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

View HDF User's Guide

Version 5.0
November 2007

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

Data Management System

View_Hdf User's Guide

Version 5.0

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November 2007

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1.0 Introduction

NASA has ongoing long term studies to increase the understanding of the Earth's climate and environment. As part of these studies, NASA Langley Research Center (LaRC) 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 Competency to generate science data products from the instrument measurements. This system is now operational at the Langley Atmospheric Sciences Data Center (ASDC) producing archival data sets written in Hierarchical Data Format (HDF).

The HDF is a product of the National Center for Supercomputing Applications (NCSA). HDF is self-documenting and enables the storage of large scientific data sets in a common, efficient machine-independent binary format. Many scientific data sets are being archived in HDF. Due to some limitations of the HDF version 4 (HDF4), NCSA has issued a new design HDF format, version (HDF5). The HDF5 is redesigned to store larger files and more objects per file, use a simpler and more comprehensive data model, and improve the efficiency of storage and I/O. These two HDF formats are not compatible. More information about HDF can be found from the web site: http://hdf.ncsa.uiuc.edu.

To help access data from HDF products, a visualization and analysis tool (view_hdf) has been written in Interactive Data Language (IDL) using a graphical user interface (GUI) to manipulate the data. The view_hdf tool can select and subset variables from any data set in an HDF file, as well as ASCII data in column format, render both two and three dimensional graphics, and plot geolocated data onto various world map projections. Other features include multiple variable plotting, arithmetic operations, curve fitting, variable regression, bit extraction, simple statistics of variables, value based subsetting, computing and displaying histograms, and executing user defined procedures. Plots can be saved in a variety of formats including PostScript, encapsulated PostScript, GIF, PNG, JPEG, or MPEG formats or can be sent directly to a printer. Data and analysis results can be written to a file in ASCII format or HDF4 format for use in other analysis programs.

Examples presented in this document include results from the CERES instruments recently launched on the TRMM, Terra, and Aqua satellites. 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, as well as to Microsoft Windows environment. It should be portable to any platform which supports IDL. More information about view_hdf can be obtained from the NASA Langley ASDC web site: http://eosweb.larc.nasa.gov/HPDOCS/view_hdf.html.

Dr. Kam-Pui Lee of Science Systems and Applications Inc. (SSAI) is a major author of the view_hdf tool and continues to add new features. Ms. Sharon L. Gibson and Mr. Larry E. Matthias of SSAI contributed to earlier development work on this tool.

