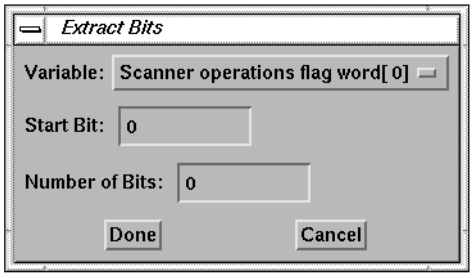


Fig. 4-23. Extract Bits Window

(4) "Curve Fit": Do curve fitting from one variable to another variable. The calculated values and errors for the curve fit are added into the Current Subset list. The result of the coefficients to write into a file are optional. The four models for curve fitting in this option are shown in Fig. 4-24.

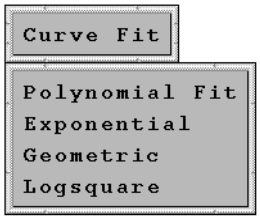


Fig. 4-24. Curve Fit Menu

The options are:

(a) "Polynomial Fit": Use least-square polynomial fit. The form is:

$$y = a_0 + a_1 x + \ldots$$

If this model is selected, a window, as shown in Fig. 4-25, pops up for selecing the independent variable, dependent variable, and the degree of the polynomial to fit. The default degree is one. Click the

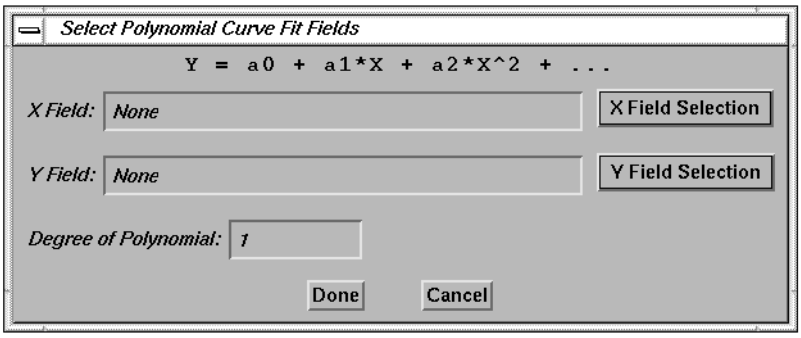


Fig. 4-25. Select Polynomial Fit Parameter Window

"Done" button after selecting all the fields, and another window will pop up for entering the name of the variable which will store the calculated Y values, as shown in Fig. 4-20. Click the "Done" button after entering the name of the new variable. The calculated values and the error estimates will be added into the Current Subset list. A window, as shown in Fig. 4-26, pops asking whether or not you want to write the coefficients of the

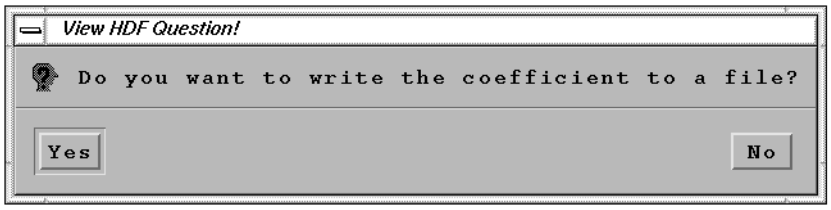


Fig. 4-26. Question for Writing Coefficients to a File

polynomial fit to a file. Click the "Yes" button to write the coefficients to a file. The example output is shown in Fig. 4-27.

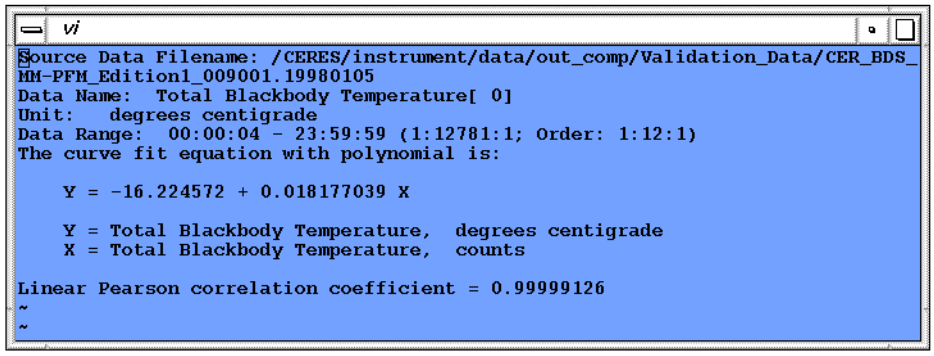


Fig. 4-27. Output file for Polynomial Fit Result

Another window, as shown in Fig. 4-28, will pop up asking whether or not you want to display the calculated values on a plot.

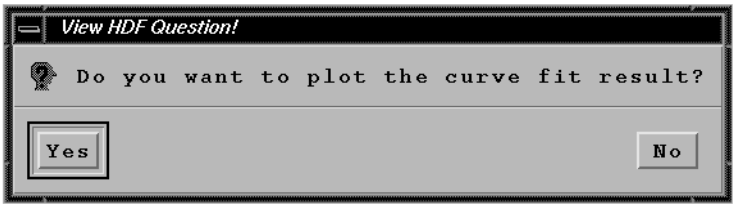


Fig. 4-28. Question for Plotting the Curve Fit Result

If 'Yes" is selected, a window, as shown in Fig. 4-29, pops up asking if you want to display the error on the plot. The plot with the result of the polymonial fit and error estimates are shown in Fig. 4-30.

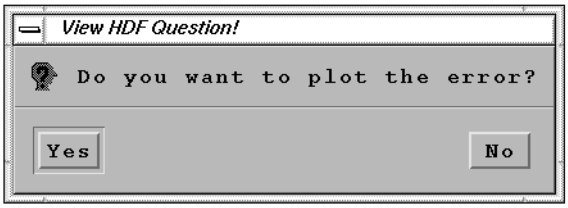


Fig. 4-29. Question for Plotting Error

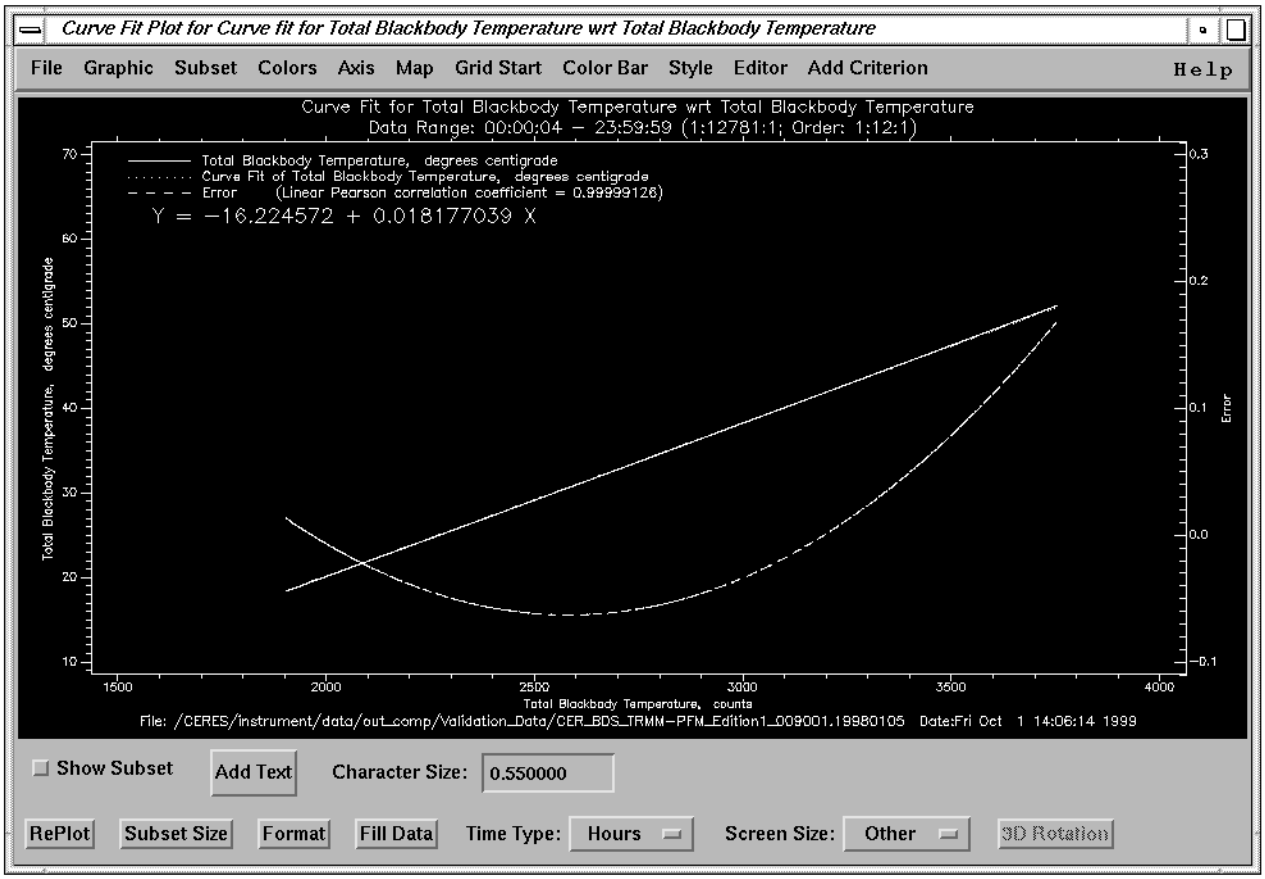


Fig. 4-30. Polynomial Fit Result with Error Estimates

(b) "Exponential": Use a gradient-expansion least-squares method with exponential model. The form of this model is expressed as:

$$y = a_0 \, a_1^{\,x} + a_2$$

If this model is selected, a window, as shown in Fig. 4-31, pops up for selecting the independent variable and dependent variable. The procedure is the same as "Polynomial Fit"; see item 4(a).

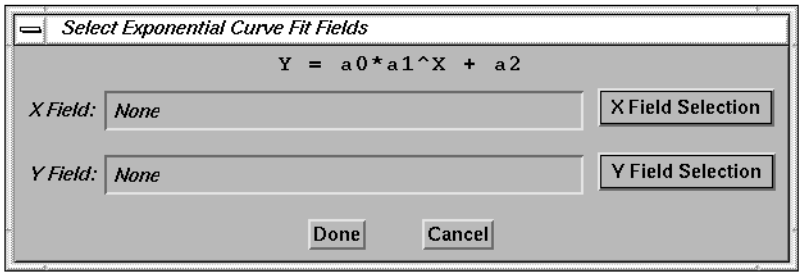


Fig. 4-31. Select Exponential Model Fit Parameter Window

(c) "Geometric": Use a gradient-expansion least-squares method with geometric model. The form of this model is expressed as:

$$y = a_0 x^{a1} + a_2$$

The procedure is the same as “Polynomial Fit”; see item 4(a).

(d) “Logsquare”: Use a gradient-expansion least-squares method with logsquare model. The form of this model is expressed as:

$$y = a_0 + a_1 \log(x) + a_2 \log(x)^2$$

The procedure is the same as “Polynomial Fit”; see item 4(a).

(5) “Colors”: This menu includes the options for selecting different color tables, editing and saving the color map, and changing the background and foreground colors. The menu is shown in Fig. 4-32.

Fig. 4-32. Colors Menu

The options are:

(a) “Select Colors...”: Select the predefined color tables. If this option is selected, the current color table is displayed and a list of available predefined color tables is given, as shown in Fig. 4-33. Click on the name of a color table to load the color table. For example, the table “Rainbow + white” is useful for many CERES data products. Click the “Done” button when selection is completed.

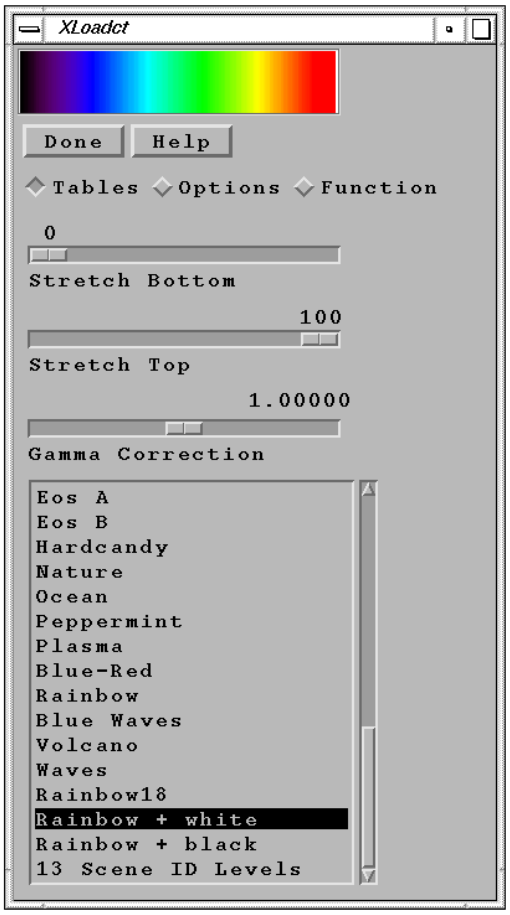


Fig. 4-33. Select Color Table

(b) “Edit Colors...”: Edit the current color table. If this option is selected, all the colors in the current color map will be displayed, as shown in Fig. 4-34. Click on the color index or move the slider to select the color index to edit.

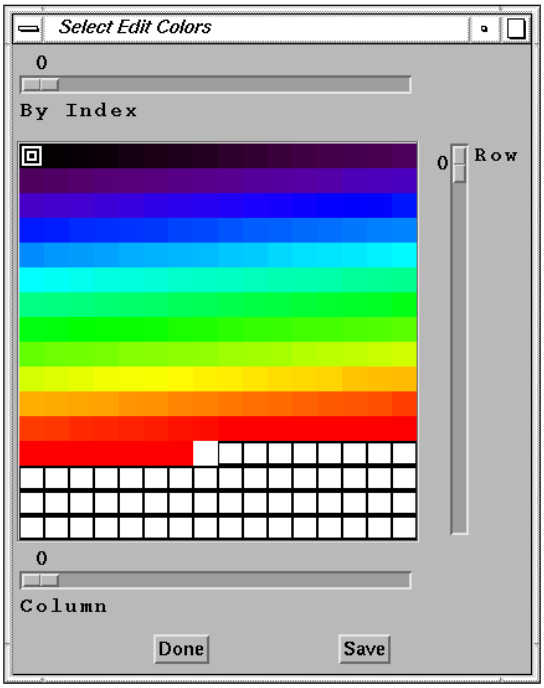


Fig. 4-34. Edit Color Map

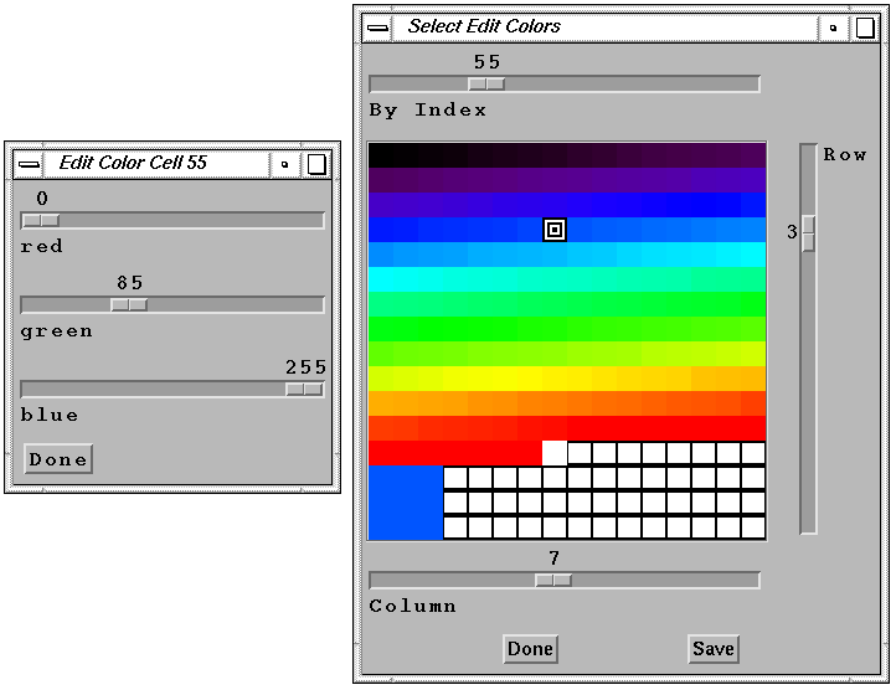


Fig. 4-35. Edit Color Cell Window

An RGB sliders window, as shown in Fig. 4-35, will pop up for adjusting the RGB value. A small sample color square will show on the lower left corner of the Select Edit Colors window. Click the “Done” button on the Edit Color Cell window after adjusting the color. Click the “Done” button on the Select Edit Colors window for the current session without saving to the color table file. Click the “Save” button to save the modified color table to the color table file for later use.

If the “Save” button is selected, a window, as shown in Fig. 4-36, pops up for entering the name of the new color table. After entering a new table name, click the “Done” button. Click the “Cancel” button to cancel saving the new color table.

Fig. 4-36. New Color Table Name Window

(c) “Background”: Change the background color. A window, as shown in Fig. 4-37, pops up for changing the background color if this option is selected. Value zero means the background color is the color at the index zero in the current color table. Click the “Done” button to use a new value, or the “Cancel” button to cancel this selection.

Fig. 4-37. Enter Background Color window

(d) “Foreground”: Change the foreground color. A window, as shown in Fig. 4-38, pops up for changing the foreground color if this option is selected. The foreground color is the default color to display text or graphics on the screen. The foreground color should not be the same as the background color. Click the “Done” button to use a new value, or the “Cancel” button to cancel this selection.

Fig. 4-38. Enter Foreground Color window

(6) “Axis”: This menu includes the options for manually or automatic setting the X, Y, and/or Z axes range. It also includes the options for producing grid lines. The menu is shown in Fig. 4-39.

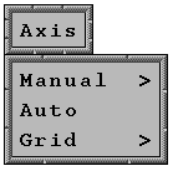


Fig. 4-39. Axis Menu

The options are:

(a) “Manual”: Enter the ranges of X, Y, and/or Z axes, or the ranges of X, Y1, and/or Y2 axes for “Y1-Y2 Plot” manually. The submenu is shown in Fig. 4-40. Click on any option, and a window will pop up for entering the ranges. Figure 4-41, Fig. 4-42, and Fig. 4-43 show the options for “X Only”, “XY Only”, and “XYZ”, respectively. Click the “Done” button to apply the ranges, or click the “Cancel” button to close the window.

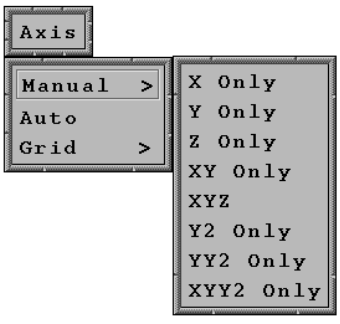


Fig. 4-40. Axis-Manual Submenu

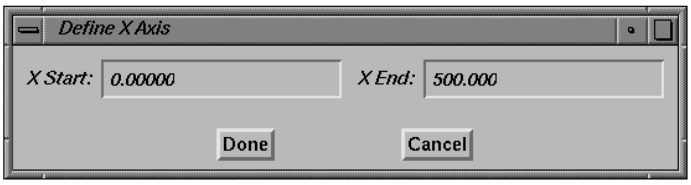


Fig. 4-41. Set X Axis Range Window

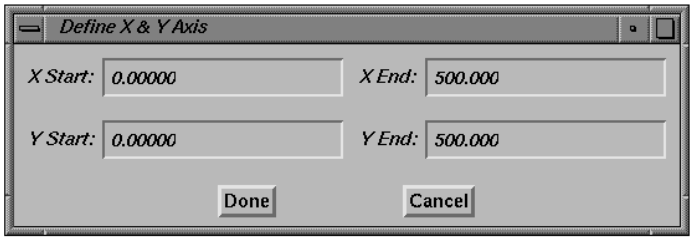


Fig. 4-42. Set X and Y Axes Ranges Window

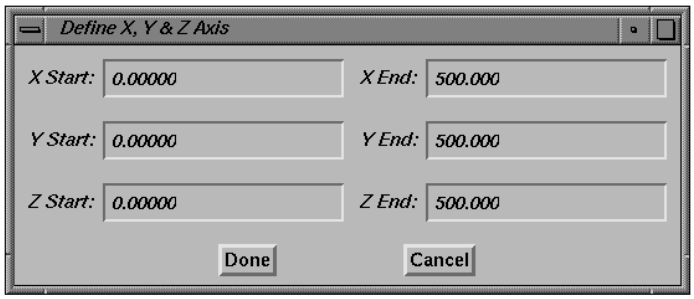


Fig. 4-43. Set X, Y, and Z Axes Ranges Window

(b) "Auto": Set the ranges of the axes automatically to span the minimum to the maximum data values. This is the default.

(c) "Grid": Draw grid lines on the major tick marks. The submenu is shown in Fig. 4-44. An example of a 2D plot with the option "With XY Grid" is shown in Fig. 4-45. The default is "Without Grid".