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2.0 Installation

This section describes how to install view_hdf on an UNIX platform. 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 5.1 or above (URL = http://www.rsinc.com) and a UNIX platform operating system. To access HDF5 files, IDL version 5.6 or higher is required. The view_hdf tool includes six IDL programs: view_hdf.pro, getinfo.pro, getinfo1.pro, getinfoa.pro, getinfosds.pro, and getinfovd.pro; a shared library, ies_bds_rel2.so; and a color table file, view_hdf_color.tbl. In order to access HDF5 files, get_hdf5_objinfo.pro, read_hdf5_sdn_data.pro, read_sdn_data.pro, and cdn_field_range_dialogue.pro are needed. The check_gif.gif and check_png.png files are used to test the availability of supporting the Graphics Interchange Format (GIF) and the Portable Network Graphic (PNG) file types. 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. It also has been ported to Microsoft Windows environment. 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/HDF4.1r3/include
setenv HDFLIB /usr/local/HDF4.1r3/lib
setenv HDFLIBS -lmfhdf -ldf -ljpeg -lz
```

It should be pointed out that the compile and ld options for IDL version 5.2 and above use **-n32** instead of **-32** in the commands. Also, the definition of STRING structure is modified for version 5.5 and above. Including in the view_hdf package, there are three pre_built shared libraries. The ies_bds_rel2.so shared library uses the **-32** option for IDL version 5.1 and below. The ies_bds_rel2_n32.so shared library uses the **-n32** option for IDL version 5.2 to 5.4. The ies_bds_rel2_5.5.so shared library uses the **-n32** option and new definition of STRING structure for IDL version 5.5 and above. The shared library may not be needed if IDL version 5.2 or above is used and the data file is not a BDS file.

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The examples included in this guide use the CERES BDS, IES, ES8, ES4, and SSF and CALIPSO LIDAR Level 1 and 2 Hierarchical Data Format (HDF4) science archival products. For a description of these datasets, see the CERES BDS Collection Guide (Ref. 1), the CERES ES8 Collection Guide (Ref. 2), the CERES Data Product Catalog (Ref. 3) or the CALIPSO Data Product Catalog (Ref. 6). For further information on HDF, see the HDF User's Guide (Ref. 4).

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3.0 How to Start

The view_hdf tool is developed with a graphical user interface (GUI). Before starting the GUI in the directory where the view_hdf files reside, 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=n`**, where n is an integer less than 256. 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. If the local machine is running under MAC OS X operation system and it is remote login to an UNIX system, the **`macosx=1`** keyword has to be added in the command. If the input HDF4 file is written with HDF version 4.2.1 and used SZIP utility to compress SDS data type, the **hdf421=1** keyword can be added in the command to access the shared library which is built with HDF 4.2r1 if the shared libreary is available. The main menu, as shown in Fig. 3-1, pops up on the screen. The GUI is described in Section 4.0.

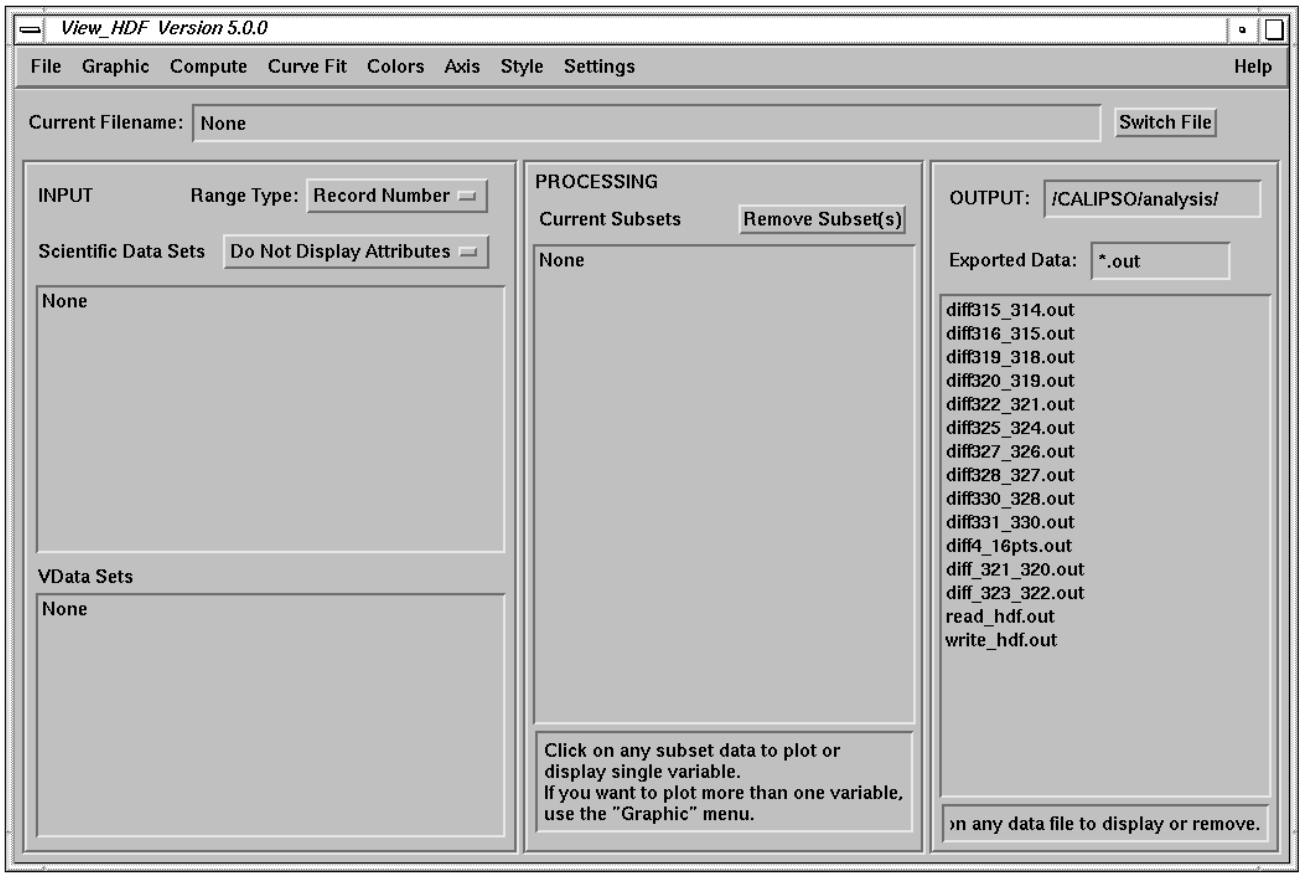

Fig. 3-1. Main Menu

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The following procedure is used to select an HDF4 file:

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

Fig. 3-2. File Menu

Step 2: Select “Open HDF Files”. This option displays on the Main Menu the names of all Science Data Sets (SDS) and Vdata in the HDF file. After selecting this option, a Select File window pops up, as shown in Fig. 3-3.

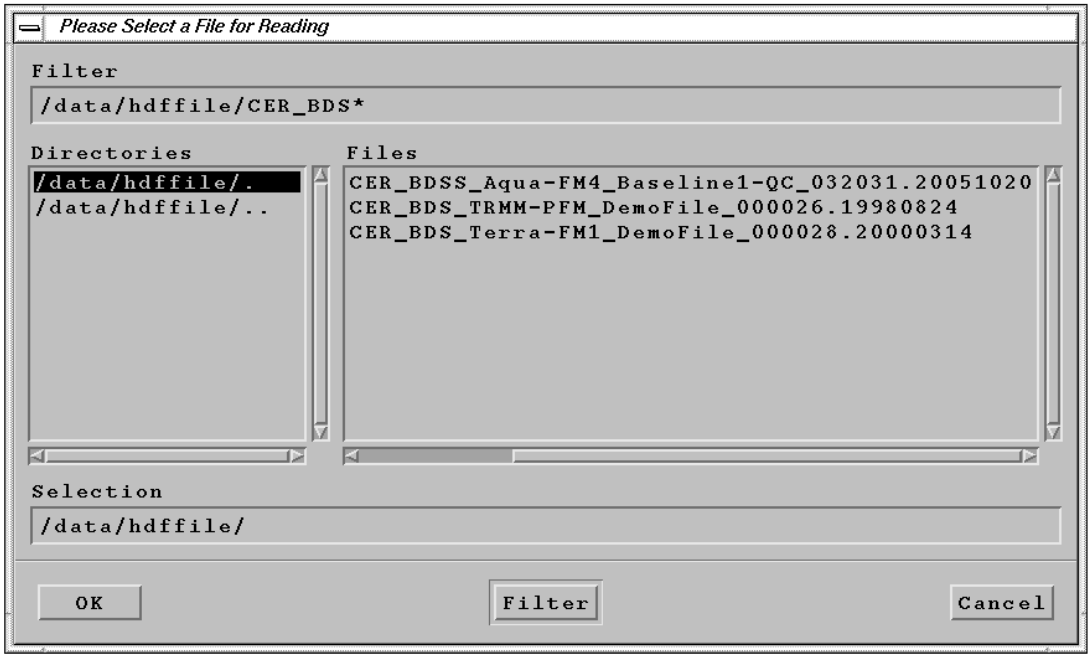

Fig. 3-3. Select File Window

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 exam-

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ple 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.

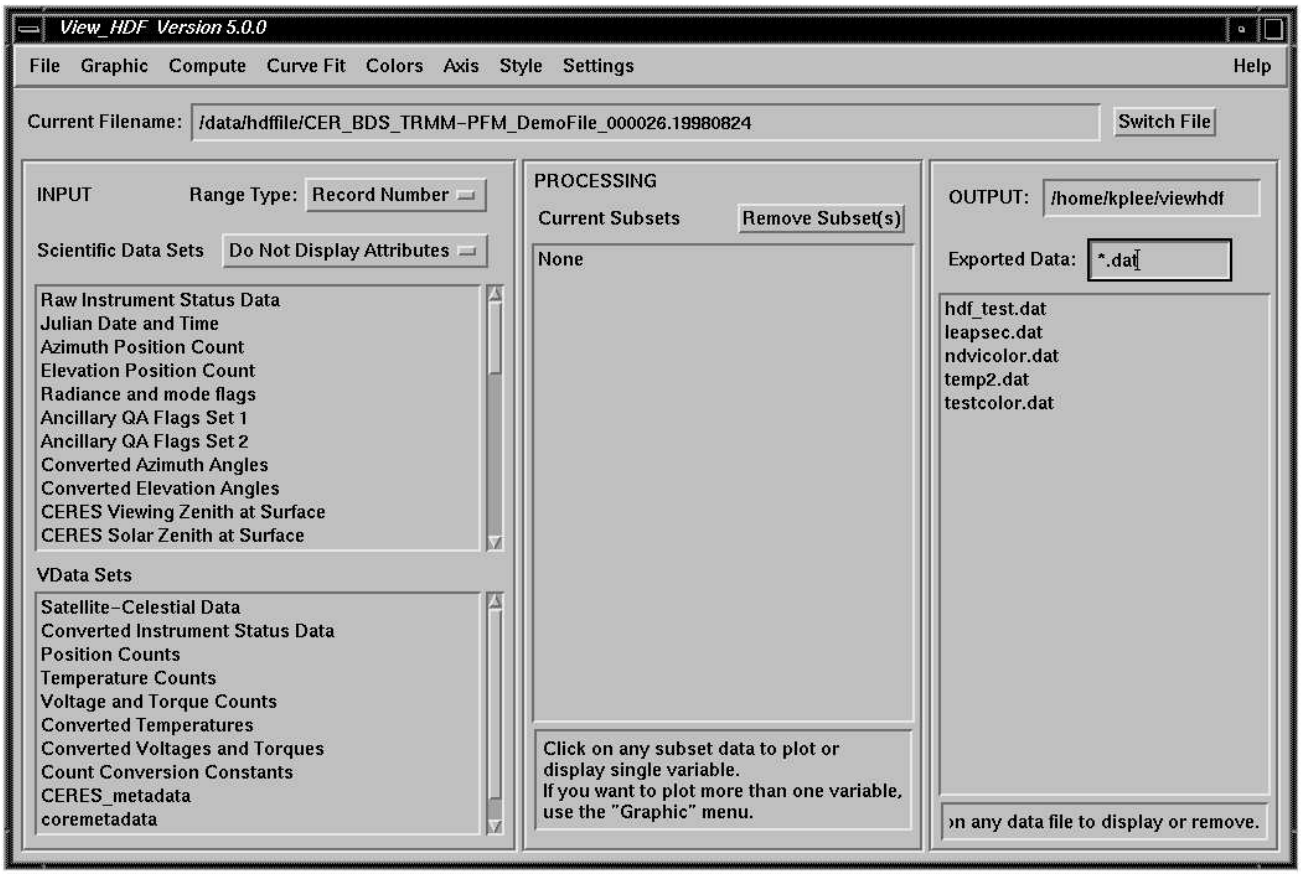

Fig. 3-4. List SDS and Vdata Names

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 a 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.

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A range of data can then be selected to import. The Increment field can be used to selectively subset each dimension.

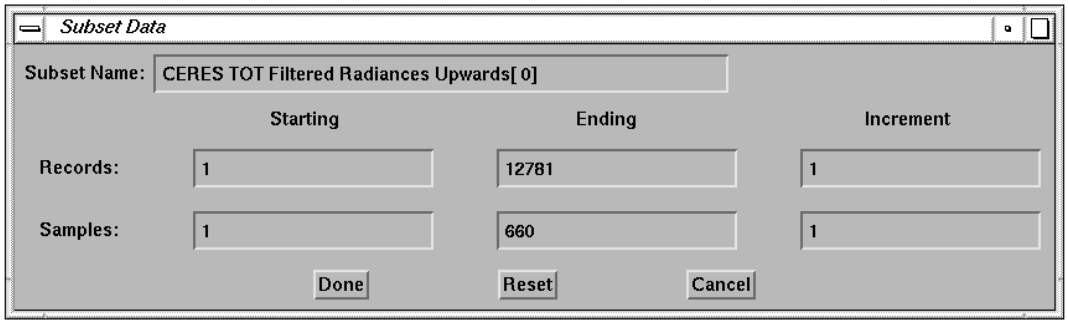

Fig. 3-5. SDS Range Input Window

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.

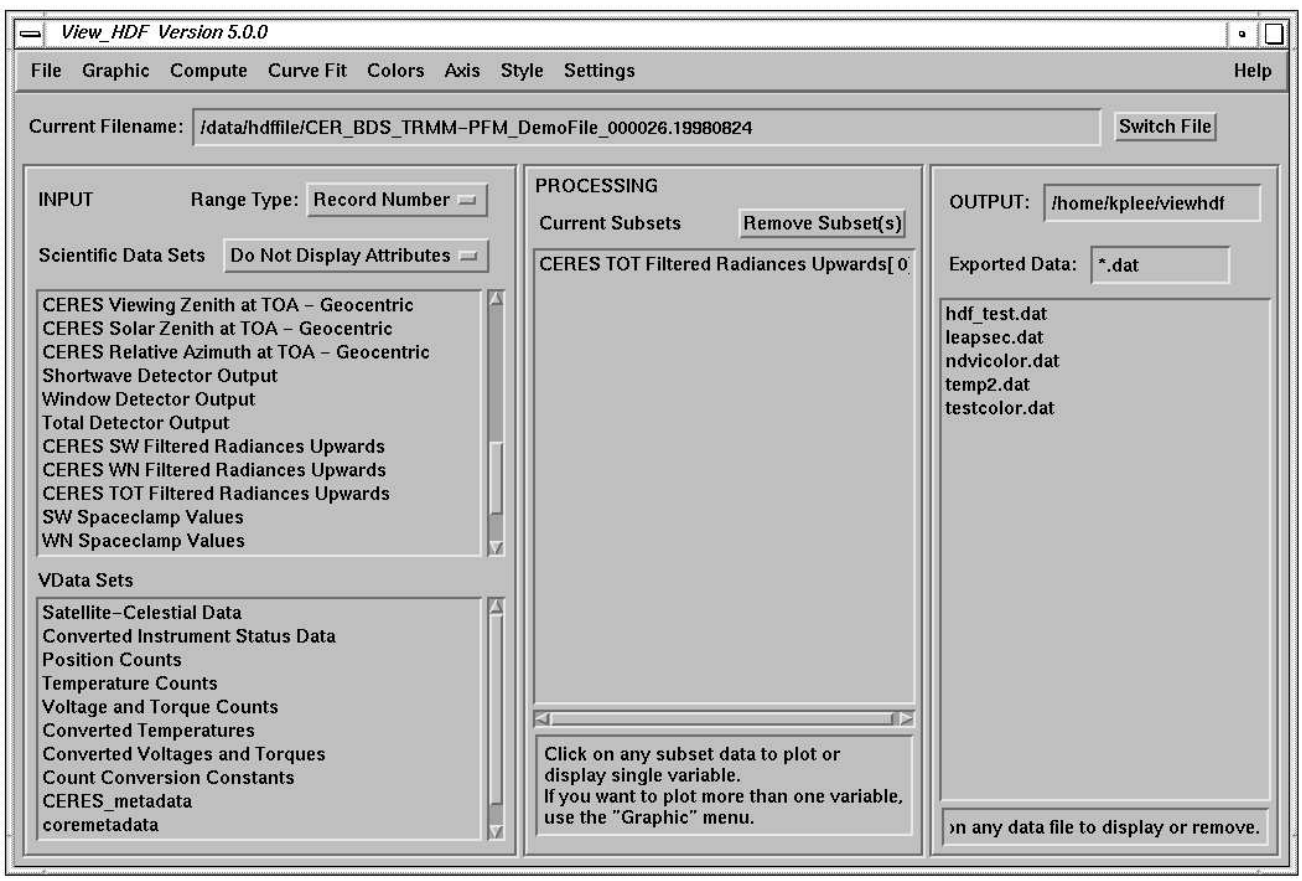

Fig. 3-6. Import SDS

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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.

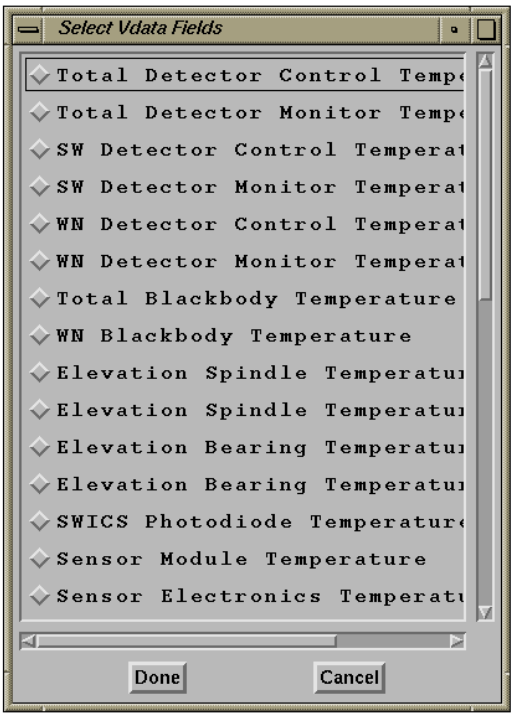

Fig. 3-7. Vdata Fields Window

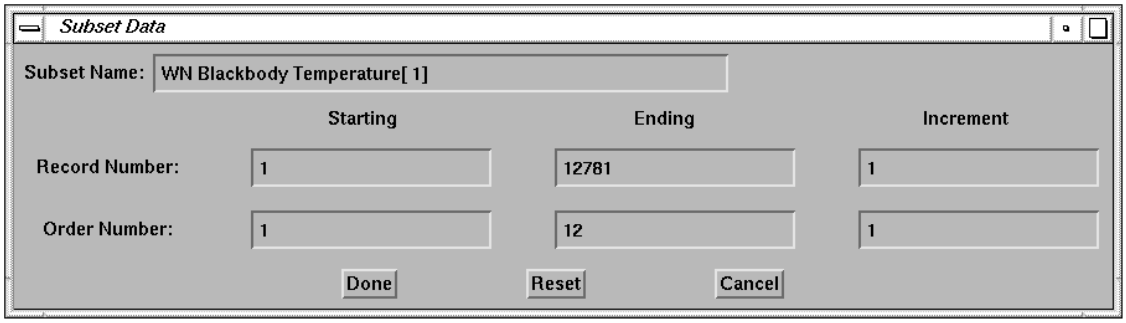

Fig. 3-8. Vdata Field Range Window

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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.

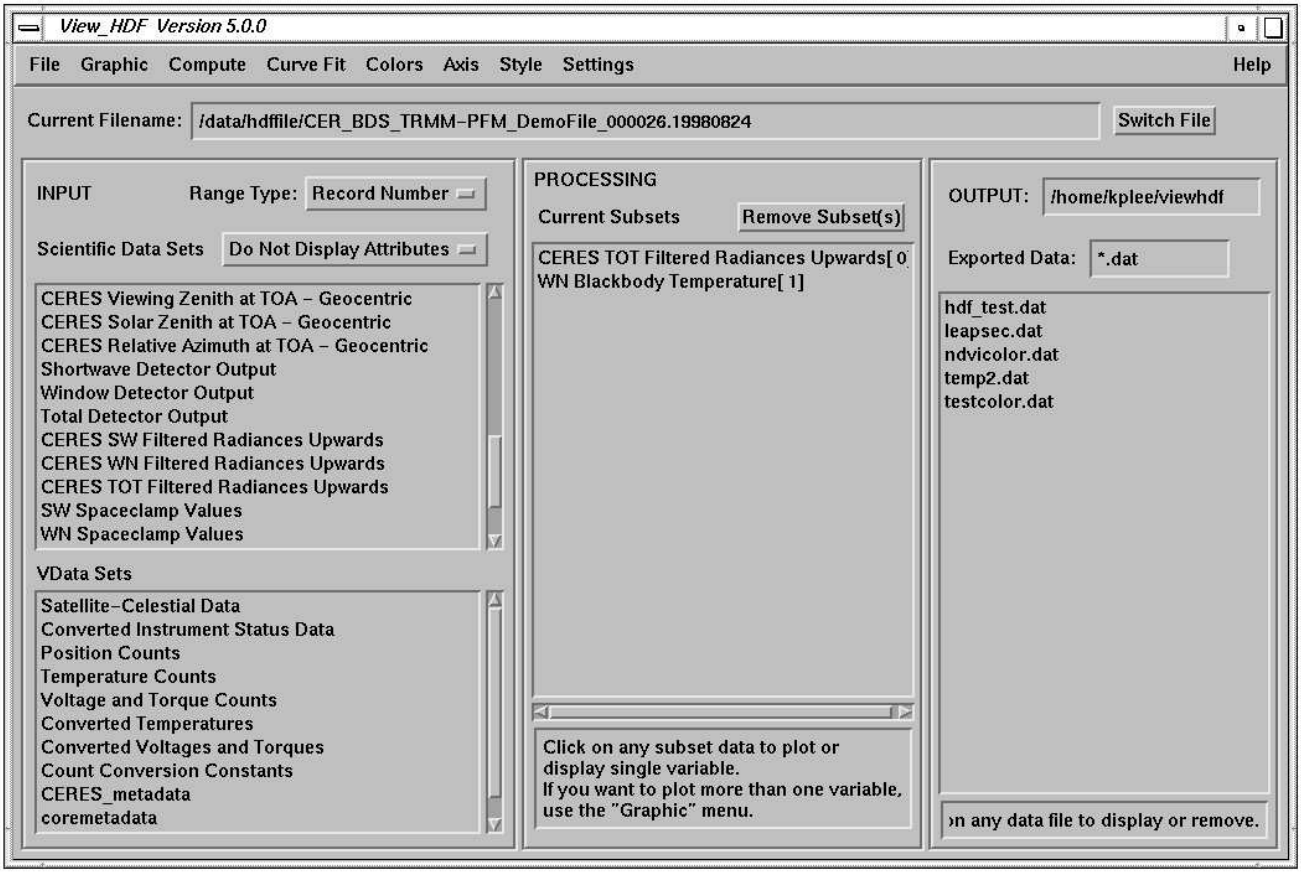

Fig. 3-9. Import Vdata

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 to access that data.

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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.

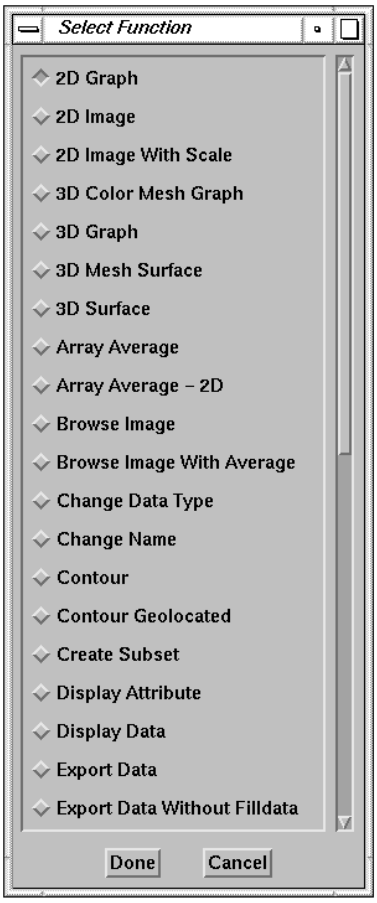

Fig. 3-10. Select Function Menu

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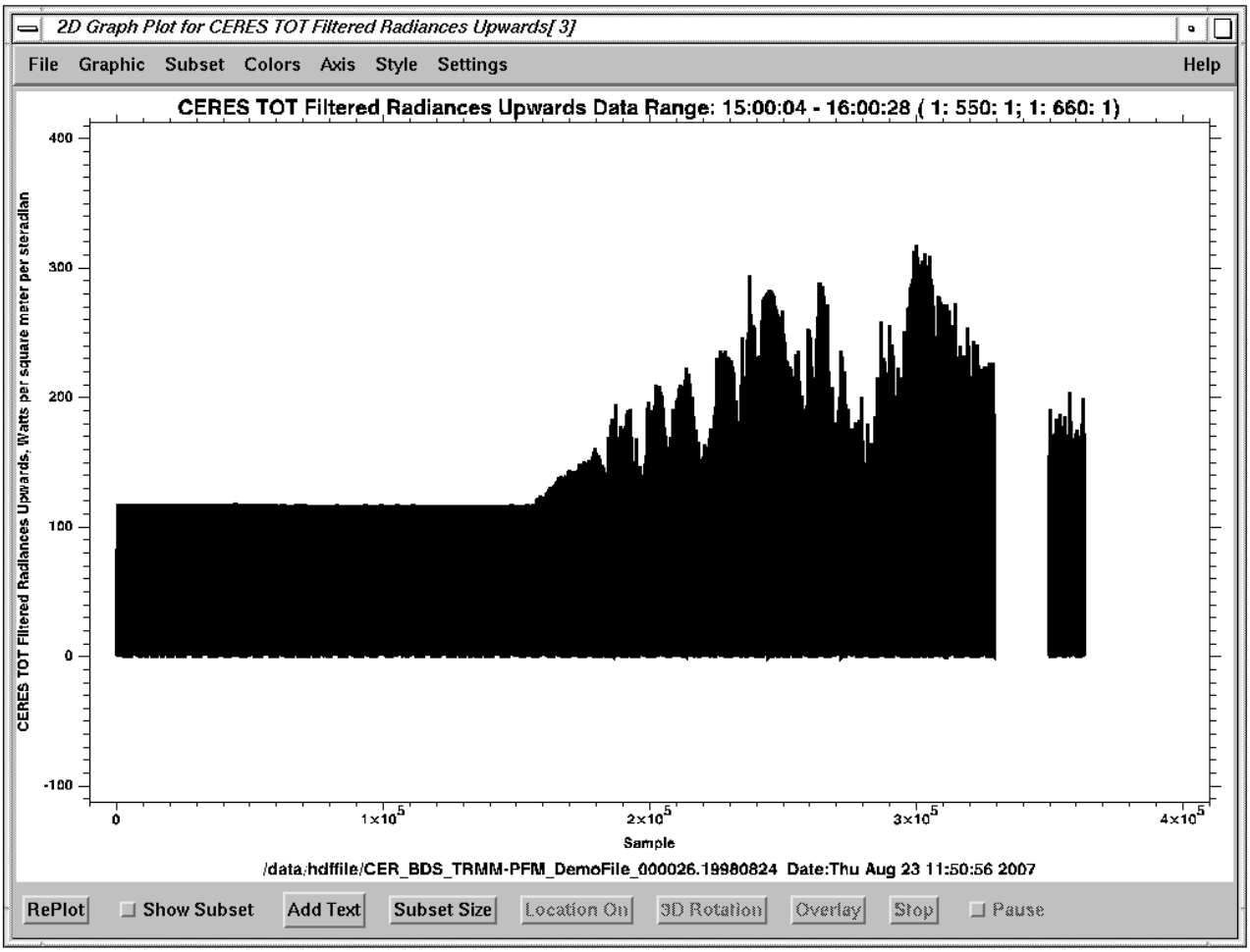

Fig. 3-11. Plot Window

The plot can now be saved as a Postscript, GIF, JPEG, or PNG 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, move the cursor on the desired plot window.

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.

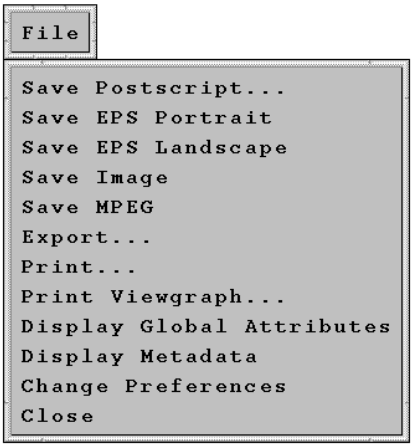

Fig. 3-12. File Menu

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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 a file, exporting data to a file, changing preferences settings, and exiting view_hdf.	Fig. 4-1
(2)	"Graphic": Plots more than one variable from the Current Subsets list.	Fig. 4-16
(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. 4-27
(4)	"Curve Fit": Does curve fitting between two variables.	Fig. 4-41
(5)	"Colors": Includes the options for selecting different color tables, editing and saving the color map, and changing the background and foreground colors.	Fig. 4-47
(6)	"Axis": Includes the options for manual or automatic setting of the X, Y, and Z axes range. It also includes the options for using linear or logarithmic axis and producing grids.	Fig. 4-55
(7)	"Style": Includes the options for setting the line type, symbol type, and symbol size used to display the data.	Fig. 4-63
(8)	"Settings": Includes the options for setting axes ranges, map projection, location of first grid for "Grid Cell" plot, color bar, how to display data, fill data values, display time type, and how to select scale factor.	Fig. 4-70
(9)	"Help": Calls up this user guide or IDL on-line help menu.	Fig. 4-92
(10)	"Current Filename": Displays the name of current file.	
(11)	"Switch File": Switch the last five open files in the same session as current working file without opening it again.	
(12)	"INPUT": Displays the names of SDS and Vdata sets in the current HDF file.	Fig. 3-4
(13)	"PROCESSING": Displays the names of the imported data sets.	Fig. 3-6
(14)	"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
(15)	"2D Graph": Plots data against the index of the data array.	Fig. 3-11
(16)	"2D Image": Displays data as an image.	

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Table 4-2. Graph Style Menu

Item Number	Graph Style	Fig. Number
(17)	"2D Image With Scale": Interpolates the data set to fit the size of view window before displaying data as an image.	
(18)	"3D Graph": Draws a wire-mesh representation of a two-dimensional array projected into two dimensions.	
(19)	"3D Surface": Creates a shaded-surface representation of a gridded surface with shading from a light source model.	Fig. 4-102
(20)	"Contour": Draws a line contour plot from the data.	
(21)	"Grid Contour": Creates a filled contour plot on a map projection.	
(22)	"Grid Cell": Displays gridded data region by region on map projection.	Fig. 4-104
(23)	"Grid Cell - Region": This option is similar to "Grid Cell", (22), except the gridded data are arranged in terms of region number.	Fig. 4-105
(24)	"Statistics": Calculates the mean, standard deviation, maximum, minimum and number of samples for one- or two-dimensional arrays.	Fig. 4-108
(25)	"Statistics For Whole Subset": Calculate the mean, standard deviation, maximum, minimum and number of samples for a whole array.	Fig. 4-110
(26)	"Histogram: Does a sample histogram of data with an option to write the result to a file.	Fig. 4-111
(27)	"XY Graph": Displays data against time, sample number, record number, packet number, or variable selected from Current Subsets list.	
(28)	"XYZ Graph": Displays data (Z) against two variables (X,Y) from the Current Subsets list.	
(29)	"3D Mesh Surface": Display a data set on a 3D mesh surface.	
(30)	"3D Color Mesh Graph": Display a data set on a 3D mesh data sets, X, Y, and Z.	Fig. 4-118
(31)	"Geolocated": Displays data on map projection.	Fig. 4-120
(32)	"Contour Geolocated": Converts data into a two-dimensional regular grid and creates a filled contour plot on a map projection.	Fig. 4-121
(33)	"Create Subset": Creates a subset of the data based on the range of another criterion variable.	Fig. 4-124
(34)	"Subsampling": Subsets a data set already imported into Current Subsets list.	Fig. 4-125
(35)	"Array Average - 2D": Does array averaging for one- or two-dimensional array.	Fig. 4-126
(36)	"Array Average": Does array averaging for any rank of data array.	
(37)	"Regression": Does a multiple linear regression fit.	Fig. 4-128
(38)	"Extract Bits": Extracts specific contiguous bits from an integer variable.	
(39)	"Browse Image": Displays a two-dimensional data array with two one-dimensional arrays, X and Y variables.	
(40)	"Browse Image With Average": Does average for every number of profiles before creating a browse image.	Fig. 4-131
(41)	"Vertical Feature Mask": Displays a Vertical Feature Mask data set from Cloud - Aerosol LIDAR Infrared Pathfinder Satellite Observation (CALIPSO) LIDAR Level 2 Vertical Feature Mask data product.	Fig. 4-134

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Table 4-2. Graph Style Menu

Item Number	Graph Style	Fig. Number
(42)	"Transpose": Transposes a two-dimensional data array.	
(43)	"Display Data": Displays data on an editor window.	Fig. 4-135
(44)	"Display Attribute": Displays the attributes of the data set on an editor window.	Fig. 4-136
(45)	"Export Data": Exports data to a file.	Fig. 4-137
(46)	"Export Data Without Filldata": Exports data to a file without fill data.	
(47)	"Change Name": Changes the name of a variable in the Current Subsets list.	
(48)	"Change Data Type": Changes the data type of a variable in the Current Subsets list.	Fig. 4-138
(49)	"Replace Data Value": Replaces a range of data values or any particular data value to an assigned value.	Fig. 4-139
(50)	"Scale Data Value": Scales data set with scale factor and offset value.	Fig. 4-140
(51)	"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
(52)	"File": This menu includes the options for saving the plot in Postscript, encapsulated Postscript, GIF, PNG, JPEG, or MPEG format, exporting data to file, printing the plot, making viewgraphs, changing settings, and closing the plot window.	Fig. 4-145
(53)	"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. 4-152
(54)	"Subset": Zooms, locates or views a subset of a plot. This menu allows any particular portion of the plot to be viewed.	Fig. 4-153
(55)	"Colors": Selects color table, edit and save the color map, and changes the back-ground and foreground colors.	
(56)	"Axis": Sets the ranges of the X, Y, and Z axes manual or automatically, use linear or logarithmic axis, or produces a grid.	
(57)	"Style": Sets the line type, symbol type, and symbol size to display data.	
(58)	"Settings": Includes the options for setting axes ranges, map projection, location of first grid for "Grid Cell" plot, color bar, how to display data, fill data values, display time type, how to select scale factor.	
(59)	"Help": Calls up this user guide or IDL on-line help menu.	
(60)	"RePlot": Replots the graphic.	
(61)	"Show Subset": Varies the displayed subset.	
(62)	"Add Text": Adds text on the plot.	Fig. 4-161
(63)	"Subset Size": Resizes the subset plot window for "Select Region" with "Geolocated Plot" option.	Fig. 4-164

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Table 4-3. Plot Window Menu

Item Number	Menu and Button Description	Fig. Number
(64)	"Location On": Becomes activated if the "Locate" option in "Subset" menu is selected, see iitem 51(b).	
(65)	"3D Rotation": Sets the angles of rotation for "3D Graph" and "3D Surface".	Fig. 4-165
(66)	"Overlay": Overlay another data set on "XYZ Plot", "Scatter Contour Plot", "Grid Contour", "Grid Cell", "Grid Cell - Region", "XYZ Graph", "Geolocated", and "Contour Geolocated" graphic type plots.	Fig. 4-168
(67)	"Stop": Stop the current plotting process.	
(68)	"Pause": Pause the current plotting process.	

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 preferences settings, and exiting view_hdf. The menu is shown in Fig. 4-1.

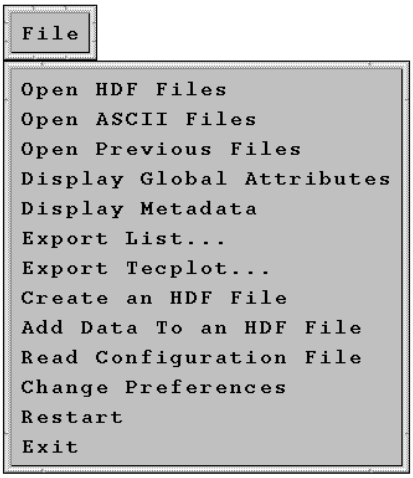

Fig. 4-1. File Menu

The options are:

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(a) "Open HDF Files": Open an HDF file. If the selected file is HDF4, the names of SDS and Vdata sets in the data file are displayed in the INPUT column on the Main Menu. If an HDF4 file 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 (12).

Fig. 4-2. Select Vgroup Window

If the selected file is HDF5, the root group, "/", information will be displayed in a popped up window, as shown in Fig. 4-3. The names of the datasets in the current group with atomic datatype will be displayed in the SDS window, while datasets with compound datatype will be displayed in the vdata window. Click on any group and another window similar to Fig. 4-3 will pop up if sub-groups exist.

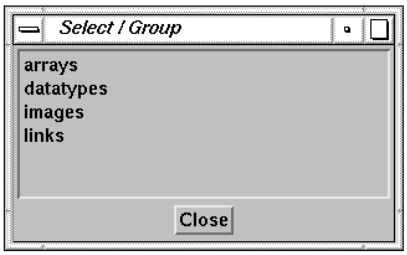
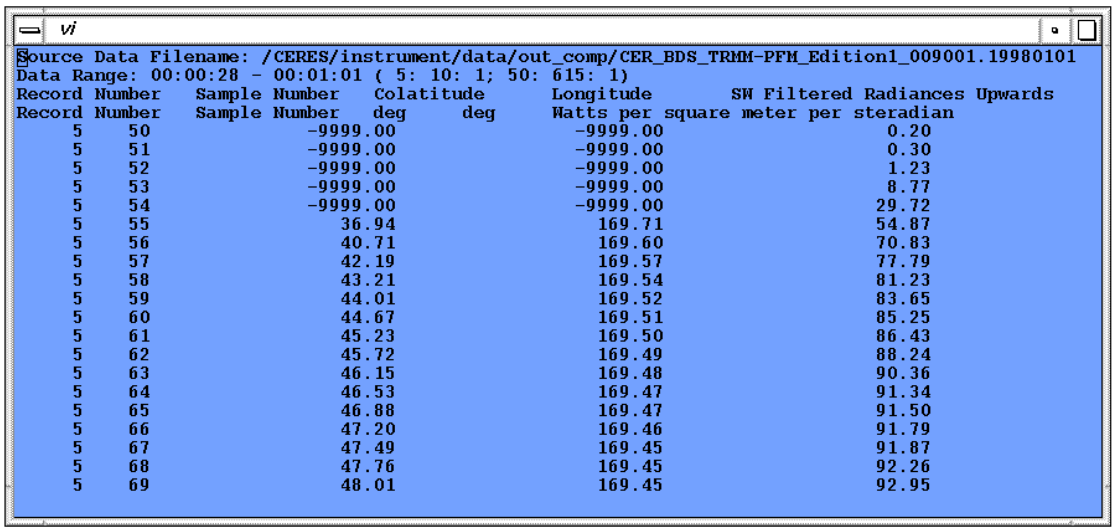


Fig. 4-3. Select HDF5 Root Group Window

(b) "Open ASCII Files": Open an ASCII data file with column format, as show in Fig. 4-4.