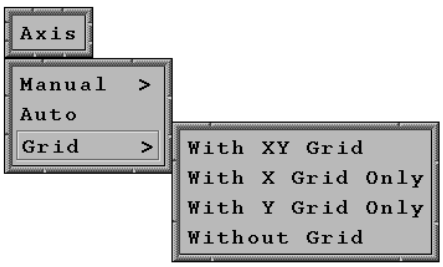


Fig. 4-44. Axis-Grid Submenu

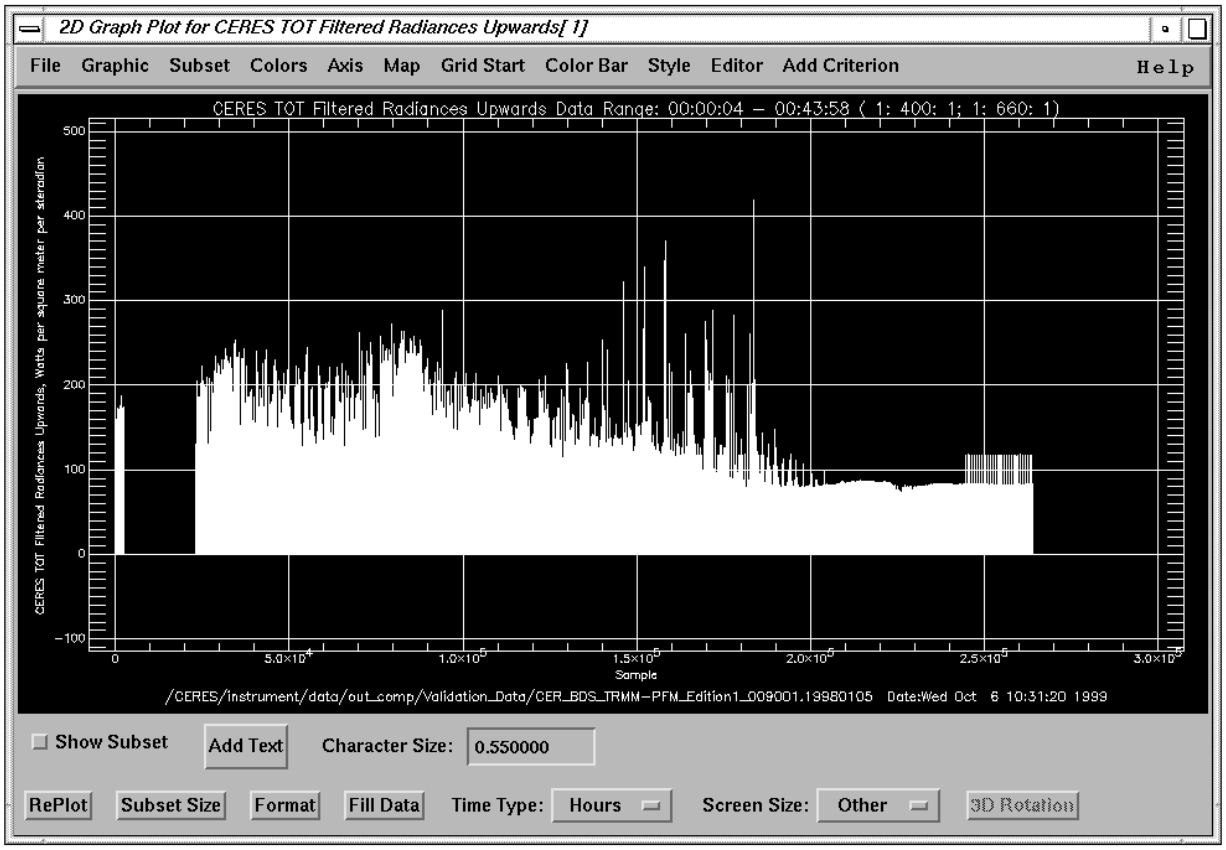


Fig. 4-45. 2D plot with XY grid

(7) "Map": This menu includes the options for adjusting the display for any geolocated plot, such as the longitude to be mapped to the center of the map projection, type of map projection, labelling the meridians, and showing locations of satellite and Sun. The menu is shown in Fig. 4-46.

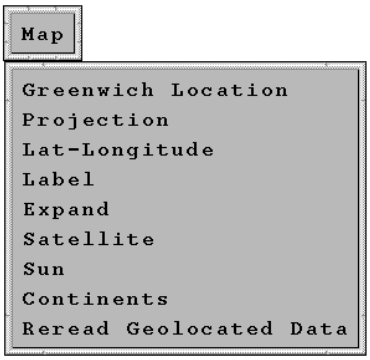


Fig. 4-46. Map Menu

The options are:

(a) "Greenwich Location": Set the longitude to be mapped to the center of the map projection. The submenu, shown in Fig. 4-47, includes:

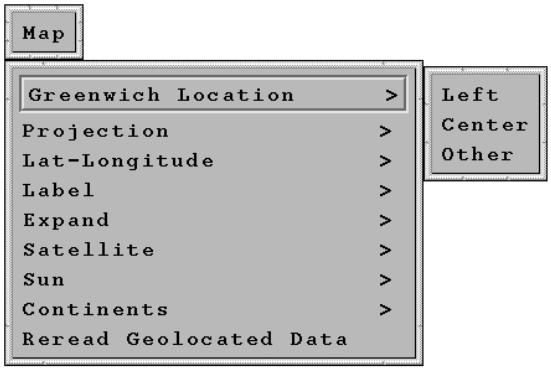


Fig. 4-47. Map-Greenwich Submenu

(i) "Left": The location of Greenwich is mapped to the left of the plot; The zero degree longitude line is at the left and 180 degrees is at the center of the map projection.

(ii) "Center": The location of Greenwich is mapped to the center of the plot; -180 degrees longitude is at the left, zero degrees is at the center, and 180 degrees is at the right of the map projection. This is the default.

(iii) "Other": The longitude to be mapped to the center of the plot is input. A window, as shown in Fig. 4-48, pops up for entering the value. Click the "Done" button to set the value or the "Cancel" button to cancel this selection. The value can be from zero to 360 degrees or from -180 to 180 degrees.

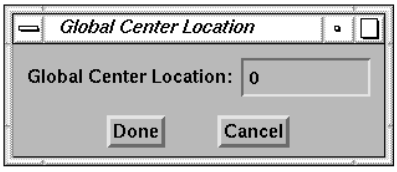


Fig. 4-48. Global Center Location Window

(b) "Projection": Set the type of map projection to display. The projection types, as shown in Fig. 4-49, include:

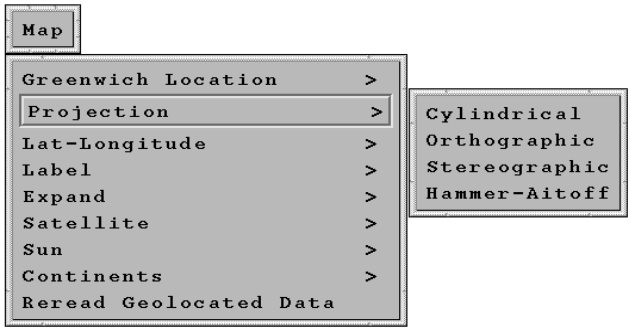


Fig. 4-49. Map-Projection Submenu

(i) "Cylindrical": Select the cylindrical equidistant projection. This is the default map projection.

(ii) "Orthographic": Select the orthographic projection.

(iii) "Stereographic": Select the stereographic projection.

(iv) "Hammer-Aitoff": Select the Hammer-Aitoff equal area projection.

(c) "Lat-Longitude": Use default geolocation parameters or selected geolocation parameters. The submenu, shown in Fig. 4-50, includes:

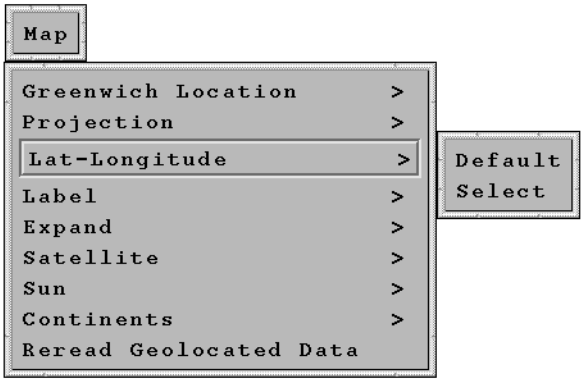


Fig. 4-50. Map-Lat-Longitude Submenu

(i) "Default": Use default geolocation parameters which are imported from the current file automatically if they can be recognized; see Section 5.0. This is the default.

(ii) "Select": Select geolocation parameters from Current Subset list. The geolocation parameters need to be imported into the Current Subset list before selecting this option. If this option and "Geolocated" option from the Select Function menu are selected, a window, as shown in Fig. 4-51, pops up for selecting the parameters.

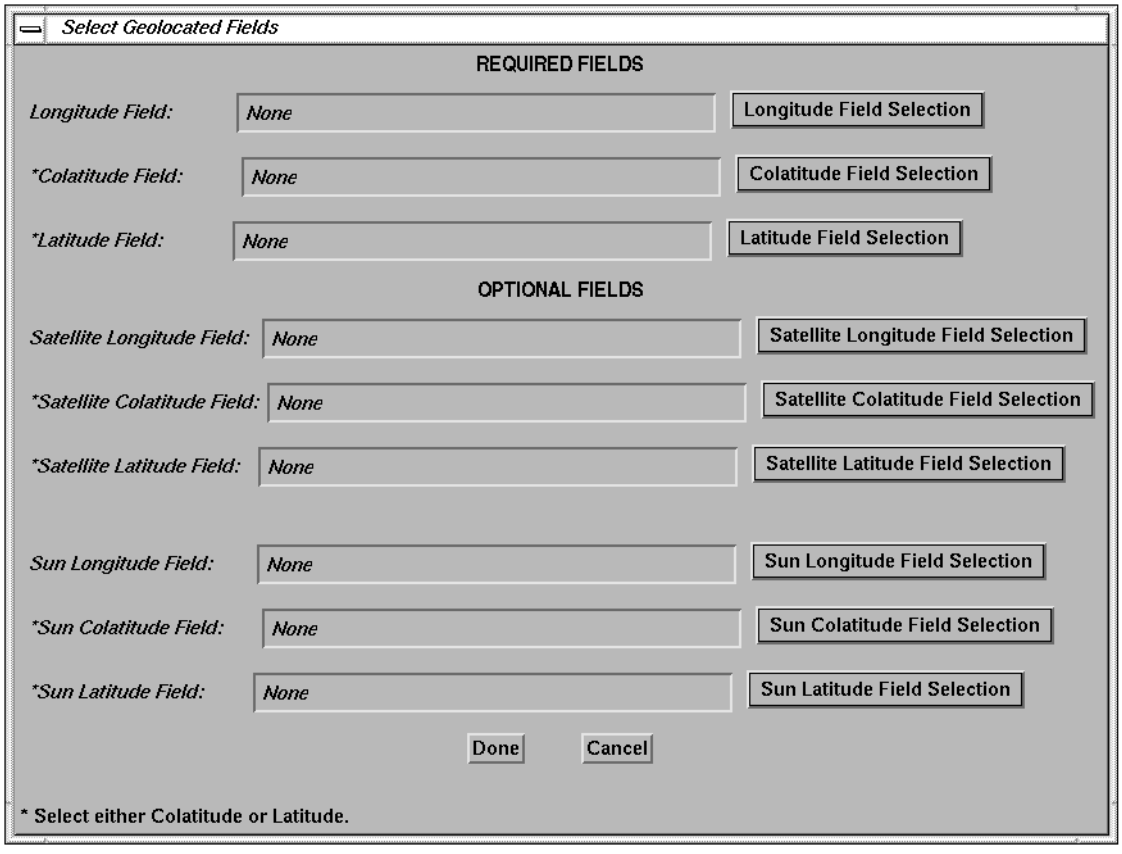


Fig. 4-51. Select Geolocated Parameters Window

(d) "Label": Label or do not label the latitudes and longitudes on the map projection. The submenu, as shown in Fig. 4-52, includes:

(i) "With Label": Label the latitudes and longitudes. This is the default.
(ii) "Without Label": Do not label the latitudes and longitudes.

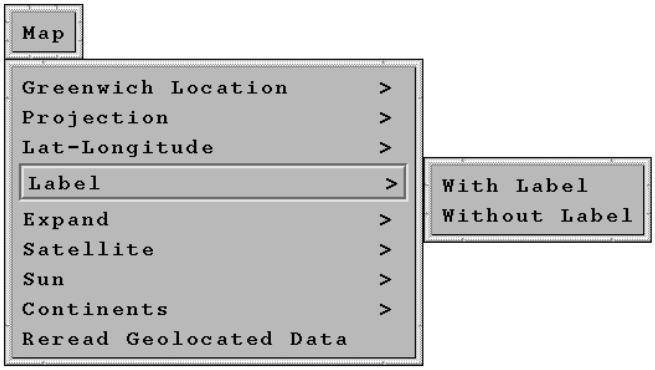


Fig. 4-52. Map-Label Submenu

(e) "Expand": Expand the longitude and latitude data from one dimension arrays to two dimension arrays. When the data are two dimensional arrays and geolocated data are one dimensional arrays, the longitude and latitude data will be expanded to two dimensional arrays. The submenu, as shown in Fig. 4-53, includes:

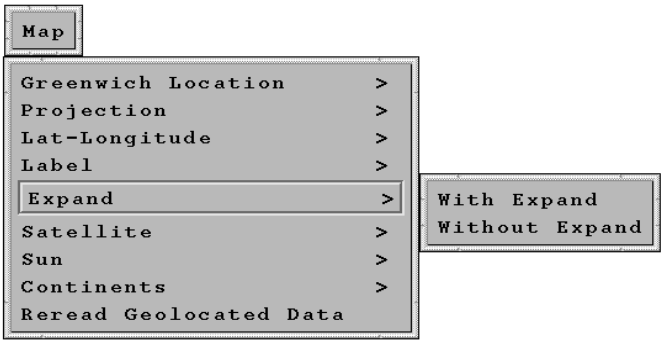


Fig. 4-53. Map-Expand Submenu

(i) "With Expand": Expand the geolocated data. This is the default.
(ii) "Without Expand": Do not expand the geolocated data.

(f) "Satellite": Display the location of the satellite on the map projection. The submenu, as shown in Fig. 4-54, includes:

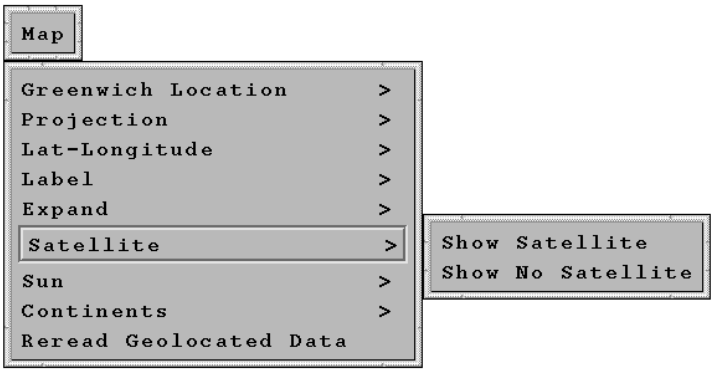


Fig. 4-54. Map-Satellite Submenu

(i) "Show Satellite": If the latitude and longitude of the satellite are available, the position of the satellite will display on the map projection. If the satellite position is not available, "Show No Satellite" will be automatically set. This is the default.
(ii) "Show No Satellite": Do not display the position of the satellite on the map projection.

(g) "Sun": Display the location of the Sun on the map projection. The submenu, as shown in Fig. 4-55, includes:

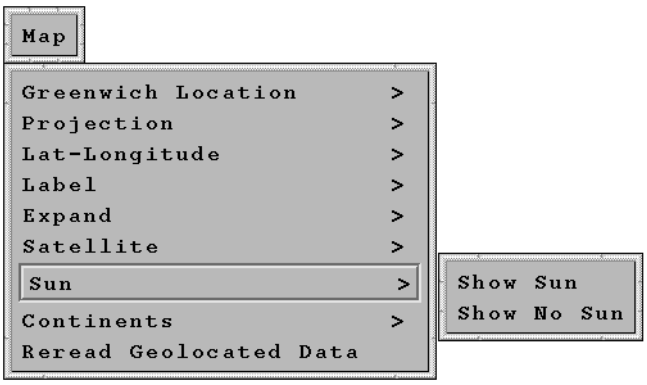


Fig. 4-55. Map-Sun Submenu

(i) "Show Sun": If the latitude and longitude of the Sun are available, the position of the Sun will display on the map projection. If the latitude and longitude are not available, "Show No Sun" will be automatically set. This is the default.

(ii) "Show No Sun": Do not display Sun location on map projection.

(h) "Continents": Redraw the continental boundaries on the map projection. The continental boundaries are drawn before data are displayed and may subsequently be covered by data. The submenu, as shown in Fig. 4-56, includes:

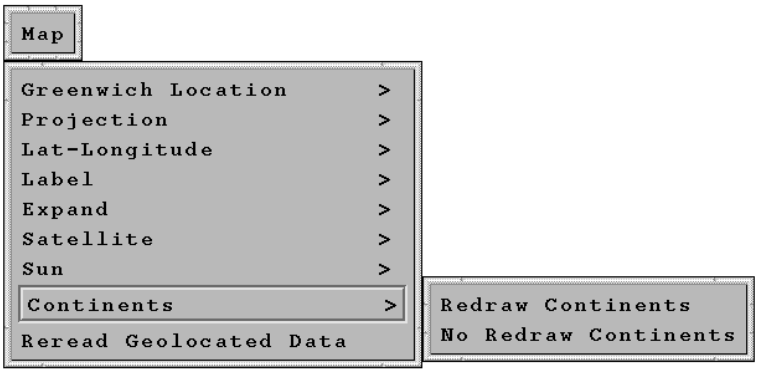


Fig. 4-56. Map-Continents Submenu

(i) "Redraw Continents": Redraw the continental boundaries after displaying data.

(ii) "No Redraw Continents": Do not redraw the continental boundaries. This is the default.

(i) "Reread Geolocated Data": Reread the geolocated parameters. When switching from "With Expand" option to "Without Expand" option, or vice versa (see item 5(e)), the geolocated data are needed to reread.

(8) "Grid Start": Select the longitude location of the first grid for "Grid Cell" plot; see item (30). The data are arranged always starting at 90 degrees latitude. The submenu, as shown in Fig. 4-57, includes:

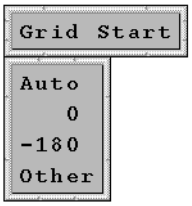


Fig. 4-57. Map-Grid Start Submenu

(i) "Auto": Set the first grid automatically. If the grid size is equal to one degree, the first grid is set at -180 degrees longitude, otherwise it is set at zero degree longitude. This option is default.

(ii) "0": Set the first grid starting at zero degree longitude.

(iii) "-180": Set the first grid starting at -180 degree longitude.

(iv) "Other": This option can be use to specify the longitude location of the first grid. A window, as shown in Fig. 4-58, pops up for entering the location. The values are in degrees. Enter the location and click the "Done" button, or click the "Cancel" button to close the window.

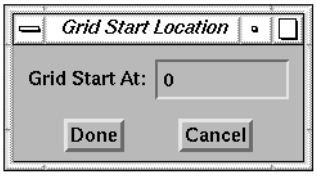


Fig. 4-58. Grid Start Window

(9) "Color Bar": This menu includes the options to display or not to display a color bar and adjust the location of the color bar. It also allows selection of discrete or continuous mapping of color to data values. The menu is shown in Fig. 4-59.

Fig. 4-59. Color Bar Menu

The options are:

(a) "With Color Bar": Display a color bar on the bottom of the graph and select how to scale data with color. Data can be scaled with discrete or continuous color mapping. The "Continuous" option is the default. The submenu, as shown in Fig. 4-60, includes:

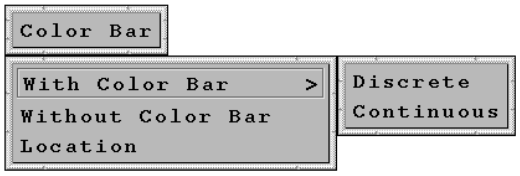


Fig. 4-60. With Color Bar Submenu

(i) "Discrete": Display the data in a discrete color pattern in the specified number of intervals. If this option is selected, a window, as shown in Fig. 4-61, pops up for entering the number of

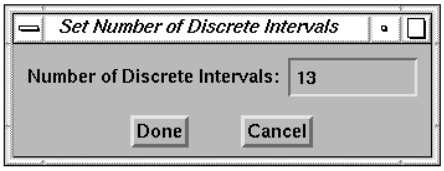


Fig. 4-61. Number of Discrete Intervals Window

intervals. Click the "Done" button to set the value, or click the "Cancel" button to close the window. This option is good for displaying variables with discrete values.

(ii) "Continuous": Display the data in a continuous color pattern. This option is good for displaying variables with continuous values.

(b) "Without Color Bar": Do not display a color bar.

(c) "Location": Set the location of the color bar. A window, as shown in Fig. 4-62, pops up for entering the new location of the color bar. The value is the vertical distance from the bottom of the plot in a normalized coordinate system, ranging from 0.0 to 1.0. Click the "Done" button after entering a value or the "Cancel" button to cancel the selection.

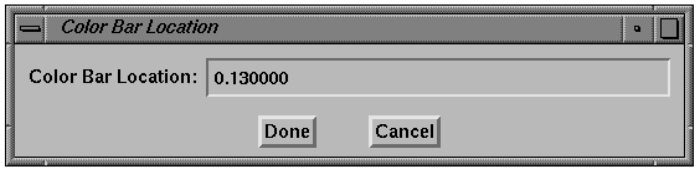


Fig. 4-62. Color Bar Location Window

(10) "Style": This menu includes the options for setting the line type, symbol type, and symbol size used to display the data. The menu is shown in Fig. 4-63.

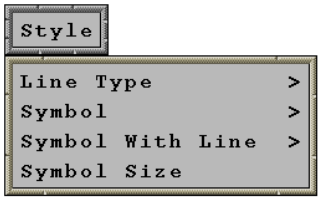


Fig. 4-63. Style Menu

The options are:

(a) "Line Type": Select the line type used to join data points. The available line types, as shown in Fig. 4-64, are:

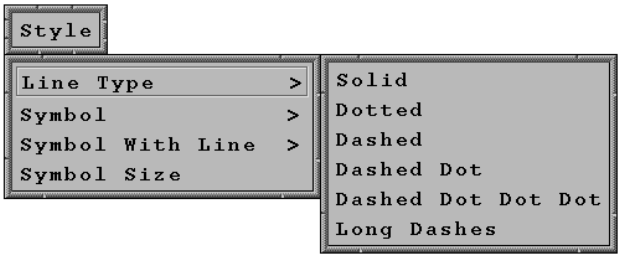


Fig. 4-64. Style-Line Type Submenu

(i) "Solid": Use a solid line to join data points. This is the default.

(ii) "Dotted": Use a dotted line to join data points.

(iii) "Dashed": Use a dashed line to join data points.

(iv) "Dashed Dot": Use a dashed dot line to join data points.

(v) "Dashed Dot Dot Dot": Use a dashed dot dot dot line to join data points.

(vi) "Long dashes": Use a long dashed line to join data points.

(b) "Symbol": Select line or symbols to display the data. The submenu, as shown in Fig. 4-65, includes:

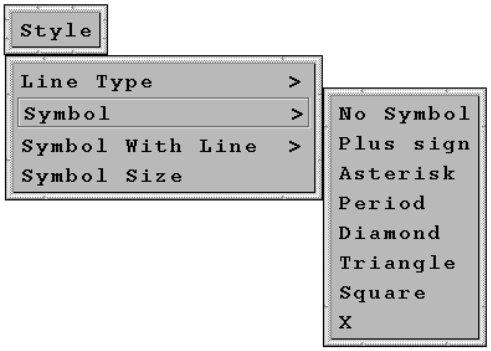


Fig. 4-65. Style-Symbol Submenu

(i) "No Symbol": Use line to display data. This is the default.
(ii) "Plus sign": Use plus sign, "+", to mark data points.
(iii) "Asterisk": Use asterisk, "*", to mark data points.
(iv) "Period": Use period, ".", to mark data points.
(v) "Diamond": Use diamond shape symbol to mark data points.
(vi) "Triangle": Use triangle shape symbol to mark data points.
(vii) "Square": Use a square shape symbol to mark data points.
(viii) "X": Use the letter "X" to mark data points.

(c) "Symbol With Line": Select to use or not to use a line to connect all the symbols if a symbol is selected to mark the data points. The submenu, as shown in Fig. 4-66, includes:

Fig. 4-66. Style-Symbol With Line Submenu

(i) "Without Line": Do not connect symbols with a line. This is the default.
(ii) "With Line": Connect the data point symbol with a line.

(d) "Symbol Size": Set the size of the symbol to mark the data points. If this option is selected, a window, as shown in Fig. 4-67, pops up for entering the new size of the symbol. The default size is 1.0 which is approximately the same size as a character. Click the "Done" button after entering the size, or click the "Cancel" button to close the window.

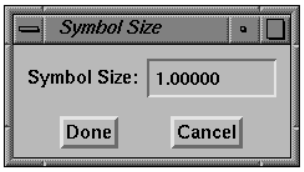


Fig. 4-67. Symbol Size Window

(11) "Editor": Select a text editor to display data or a file on the screen. The menu is shown in Fig. 4-68. The options are:

(a) "VI": Use vi editor to display data or file. This is the default.

(b) "Emacs": Use emacs editor to display data or file.

Fig. 4-68. Editor Menu

(c) "Ieditor": Use ieditor editor to display data or file. Note: this editor may not be available on all machines. The view_hdf.pro program can be modified to specify the editor of choice.

(d) "Other": Use this option to specify an editor other than the above three options. A window, as shown in Fig. 4-69, pops up for entering the command used to start the editor, including any command line options.

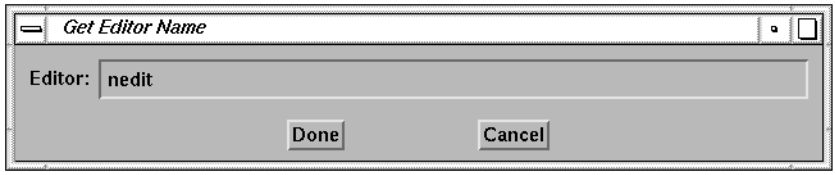


Fig. 4-69. Get Editor Name Window

(12) "Add Criterion": Add criterion based on the value of a variable listed in the Current Subset list. This criterion is used to calculate statistics. The menu is shown in Fig. 4-70.

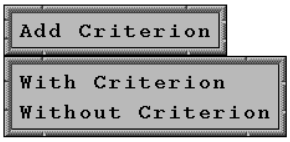


Fig. 4-70. Add Criterion Menu

The options are:

(a) "With Criterion": Control whether the statistics (described in item (32)) calculated on the "Select Function" menu are subject to an additional selection criterion.

If this option is selected, a window, as shown in Fig. 4-71, pops up for selecting the criterion. The criterion parameter must already be imported into Current Subsets before this option is selected. The record range of this parameter must be equal to or greater than the record range of the data.

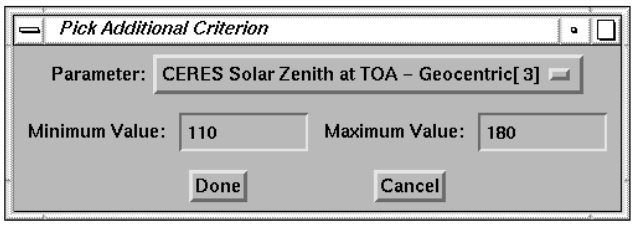


Fig. 4-71. Pick Additional Criterion Window

Select the parameter, enter the maximum and minimum values and click the "Done" button. The "With Criterion" button on the Main Menu becomes activated, as shown in Fig. 4-72. To cancel this selection, click the "Cancel" button. The "With Criterion" button will be inactivated.

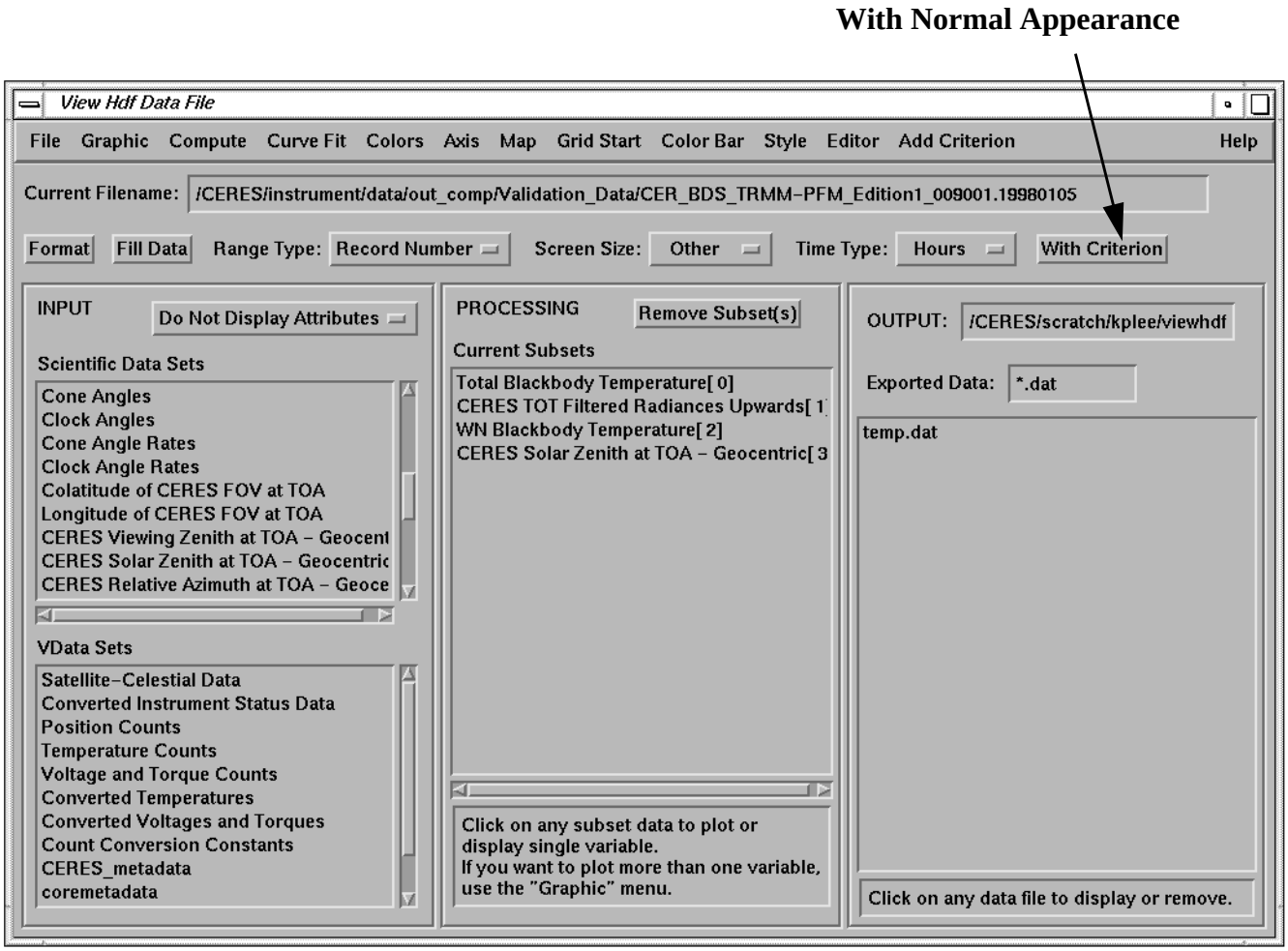


Fig. 4-72. With Additional Criterion On

(b) "Without Criterion": Turn off the "With Criterion" option. The "With Criterion" button will become inactivated and any previously specified criterion will not be used.

(13) "Help": Call up this user guide or IDL on-line help menu. The options are shown in Fig. 4-73.

(a) "User Guide": Call up this user guide which is in PDF format. An PDF reader, acroread, is needed.

(b) "IDL On-line Help": Call up the IDL on-line help menu.

Fig. 4-73. Help Menu

(14) "Current Filename": Display the name of the current input data file.

(15) "Format": Change the format for exporting data to a file. If this button is pressed, a window, as shown in Fig. 4-74, pops up for entering a format. The format syntax is the same as a FORTRAN-style specification. The default format is "e18.9". Click the "Done" button after entering a value or the "Cancel" button to cancel this selection.

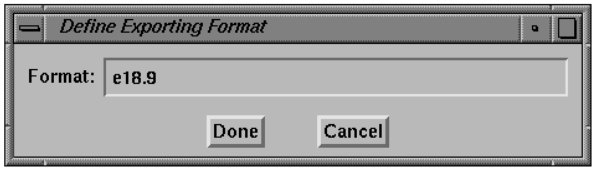


Fig. 4-74. Define Format Window

(16) "Fill Data": Change the fill data values. Any data equal to or greater than fill data represents bad data. Those data will not be plotted. This option can be used to change the fill data value. If this button is clicked, a window, as shown in Fig. 4-75, pops up for entering the new fill data value. The default fill data is "1.0E+35". Click the "Done" button after entering a value or the "Cancel" button to cancel this selection.

Fig. 4-75. Define Fill Data Window

(17) "Range Type": Use record number or time to select the range of imported data, if the time variable is recognized; see Section 5.0 for a list of time variables that are recognized. If the time variable is not recognized, the record number must be used. The options are:

(a) "Record Number": Use record number to select the range of data. If this option is selected, the range input windows are shown in Fig. 3-5 for SDS and Fig. 3-8 for Vdata. The ending values shown initially are the total number of records, or the dimension values for the corresponding ranks. Enter the record range and click the "Done" button or click the "Cancel" button to cancel this selection. Record Number is the default.

(b) "Time": Use time to select the range of data if the time variable (See Section 5.0) is recognized. If this option is selected, a window, as shown in Fig. 4-76, pops up for entering the time range. The starting time shown initially is the time of the first record and the ending time is the time of the last record. Enter the time range and click the "Done" button. The record range input window, as shown in Fig. 3-5 for SDS or Fig. 3-8 for Vdata, will pop up with the corresponding record numbers shown. The user can change the record range. Click the "Done" button to finish this selection or the "Cancel" button to cancel this selection.

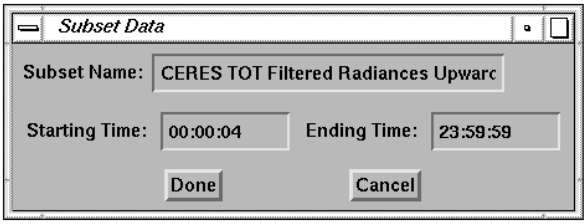


Fig. 4-76. Time Range Input Window

(18) "Screen Size": Adjust the size of draw window. This option is used to change the size of the draw window. The size is in pixels. The options are:

(a) "1036x540": The size of the draw window is set to 1036x540. This is the default for a Sun workstation.

(b) "1152x614": The size of the draw window is set to 1152x614. This is the default for a SGI workstation.

(c) "Other": This option can be used to specify the size of the draw window. A window, as shown in Fig. 4-77, pops up for entering the new size. The values are in pixels. Enter the screen size and click the "Done" button, or click the "Cancel" button to close the window.

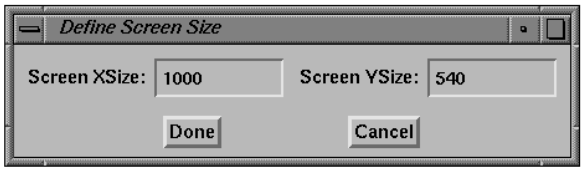


Fig. 4-77. Select Screen Size Window

(19) "Time Type": Set the X axis to hour, minute, or second if data are plotted against time. The options are:

(a) "Hours": Set the time to hours of the day.

(b) "Minutes": Set the time to minutes of the day.

(c) "Seconds": Set the time to seconds of the day.

(20) "With Criterion": Display "Add Criterion" option as on or off. When the appearance of this button is normal, as shown in Fig. 4-78a, the option is on. When this button is inactivated, as shown in Fig. 4-78b, the option is off. When the "Add Criterion" option is on, press this button to turn off this option.

(a) With option on

(b) With option off

Fig. 4-78. With Criterion Button

(21) "INPUT": Display the names of SDS and Vdata sets in the current HDF file. The options "Do Not Display Attributes" and "Display Attributes" are set for displaying the attributes of the data or not displaying the attributes when the data set is selected. Click on any of these data set names to import the data to the Current Subsets field. This procedure is described in Section 3.0: How to Start. If the "Display Attributes" option is selected, the attributes of the data set will be displayed on an editor window along with the Range Input Window, as shown in Fig. 4-79.

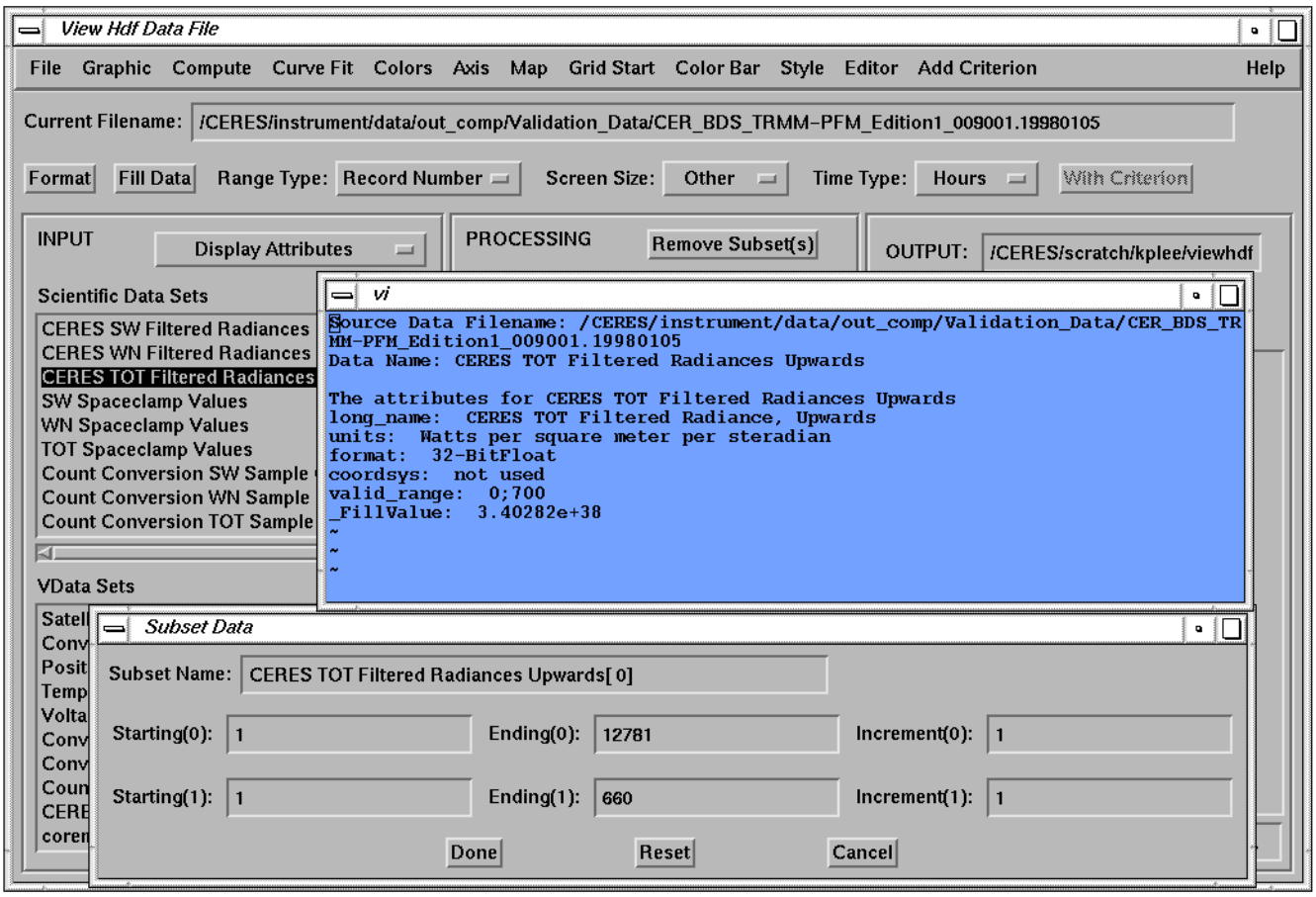
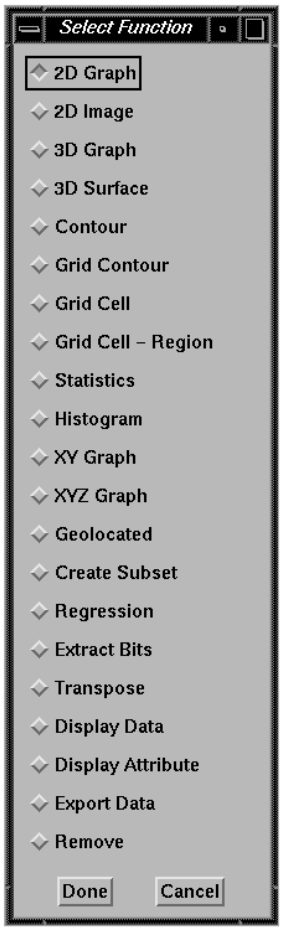


Fig. 4-79. Display Data Attributes

(22) "PROCESSING": Display the names of the imported data sets. These data sets can be accessed for plotting, displaying, or exporting. Click on any subset data in this list and a function menu, as shown in Fig. 4-80, pops up. Choose the selection and click the "Done" button. To cancel this selection, click the "Cancel" button.

The menu shown in Fig. 4-80a is for numerical data and the menu shown in Fig. 4-80b is for text data. Descriptions of these menus are given in Section 4.2: Select Function Menu.

The "Remove Subset(s)" button is for removing some or all of the imported data in the Current Subsets list. The procedure is similar to "Multi Variables"; see item 2(a)



(a) For Numerical Data

(b) For Text Data

Fig. 4-80. Select Function Menu

(23) "OUTPUT": List the names of files in the output directory that match the current export data filter. The current output directory path is displayed. The filter can be changed to refine the list. After changing the filter, press the return key to update the output list. The "Change Output Path" option in the "File" menu can be used to specify the output directory; see item 1(h) or edit the output directory path in the OUTPUT column and press the return key to change the directory. The list of files which match the file filter will be updated automatically. Click on any file in this list and a window, as shown in Fig. 4-81, pops up to display or remove the file. "Display Data" displays the contents of the file on the screen using the selected editor. "Remove" deletes the file permanently.