```
vi
Source Data Filename: /CERES/instrument/data/out_comp/CER_BDS_TRMM-PFM_Edition1_009001.19980101
Data Range: 00:00:28 - 00:01:01 ( 5: 10: 1; 50: 615: 1)
Record Number   Sample Number   Colatitude      Longitude       SW Filtered Radiances Upwards
Record Number   Sample Number   deg     deg     Watts per square meter per steradian
     5     50              -9999.00                -9999.00                    0.20
     5     51              -9999.00                -9999.00                    0.30
     5     52              -9999.00                -9999.00                    1.23
     5     53              -9999.00                -9999.00                    8.77
     5     54              -9999.00                -9999.00                   29.72
     5     55                 36.94                  169.71                   54.87
     5     56                 40.71                  169.60                   70.83
     5     57                 42.19                  169.57                   77.79
     5     58                 43.21                  169.54                   81.23
     5     59                 44.01                  169.52                   83.65
     5     60                 44.67                  169.51                   85.25
     5     61                 45.23                  169.50                   86.43
     5     62                 45.72                  169.49                   88.24
     5     63                 46.15                  169.48                   90.36
     5     64                 46.53                  169.47                   91.34
     5     65                 46.88                  169.47                   91.50
     5     66                 47.20                  169.46                   91.79
     5     67                 47.49                  169.45                   91.87
     5     68                 47.76                  169.45                   92.26
     5     69                 48.01                  169.45                   92.95
```

Fig. 4-4. ASCII File With Column Format

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After selecting an ASCII file, a window, as shown in Fig. 4-5, pops up for entering parameters for opening the file. The parameters are:

(i) "Skip lines from beginning of file": Skip number of lines from the beginning of the file. The default value is 0. The value is set to 2 for the file shown in Fig. 4-4 to skip two lines.

(ii) "Number of heading lines": Set number of lines for variable names. The default is 1.

(iii) "Skip lines after heading": Skip number of lines after the line of variable names. The default is 0. The value is set to 1 for the above example to skip one line.

(iv) "Variables separated by": Set the character which separates the columns. The default is tab. If tab is used as delimited character, enter the word **tab** in the field. If space is used, enter the word **space** in the field. If space is used as delimited character, there cannot be any missing data in any column.

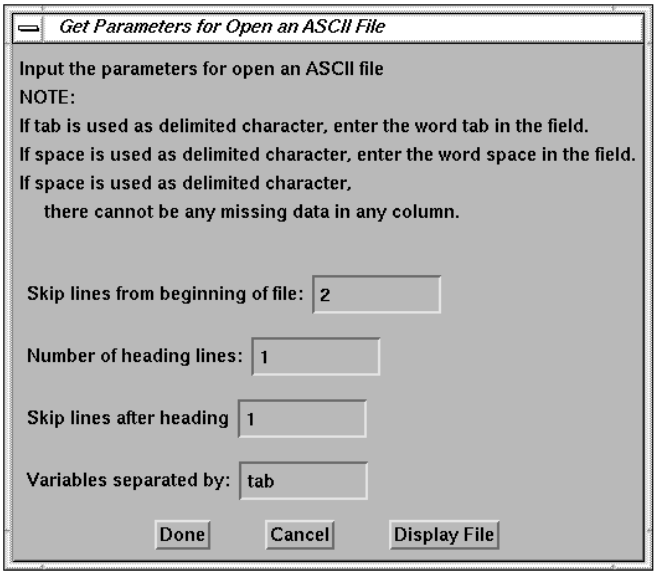

Fig. 4-5. Open ASCII File Window

After entering all the parameters, click the "Done" button. The names of the variables will display in the SDS field of the main menu, as shown in Fig. 4-6.

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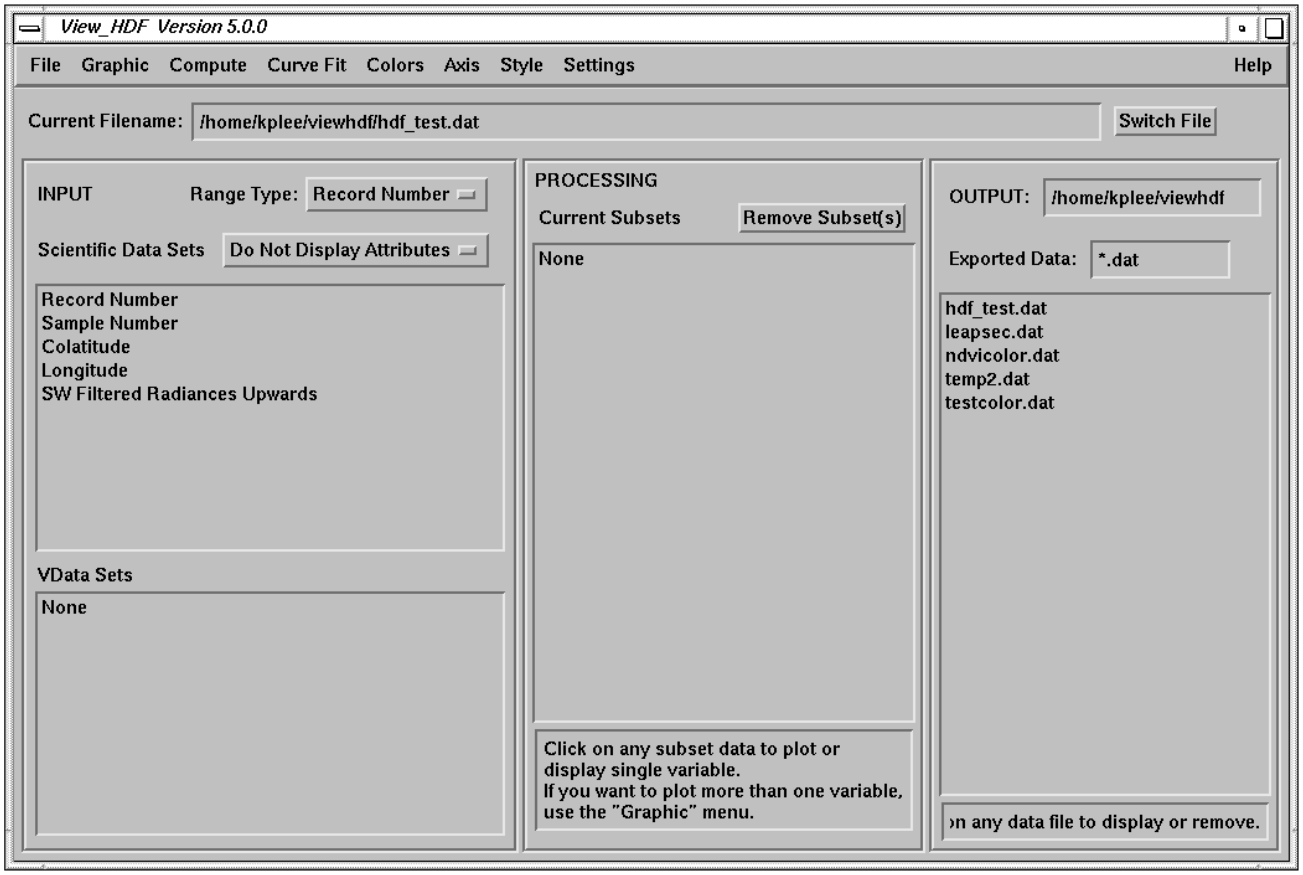

Fig. 4-6. List Variable Names for ASCII File

If the number of lines for variable names is set to 0, the default names, Variable_#, will be used where # is the sequence column in the file. The "Display File" button in the open ASCII file window allows the user to open the file in the specified editor to look at the data before entering the necessary parameters.

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To select a particular variable, click on the variable name in the Scientific Data Sets area. A window, as shown in Fig. 4-7, will pop up for entering the parameters required for importing the data. These parameters are:

(i) Name of the variable.
(ii) Rank. The default is 1.
(iii) Dimension size. The default is total number of data for this column.
(iv) Unit. The unit of the variable.
(v) Fill Value. The fill value used in this data set.

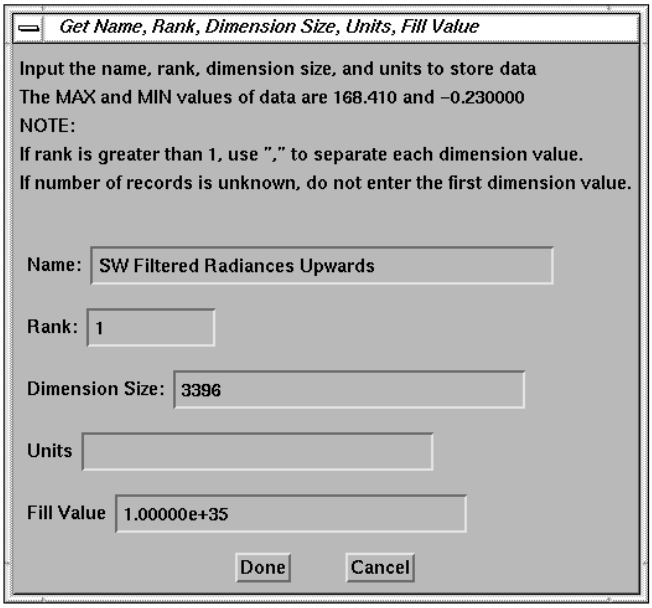

Fig. 4-7. Data Parameters for ASCII File Window

If the rank is set to greater than 1, enter the dimension size for each dimension separated by ",". The order of the dimensions is same as one specifies in HDF file. If the first dimension is unknown, enter the other dimensions only. The first dimension will be calculated based on number of data records read. An example based on the file as shown in Fig. 4-4 is shown in Fig. 4-8. After entering all the parameters, click the "Done" button. A Subset Data window, as shown in Fig. 3-5, pops up for selecting the range of data to import to the Current Subsets list.

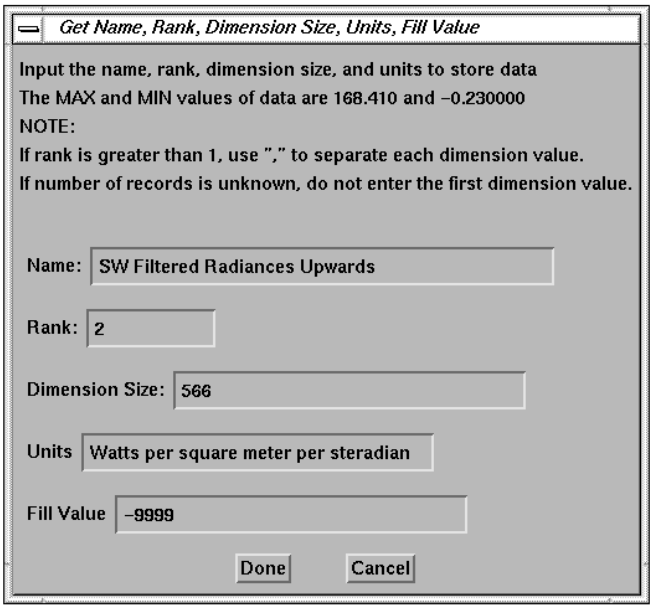

Fig. 4-8. Example for Import ASCII Data Set

(c) "Open Previous Files": The last five files opened will be remembered. A file can be reopened from the list by selecting this option.

(d) "Display Global Attributes": Display the global attributes of an HDF file if this information is available.

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(e) “Display Metadata”: Display the metadata stored in an HDF file. The metadata is stored in vdata with name contained “metadata”. After this option is selected, a window, as shown in Fig. 4-9, will pop up with all the vdata sets contain “metadata” for user to select which one to display the contents of the data set.

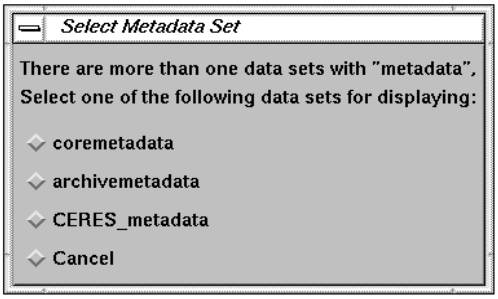

Fig. 4-9. Select Metadata Set

(f) “Export List...”: Export one or more variables from the Current Subsets list to a file. The default output path is the current directory. The variables should have same type, same rank, same dimensions, and same order. The submenu, as shown in Fig. 4-10, includes:

(i) “Without Filldata”: Export subset data without fill data values. The option “Without Reference” does not export data for a record if all items in the list are the fill values. The option “With Reference” does not export data for a record if the reference data value is a fill value.

(ii) “With Filldata”: Export subset data including those equal to fill values.

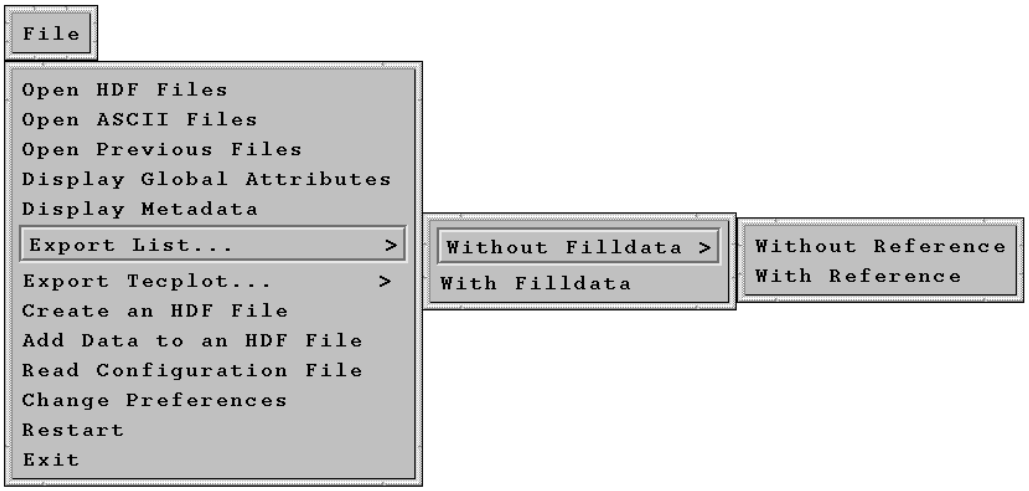

Fig. 4-10. Export List Submenu

(g) “Export Tecplot...”: Export one or more variables from the Current Subsets list to a file in Tecplot data input format. 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 if the time variable is valid, otherwise the first column is the index of the variable. The submenu is the same as the “Export List...” option, item 1(f).

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(h) "Create an HDF File": Write one or more subset data sets from the Current Subsets list to a new HDF4 file. The structure of the new file is same as that of the original file. For vdata sets, only one field is written. If the file already exists, that file will be overwritten. If two or more data sets have same name, four options will be given, as shown in Fig. 4-11:

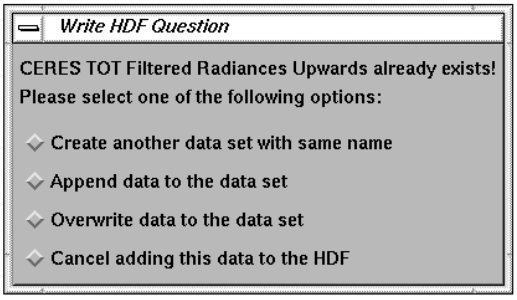

Fig. 4-11. Add HDF Option Menu

(i) Create another data set with same name.

(ii) Append data to the data set. The new data will be added at the end of the data set which is in the file.

(iii) Overwrite data to the data set. The existing data set is overwritten. If this option is selected, a window, as shown in Fig. 4-12, pops up for entering the record number to start overwriting.

(iv) Cancel adding this data to the HDF file.

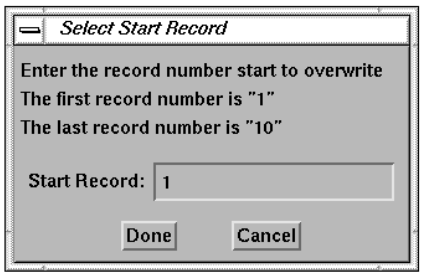

Fig. 4-12. Select Start Record Window

(i) "Add Data to an HDF File": Add subset data to an existing HDF file. If the file does not exist, it will be created. If the data set to be written has the same name as a data set already in the file, four options will be given as shown in Fig. 4-11. **Note**: Users should be careful when using this editing HDF file feature. It is recommended that original HDF files not be modified.

(j) "Read Configuration File": Reread the configuration file. The values in the configuration file will replace the current values.