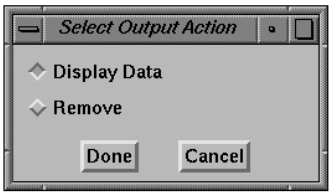


Fig. 4-81. Output Action Window

4.2 Select Function Menu

This section describes the different graph styles from the “Select Function” menu (Fig. 4-80):

(24) “2D Graph”: Plot data against the index of the data array. An example of a 2D plot is shown in Fig. 3-11. This is the default.

(25) “2D Image”: Display data as an image.

(26) “3D Graph”: Draw a wire-mesh representation of a two-dimensional array projected into two dimensions. The plot is generated as a function of the array index of each element of data.

(27) “3D Surface”: Creates a shaded-surface representation of a gridded surface with shading from a light source model. The surface is generated as a function of the array index of each element of data. An example of a 3D surface plot is shown in Fig. 4-82

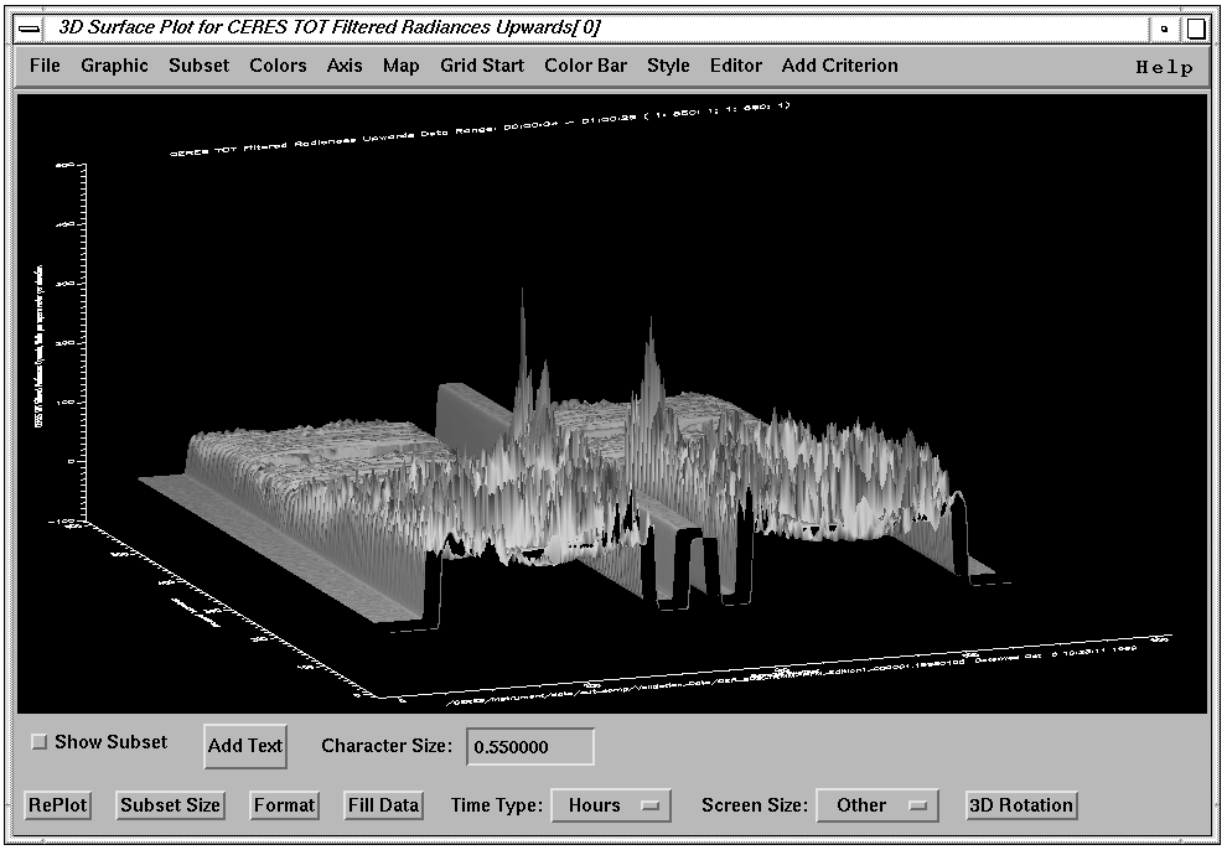


Fig. 4-82. 3D Surface graph

(28) “Contour”: Draw a line contour plot from the data. The contour is plotted as a function of the two-dimensional array index of each element of data.

(29) “Grid Contour”: Create a filled contour plot on a map projection. The gridded data are arranged into a two or three dimensional array. For a two dimensional array, the first dimension is for latitude, and the second is for longitude. For example, for a 2.5 degree grid in latitude and longitude, the dimensions of the data array are 72x144. For a three dimensional array, the first dimension is the index of the two dimensional grid. For example, for a 24 hours with 2.5 degrees grid in latitude and longitude, the dimensions of the data array are 24x72x144. If the data array is three dimensional, it will continuously display the plot with increment of the first dimension index. A window, as shown in Fig. 4-83, pops up. Click the “Yes” button to display the next plot, click the “No” button to skip the next plot, or click the “Cancel” button to stop the increment. See item (8) for a description of gridded data arranged. A color bar displays the scale value.

Fig. 4-83. Question for Displaying Next Plot

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(30) “Grid Cell”: Display gridded data by region on a map projection. The gridded data are arranged in the same way as for “Grid Contour”. A region is represented by one grid cell. The data value for each region is displayed with the color of the scaled data. This option can also

display zone regions if the dimension of the longitude is set to 1. A color bar shows the scale values. An example of a grid cell plot is shown in Fig. 4-84.

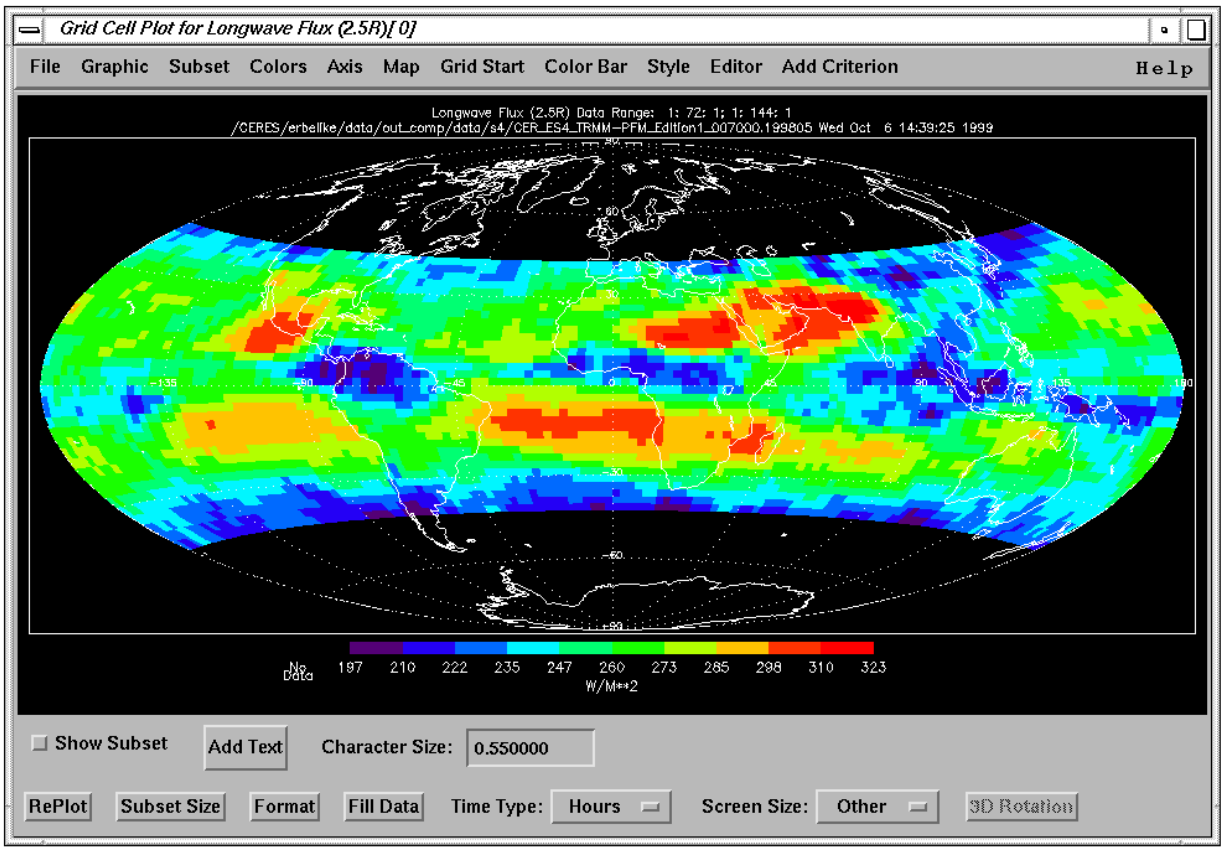

Fig. 4-84. Grid Cell Plot

(31) "Grid Cell - Region": This option is similar to "Grid Cell", item (30), except the gridded data is arranged in terms of region number. The corresponding region numbers are stored in a different variable array which is already imported into the Current Subset list before this option is selected. If this option is selected, a window, as shown in Fig. 4-85, pops up for selecting the region number from the Current Subset list and the grid size. Click the "Done" button after selecting the variable. A plot similar to Fig. 4-84 will be displayed on the screen. Click the "Cancel" button to cancel this selection.

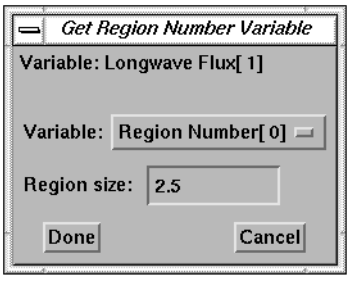

Fig. 4-85. Get Region Number Variable

(32) "Statistics": Calculate the mean, standard deviation, maximum, minimum and number of samples for one- or two-dimensional arrays. If the data are in a two-dimensional array, the statistics parameters are obtained for all elements from the first dimension on each second dimension array index. For example, a 13091x660 data array results in five arrays with a dimension of 660 each. Each array is for one statistics parameter. Each element of these arrays is the result for 13091 samples. The results are written to a file. A window, as shown in Fig. 4-86, pops up for entering the filename.

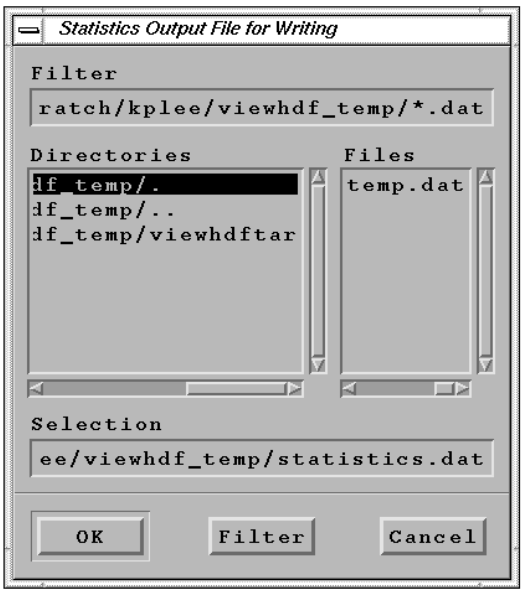

Fig. 4-86. Enter Filename Window

The results are also displayed in an editor window on the screen. Figure 4-87 shows an example of the statistics results for a two-dimensional array.

vi

```
Source Data Filename: /CERES/instrument/data/out_comp/Validation_Data/CER_BDS_TR
MM-PFM_Edition1_009001.19980105
Subset Name: CERES TOT Filtered Radiances Upwards[ 0]
Unit:  Watts per square meter per steradian
Data Range:  00:00:04 - 01:00:28 ( 1: 550: 1; 58: 660: 1)
Criterion: 110.000 <= CERES Solar Zenith at TOA - Geocentric <= 180.000

  Sample        N         StdDev           Mean        Maximum        Minimum
       0      206       10.55448       56.97289       69.45500       29.53450
       1      204       11.42120       58.74463       71.70246       28.74473
       2      203       12.01034       60.09617       72.89214       29.94249
       3      202       12.17927       61.29155       73.93341       29.05031
       4      202       12.19058       62.15158       75.12082       29.95410
       5      201       12.12478       62.90057       76.00702       30.67894
       6      202       12.18914       63.49538       77.05071       31.10548
       7      201       12.48497       63.95403       77.77692       31.24688
       8      200       12.75807       64.43039       78.21188       30.55462
       9      199       12.96238       64.87907       78.63191       28.20050
      10      199       13.09496       65.30891       79.08065       28.51952
      11      199       13.23051       65.70958       79.20947       30.21814
      12      198       13.22664       66.17120       79.58337       30.06032
      13      198       13.29237       66.42968       79.55683       30.23698
      14      198       13.27821       66.77017       79.82609       30.84143
```

Fig. 4-87. Display Statistics Result

A plot, as shown in Fig. 4-88, with mean and standard deviation, will display results for a two-dimensional array on the screen. A plot is not produced for an one-dimensional array.

Fig. 4-88. Mean and Standard Deviation Plot

The results are also placed in the Current Subsets list, as shown in Fig. 4-89. Note that in this example the “Add Criterion” option is on.

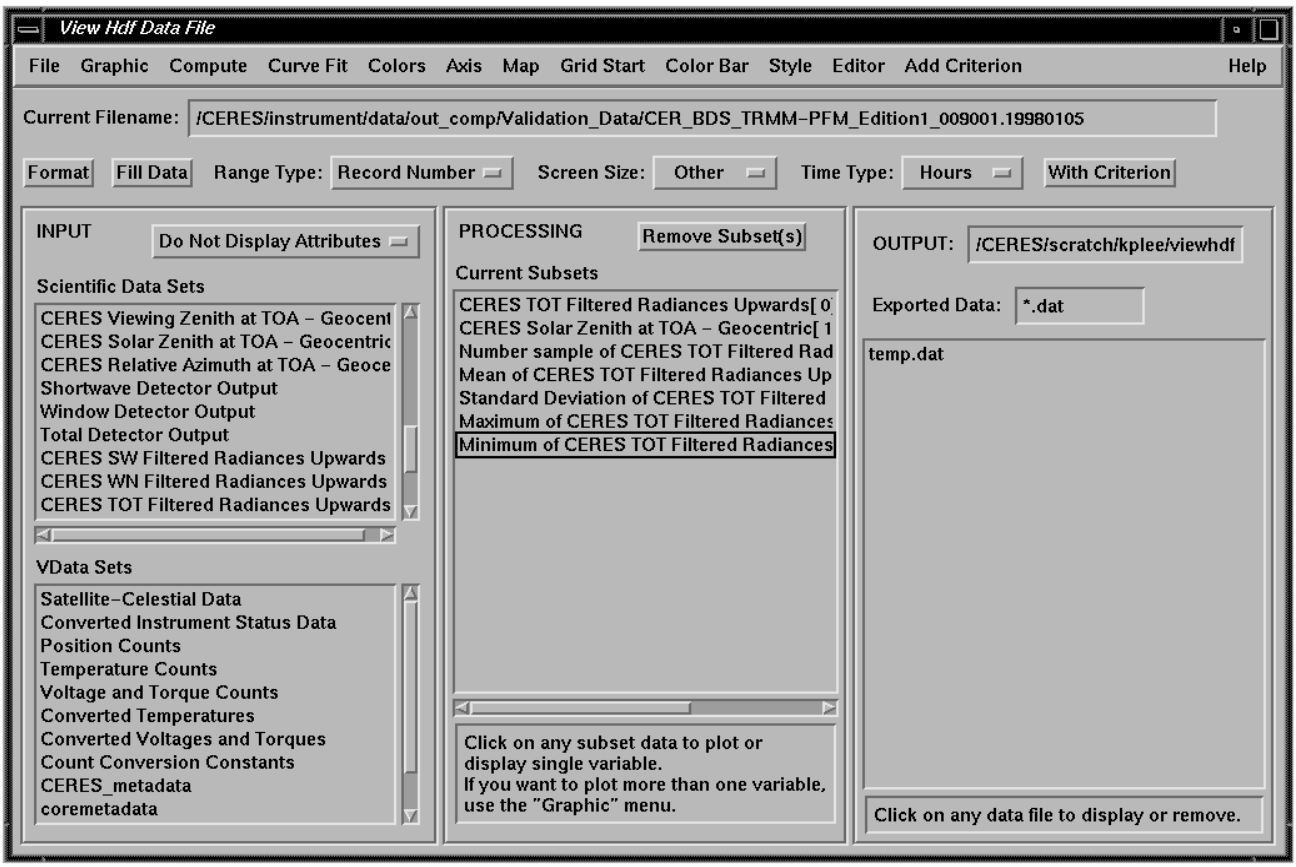

Fig. 4-89. Statistics Parameters in Current Subsets

(33) “Histogram: Do a sample histogram of data with the option to write the result to a file. If this option is selected, a window, as shown in Fig. 4-90, pops up for entering the “Bin Size”, the size of bin, “Max Value”, maximum value, and “Min Value”, minimum value of the histogram. After entering the value, click the “Done” button.

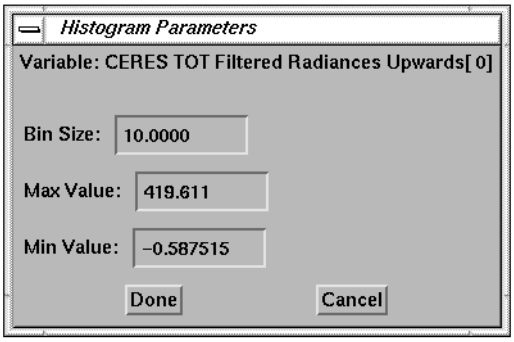

Fig. 4-90. Histogram Parameters Window

Another window, as shown in Fig. 4-91, pops up asking whether or not you want to write the result to a file. Click the "Yes" button to write the result to a file. A sample result and a plot of the histogram are shown on Fig. 4-92 and Fig. 4-93.