(k) "Change Preferences": Change the default settings of input and output directories, user-defined procedure directory, temporary directory, home directory, editor, open file filter, default color table, open format, and screen size. If this option is selected, a window, as shown in Fig. 4-13, pops up to display the current settings. The "Browse" buttons allow the user to search the correct paths for corresponding directories.

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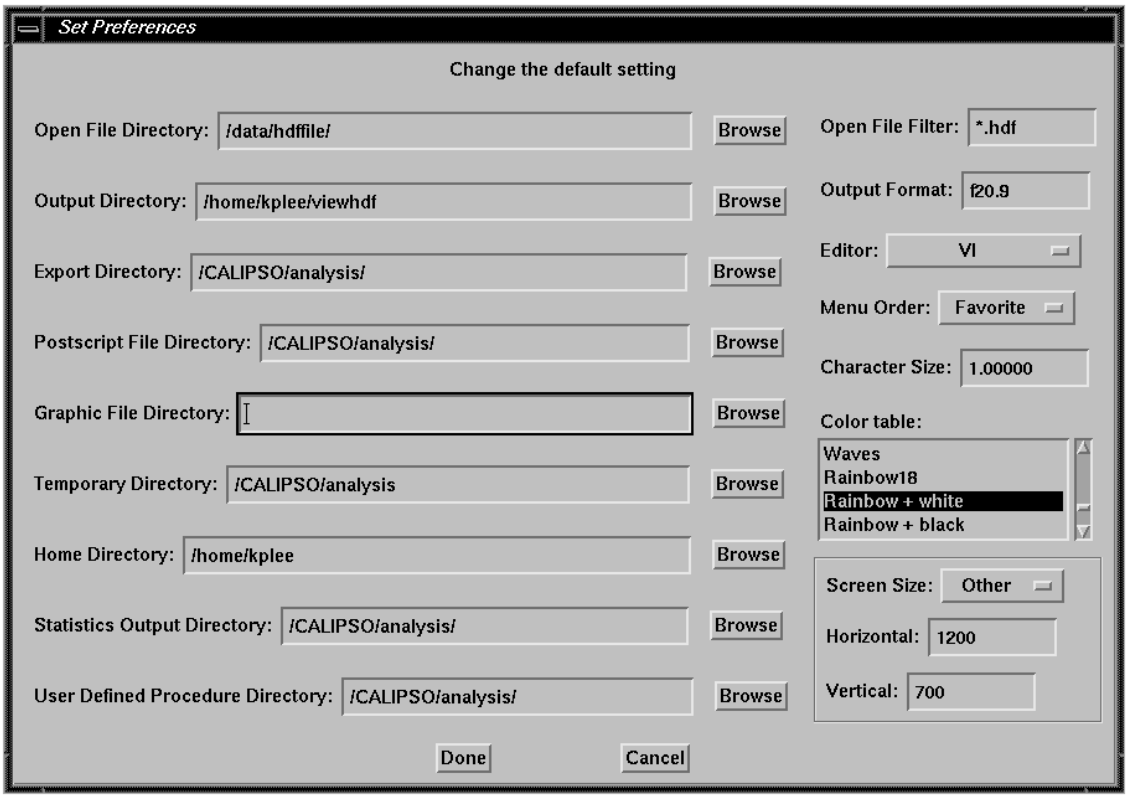

Fig. 4-13. Change Preferences Window

Other fields include:

(i) "Open File Filter": Set a filter to refine the list of file names displayed on open file window.

(ii) "Output Format": Change the format for exporting data to a file. The format syntax is the same as a FORTRAN-style specification. The default format is "f18.9".

(iii) "Editor": Select a text editor to display data or a file on the screen. The options in this field are:

1. "VI": Use vi editor to display data or file. This is the default.
2. "Emacs": Use emacs editor to display data or file.
3. "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.

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4. "Other": Use this option to specify an editor other than the above three options. A window, as shown in Fig. 4-14, pops up for entering the command used to start the editor, including any command line options.

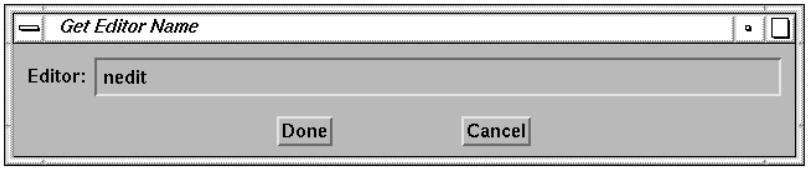

Fig. 4-14. Get Editor Name Window

(iv) "Menu Order": Set the order to display options in Graphic menu and Select Function menu. There are three options:

1. "Auto": Use the current order which is based on the functions.
2. "Alphabetic": Use the alphabetical order.
3. "Favorite": Display user's selected options at the beginning of the menu. When this option is selected, a window, as shown in Fig. 4-15, pops up with the available options. The user selects the most used options to put at the top of the menu and click done. The options will display in alphabetical order at the beginning of the menu followed by the other options.

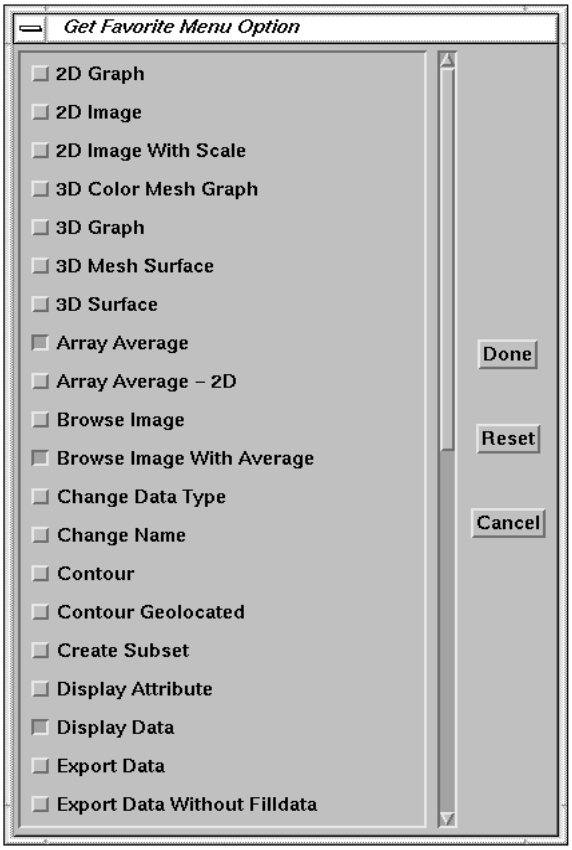

Fig. 4-15. Get Favorite Menu Order Menu

(v) "Character Size": Set the character size of text to display on the plot. The default value is 1.0.

(vi) "Color table": Set the default color table. The default is "Rainbow".

(vii) "Screen Size": Set the size of the draw window. The size is in pixels. The options are:

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1. “1024x600”: The size of the draw window is set to 1024x600 pixels. This is the default for a Sun workstation.
2. “1152x614”: The size of the draw window is set to 1152x614 pixels. This is the default for an SGI workstation.
3. “Other”: This option can be used to specify the size of the draw window. If this option is selected, the “Horizontal” and “Vertical” fields become activated for entering the new values.

Click the “Done” button to use the changed values as the default setting. Click the “Cancel” button to cancel this selection. This window will automatically pop up when a user starts view_hdf if the user’s configuration file does not exist.

(l) “Restart”: Restart view_hdf. All the data sets in Current Subsets list will be removed and all the currently active widgets will be destroyed.

(m) “Exit”: Exit the view_hdf program and return to the IDL prompt.

(2) “Graphic”: This menu is for plotting one or more variables from the Current Subsets list. The menu is shown in Fig. 4-16.

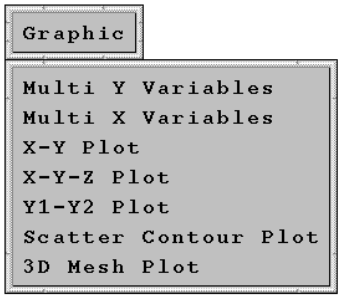

Fig. 4-16. Graphic Menu

The options are:

(a) “Multi Y Variables”: Plot one or more Y variables against one X variable on the same graph. If this option is selected, a window, as shown in Fig. 4-17, pops up to select all or some variables from the list.

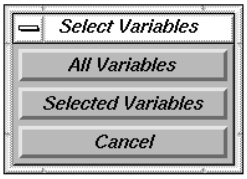

Fig. 4-17. Select Variables Window

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If only some variables are selected, another window, shown in Fig. 4-18, 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.

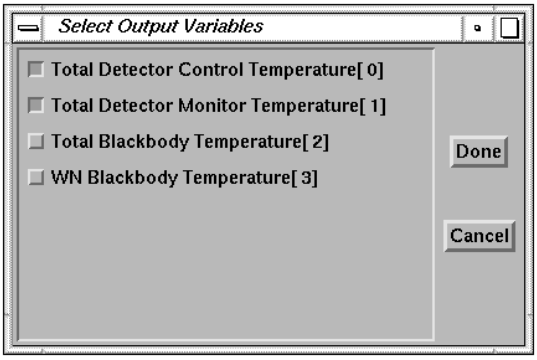

Fig. 4-18. Select Multiple Variables Window

After the "Done" button is clicked, the Select a Graph Style window, shown in Fig. 4-19, pops up. The "2D Graph" is plotted against the index of the arrays. The "XY Graph" is plotted against time, record number, sample number, packet number, or a variable selected from the Current Subsets list.

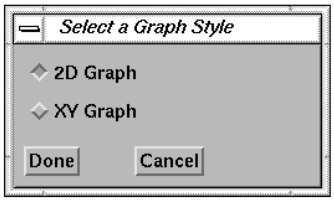

Fig. 4-19. Select Graph Type Window

After clicking the "Done" button, the plot will display on the screen as shown in Fig. 4-20.

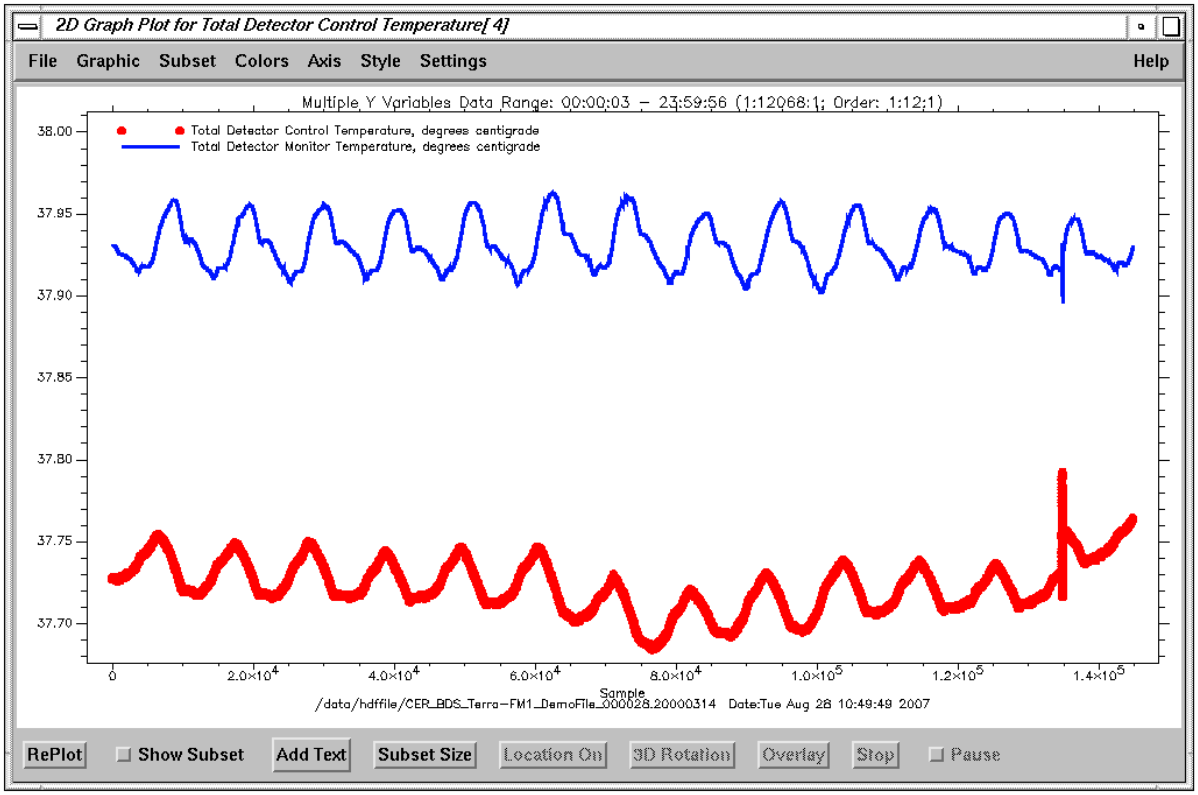

Fig. 4-20. Multiple Variables Plot

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(b) "Multi X Variables": Plot one Y variable against one or more X variables from Current Subsets list on the same graph. The procedure is similar to item 2(a).

(c) "X-Y Plot": Plot one variable against another variable. If this option is selected, a Select Plot Fields window, as shown in Fig. 4-21, pops up for selection. Click the "Done" button when the selection is completed.

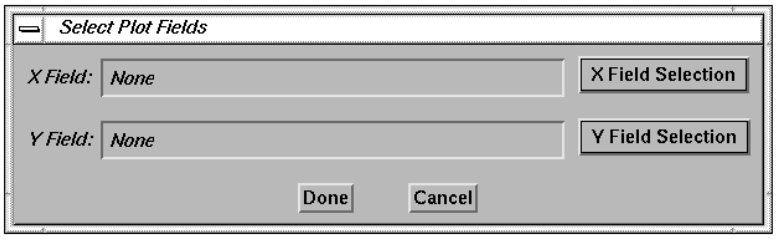

Fig. 4-21. Select X and Y Fields Window

(d) "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

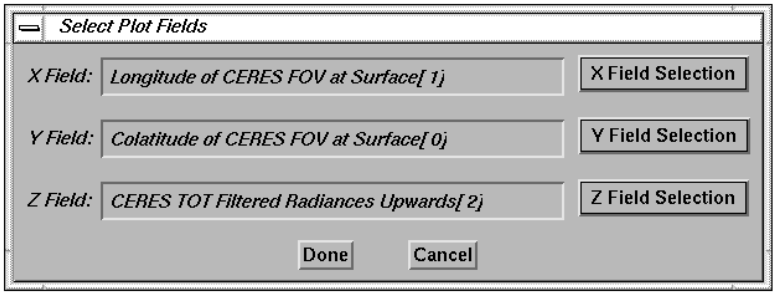

Fig. 4-22. Select X, Y, and Z Fields Window

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Fig. 4-22, 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. 4-23.

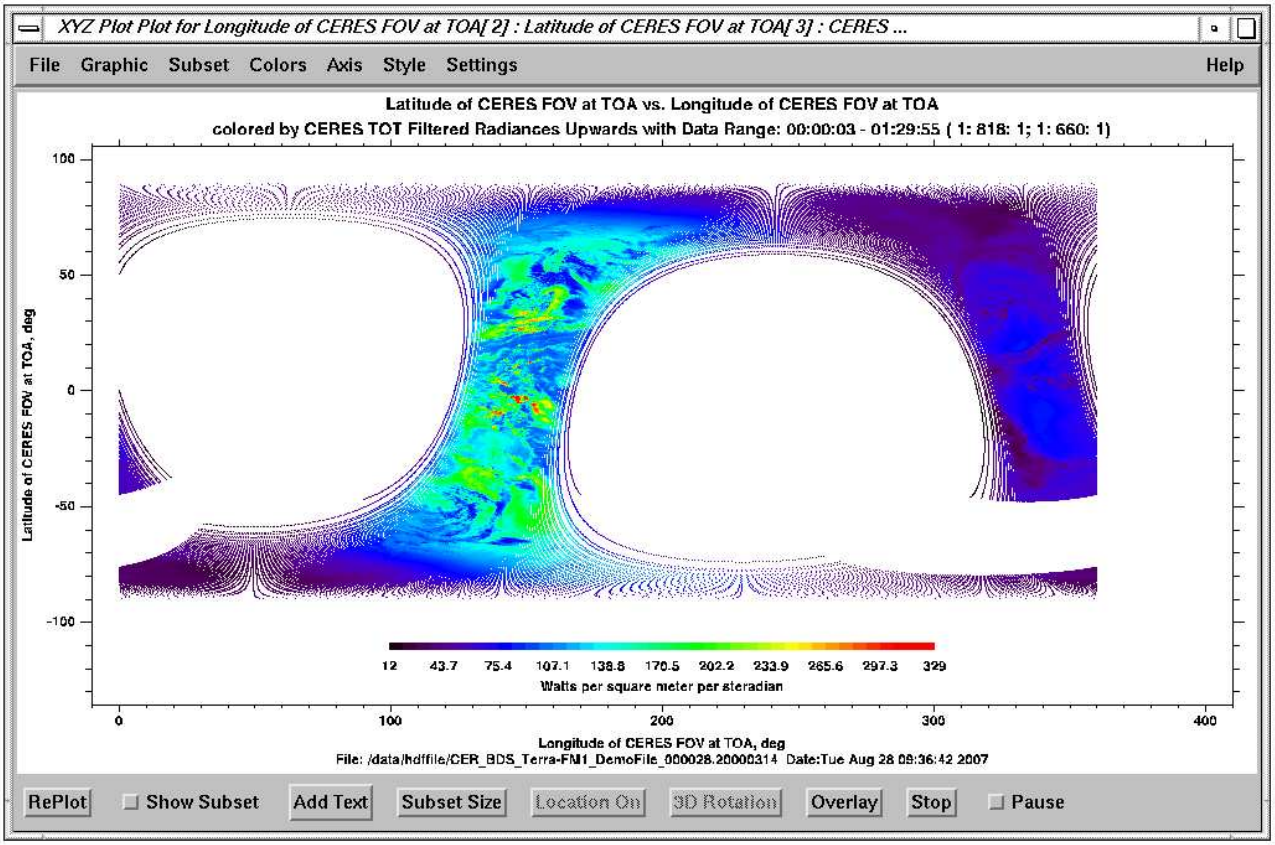

Fig. 4-23. X-Y-Z Plot

(e) "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 the same as the "Multi Y Variables" option; see item 2(a). An example plot with the same variables shown in Fig. 4-20 is shown in Fig. 4-24.

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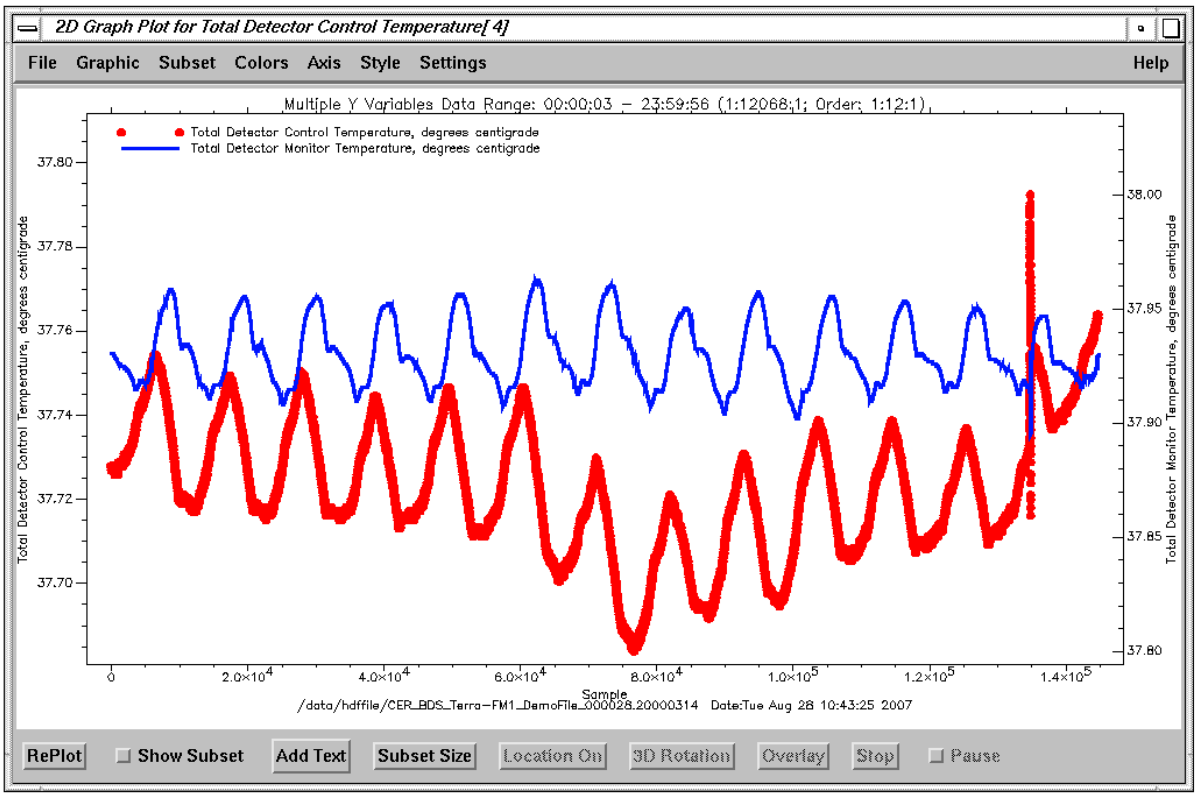

Fig. 4-24. Y1-Y2 Plot

(f) "Scatter Contour Plot": Convert scattered data into gridded data format and create a contour plot. The default number of grids is 360 X 180 points. User can use the "Map" option under the "Settings" menu to change the default number; see item 8(b). For example, the scattered data shown in Fig. 4-25 is converted into the contour plot shown in Fig. 4-26.

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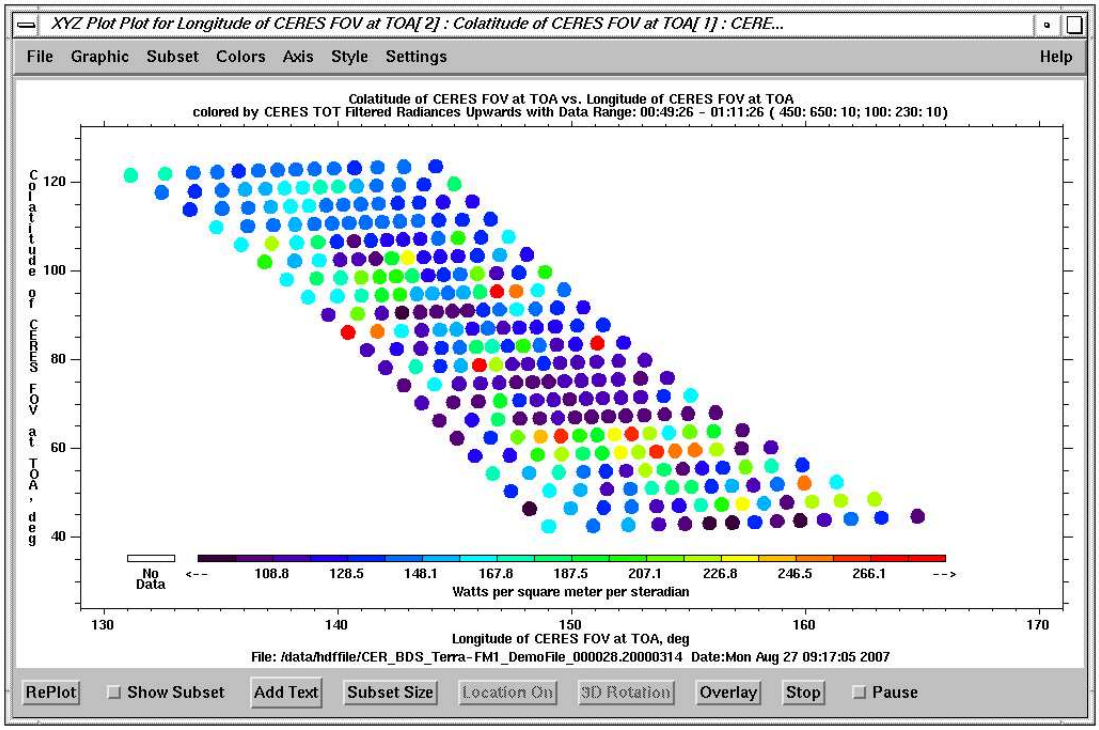

Fig. 4-25. Scattered Data Set

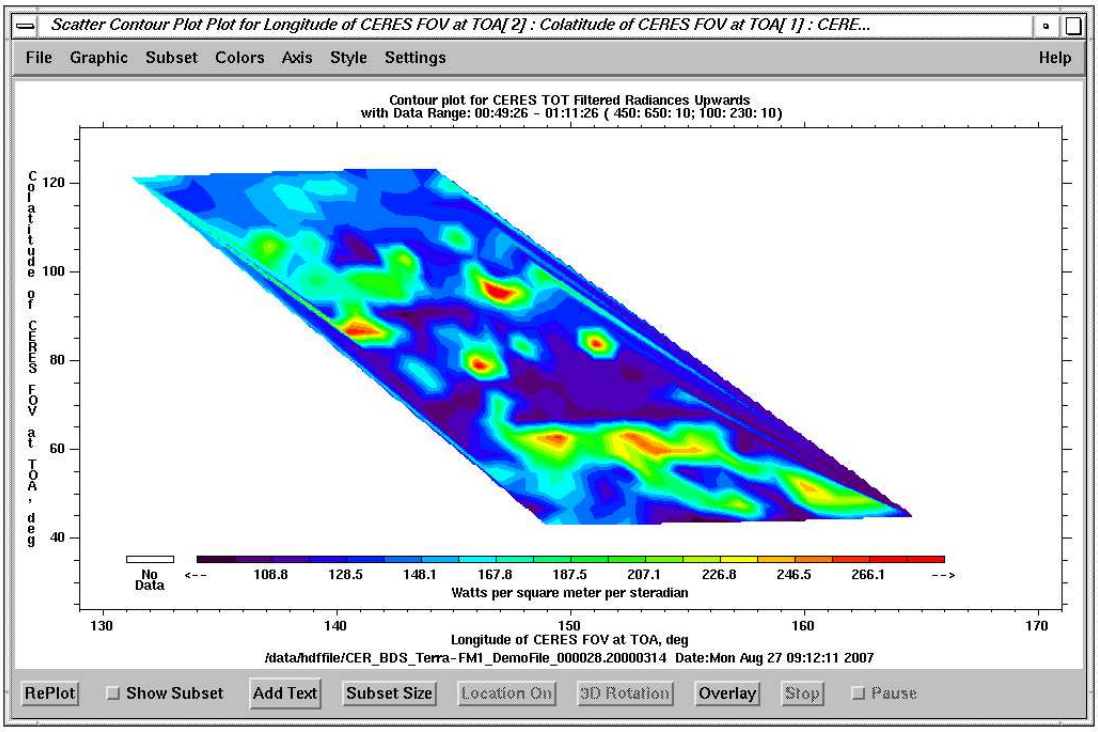

Fig. 4-26. Scatter Contour Plot

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(g) "3D Mesh Plot": Display a 3D mesh data with providing X, Y, and Z values that are three two-dimensional arrays.

(3) "Compute": This menu includes options for doing simple arithmetic operations between two variables or between one variable and a constant, and for 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. 4-27.

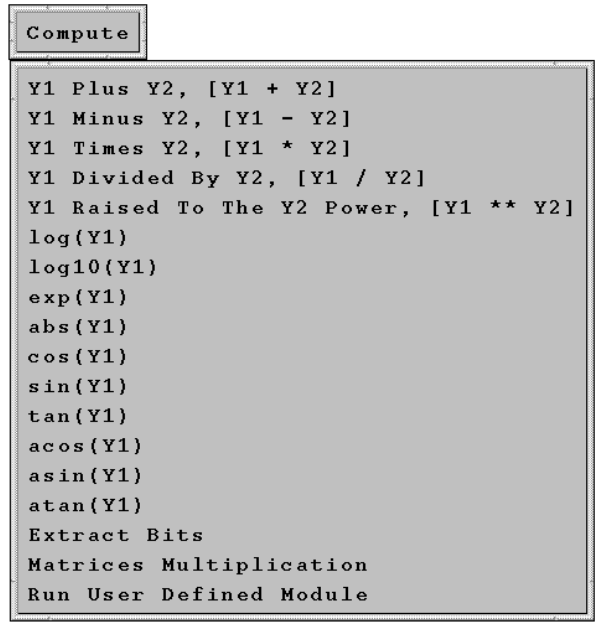

Fig. 4-27. Compute Menu

The options are:

(a) "Y1 Plus Y2, [Y1 + Y2]": Calculate the sum of two variables or one variable and a constant value. If one of the variable is a two-dimensional array and the other is an one-dimensional array, and the number of elements of the one-dimensional array is equal to either one the number of elements, each element of the one-dimensional array will apply to the same row (or column) with corresponding element of the two-dimensional array. For example, if Y1 is a two-dimensional array with number of columns equal to 10 and number of rows equal to 5 and Y2 is an one-dimensional array with number of elements equal to 10, each element of Y2 will add to the same row for the corresponding column of the Y1 array; Y1[i, *] = Y1[i, *] + Y2[i].

If this option is selected, a window, as shown in Fig. 4-28, pops up to select the operands from the list.

Fig. 4-28. Select Operands Window

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If one of the operands is constant, another window will pop up for entering the constant value, as shown in Fig. 4-29. 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. 4-30.

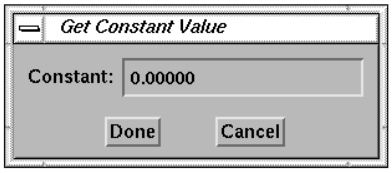

Fig. 4-29. Get Constant Value Window

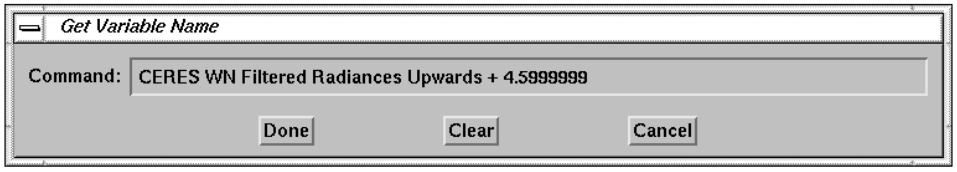

Fig. 4-30. Get Variable Name Window

After entering the name of the variable, click the "Done" button. A window, as shown in Fig. 4-31, pops up.

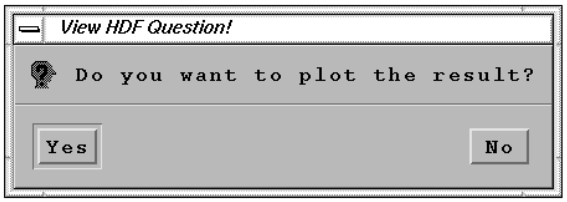

Fig. 4-31. Question for Displaying Plot

Click the "Yes" button to display the result and another window, as shown in Fig. 4-32, 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.

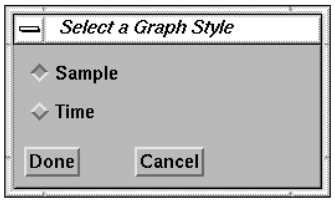

Fig. 4-32. Select Graph Style

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

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

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

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(e) "Y1 Raised To The Y2 Power, [Y1 ** Y2]": This option allows calculation of the square root of Y1 when Y2 is set to 0.5, the square of Y1 when Y2 is set to 2, and the inverse of Y1 when Y2 is set to -1. Y2 can be set to any value. If Y2 is not set to an integer number, all the negative values of Y1 are set to the fill value and the result is not calculated. This procedure is the same as "Y1 Plus Y2, [Y1 + Y2]"; see item 3(a).

(f) "log(Y1)": Compute the natural logarithm of the Y1 variable. This procedure is the same as "Y1 Plus Y2"; see item 3(a).

(g) "log10(Y1)": Compute the logarithm of the base 10 of the Y1 variable. This procedure is the same as "Y1 Plus Y2, [Y1 + Y2]"; see item 3(a).

(h) "exp(Y1)": Compute the natural exponential function of the Y1 variable. This procedure is the same as "Y1 Plus Y2, [Y1 + Y2]"; see item 3(a).

(i) "abs(Y1)": Compute the absolute value of the Y1 variable. This procedure is the same as "Y1 Plus Y2, [Y1 + Y2]"; see item 3(a).

(j) "cos(Y1)": Compute the cosine of the Y1 variable. Set Y2 equal to 0 for Y1 values expressed in units of degrees and set Y2 equal to 1 for Y1 values expressed in radians by selecting the "Constant" option for Y2 variable. The default for Y2 is 0. This procedure is the same as "Y1 Plus Y2, [Y1 + Y2]"; see item 3(a).

(k) "sin(Y1)": Compute the sine of the Y1 variable. See explanation of Y2 in item 3(j). This procedure is the same as "Y1 Plus Y2, [Y1 + Y2]"; see item 3(a).

(l) "tan(Y1)": Compute the tangent of the Y1 variable. See explanation of Y2 in item 3(j). This procedure is the same as "Y1 Plus Y2, [Y1 + Y2]"; see item 3(a).

(m) "acos(Y1)": Compute the arc cosine of the Y1 variable. The results are in degrees when Y2 is set to 0 and in radians when Y2 is set to 1. This procedure is the same as "Y1 Plus Y2, [Y1 + Y2]"; see item 3(a).

(n) "asin(Y1)": Compute the arc sine of the Y1 variable. See explanation of Y2 in item 3(m). This procedure is the same as "Y1 Plus Y2, [Y1 + Y2]"; see item 3(a).

(o) "atan(Y1)": Compute the arc tangent of the Y1 variable. See explanation of Y2 in item 3(m). This procedure is the same as "Y1 Plus Y2, [Y1 + Y2]"; see item 3(a).

(p) "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. 4-33, 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, [Y1 + Y2]"; see item 3(a), to enter the variable name and plot the result.

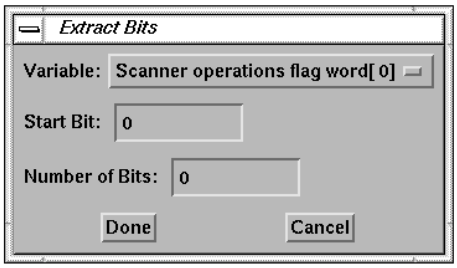

Fig. 4-33. Extract Bits Window

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(q) "Matrices Multiplication": Perform the multiplication of two matrices, two vectors, or one matrix and one vector. This option multiplies the rows of the first array by the columns of the second array. The second array must have the same number of rows as the number of columns of first array. The resulting array has the same number of rows of the first array and the same number of columns as the second array. This procedure is the same as "Y1 Plus Y2, [Y1 + Y2]"; see item 3(a).

(r) "Run User Defined Module": This option allows a user to execute any IDL procedure which is not included in the view_hdf tool and is written by the user. The requirements for the procedure are:

(i) The first command line in the procedure must start with "pro" and the file name must be the same as the procedure name with the extension ".pro".
(ii) The maximum number of arguments is 22. They can be variables in the Current Subsets list, constant values, constant value arrays, and strings. For constant arrays, the elements are separated by commas.
(iii) If the procedure has output data which are put into the Current Subsets list, they must be the last procedure arguments listed, and they must be arrays.

The data sets used in the procedure must be imported to the Current Subsets list before selecting this option. A window will pop up for selecting the user defined module, as shown in Fig. 4-34.

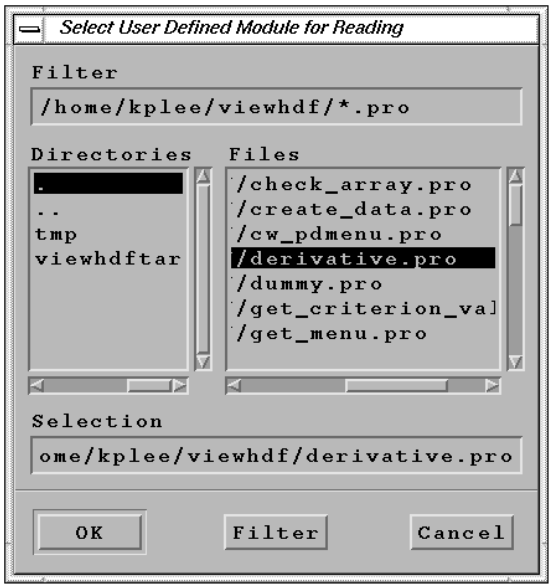

Fig. 4-34. Select User Defined Module Window

After a procedure is selected, another window, as shown in Fig. 4-35, will pop up for asking for the number of output arguments if the procedure has one or more arguments. Click the "Done" button after entering the number of output parameters. Click the "Cancel"

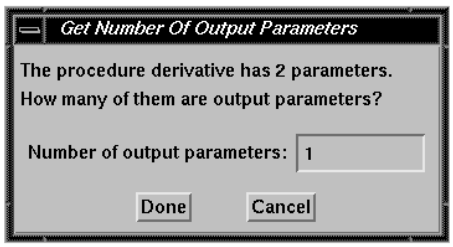

Fig. 4-35. Number of Output parameters Window

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button to cancel this selection. If there is an output variable, a window, as shown in Fig. 4-36, pops up for entering the name of the output variable that will be put into the Current Subsets list. Click the "Done" button after entering the name or the "Cancel" button to cancel this selection. After entering the name, another window, as shown in Fig. 4-37,

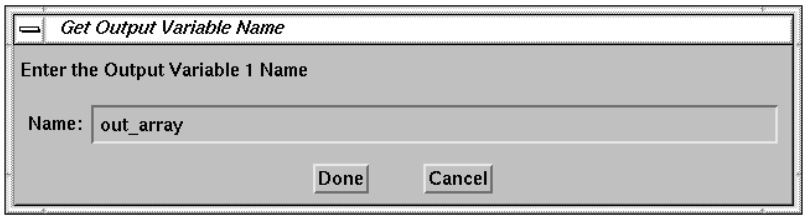

Fig. 4-36. Get Output Variable Name Window

pops up for entering the unit value for this variable. Click the "Done" button after entering the unit value or the "Cancel" button to cancel this selection.

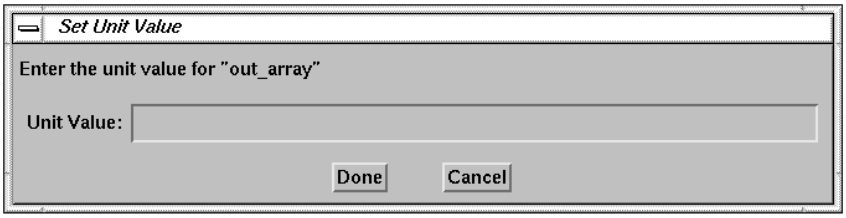

Fig. 4-37. Set Unit Value Window

If the procedure has one or more input arguments, the window, as shown in Fig. 4-38, pops up for selecting either a constant value or a variable from the Current Subsets list.

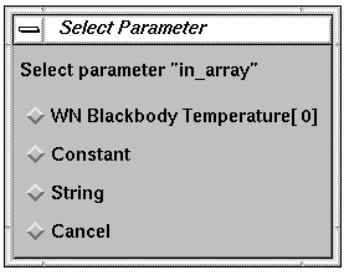

Fig. 4-38. Select Input Parameter Window

If the "Constant" or "String" option is selected, a window, as shown in Fig. 4-39, will pop up for entering the constant value, string, or constant array. If the input is a constant array, the elements are separated by commas. Click the "Done" button after entering the value or click the "Cancel" button to cancel this selection.

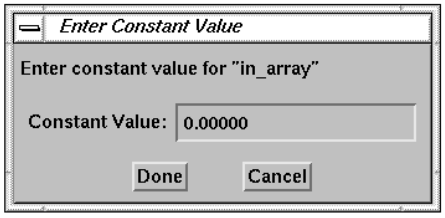

Fig. 4-39. Enter Constant Value Window

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If the procedure has output variables, windows, as shown in Fig. 4-40, will pop up for selecting reference data sets for storing the output data sets to the Current Subsets list after the procedure has executed. The reference data set defines the structure of the output data. If both data sets have the same number of elements, the data set will be saved with the same rank and dimension for SDS data or with the same order and record number for Vdata as the reference data set. If they do not have same number of elements, the data set will be saved with its own rank and dimension for SDS data or with order equal to one for Vdata. If "No Reference" is selected, the data set will be stored in SDS structure.

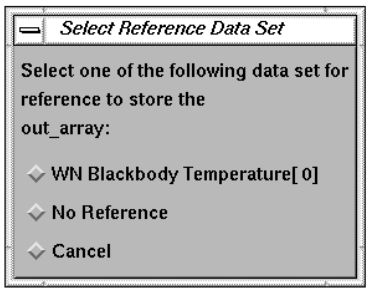

Fig. 4-40. Select Reference Data Window

(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 four models for curve fitting in this option are shown in Fig. 4-41.

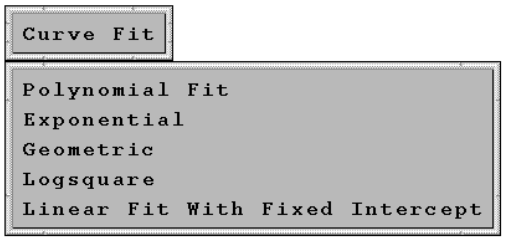

Fig. 4-41. Curve Fit Menu

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. 4-42, pops up for selecting the independent variable, dependent variable, and the degree of the polynomial to fit. The default degree is one. Click the "Done" button after

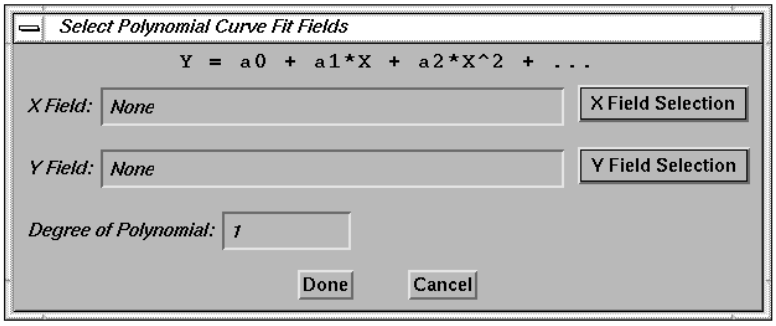

Fig. 4-42. Select Polynomial Fit Parameter Window

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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. 4-30. 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. 4-43, pops asking the output options. They are:

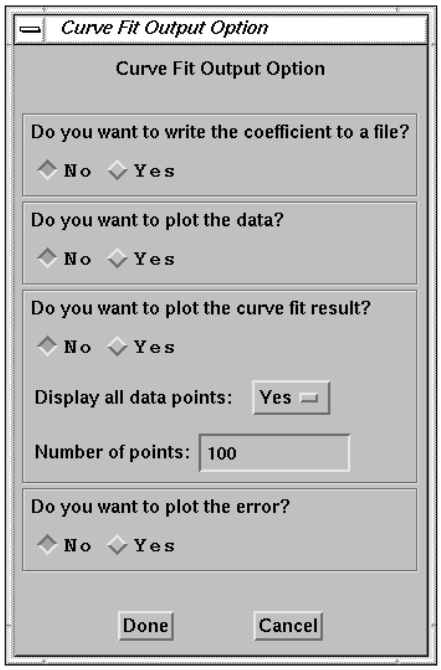


Fig. 4-43. Curve Fit Output Options Window

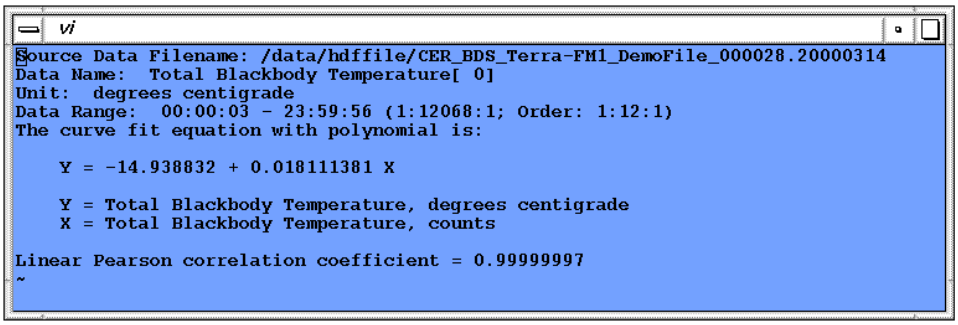
(i) Write the coefficient to a file. The default is "No".

(ii) Display the original data set on the plot. The default is "No".

(ii) Display the curve fit result. The default is "No". If this item is set to "Yes", the user can select to use all the data points or number of points that specified in the "Number of points" field to plot using the curve fit equation.

(iii) Display the error. The default is "No".

An example output for writing coefficients to a file is shown in Fig. 4-44, and an example plot with the result of the polynomial fit and error estimates are shown in Fig. 4-45