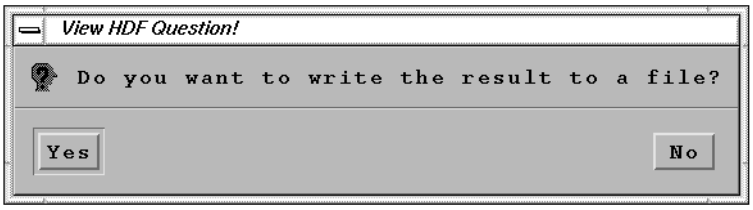

Fig. 4-91. Question for Writing Result to a File

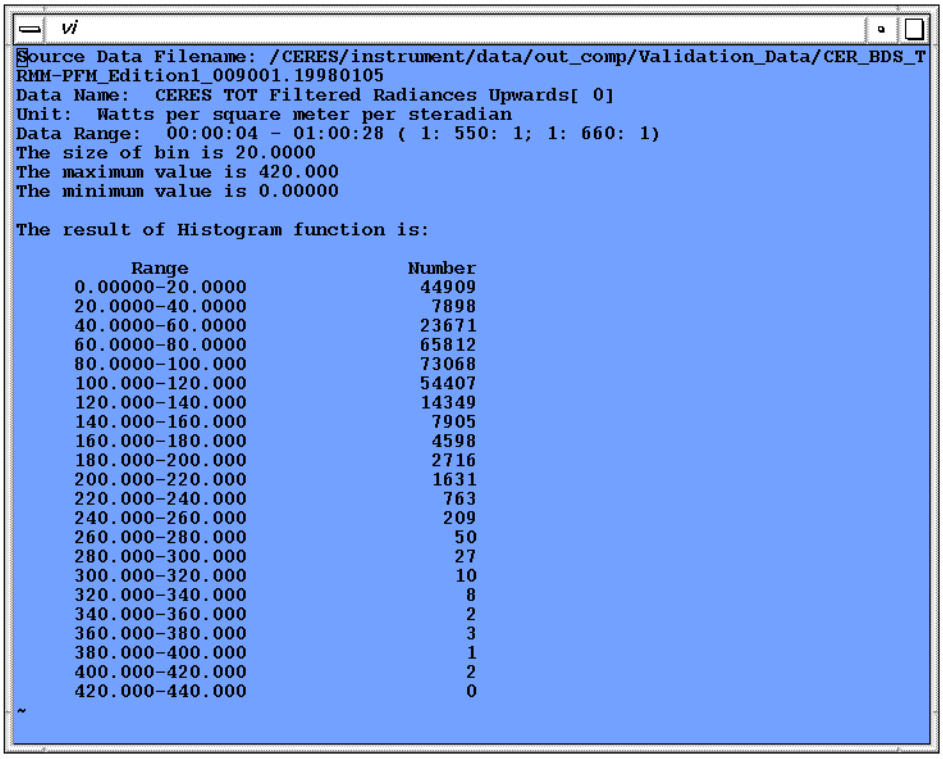

Fig. 4-92. Histogram Result

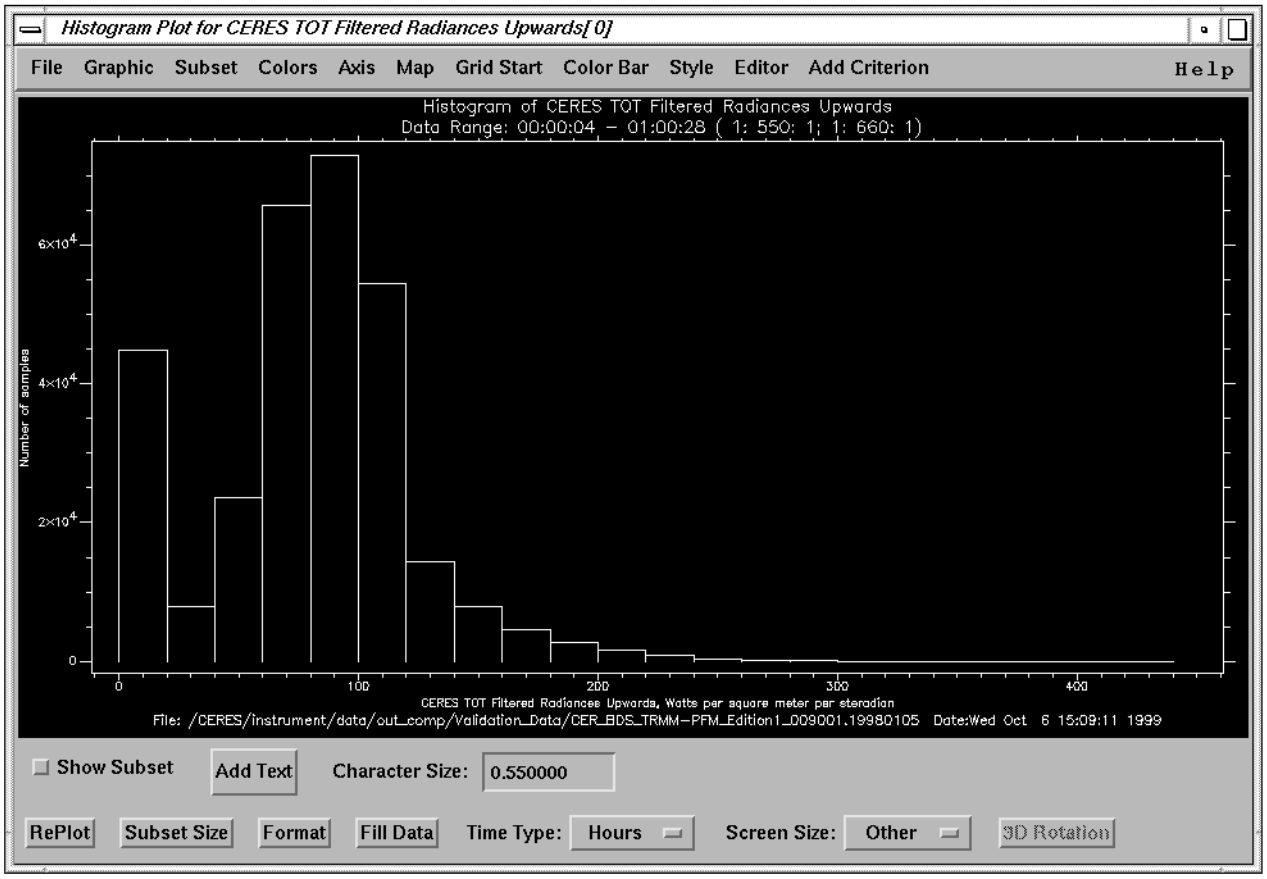

Fig. 4-93. Histogram Result Plot

(34) "XY Graph": Display data against time, sample number, record number, or packet number if these variables are recognized; see Section 5.0 for variables that are recognized. A window, as shown in Fig. 4-94, pops up for selecting the X field variable. Click the "X Fields Selection" button.

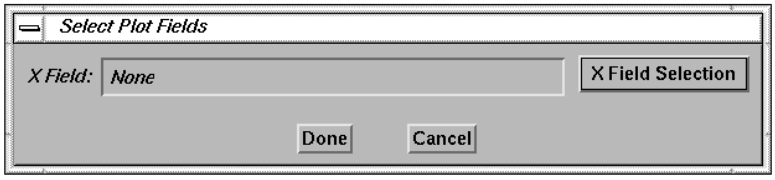

Fig. 4-94. Select X Field Window

A list, as shown in Fig. 4-95, displays for selecting. After the X Field Selection has been made, click the "Done" button to close the window.

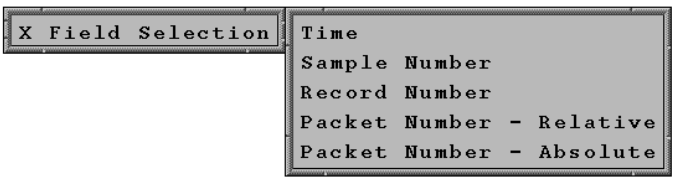

Fig. 4-95. X Field List

(35) "XYZ Graph": Display data (Z) against two variables (X,Y) from the Current Subsets list. The data values are represented by color. A window, as shown in Fig. 4-96, pops up for selecting the X and Y variables. After selecting the variables, click the "Done" button.

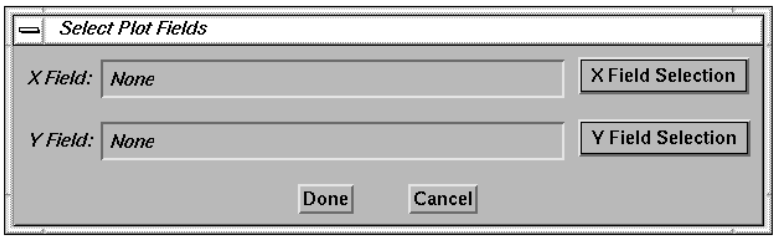

Fig. 4-96. Select X and Y Field Window

(36) "Geolocated": Display data on a map projection. The geolocation parameters are imported from the current file automatically if they can be recognized; see Section 5.0 for geolocation parameters that are recognized. Otherwise, a window, as shown in Fig. 4-97, pops up for selecting geolocation parameters from the Current Subsets list. If the geolocation parameters are already imported into the Current Subsets list, click "Yes" to select these variables. A window, as shown in Fig. 4-51, pops up for entering the parameters. Either latitude or colatitude position of the data can be selected. Also, the positions of satellite or Sun can be selected if available. After selections have been made, click the "Done" button, or click the "Cancel" button to close the window. An example of a geolocated plot is shown in Fig. 4-98.

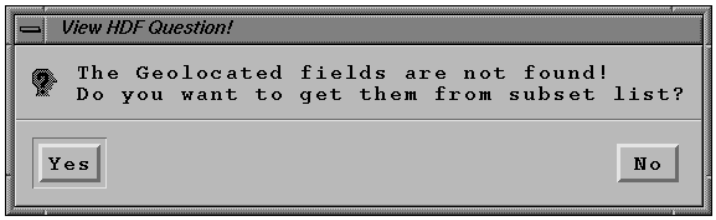

Fig. 4-97. Question for Getting Geolocated Parameters

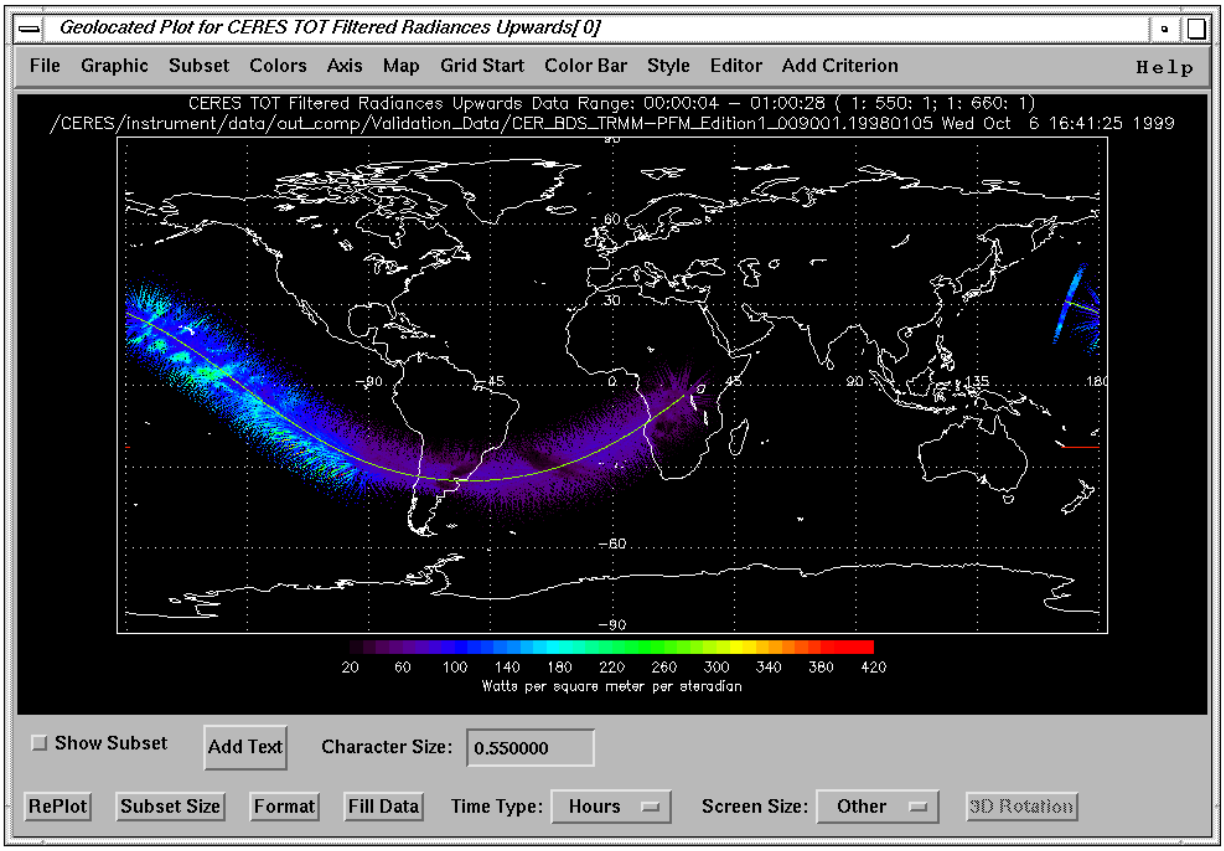

Fig. 4-98. Geolocated Plot

(37) "Create Subset": Create a subset of the selected variable based on the value of another criterion variable. The criterion data should be read into the Subset list before using this option. A criterion window, as shown in Fig. 4-99, pops up for selecting the criterion variable and the range. Click the "Done" button after selecting proper values. A window will pop up for entering the name of the variable for the result of this operation, as shown in Fig. 4-20. A subset of the selected variable is created and put into the Current Subsets list, as shown in Fig. 4-100. This subset variable can be accessed just as any other variable. Another subset can be created from this subset. Note that the out-of-range data are not removed, but are set to fill data. Fill data are not plotted.

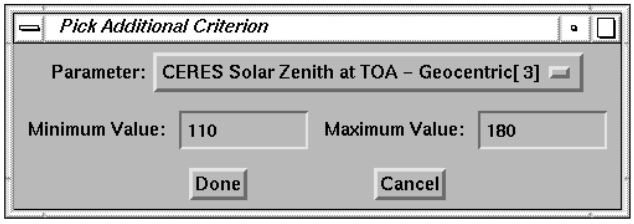

Fig. 4-99. Get Criterion Window

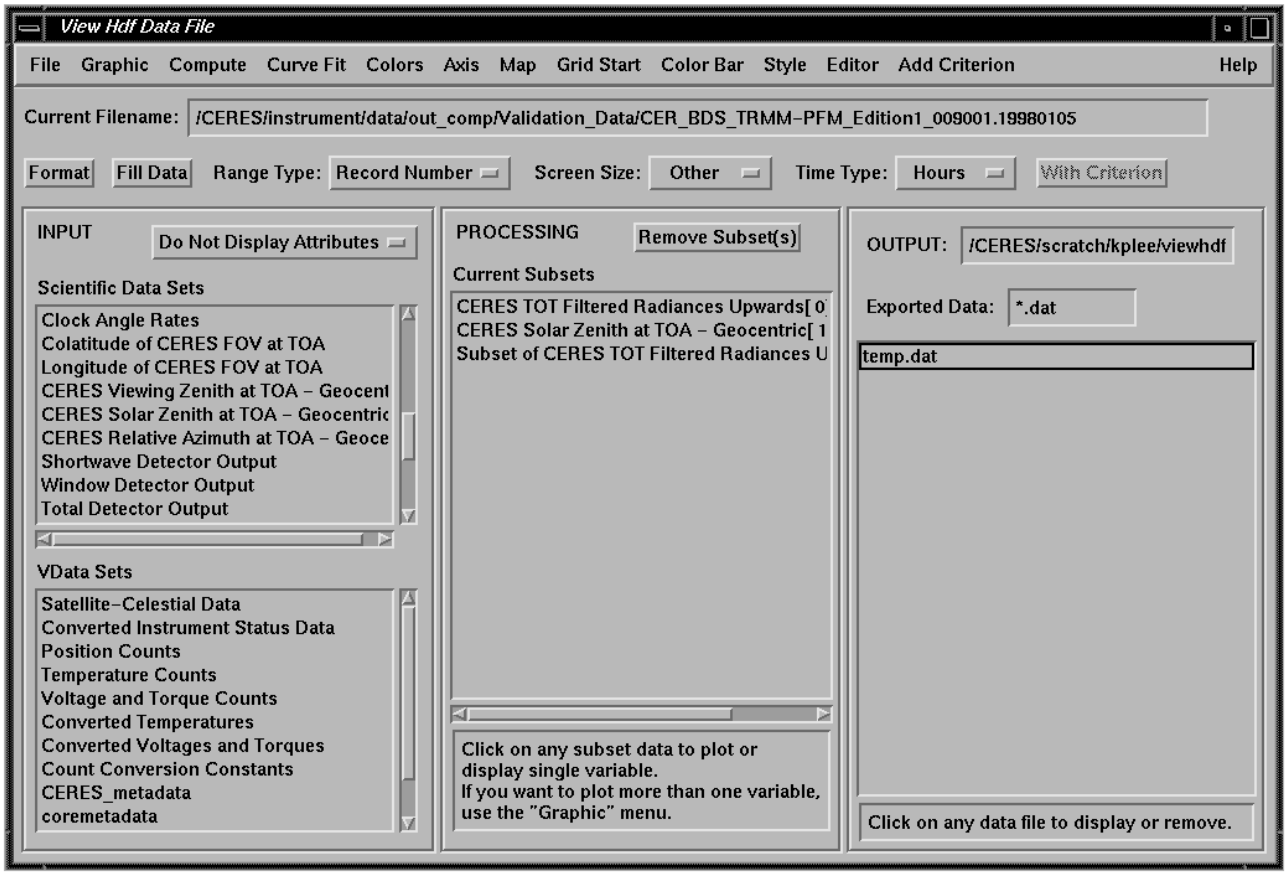

Fig. 4-100. Name of Subset Data

Figure 4-101 shows the plot with Create Subset option (compare with Fig. 3-11 for a plot of the unsubsetted data). The criterion is written on the lower part of the plot area.

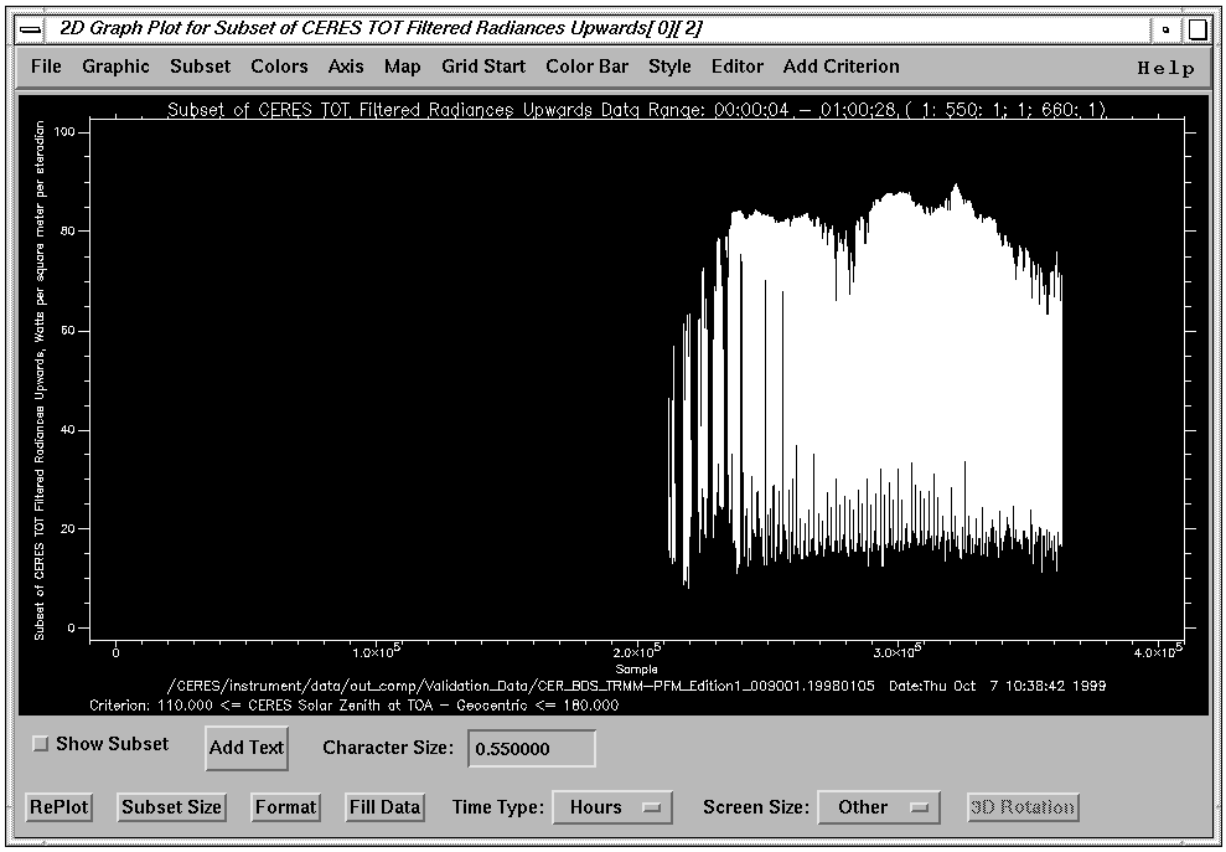

Fig. 4-101. 2D Plot with Criterion

(38) "Regression": Do a multiple linear regression fit. The calculated values and errors for the regression fit are added into the Current Subset list. The result of the coefficients are optional to write into a file. A window, as shown in Fig. 4-102, pops up for selecting the independent variables which are already imported in the Current Subset list. The "Time", the time of the day, and the "Sample", the index of the data array, are added into the list. One or more independent variables can be selected. Click the "Done" button after selecting the variable(s). A similar procedure to "Curve Fit"; see item (4), is used which asks you to enter the name of the variable for a calculated result, write the rusult to a file, and plot the result and errors on a plot. A sample result and plot are shown in Fig. 4-103 an Fig. 4-104

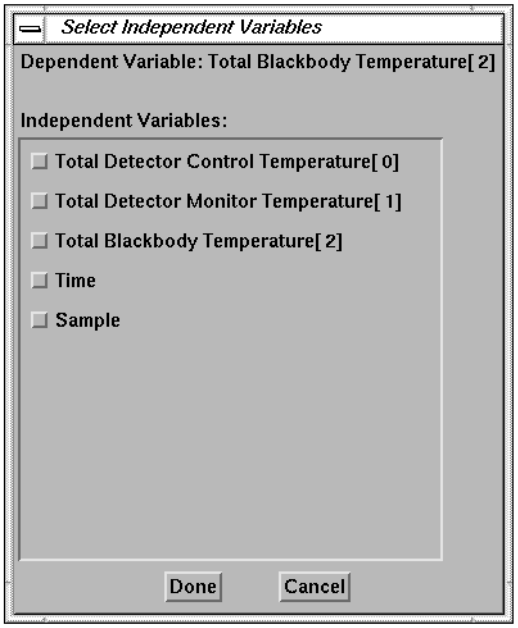

Fig. 4-102. Select Independent Variable Window

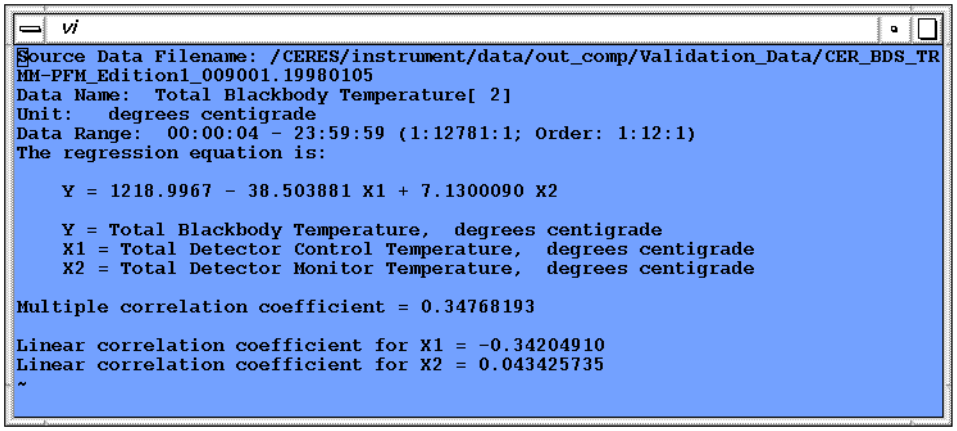

Fig. 4-103. Regression Fit Result

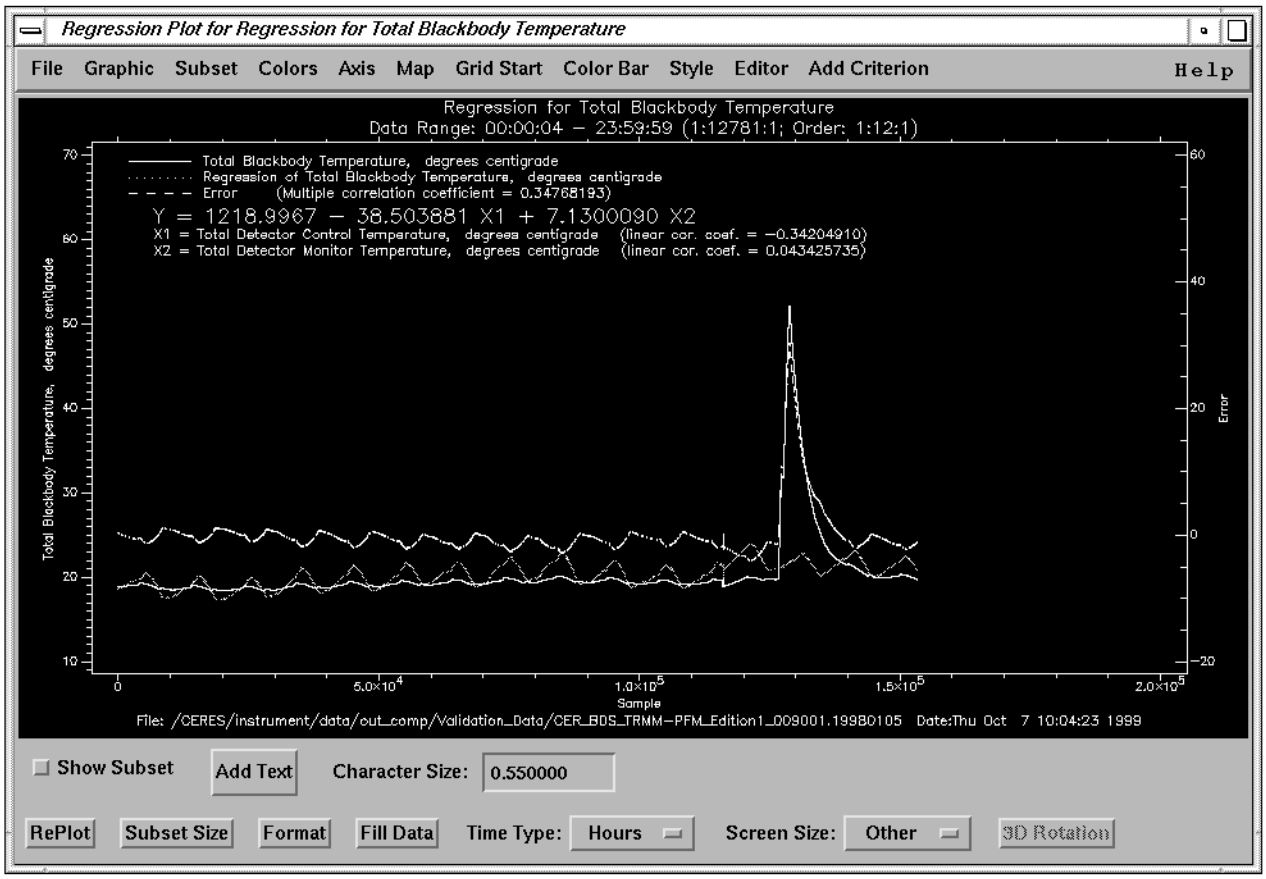

Fig. 4-104. Regression Fit Plot

(39) “Extract Bits”: Extract specific contiguous bits from an integer variable. See item 3(e).

(40) “Transpose”: Transpose a two-dimensional data array. A window, as shown in Fig. 4-20, pops up for entering the new variable name. As described in the “Statistics” option, see item (32), for a two-dimensional array, the statistics parameters are obtained for all elements from the first dimension on each second dimension array index. However, if the statistics parameters are wanted for all elements from the second dimension on each first dimension array index, the-dimensional data array needs to be transposed before the “Statistics” option is selected.

(41) “Display Data”: Display data on the screen in an edit window. The currently selected editor is used; see item (11). An example using the vi editor to display data is shown in Fig. 4-105.

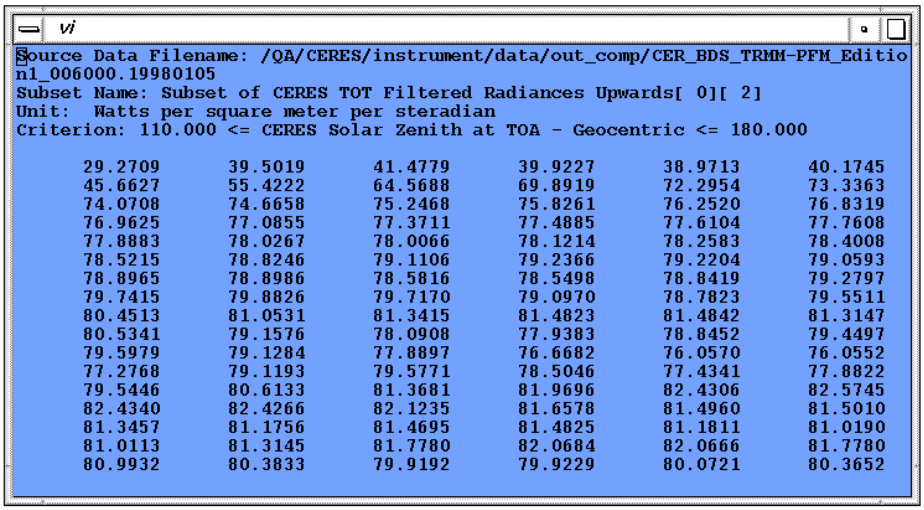

Fig. 4-105. Display Data

(42) “Display Attribute”: Display the attributes of the data set on an editor window. A sample display is shown in Fig. 4-106.

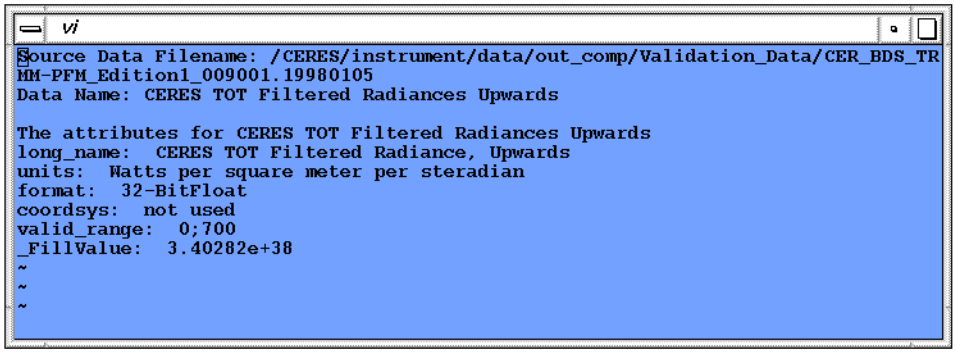

Fig. 4-106. Display Data Attributes

(43) "Export Data": Export data to a file. A window, as shown in Fig. 4-107, pops up for entering the path and name of a file where data are to be written. Click "OK" after entering the file name. The output format can be changed by using the "Format" option; see item (15).

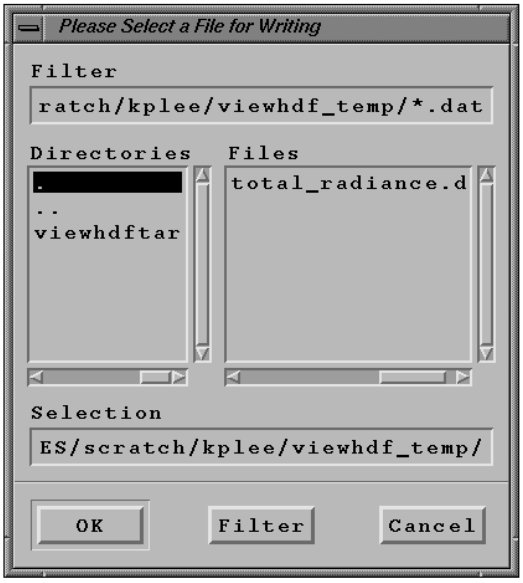

Fig. 4-107. Enter Export File Window

(44) "Remove": Remove the name of the variable from the Current Subsets list. This option can be used to remove any subset which is no longer needed to reduce the number of data sets in the list. The maximum number of subsets that can be imported into the Current Subsets list at one time is twenty.

4.3 Plot Window Menu

This section describes menus, functions, and buttons in the GUI plot window (see Fig. 4-101):

(45) "File": This menu includes the options for saving the plot in Postscript, encapsulated Postscript, or GIF, exporting data to a file, printing the plot, making viewgraphs, changing a temporary directory, and closing the plot window. The menu is shown in Fig. 4-108.

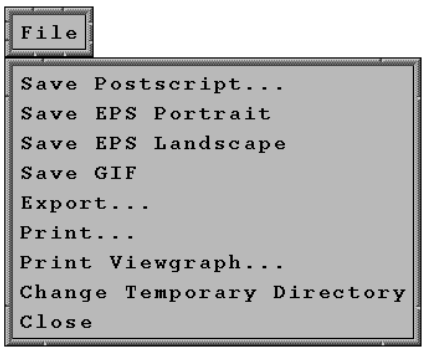

Fig. 4-108. File Menu

The options are:

(a) "Save Postscript...": Save the plot to a file in Postscript format. A window, as shown in

Fig. 4-109, pops up for entering the filename. After entering the file name, click the “OK” button. The “Filter” button can be used to refine the list of files. To cancel this selection, click the “Cancel” button .

(b) “Save EPS Portrait”: Save the plot to a file in encapsulated Postscript format in portrait orientation. This format is useful for importing to any document. A window similar to Fig. 4-109 pops up for entering the filename.

(c) “Save EPS Landscape”: Same as (b) except in landscape orientation.

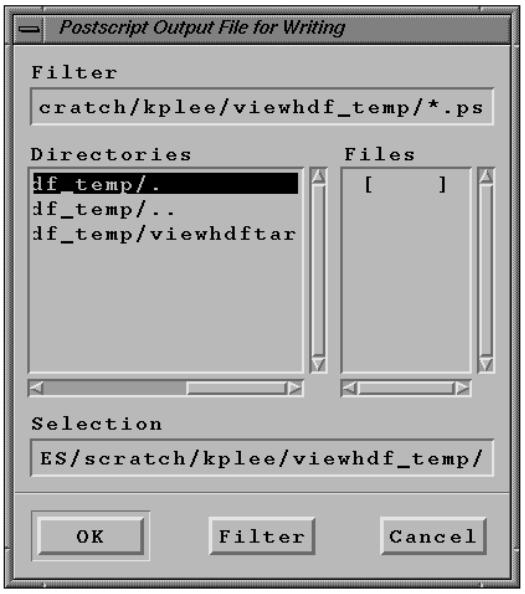

Fig. 4-109. Enter Postscript File Name Window

(d) “Save GIF”: Save the plot to a file with Graphics Interchange Format. A window similar to Fig. 4-109 pops up for entering the filename.

(e) “Export...”: Export data to a file. A window, as shown in Fig. 4-107, pops up for entering the filename where data are to be written. Click “OK” after entering the filename. The output format can be changed by using the “Format” option; see item (15).

(f) "Print...": Print the plot using any available printer. If this option is selected, the program obtains the names of available printers connected to the system by using a Unix command.

A window, as shown in Fig. 4-110, displays a list of the available printers. Select a printer and click the "Done" button. The print job will be sent to the queue of the selected printer. This printer is set as the default printer and it will be the first one on the printer list when this option is selected the next time. Click the "Cancel" button to cancel this selection.

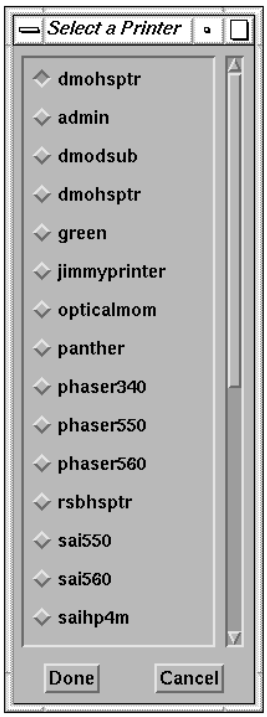

Fig. 4-110. Select Printer Window

(g) "Print Viewgraph...": Create a viewgraph of the plot. A window, as shown in Fig. 4-111, pops up for this selecting the viewgraph printer. The first two entries specify CERES project-specific Tektronix Phaser 550 printers.

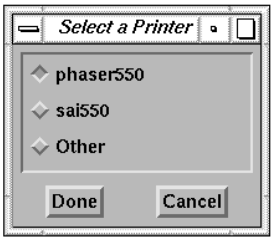

Fig. 4-111. Select Viewgraph Printer Window

If "Other" is selected, a window, as shown in Fig. 4-112,will pop up for entering the command for printing a viewgraph using a particular printer. After entering the command, click the "Done" button, or the "Cancel" button to close the window.

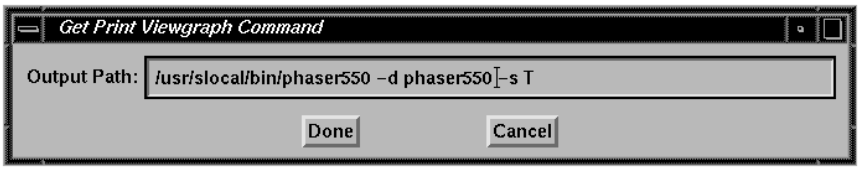

Fig. 4-112. Enter Print Viewgraph Command Window

(h) "Change Temporary Directory": Change the directory for storing temporary files. See item 1(i).

(i) "Close": Close the plot window.

(46) “Graphic”: Redisplay the data with a different type graphic. This menu can be used to redisplay the data with a different style of graphic. The Graphic menu is shown in Fig. 4-113.

See Section 4.2: Select Function Menu for a description of these options.

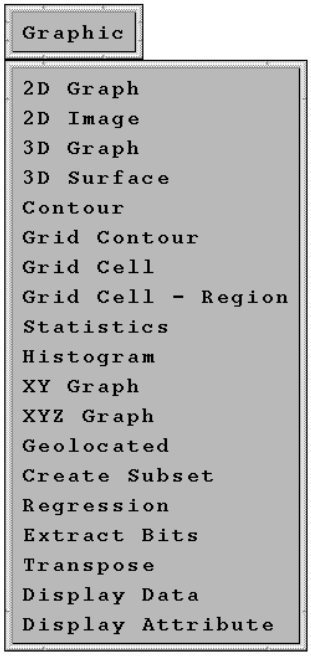

Fig. 4-113. Graphic Menu

(47) “Subset”: Zoom, locate or view a subset of a plot. This menu allows any particular portion of the plot to be viewed. The menu is shown in Fig. 4-114.

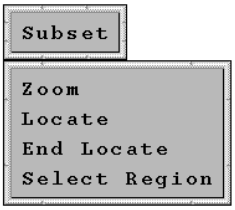

Fig. 4-114. Subset Menu

The options are:

(a) “Zoom”: Display part of an image from the current window enlarged in a zoom window. After selecting this option, move the mouse cursor to mark the center of the zoom area. Click the left mouse button to display the zoomed image. Click the middle mouse button to display a menu of zoom factors. Click the right mouse button to exit this selection.

(b) “Locate”: Display the current position. After selecting this option, move the cursor to the location and press the left mouse button to show position. The position information is displayed in the window where IDL was started. Select the “End Locate” to end this selection.

(c) “End Locate”: Turn off the option of “Locate”.

(d) “Select Region”: Select a region from a geolocated plot to view. This option works only for “Geolocated” plots. After selecting this option, move the cursor to the location and

click the left button to mark points. Click the middle button to erase the previous point. Click the right button to close the region. An example is shown in Fig. 4-115.

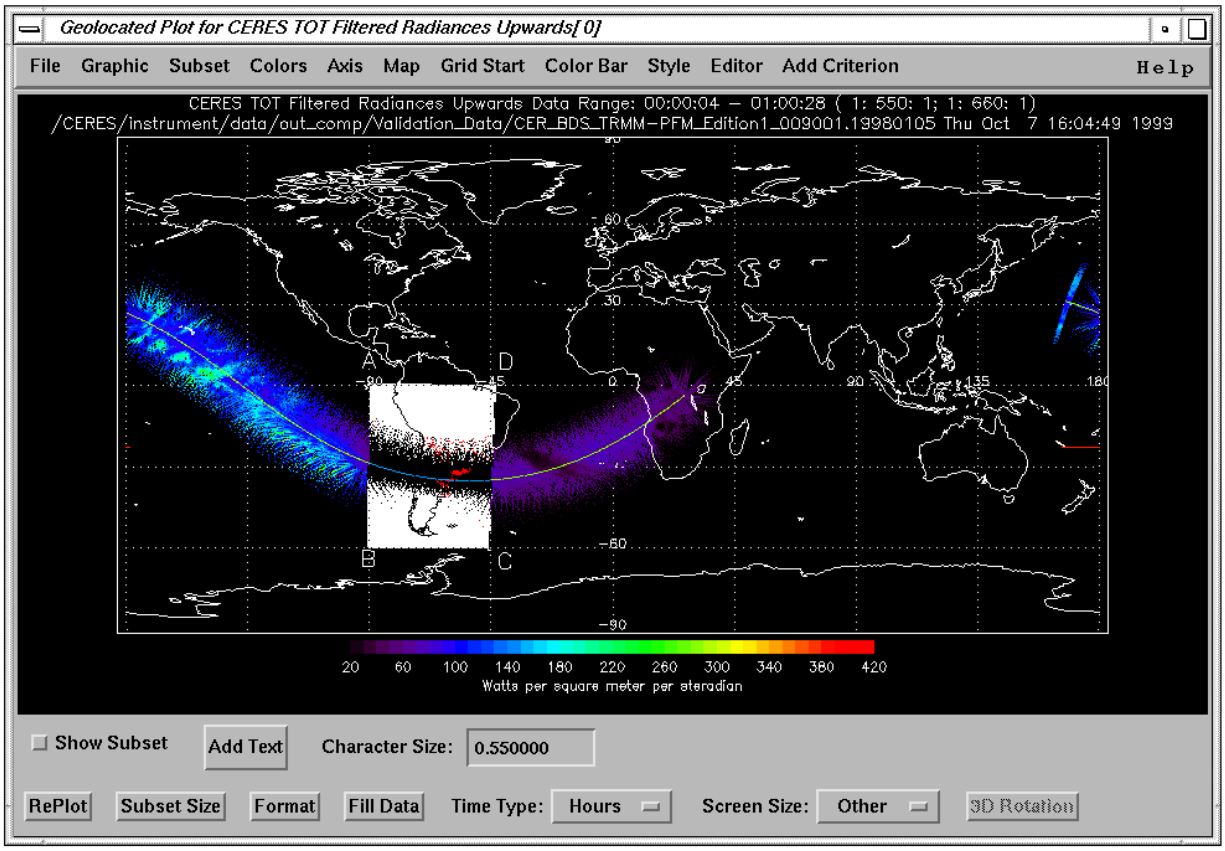

Fig. 4-115. Select Subset Region

The region is created by clicking the left mouse button at positions A, B, C, and D. Close this region by clicking right mouse button at position D.

A Subset View menu, as shown in Fig. 4-116, pops up for selecting options.

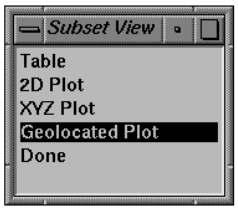

Fig. 4-116. Subset View Menu

The options are:

(i) "Table": Display the subset data in table format in the window where IDL was started.

(ii) "2D Plot": Plot the subset data against the index of the data array.

(iii) "XYZ Plot": Plot the subset data with longitude as the X variable and latitude as the Y variable. The values of the data are scaled by color.

(iv) "Geolocated Plot": Plot the subset data on the portion of the map projection. The values of the data are scaled by color.

(v) "Done": End the "Select Region" option.

A "Geolocated Plot" for the selected region is shown in Fig. 4-117.

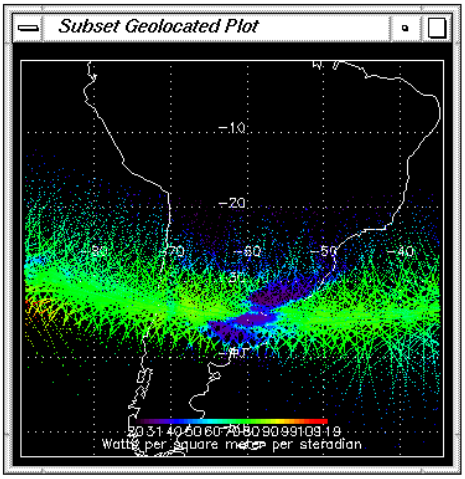

Fig. 4-117. Select Region Plot

(48) "Colors": Select color table, edit and save the color map, and change the background and foreground color. See item (5).

(49) "Axis": Set the ranges of the X, Y, and/or Z axes manually or automatically, or draw grid lines. See item (6).

(50) "Map": Select the longitude to be mapped to the center of the map projection, type of map projection, labelling of meridians, and display of satellite and Sun location. See item (7).