```
vi
Source Data Filename: /data/hdffile/CER_BDS_Terra-FM1_DemoFile_000028.20000314
Data Name:  Total Blackbody Temperature[ 0]
Unit:  degrees centigrade
Data Range:  00:00:03 - 23:59:56 (1:12068:1; Order: 1:12:1)
The curve fit equation with polynomial is:

    Y = -14.938832 + 0.018111381 X

    Y = Total Blackbody Temperature, degrees centigrade
    X = Total Blackbody Temperature, counts

Linear Pearson correlation coefficient = 0.99999997
~
```

Fig. 4-44. Output file for Polynomial Fit Result

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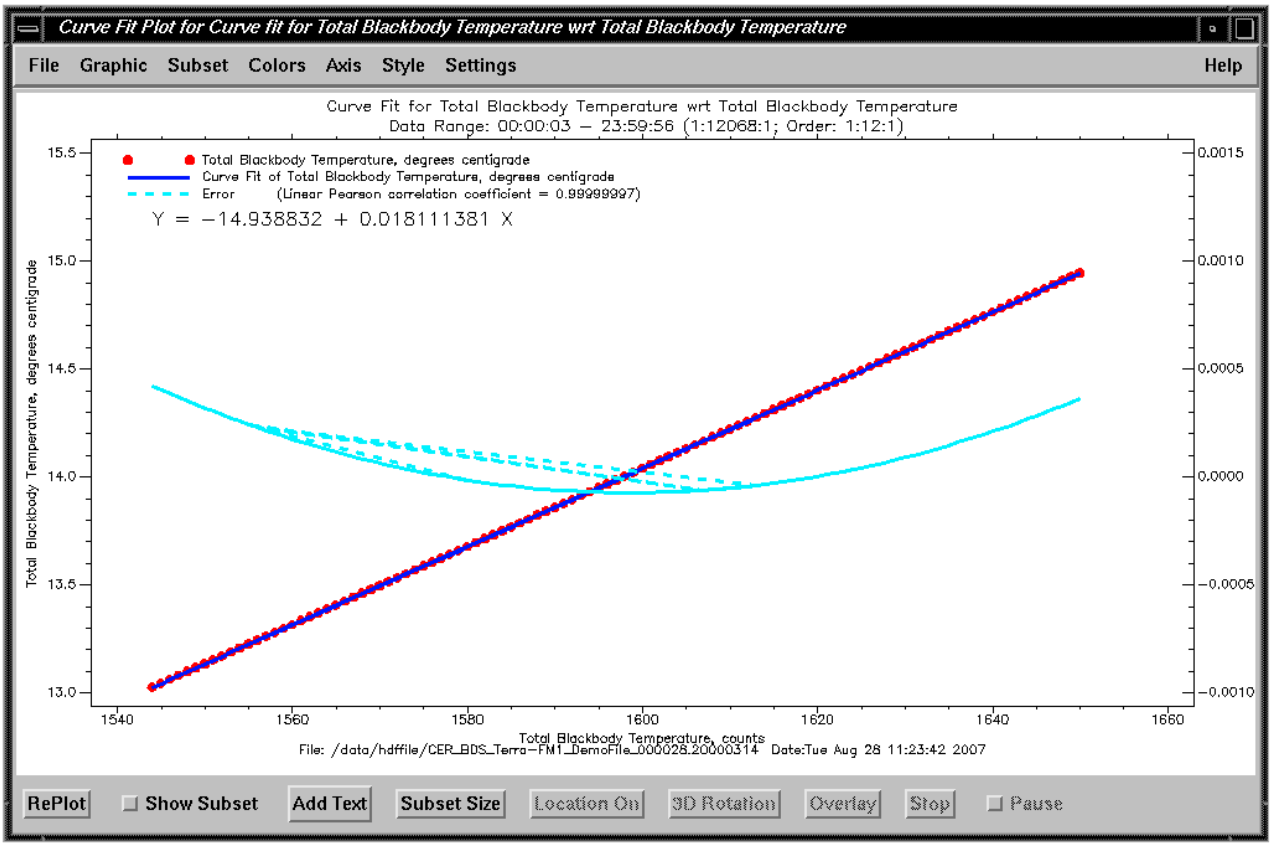

Fig. 4-45. Polynomial Fit Result with Error Estimates

(b) "Exponential": Use a gradient-expansion least-squares method with an 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. 4-46, pops up for selecting the independent and dependent variables. The procedure is the same as "Polynomial Fit"; see item 4(a).

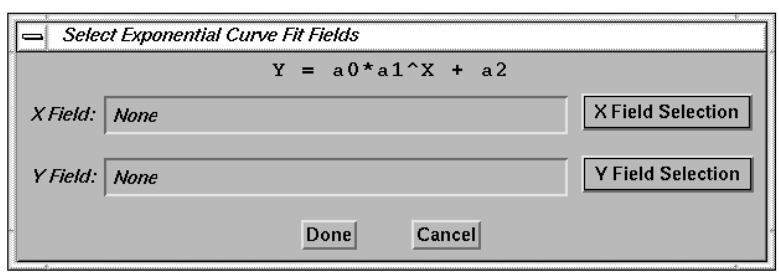

Fig. 4-46. Select Exponential Model Fit Parameter Window

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

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

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

(d) "Logsquare": Use a gradient-expansion least-squares method with a 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).

(e) "Linear Fit With Fixed Intercept": Use a first order of polynomial fit with the intercept specified by the user. The procedure is the same as "Polynomial Fit"; see item 4(a).

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(5) "Colors": This menu includes options for selecting different color tables, editing and saving the color map, load a user defined color table, and changing the background and foreground colors. The menu is shown in Fig. 4-47.

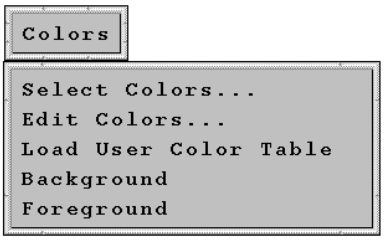

Fig. 4-47. Colors Menu

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. 4-48. 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.

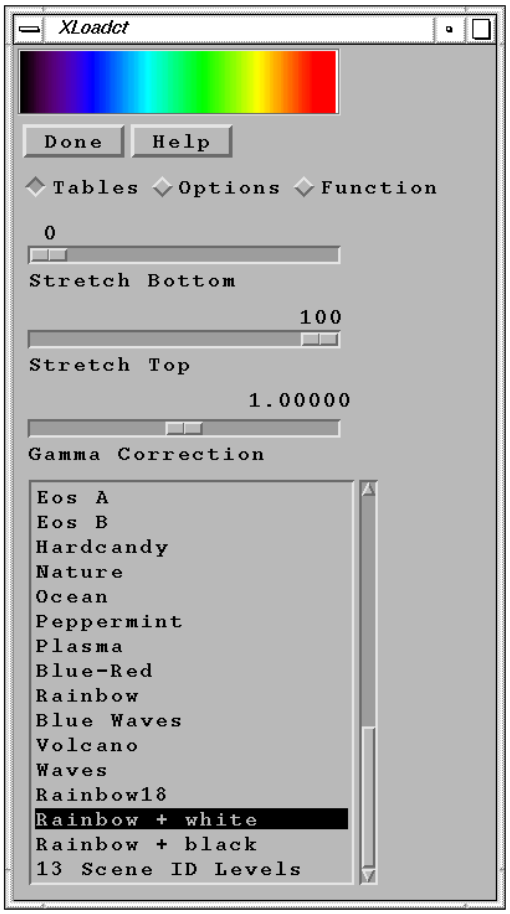

Fig. 4-48. Select Color Table

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(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. 4-49. Click on the color index or move the slider to select the color index to edit.

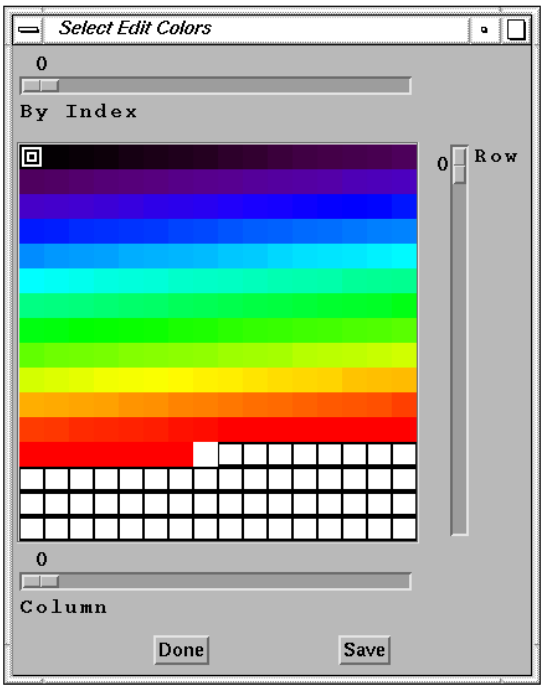

Fig. 4-49. Edit Color Map

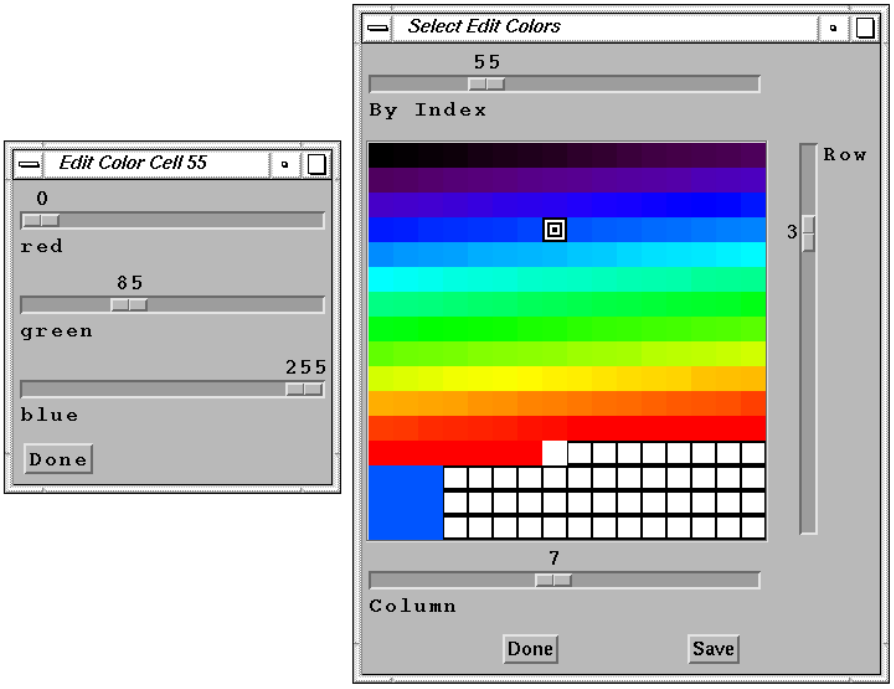

Fig. 4-50. Edit Color Cell Window

An RGB sliders window, as shown in Fig. 4-50, 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 to use the edited colors for the current session without saving the changes to the color table file. Click the “Save” button to save the modified color table to the color table file for later use.

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If the “Save” button is selected, a window, as shown in Fig. 4-51, 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 exit without saving the new color table.

Fig. 4-51. New Color Table Name Window

(c) “Load User Color Table”: Load a user defined color table. Other than the predefined IDL color tables, user can use this option to load an user defined color table. Before selecting this option, the red, green, and blue values that are either three n-elements vectors or a single n by 3 array have to be imported into the Current Subset list. The n value can be one or up to 256. After this option is selected, a window, as shown in Fig. 4-52, pops up for entering the red, green, and blue values. If these values are stored in a single n by 3 array, only the Red Field is needed to select. After entering the values, click the “Done” button. Click the “Cancel” button to cancel this selection. User can use the “Edit Color...” option to save the new color table to the color table file for later use.

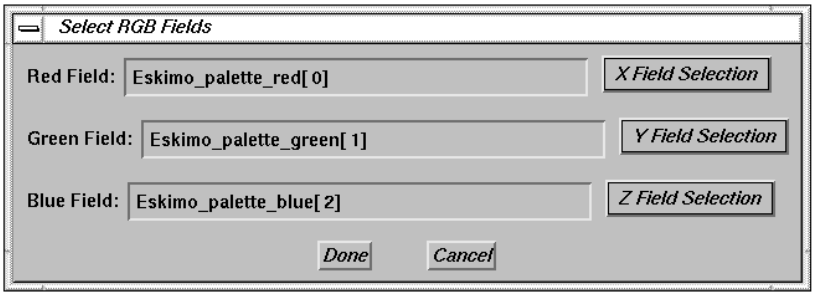

Fig. 4-52. Select RGB Fields Window

(d) “Background”: Change the background color. A window, as shown in Fig. 4-53, pops up for changing the background color if this option is selected. Value zero means the background color is the color of 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. 4-53. Enter Background Color window

(e) “Foreground”: Change the foreground color. A window, as shown in Fig. 4-54, 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 the new value, or the “Cancel” button to cancel this selection.

Fig. 4-54. Enter Foreground Color window

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(6) "Axis": This menu includes the options for manually or automatically setting the X, Y, and/or Z axes ranges. It also includes options for producing grid lines and using linear or logarithmic axes. The menu is shown in Fig. 4-55.

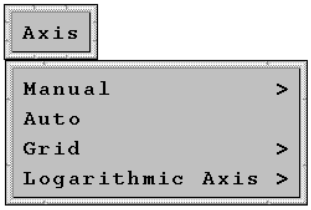

Fig. 4-55. Axis Menu

The options are:

(a) "Manual": Enter the ranges of the X, Y, and/or Z axes, or the ranges of the X, Y1, and/or Y2 axes for "Y1-Y2 Plot" manually. The submenu is shown in Fig. 4-56. Click on any option, and a window will pop up for entering the ranges. Figure 4-57, Fig. 4-58, and Fig. 4-59 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.

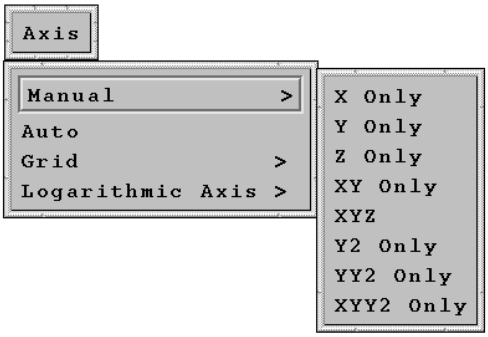

Fig. 4-56. Axis-Manual

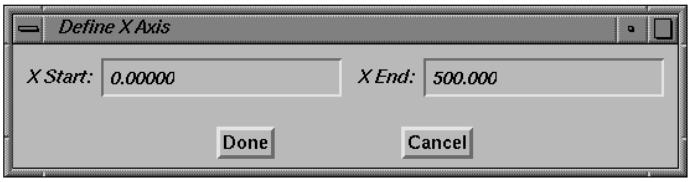

Fig. 4-57. Set X Axis Range Window

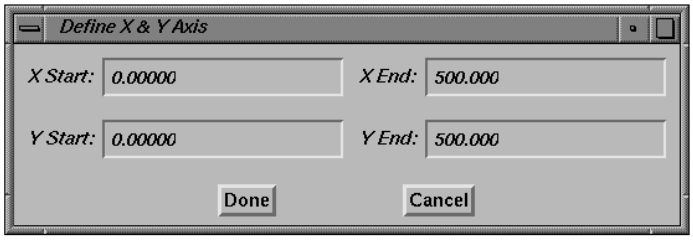

Fig. 4-58. Set X and Y Axes Ranges Window

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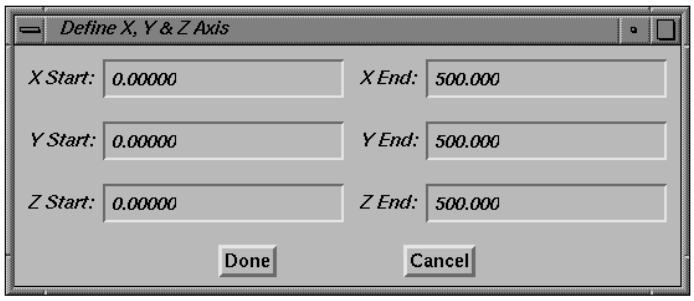

Fig. 4-59. Set X, Y, and Z Axes Ranges Window

(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. 4-60. An example of a 2D plot with the option "With XY Grid" is shown in Fig. . The default is "Without Grid".

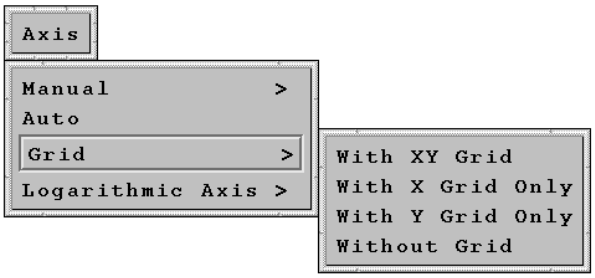

Fig. 4-60. Axis-Grid Submenu

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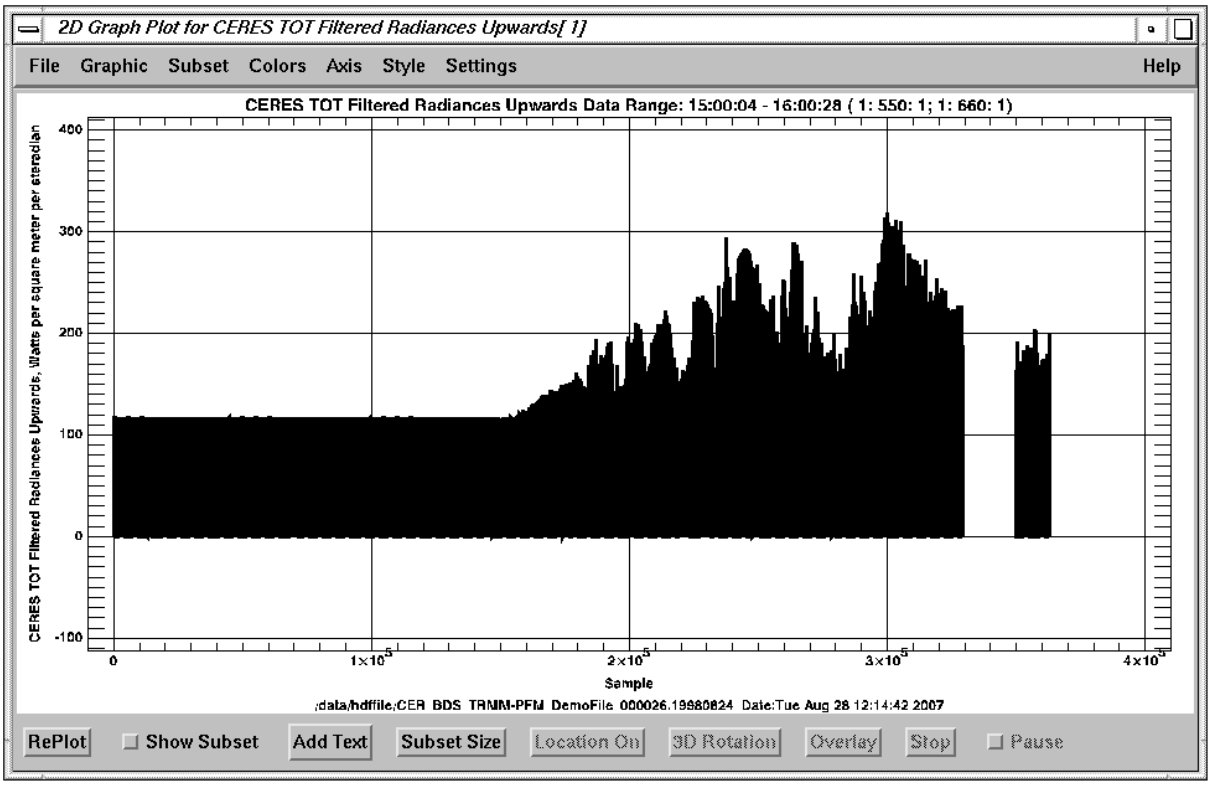

Fig. 4-61. 2D plot with XY grid

(d) "Logarithmic Axis": Set the X, Y, and/or Y1 axes as logarithmic axes instead of linear axes. The submenu is shown in Fig. 4-62. The default is the "With Linear Axes" option.

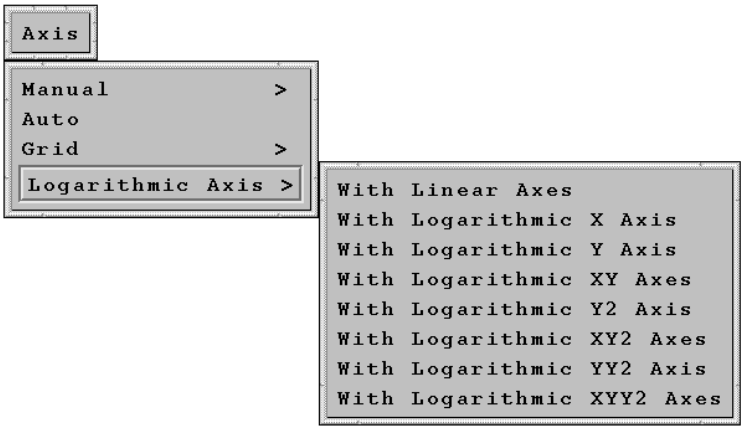

Fig. 4-62. Axis-Logarithmic Axis Submenu

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

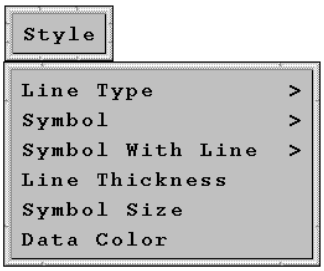

Fig. 4-63. Style Menu

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:

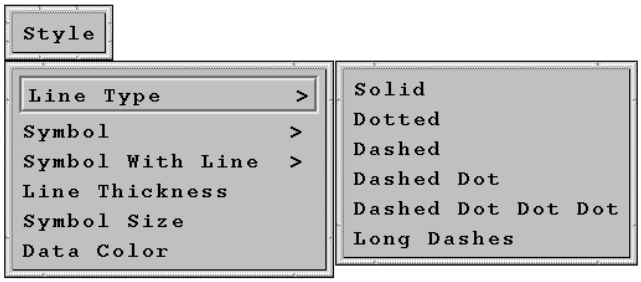

Fig. 4-64. Style-Line Type Submenu

(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:

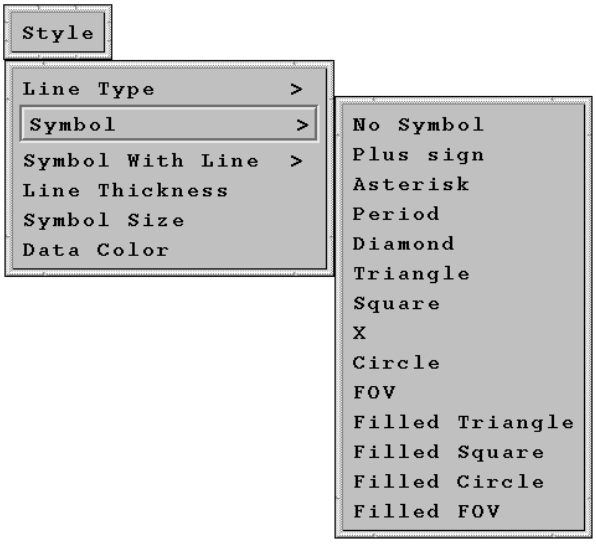

Fig. 4-65. Style-Symbol Submenu

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

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(x) “FOV”: Use the CERES FOV symbol to mark data points.
(xi) “Filled Triangle”: Use a filled triangle to mark data points.
(xii) “Filled Square”: Use a filled square to mark data points.
(xiii) “Filled Circle”: Use a filled circle to mark data points.
(xiv) “Filled FOV”: Use a filled CERES FOV symbol 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:

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

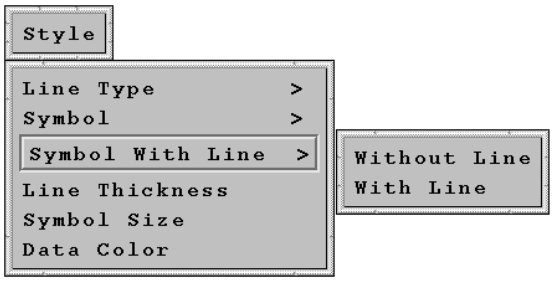

Fig. 4-66. Style-Symbol With Line Submenu

(d) “Line Thickness”: Set the thickness of line that used to join data points. If this option is selected, a window, as shown in Fig. 4-67, pops up for entering the new thickness of the line. The default is 1.0. Click the “Done” button after entering the thickness, or click the “Cancel” button to close the window.

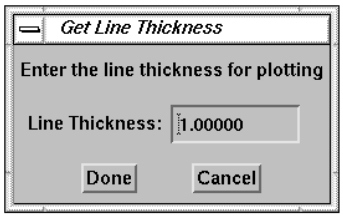

Fig. 4-67. Line Thickness Window

(e) “Symbol Size”: Set the size of the symbol to mark the data points. If this option is selected, a window, as shown in Fig. 4-68, 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.

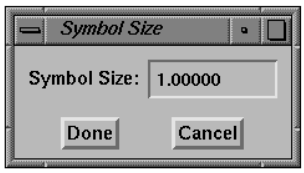

Fig. 4-68. Symbol Size Window

(f) “Data Color”: Select this option to choose a different color from the foreground color to display the data on the plot. When this option is selected, a window, as shown in Fig. 4-69, pops up for selecting the color. Select the color by either entering the

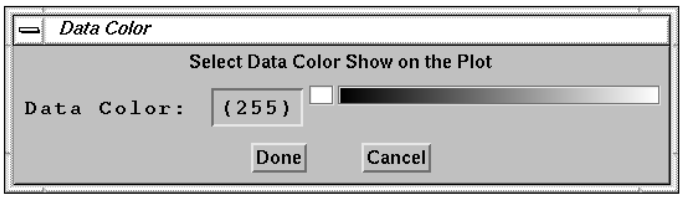

Fig. 4-69. Select Data Color Window

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color index in the field or click on the color bar. Click “Done” button to select or click “Cancel” button to cancel this option.

(8) “Settings”: This menu allows a user to modify various display settings. The menu is shown in Fig. 4-70. After selecting an option in this menu, a window will pop up with all the fields in this option. Users can change the values in the fields and click the “Done” button to accept the new settings or click the “Cancel” button to cancel the selection.

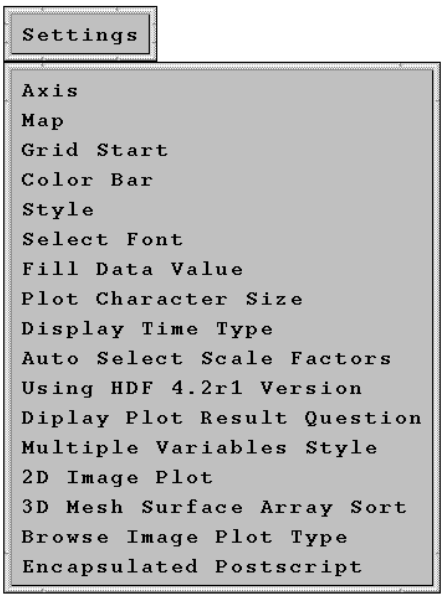

Fig. 4-70. Settings Menu

The options are:

(a) “Axis”: This option includes setting the X, Y, and/or Z axes ranges manually or automatically, producing grid lines, and using linear or logarithmic axes. A window, as shown in Fig. 4-71, pops up for changing the settings if this option is selected. The fields in this window include:

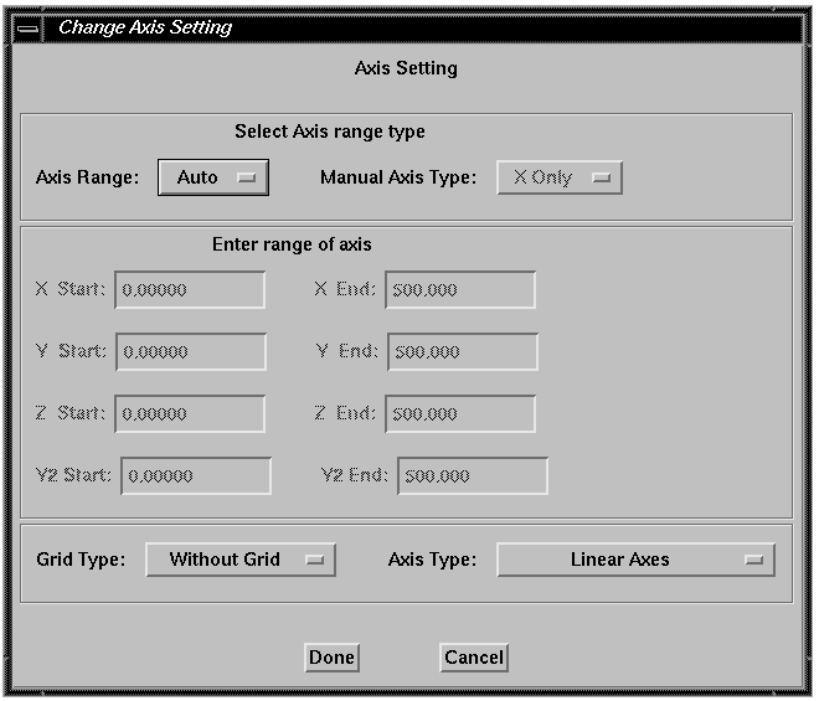

Fig. 4-71. Axis Settings Window

(i) “Select Axis range type”: The axes range can be

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set to either “Auto” or “Manual” option. The default is “Auto”. If “Manual” is selected, the “Manual Axis type” option field becomes activated. There are nine options in this field for selecting the ranges of the X, Y, and/or Z axes, or the ranges of the X, Y1, and/or Y2 axes for a “Y1-Y2 Plot”.

(ii) “Enter range of axis”: The corresponding fields becomes activated when the option in “Manual Axis type” is selected. Users can enter the values of the range.

(iii) “Grid Type”: Draw or do not draw grid lines on the major tick marks. The default is “Without Grid”.

(iv) “Axis Type”: Select linear or logarithmic axes to represent data on the plot. The default is “Linear Axes”.

(b) “Map”: This option allows the user to adjust the display for any geolocated plot, such as the Earth location to be mapped to the center of the map projection, the type of map projection, labelling of the meridians, and showing the locations of the satellite and the Sun. The window for this option is shown in Fig. 4-72.

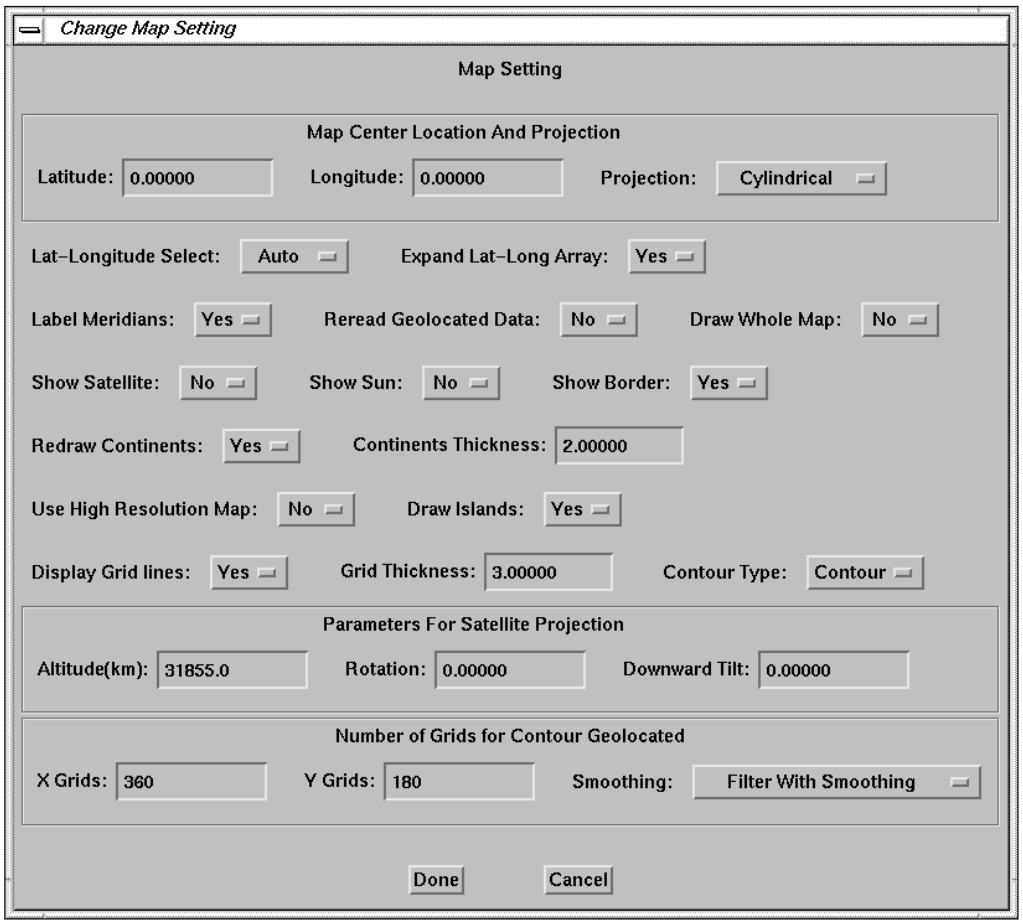

Fig. 4-72. Map Settings Window

The fields include:

(i) “Map Center Location And Projection”: Set the latitude and longitude location to

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be mapped to the center of the map projection and the type of map projection to be used. The projection types include “Cylindrical”, “Orthographic”, “Stereographic”, “Hammer-Aitoff”, and “Satellite”. The location of the map center, Latitude and Longitude fields, represent the sub-satellite point if “Satellite” projection is selected. The default is zero degree for latitude and longitude and “Cylindrical” for the projection type.

(ii) “Lat-Longitude Select”: Use default geolocation parameters or selected geolocation parameters from the Current Subsets list. The “Auto” option uses default geolocation parameters which are imported from the current file automatically if they can be recognized; see Section 5.0. If the geolocation parameters cannot be recognized, the “Auto” will switch to the “Manual” option. The “Manual” option selects geolocation parameters from Current Subsets list. The geolocation parameters need to be imported into the Current Subsets list before selecting this option. A window, as shown in Fig. 4-73, pops up for selecting the parameters. The default is “Auto”.

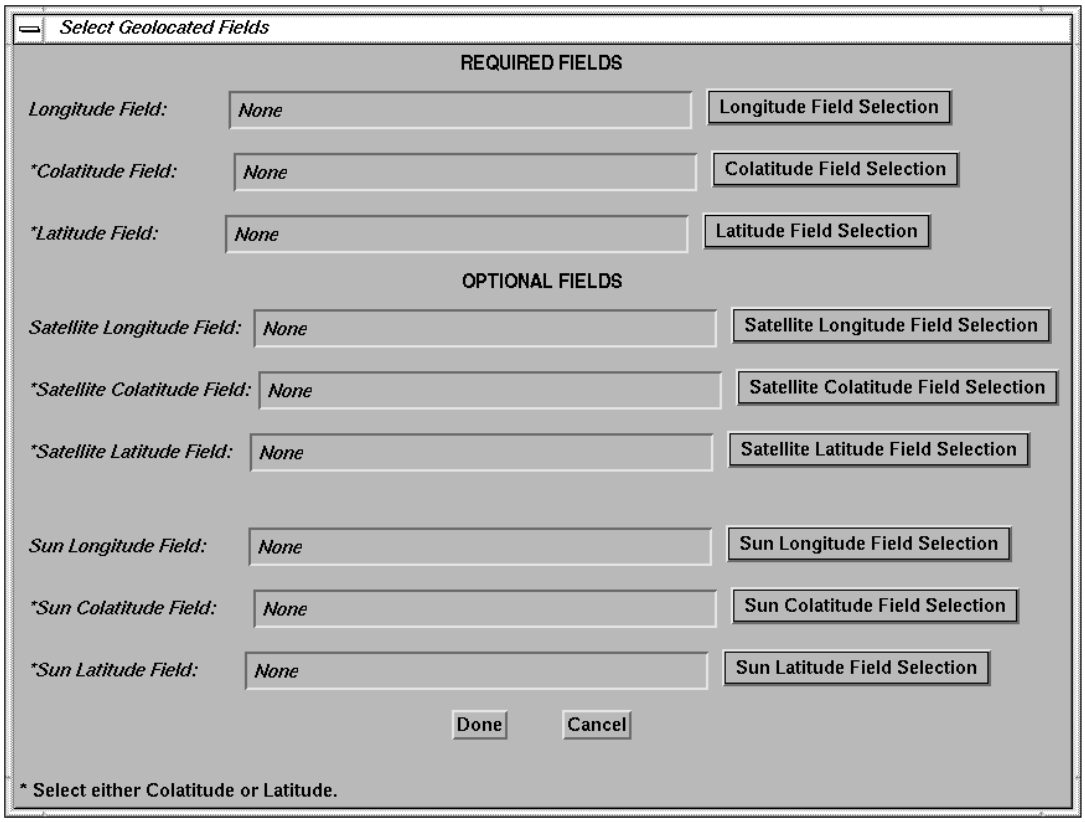

Fig. 4-73. Select Geolocated Parameters Window

(iii) “Expand Lat-Long Array”: Expand or do not expand the longitude and latitude data from one dimension arrays to two dimensional arrays. When the data are two dimensional arrays, and geolocated parameters are one dimensional arrays, the longitude and latitude data expand to two dimensional arrays the same as the data set if the “Yes” option is selected. The default is “Yes”.

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(iv) “Label Meridians”: Label or do not label the latitudes and longitudes on the map projection. The default is “Yes”.

(v) “Reread Geolocated Data”: Reread or do not reread the geolocated parameters. When switching from the “Yes” option to the “No” option in “Expand Lat-Long Array” field, or vice versa, the geolocated data need to be reread. The default is “No”.

(vi) “Draw Whole Map”: Display manual range setting data on a whole map projection. Setting this option to “No”, only the specified range of the map is displayed. Setting this option to “Yes”, the specified range of data is displayed on a whole map projection. The default is “No”.

(vii) “Show Satellite”: Display or do not display the location of the satellite on the map projection. If the latitude and longitude of the satellite are available, the position of the satellite will display on the map projection if the “Yes” option is selected. If the satellite position is not available, the “No” option will be automatically set. The default is “Yes”.

(viii) “Show Sun”: Display or do not display the location of the Sun on the map projection. If the latitude and longitude of the Sun are available, the position of the Sun will display on the map projection if the “Yes” option is selected. If the latitude and longitude are not available, the “No” option will be automatically set. The default is “Yes”.

(ix) “Show Border”: Draw a border around the map. Setting this option to “No”, the border around the map is not drawn. The default is “Yes”.

(x) “Redraw Continents”: Redraw or do not redraw the continental boundaries on the map projection. The continental boundaries are drawn before data are displayed and may subsequently be covered by data. If the “Yes” option is selected, the continental boundaries will be redrawn after displaying data. The default is “Yes”.

(xi) “Continents Thickness”: The line thickness used to draw the continental boundaries on the map projection. The default value is 1.0.