(51) "Grid Start": Select the longitude location of the first grid for "Grid Cell" plot. See item (8).

(52) "Color Bar": Select to display or not to display a color bar, adjust the location of the color bar, and discrete or continuous mapping. See item (9).

(53) "Style": Set the line type, symbol type, and symbol size to display data. See item (10).

(54) "Editor": Select a text editor to display data or a file on the screen. See item (11).

(55) "Add Criterion": Add a criterion based on the value of a variable listed in the Current Subset list; this option is used for calculating statistics. See item (12).

(56) "Show Subset": This option can be used to vary the subset that is displayed. After this option is selected, a window, shown in Fig. 4-118, will pop up with the "Range",

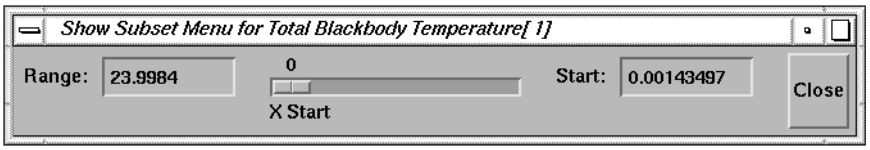

Fig. 4-118. Show Subset Menu Window

"X Start", "Start", and "Close" fields. These four fields are used to control the subset data:

(a) "Range": Set the range of X axis to display. Change the range and press the Enter key to update the range. The initial value is the whole range.

(b) "X Start": Use the slider to set the starting value of the X axis. The ending value is equal to the starting value plus the value from "Range".

(c) "Start": Set the starting value of the X axis. Specify the starting value by typing in this field. Press the Enter key to update the plot and the value of "X Start".

(d) "Close": End this selection and close the Show Subset Menu window.

Both "X Start" and "Start" specify the starting value. Changing either one will change the other value. To end this selection, click "Show Subset" again or click the "Close" button on the Show Subset Menu window. An example is shown in Fig. 4-119 in which the range is set to 1 and X starts at 0.0i.

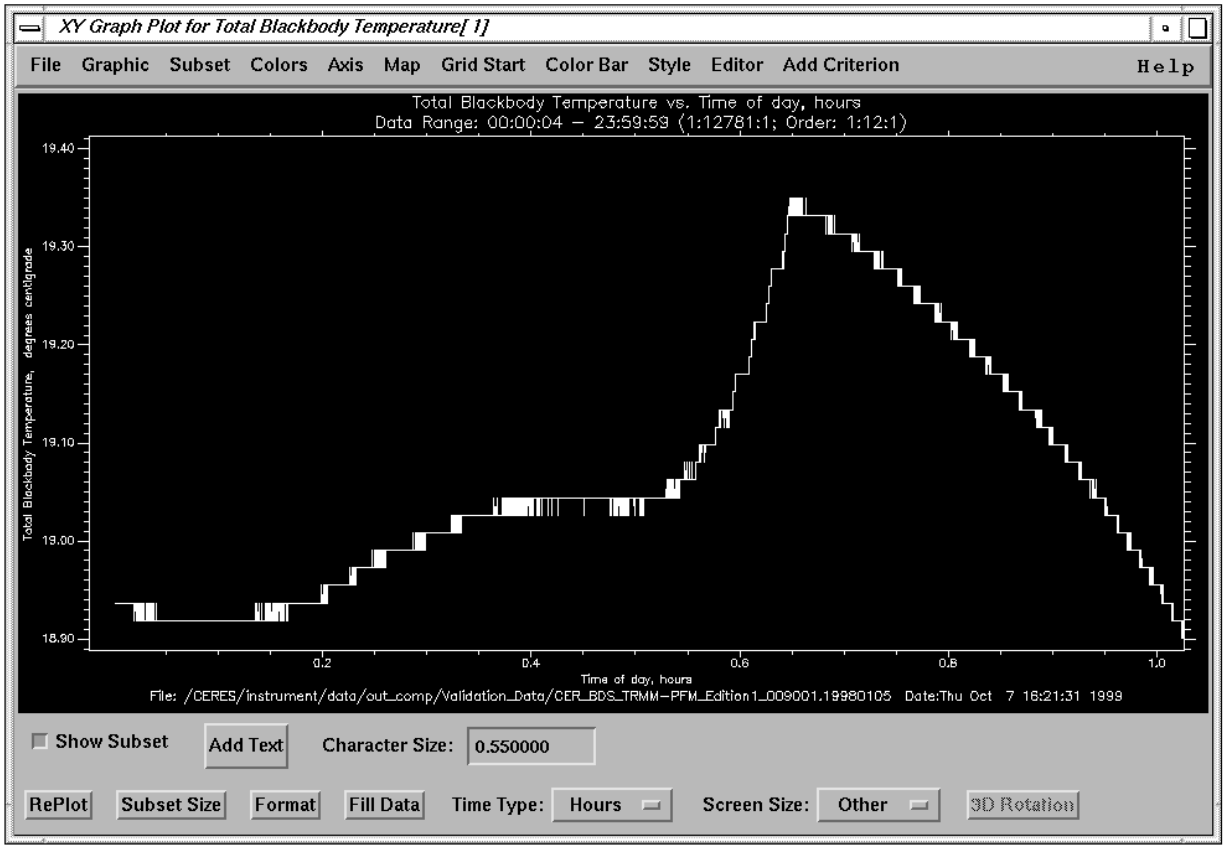

Fig. 4-119. Show Subset Plot

(57) "Add Text": Add text on the plot. If this option is selected, a message pops up to tell user to click the location in the plot where the text will be added. After clicking the "OK" button on the message, a window, as shown in Fig. 4-120, pops up for entering text. The following fields are used to control this selection:

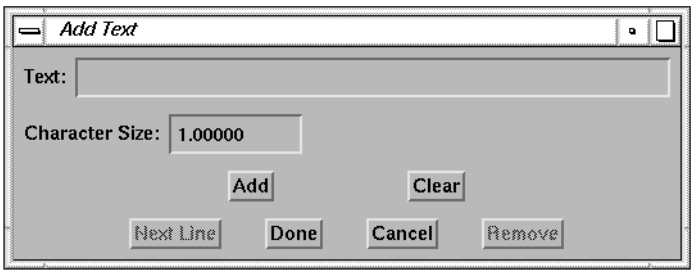

Fig. 4-120. Add Text Window 1

(a) "Add": Add text on the plot. After this button is click, the text is added on the plot, and the Add Text window will become as shown in Fig. 4-121.

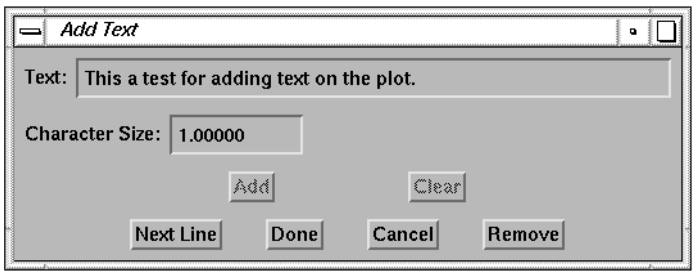

Fig. 4-121. Add Text Window 2

(b) "Clear": Clear the text on the text field before the "Add" button is clicked.

(c) "Next Line": Enter next line under the previous line. After this button is clicked, the Add Text window will turn back as Fig. 4-120.

(d) "Remove": Remove the previous text line from the plot.

(e) "Done": Finish adding text on the plot.

(f) "Cancel": Remove all the text lines from this selection.

(g) "Character Size": Control the character size of the text. The default value is 1.0.

An example for adding text on a plot is shown in Fig. 4-122.

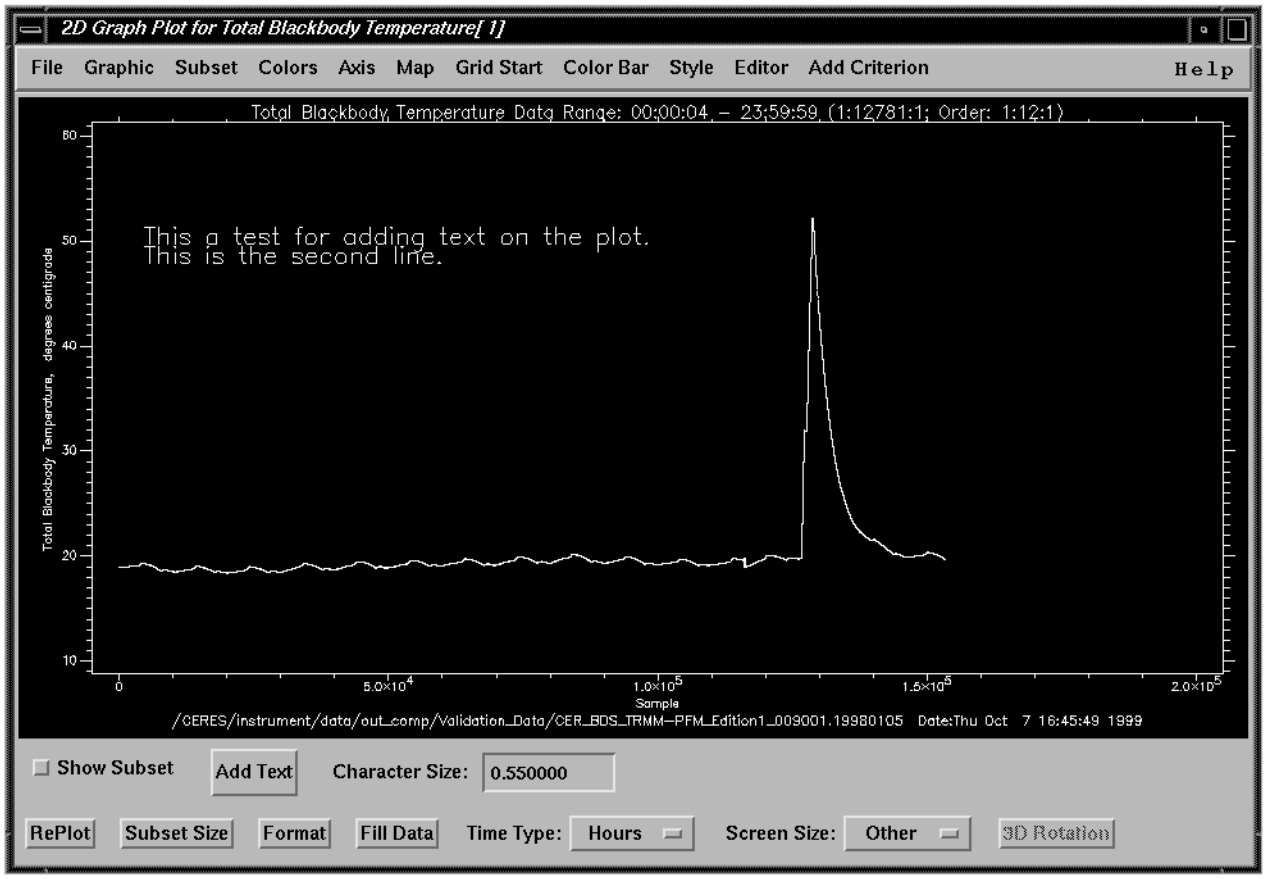

Fig. 4-122. Adding Text on a Plot

(58) "Character Size": Change the character size on the plot window. The default for Sun workstations is 1.0, and for SGI the default is 0.6. Use this field to change the value of the character size and press the Enter key to update the value. The graph will be replotted with the new character size.

(59) "RePlot": Replot the graph. Press this button to replot the graph with any new setting.

(60) "Subset Size": Resize the subset plot window for "Select Region" (see item 37(d)) with "Geolocated Plot" option. The default is three times as large in both height and width as the selected region. Click this button and a window, as shown in Fig. 4-123, pops up for adjusting the size. The "Subset View Ratio" is the ratio number for enlarging the region. The "Subset View XSize" and Subset View YSize" are sizes of the subset plot window in pixels. Change either the X or Y sizes or the ratio to resize the window.

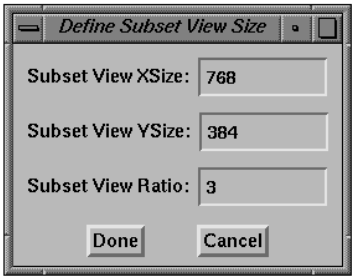

Fig. 4-123. Subset View Size Window

(61) "Format": Change the format for exporting data to a file. See item (15).

(62) "Fill Data": Change the fill data value. See item (16).

(63) "Time Type": Set the X axis to hour, minute, or second if data are plotted against time. See item (19).

(64) "Screen Size": Adjust the size of the draw window. See item (18).

(65) "3D Rotation": Set the angles of rotation for "3D Graph" and "3D Surface". If this button is clicked, a window, as shown in Fig. 4-124, pops up for entering the angles. The two angles are defined as:

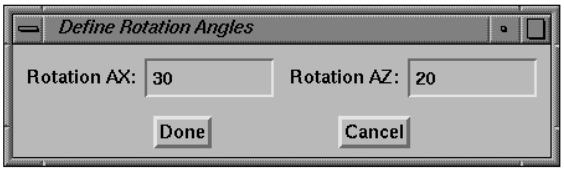

Fig. 4-124. 3D Rotation Window

(a) "Rotation AX": The angle of rotation, about the X axis, in degrees towards the viewer. The default is 30 degrees.

(b) "Rotation AZ": The counterclockwise angle of rotation about the Z axis. The default is 20 degrees.

Click the "Done" button to replot the graph or the "Cancel" button to cancel this selection.

5.0 Recognized Variable Names

In order to make some particular functions and graph styles work properly, the names of some variables were coded into the program; for example, the name of the time variable for "Range Type" (item (17)). This section gives the names of the CERES variables used in the code to locate those "recognized" variables. To use any of those functions, their variable names need to be set as follows:

(1)"Time": These variables are used for "Range Type" (item (17)) and "XY Graph" (item (34)) with "Time" option. The variables include:

(a) "Julian Date and Time": This is a two-dimensional SDS variable. The time is in Julian date format. The number of elements in the first dimension is equal to the number of records. The number of elements in the second dimension is two. The first element is the whole Julian date; the second element is the fractional part. This variable is in the BDS file (See Ref. 1).

(b) "Time of observation": This is a one-dimensional SDS variable. The time is in Julian date. The value contains the Julian whole and fractional parts added together. The number of elements is equal to the number of records. This variable is in the SSF file.

(c) "Time of Observation": This is a field in the Vdata named "IES Hour**" where "**" is the hour number from 00 to 23. The field contains the Julian whole and fractional parts added together. This variable is in the IES file.

(d) "Time of observation": This is a field in the Vdata named "Time of observation". The field contains the Julian whole and fractional parts added together. This variable is in the ES8 file.

(2) "Sample Number": These variables are used for the "XY Graph" (item (34)) with "Sample Number" option. The variables include:

(a) "Scan Sample Number": This is a field in the Vdata named "IES Hour**" where "**" is the hour number from 00 to 23. The value is the sample number in each scan. This variable is in the IES file.

(b) "Scan sample number": This is a one-dimensional SDS variable. The number of elements is equal to the number of records. The value is the scan sample number. This variable is in the SSF file.

(3) "Packet Number - Relative": These variables are used for the "XY Graph" (item (34)) with "Packet Number - Relative" option. The variables include:

(a) "Packet Counter - Relative": This is a field in the Vdata named "Converted Digital Data" or "Converted Instrument Status Data". The value is the packet number relative to the first packet number of the day. This variable is in the BDS file.

(b) "Packet Number": This is a field in the Vdata named "IES Hour**" where "**" is the hour number from 00 to 23. The value is the packet number relative to the first packet number of the day. This variable is in the IES file.

(4) "Packet Number - Absolute": These variables are used for the "XY Graph" (item (34)) with "Packet Number - Absolute" option. The variables include:

(a) "Packet Counter - Absolute": This is a field in the Vdata named "Converted Digital Data" or "Converted Instrument Status Data". The value is the absolute packet number of the CERES instrument data. This variable is in the BDS file.

(b) "Absolute Packet Number": This is a field in the Vdata named "IES Hour**" where "**" is the hour number from 00 to 23. The value is the absolute packet number of CERES instrument data. This variable is in the IES file.

(c) "Packet number": This is a one-dimensional SDS variable. The number of elements is equal to the number of records. The value is the absolute packet number. This variable is in the SSF file.

(5) "Geolocated Parameters": These variables are used for the "Geolocated" (item (36)) option in the Graph Menu. The geolocated parameters include the longitude and latitude/colatitude of the data, satellite, and Sun. The variable unit is expressed in degrees. These variables include:

(a) "Longitude of CERES FOV at Surface": This is a two-dimensional SDS variable. The number of elements in the first dimension is equal to the number of records. The number of elements in the second dimension is equal to the number of samples in each record. This variable is in the BDS file.

(b) "Longitude of CERES FOV at TOA": This is a two-dimensional SDS variable. The format is same as "Longitude of CERES FOV at Surface". This variable is in the ES8 files.

(c) "Colatitude of CERES FOV at Surface": This is a two-dimensional SDS variable. The format is same as "Longitude of CERES FOV at Surface". This variable is in the BDS file.

(d) "Colatitude of CERES FOV at TOA": This is a two-dimensional SDS variable. The format is same as "Longitude of CERES FOV at Surface". This variable is in the ES8 files.

(e) "Longitude of Subsatellite Point at Surface at record start": This is a field in the Vdata named "Satellite-Celestial Data" in the BDS file.

(f) "Colatitude of Subsatellite Point at Surface at record start": This is a field in the Vdata named "Satellite-Celestial Data" in the BDS file.

(g) "Longitude of Subsolar Point at Surface": This is a field in the Vdata named "Satellite-Celestial Data" in the BDS file.

(h) “Colatitude of Subsolar Point at Surface”: This is a field in the Vdata named “Satellite-Celestial Data” in the BDS file.

(i) “Longitude of satellite nadir at record start”: This is a field in the Vdata named “Longitude of satellite nadir at record start” in the ES8 file.

(j) “Colatitude of satellite nadir at record start”: This is a field in the Vdata named “Colatitude of satellite nadir at record start” in the ES8 file.

(k) “Longitude of Sun at observation”: This is a field in the Vdata named “Longitude of Sun at observation” in the ES8 file.

(l) “Colatitude of Sun at observation”: This is a field in the Vdata named “Colatitude of Sun at observation” in the ES8 file.

(m) “Longitude of CERES FOV at surface”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. This variable is in the SSF file.

(n) “Colatitude of CERES FOV at surface”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. This variable is in the SSF file.

(o) “Longitude of subsatellite point at surface at observation”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. This variable is in the SSF file.

(p) “Colatitude of subsatellite point at surface at observation”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. This variable is in the SSF file.

(q) “Longitude of subsolar point at surface at observation”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. This variable is in the SSF file.

(r) “Colatitude of subsolar point at surface at observation”: This is a one-dimensional SDS variable. The number of elements is equal to the number of records. This variable is in the SSF file.

(s) “Longitude of CERES FOV at Surface”: This is a field in the Vdata named “IES Hour**” where “**” is the hour number from 00 to 23. This variable is in the IES file.

(t) “Colatitude of CERES FOV at Surface”: This is a field in the Vdata named “IES Hour**” where “**” is the hour number from 00 to 23. This variable is in the IES file.

(u) “Longitude of Subsatellite Point at Surface at Observation”: This is a field in the Vdata named “IES Hour**” where “**” is the hour number from 00 to 23. This variable is in the IES file.

(v) “Colatitude of Subsatellite Point at Surface at Observation”: This is a field in the Vdata named “IES Hour**” where “**” is the hour number from 00 to 23. This variable is in the IES file.

(w) “Longitude of Subsolar Point at Surface at Observation”: This is a field in the Vdata named “IES Hour**” where “**” is the hour number from 00 to 23. This variable is in the IES file.

(x) “Colatitude of Subsolar Point at Surface at Observation”: This is a field in the Vdata named “IES Hour**” where “**” is the hour number from 00 to 23. This variable is in the IES file.

6.0 Configuration File

A configuration file stores some settings for the current session. When the user calls up the next session of view_hdf, these settings are read and they replace the default values. The configuration file is stored under the user's home directory with the name username_view_hdf_config_file. This file is written in ASCII format. With any editor, the user can change the settings. The settings in a configuration file include the items listed in the Configuration Item column in Table 6-1.

Table 6-1. Configuration File Settings

Configuration Item	Description	Default
view_hdf Configuration file for: username	User configuration file identification	
info.precision	format for exporting data;	e18.9
info.color_bar	draw color bar; 1 on, 0 off.	1
info.barlocation	location of color bar.*	0.13
info.color_table	number of default color table.	13
info.open_path	path for open file.	local directory
info.open_filter	filter for open file.	"*"
info.ps_path	path for saving Postscript output file.	local directory
info.ps_file	Postscript output file name.	plot.ps
info.eps_path	path for saving encapsulated Postscript output file.	local directory
info.eps_file	encapsulated Postscript output file name.	plot.eps
info.export_path	path for saving export data file.	local directory
info.export_file	export data file name.	export.dat
info.list_path	path for save export list data file.	local directory
info.output_path	path for listing files in OUTPUT field.	local directory
info.filter	filter for listing file in OUTPUT field.	"*.dat"
info.gif_path	path for saving GIF output file.	local directory
info.gif_file	GIF output file name.	plot.gif
info.stats_path	path for saving statistics result file.	local directory
info.stats_file	statistics result file name.	stats.dat
nfo.temp_dir	path for saving temporary file.	/CERES/scratch/idltemp
info.eps_type	type of encapsulated Postscript output file; 0 portrait, 1 landscape.	
info.editor_type	type of editor; 0 vi, 1 emacs, 2 ieditor.	0
info.editor	name of editor for "Other" option.	vi
info.printcommand	command for print viewgraph for "Other" option.	
info.style.symbolsize	symbol size for marking data.	1
info.char.size	character size.	0.6 for (SGI); 1 for (Sun)
info.greenwich.greenloca	Greenwich location.	0 for center of plot
info.greenwich.projection	type of map projection.	0 for cylindrical
info.greenwich.label	label the longitudes and latitudes; 1 on, 0 off.	1
info.greenwich.n_level	number of levels for "With Level" option on.	10
info.greenwich.expand	Expand the geolocated data; 1 expand, 0 not expand.	1
info.greenwich.satellite	plot satellite position; 1 on, 0 off.	1
info.greenwich.sun	plot Sun position; 1 on, 0 off.	1
info.greenwich.continents	redraw the continents boundaries; 1 on, 0 off.	0
info.grid_start	the longitude location of first grid data; value greater than 360 means auto.	500
info.time_type.old	time type; 0 hours, 1 minutes, 2 seconds.	2

Table 6-1. Configuration File Settings

Configuration Item	Description	Default
info.time_type.new	time type; 0 hours, 1 minutes, 2 seconds.	2
info.screen.pick	type of screen size; 0 1035x540, 1 1152x614, 2 other.	0 for Sun workstation, 1 for SGI
nfo.screen.xsize	size of screen in X direction.	
info.screen.ysize	size of screen in Y direction.	
info.current_printer	default printer.	
info.top_color	maximum number of colors.	200
background_color	background color.	0 for black
foreground_color	foreground color.	199

7.0 Examples

This section gives examples for making some special plots using view_hdf. The first example is plotting total filtered radiances for nighttime from a BDS file on a map projection. The procedure is:

(1) Open a BDS file with “File” --> “Open...Without Attribute”.
(2) Import “CERES TOT Filtered Radiances Upwards” for the first 550 records.
(3) Import “CERES Solar Zenith at TOA - Geocentric” for the first 600 records.
(4) Click “CERES TOT Filtered Radiances Upwards[0]” from the Current Subsets list. The “Select Function” menu pops up.
(5) Select “Create Subset” and click the “Done” button. The “Pick Additional Criterion” window pops up.
(6) Select “CERES Solar Zenith at TOA - Geocentric[1]” as parameter and enter minimum value as 110 and maximum value as 180. Note: nighttime is defined here as solar zenith angle greater than 110 degrees. Click the “Done” button.
(7) Name the new subset data as “TOT Filtered Radiances for Night Time” and click the “Done” button. This data set is total filtered radiances for nighttime.
(8) Click on the new data set in the Current Subsets list; the “Select Function” menu pops up again.
(9) Select “Geolocated” and click the “Done” button.

A plot for total filtered radiances for nighttime appears on the screen as shown in Fig. 7-1. The criterion is shown on the left bottom corner.

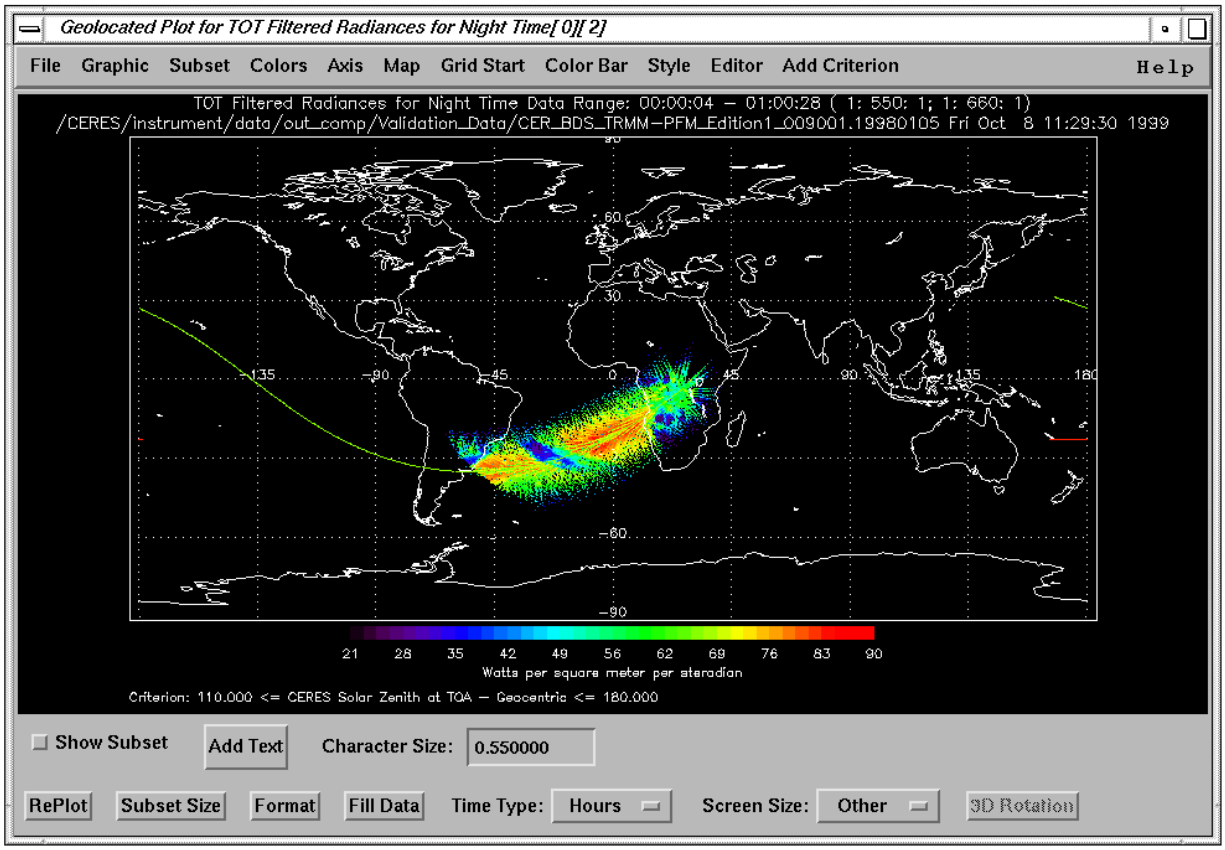

Fig. 7-1. Total Filtered Radiances for Night Time

The next example is for plotting scene ID from an ES8 file on a map projection. The values for total filtered radiances are continuous; however, the values of scene ID are discrete. It is better to use discrete color levels to represent the values of scene ID. The procedure is:

(1) Use “File” --> “Open File Filter” to change the filter to “CER_ES8_*”.
(2) Open an ES8 file with “File” --> “Open...Without Attribute”.
(3) Import “ERBE scene identification at observation” for the first 550 records.
(4) Select “Color Bar” --> “With Color Bar” --> “Discrete” to display the data with discrete color mapping. The “Set Number of Discrete Intervals” window pops up.
(5) Enter “13” and click the “Done” button. The value of scene ID ranges from 1 to 13. Each level is for one scene ID number.
(6) Use “Axis” --> “Manual” --> “Z Only” to set the scene ID range. The “Define Z Axis” window pops up. Enter the 0 for “Z Start”, and 13 for “Z End” and click the “Done” button.
(7) Use “Colors” --> “Select Colors” to select the “13 Scene ID Levels” color table. This entry is at the end of the list.
(8) Click on the scene ID data from the Current Subsets list and select the “Geolocated” option from the popped up “Select Function”. Click the “Done” button.

A plot for scene ID with 13 levels will be shown on the screen as in Fig. 7-2.

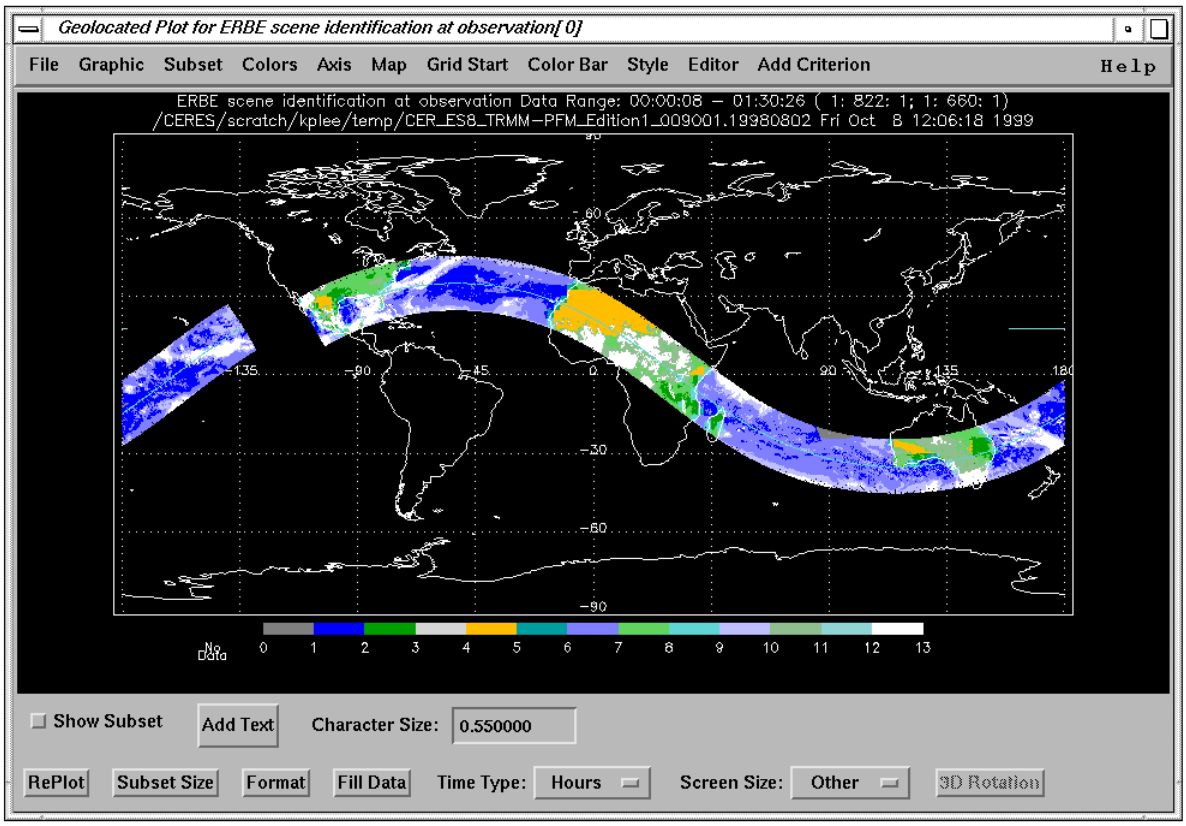

Fig. 7-2. Scene ID with 13 Levels

To change back to continuous color, the procedure is:

(1) Select “Color Bar” --> “With Color Bar” --> “Continuous” to switch back to display of the data with a continuous color mapping.
(2) Select “Axis” --> “Auto” to use automatically set axes ranges.
(3) Select “Colors” --> “Select Colors” to select any continuous color table; for example, “Rainbow + white”

The next example shows how to use “Extract Bits” option to extract some specific contiguous bits from an integer variable. The “Radiance and Mode Flags” in SSF file contains the filtered radiance quality flags and instrument mode. The bits from 10 to 13 represent the “Elevation scan plane”. The definition of the bit patterns is described in SSF Collection Guide. The procedure is:

(1) Use “File” --> “Open File Filter” to change the filter to “CER_SSF_*”.

(2) Open a SSF file with “File” --> “Open...Without Attribute”.

(3) Import “Radiance and Mode Flags” in the Current Subset list.

(4) Click on the variable from the Current Subset list and select the “Extract Bits” option from the popped up “Select Function”. Click the “Done” button.

(5) The Extract Bits window, as shown in Fig. 7-3, pops for entering the location bit and how many bits to extract. Enter 10 for Start Bit field and 4 for Number of Bits field and click the “Done” button.

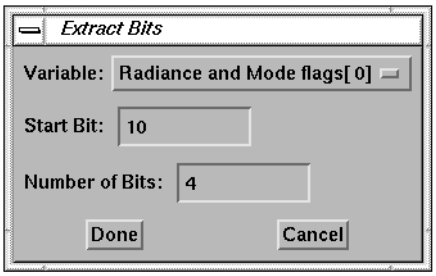

Fig. 7-3. Extract Bits Window

(6) Name the new variable as “Elevation scan plane flag” in the Get Variable Name window, and click the “Done” button. The new variable is put into Current Subset list as shown in Fig. 7-4.

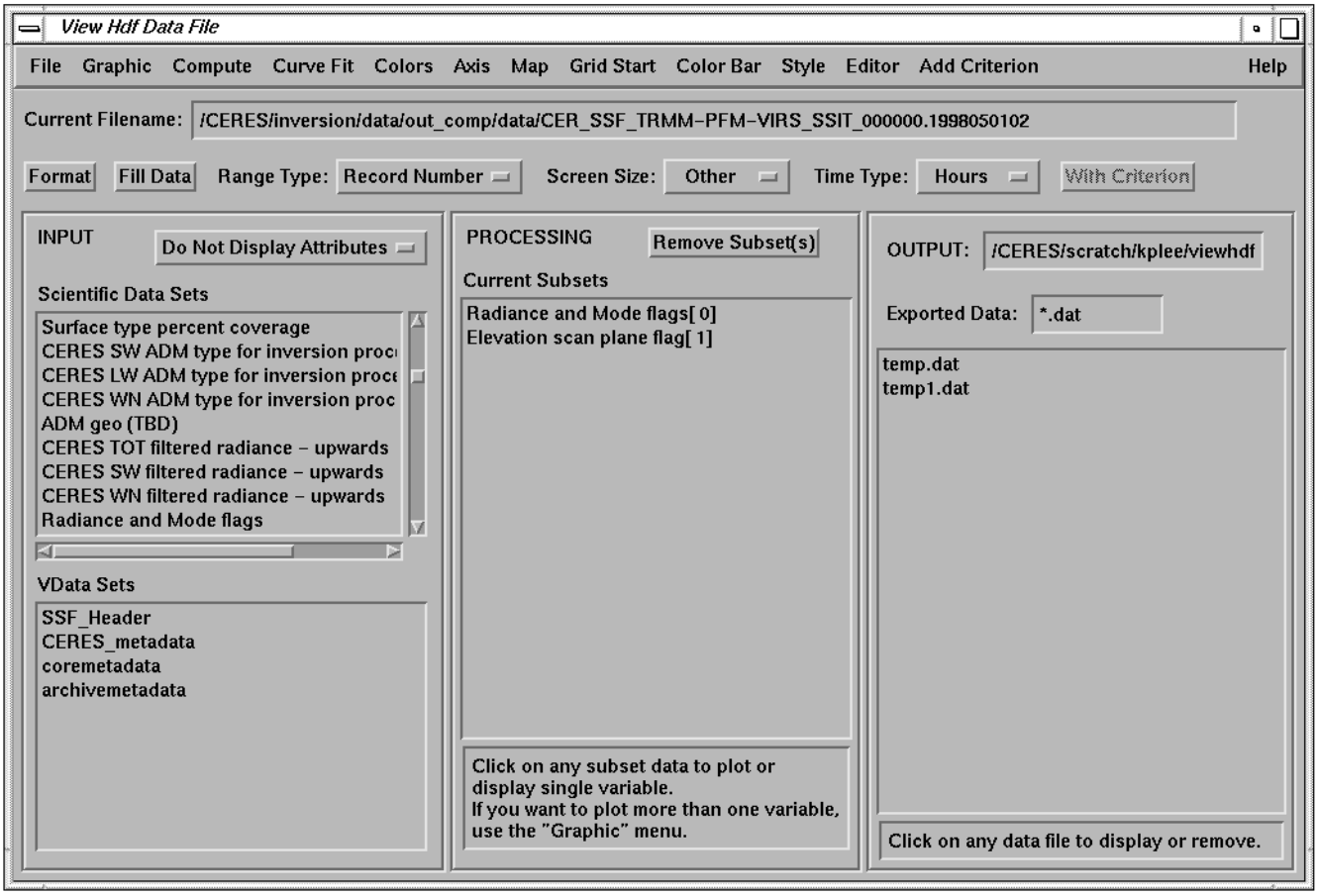

Fig. 7-4. Extract Elevation Scan Plane Flag

A 2D plot of the Elevation Scan Plane Flag is shown in Fig. 7-5. The value of zero represents the elevation scan profile in Normal Earth Scan mode.

Fig. 7-5. 2D Plot for Elevation Scan Plane Flag

The last example describes how to stop a running process. The view_hdf tool does not have a "Stop" button to terminate a long process; however, the following procedure can do the trick:

1. Move the cursor to the window where IDL was started.
2. Press the <CTRL> C to interrupt the process. The IDL prompt will appear. Note: if IDL prompt does not appear, move the cursor to the main menu window or plot window then move it back to the window where IDL was started. If the IDL prompt does not appear, it is because an external C function is running. The IDL prompt will appear after the function finishes.
3. Type **`.continue`** to resume the process, or
4. Type **`return`** or **`retall`** to stop the process. Note: the "retall" command returns to the top of main program, type **`xmanager`** at the IDL prompt to continue using the view_hdf tool.or type **`exit`** to exit IDL.

If an error message "Can't continue from this point" is given, type **`xmanager`** at the IDL prompt to continue or **`exit`** to exit IDL.

8.0 References

1. Cloud's and the Earth's Radiant Energy System (CERES) Bi-directional Scans (BDS) Collection Document, Draft; January 19, 1999;
   URL: http://asd-www.larc.nasa.gov/ceres/collect_guide/list.html
2. Cloud's and the Earth's Radiant Energy System (CERES) ES-8 Collection Document, Draft; September 13, 1999;
   URL: http://asd-www.larc.nasa.gov/ceres/collect_guide/list.html
3. Cloud's and the Earth's Radiant Energy System (CERES) Data Management System Data Products Catalog, Release 3, July 1998.
   {URL = http://asd-www.larc.nasa.gov/DPC/DPC.html}
4. HDF User's Guide, Version 4.0, February 1996 (from NCSA)
   {URL = http://eosweb/HBDOCS/hdf.html}.

9.0 List of Acronyms

ASCII	American Standard Code for Information Interchange
BDS	Bidirectional Scan Science Product
CERES	Clouds and the Earth's Radiant Energy System
CRS	Clouds and Radiative Swath Science Product
DAAC	Distributed Active Archive Center
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ES4	ERBE-like S4 Monthly Science Product
ES8	ERBE-like S8 Instantaneous Science Product
FORTRAN	Formula Translation
GIF	Graphical Interchange Format
GUI	Graphical User Interface
HDF	Hierarchical Data Format
IDL	Interactive Data Language
IES	Instrument Earth Scans Science Product
LaRC	Langley Research Center
LW	Longwave
NASA	National Aeronautics and Space Administration
SARB	Surface and Atmospheric Radiation Budget
SDS	Scientific Data Set
SSF	Single Satellite CERES Footprint TOA and Surface Fluxes, Clouds Science Product
SW	Shortwave
TOT	Total
TRMM	Tropical Rainfall Measuring Mission
URL	Uniform Resource Locator
WN	Window

10.0 Data Center/Data Access Information

1. Contacts

Langley DAAC User and Data Services Office
NASA Langley Research Center
Mail Stop 157D
2 South Wright Street
Hampton, VA 23681-2199
USA
Telephone: (757) 864-8656
FAX: (757) 864-8807
E-mail: larc@eos.nasa.gov
URL: http://eosweb.larc.nasa.gov

2. Ordering Data

Several media types are supported by the Langley DAAC CERES Web Order Tool. Data can be downloaded from the Web or via FTP. Alternatively, data can be ordered on media tapes. The media tapes supported are 4mm 2Gb (90m), 8mm 2Gb (8200), 8mm 5Gb (8500), and 8mm 7Gb (8500c).

Data ordered via the Web or via FTP can be downloaded in either Uncompressed mode or in UNIX Compressed mode. Data written to media tape (in either Uncompressed mode or in UNIX Compressed mode) is in UNIX TAR format. To assist the Langley DAAC in providing the best service to the scientific community, a notification is requested if these data are transmitted to other researchers.

3. Citation

Please provide a reference to the following paper when scientific results are published using the CERES BDS TRMM data:

"Wielicki, B. A.; Barkstrom, B.R.; Harrison, E. F.; Lee III,R.B.; Smith, G.L.; and Cooper, J.E., 1996: Clouds and the Earth's Radiant Energy System (CERES): An Earth Observing System Experiment, Bull. Amer. Meteor. Soc., 77, 853-868."

When Langley DAAC data are used in a publication, the following acknowledgment is requested to be included:

"These data were obtained from the NASA Langley Research Center EOSDIS Distributed Active Archive Center."

The Langley DAAC requests two reprints of any published papers or reports which cite the use of data the Langley DAAC have distributed. This will help the DAAC to determine the use of data distributed, which is helpful in optimizing product development. It also helps the DAAC to keep product related references current.

4. Document Information

Table 10-1. view_hdf Document Information

Document Item	Version	Date
Document Creation	Version 1.0	December 1998
Document Revision	Version 2.0	December 1999
Document Curator	The Langley DAAC Science, User & Data Services Office.	
Document URL	http://eosweb.larc.nasa.gov/HPDOCS/view_hdf.html	