(xii) “Use High Resolution Map”: Use the high resolution map. Setting this option to “Yes”, the high resolution map will be used if it is available. By default, the high resolution map will not be installed by IDL. If the high resolution is not available, the low resolution map will be used and the “No” option will be automatically set. The “No” option uses the low resolution map. It will take longer time to draw the map if the high resolution map is selected. The default is “Yes”.

(xiii) “Draw Islands”: Display the islands and lakes when using high resolution map. Setting this option to “Yes”, the islands and lakes will be drawn when high resolution map is used, otherwise, only the continental outlines are drawn. The default is “Yes”.

(xiv “Display Grid Lines”: Display the meridians lines on the amp. Setting this option to “No”, the meridian line is not drawn. The default is “Yes”.

(xv) “Grid Thickness”: The line thickness used to draw the meridian lines. The default is 1.0.

(xvi) “Contour Type”: Display the Contour Geolocated plot with a contour plot or an image plot. The default is “Contour”.

(xvii) “Parameters For Satellite Projection”: Three parameters are needed to define when “Satellite” projection is selected. They are:

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1. “Altitude”: The distance of the point of perspective from the center of the globe, in Km. The default is 6371 km.
2. “Rotation”: The angle, expressed in degrees clockwise from north, of the rotation of the projection plane. The default is 0 degree.”
3. “Downward Tilt”: Downward tilt of the camera, in degrees from the new horizontal. The default is 0 degree. If both “Rotation” and “Downward Tilt” are set to 0, a Vertical Perspective projection results.

(xviii)“Number of Grids for Contour Geolocated”: Set the number of grids and how to smooth the data for the “Contour Geolocated” graphic option, see item (32). The default of number of grids is 360 in longitude (X Grids) and 180 in latitude (Y Grids) directions. The options of smoothing include:

1. “Without Smoothing”: Do not smooth the data set.
2. “With Smoothing”: Smooth the data set before creating the contour plot. This option is the default.
3. “Filter Without Smoothing”: Do not smooth the data set after filtering the triangles that return from the TRIANUGLAR function. See option 4.
4. “Filter With Smoothing”: Remove any large triangles which return from the TRIANUGLAR function before calling the TRIGRID function. The lengths of any triangles that are greater than five times the length of the diagonal of the grid size are removed. Smooth the data set before creating the contour plot.
5. “Average Without Smoothing”: Create the grided data by calculating the mean value of data points in each grid. Do not smooth the data set before creating the contour plot.
6. “Average With Smoothing”: Create the grided data by calculating the mean value of the data points in each grid. Smooth the data set before creating the contour plot.

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(c) "Grid Start": Select the longitude and latitude location of the first grid for "Grid Cell" plot; see item (22). The window for this option is shown in Fig. 4-74. The "Grid Start" field includes:

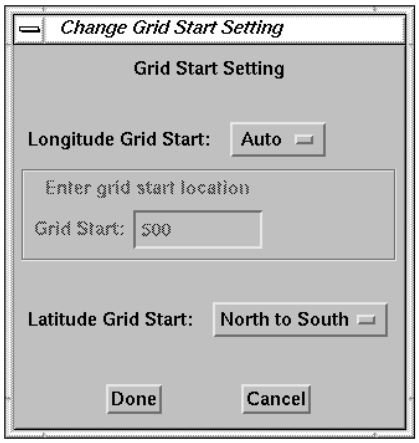

Fig. 4-74. Grid Start Setting

(i) "Longitude Grid Start": Set the longitude location of the first grid. The options include:

1. "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 the default.
2. "0": Set the first grid starting at zero degree longitude.
3. "-180": Set the first grid starting at -180 degrees longitude.
4. "Other": This option can be use to specify the longitude location of the first grid. If this option is selected, the "Enter grid start location" field becomes activated for entering the location. The values are in degrees.

(ii) "Latitude Grid Start": Set the latitude location of the first grid. The options include:

1. "North to South": The data are ranged from 90 degrees to -90 degrees latitude. This option is the default.
2. "South to North": The data are ranged from -90 degrees to 90 degrees latitude.

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(d) "Color Bar": Display or do not display a color bar. This option also allows selection of discrete or continuous mapping of color to data values. The window for this option is shown in Fig. 4-75. The "Color Bar" field includes:

(i) "Without": Do not display a color bar.

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

(iii) "Discrete": Display the data in a discrete color pattern in the specified number of intervals. If this option is selected, the "Enter number of discrete intervals" field becomes activated. This field includes:

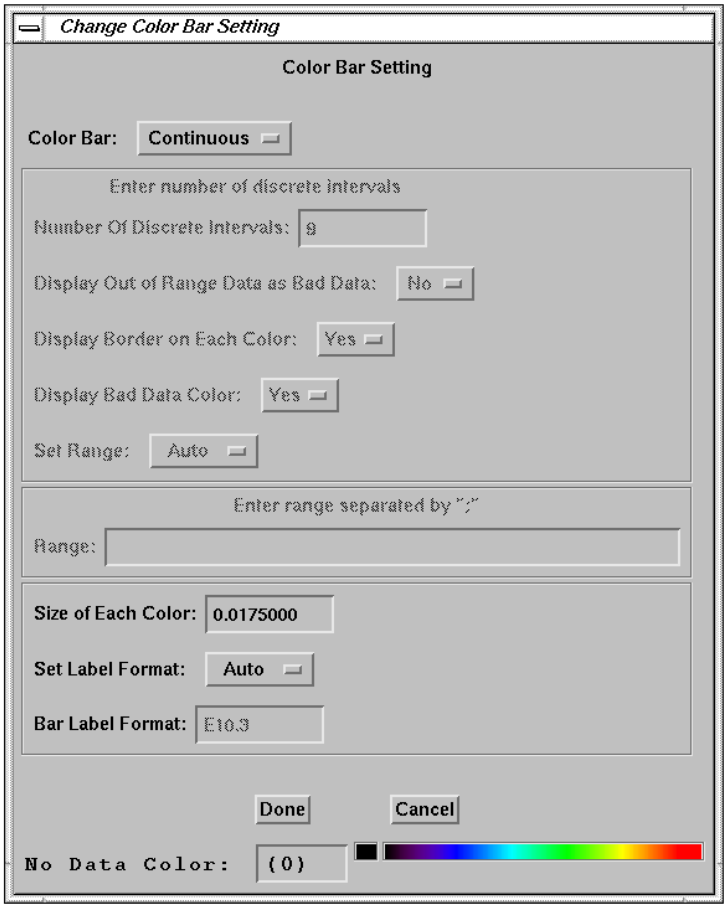

Fig. 4-75. Color Bar Setting Window

1. "Number of Discrete Intervals": Set the number of discrete intervals to display data. The default is 10.

2. "Display Out of Range Data as Bad Data": Set this item to "No" to display any data less than the minimum value with the same color of the minimum value and display any data greater than the maximum value with the same color of the maximum value; see Fig. 4-25. Set this item to "Yes" to display any data out of range as missing data. The default is "No".

3. "Display Border on Each Color": Set this item to 'Yes" to display a border around each color in the color bar; see Fig. 4-25. Set this item to "No", no border is drawn and the color bar will look like a continuous color bar; see Fig. 4-104. The default is "Yes".

4. "Display Bad Data Color": Set this item to "Yes" to display the color represented bad data next to the color bar; see Fig. 4-25, otherwise the color of bad data will not display. The default is "Yes".

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5. "Set Range": If "Auto" option is selected, the value for each interval is uniformly divided based on the number of discrete intervals. If "Manual" option is selected, the values of intervals, separated by either ";" or ",", are specified by the users in the "Range" field that becomes activated. The number of discrete intervals are calculated from the input values. The default is "Auto".

This option is good for displaying variables with discrete values.

(iv) "Log Discrete": Use log10 scale for scaling data. If all the data are less than 1, this option will switch to "Discrete" option.

(v) "Size of Each Color" Specify the horizontal size of each color in the color bar. The default size is 0.011 in normal coordinates. For a Continuous color bar, 40 colors will be displayed.

(vi) "Set Label Format": Specify the label format. Set this item to "Auto", the format will be automatically set depending on the range of the data. Set this item to "Manual", the "Bar Label Format" will become available for user to specify the data format that displays on the color bar. The default is "Auto".

(vii) "No Data Color": Specify the color to represent the bad (fill) data. The default is the background color.

(e) "Style": Set the line type, symbol type, and symbol size used to display the data. The window for this option is shown in Fig. 4-76. The fields include:

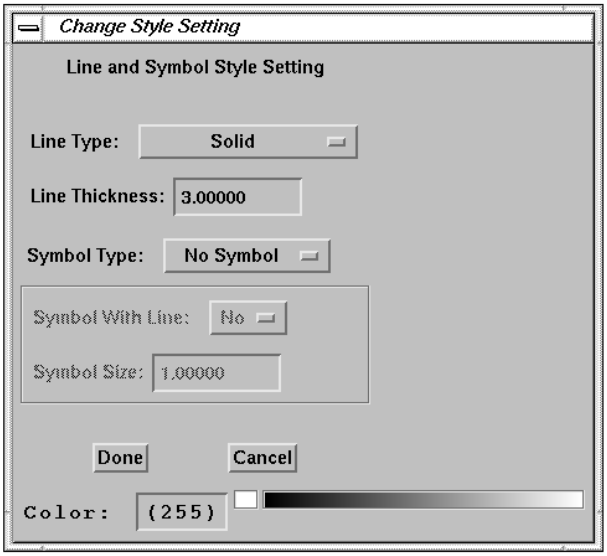

Fig. 4-76. Style Setting Window

(i) "Line Type": Select the line type used to join data points. The available line types are "Solid", "Dotted", "Dashed", "Dashed Dot", "Dashed Dot Dot Dot", and "Long Dashes". The default is "Solid".

(ii) "Line Thickness": Specify the line thickness of the line used to display data when Line style is selected. The default is 1.0.

(ii) "Symbol Type": Select line or symbols to display the data. The options in this field include "No Symbol", "Plus sign", "Asterisk", "Period", "Diamond", "Triangle|", "Square", "X", "Circle", "FOV", "Filled Triangle", "Filled Square", "Filled Circle", and "Filled FOV". The default is "No Symbol".

(iii) "Symbol With Line": Select to use or not to use a line to connect all the symbols. This field becomes activated if a symbol is selected to display the data. The default is "No".

(iv) "Symbol Size": Set the size of the symbol to mark the data points. This field becomes activated if a symbol is selected to display the data. The default size is

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1.0, which is approximately the same size as a character.

(v) "Color": Specify the color to display the data on the plot. Select the color by either entering the color index in the field or clicking on the color bar. The default is the foreground color.

(f) "Select Font": Select the text font to display on the plot. If this option is selected, a window, as shown in Fig. 4-77, pops up for select the font type. There are three types of fonts available in IDL:

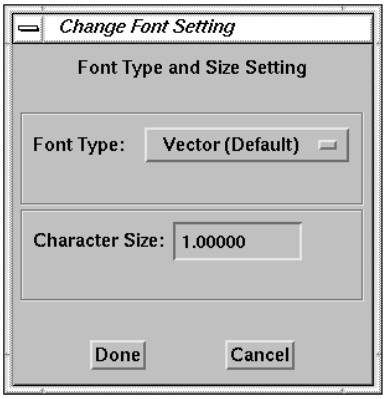

Fig. 4-77. Change Font Setting Window

(i) "Vector": Vector-drawn fonts are drawn as lines on the current graphics device, and are displayed quickly and efficiently by IDL. These fonts are device-independent but the size may be different on every platform. This option is the default.

(ii) "Hardware": Hardware fonts (or called device-fonts) rely on character-display hardware or software built in to a specific display device, therefore these fonts are device-dependent and differ from platform to platform and display device to display device. The form to specify the font name is also different from platform to platform. If this option is selected and is in UNIX platform, a window, as shown in Fig. 4-78, will pop up for selecting the available hardware font.

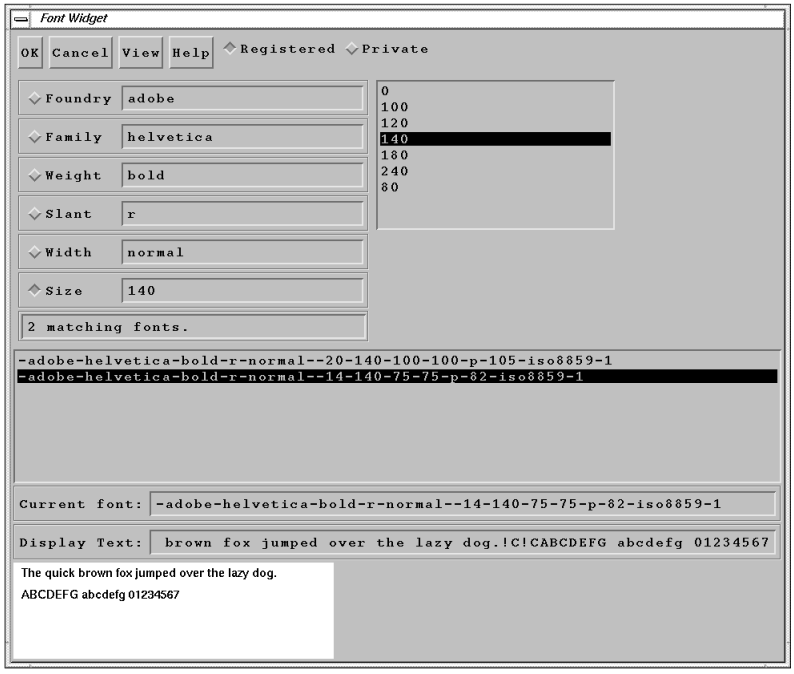

Fig. 4-78. Select Hardware Fonts in UNIX Platform

Select the options are available in all the fields and click "OK" to choose the font

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to display the text, or "Cancel" button to cancel this option. The Fig. 4-25 and Fig. 4-26 are using the hardware font to display the text.

(iii) "True-Type Outline": True-Type fonts are drawn as character outlines, which are filled when displayed. They are largely device-independent, but do have some device-dependent characteristics. If this option is selected, a window, as shown in Fig. 4-79, pops up for selecting the font and the size:

1. "Font Type": User can select the font type from the available font list. This list may be different from platform to platform.
2. "Font Size": Specify the font size (in pixels) of the width of the character. The height of character will be calculated.
3. "Leading Space Size": Specify the number of pixels between baselines of lines of text.

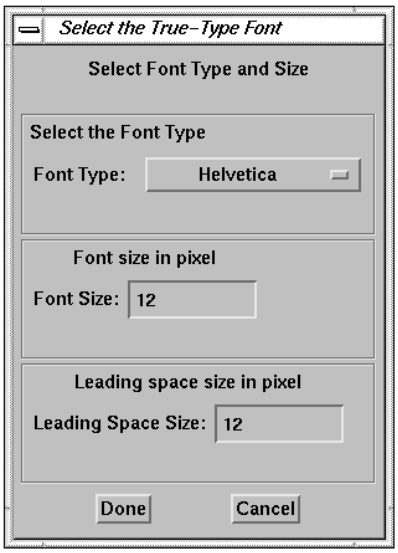

Fig. 4-79. Select True-Type Font Window

The default True-Type font is 12 point Helvetica regular. The Fig. 3-11 is using the true-type font to display the text.

(iv) "Character Size": Specify the character size to display the text on a plot. The default is 1.0.

Click the "Done" button after selecting the font and size to display the text, or click the "Cancel" button to cancel this selection.

(g) "Fill Data Value": Change the fill data value. The fill data value can be a positive or a negative value. If the fill data value is positive, any data equal to or greater than the fill value represents bad data. If the fill data value is negative, any data equal to or less than the fill value represents bad data. Those data will not be plotted. If this option is selected, a window, as shown in Fig. 4-80, pops up for entering the new fill data value. The default fill data value is "1.0E+35". Click the "Done" button after entering a value or the "Cancel" button to cancel this selection.

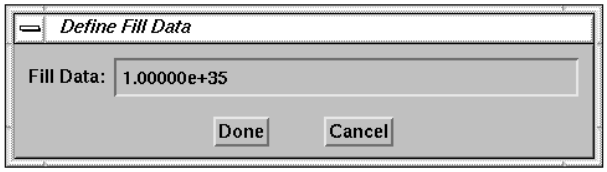

Fig. 4-80. Define Fill Data Window

(h) "Plot Character Size": Set the size of characters that display on the plot window. If this option is selected, a window, as shown Fig. 4-81, pops up for setting the size. Click the "Done" button after entering the size, of 'Cancel" button to cancel this option. The default plot character size is 1.0.

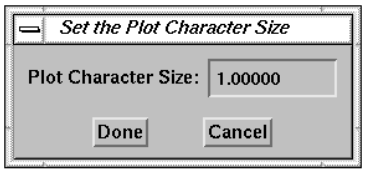

Fig. 4-81. Set Plot Character Size Window

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(i) "Display Time Type": Set the X axis to hour, minute, or second if data are plotted against time. The window for this option is shown in Fig. 4-82. The options in the "Display Time Type" field include:

(i) "Hours": Set the time to hours of the day.
(ii) "Minutes": Set the time to minutes of the day.
(iii) "Seconds": Set the time to seconds of the day. This is the default option.

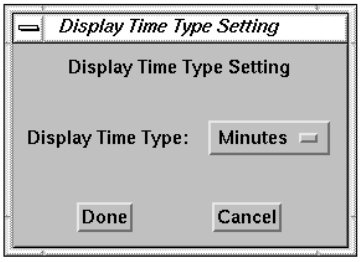

Fig. 4-82. Display Time Type Setting Window

(j) "Auto Select Scale Factors": This option is for the "Scale Data Value" function option, see item (50). The window for this option is shown in Fig. 4-83. If "Yes" is selected, the windows for selecting equation, input type, and input values pop up only the first time. The same information will be used when the "Scale Data Value" function is selected again. However, this information will be reset to initial values when a new file is opened. If "No" is selected, these windows pop up every time the "Scale Data Value" function is selected. The default is "No".

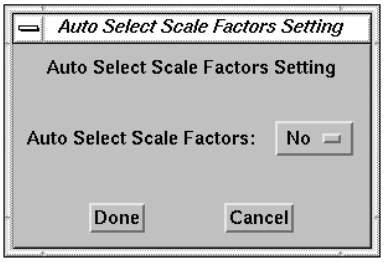

Fig. 4-83. Auto Select Scale Factors Setting Window

(k) "Using HDF 4.2r1 Version": This option is for reading HDF data file with version 4.2r1 and the SDS data sets are compressed with SZIP utilities. The default HDF libraries used in the IDL either 4.1r3 or 4.1r5. Both versions of HDF libraries cannot access any SDS data sets compressed with SZIP. A function is added into the shared library to access any of these HDF files, therefore this option is only available when the shared library is existed and valid. If this option is selected, a window, as shown in Fig. 4-84, pops up for setting this option. Select "Yes" to use HDF functions in the shared library to read the data set, or select "No" to use the IDL built-in HDF functions. The default is "No" option.

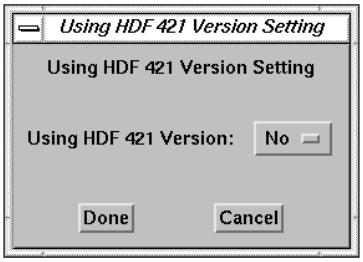

Fig. 4-84. Using HDF 4.2r1 Library Setting Window

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(l) "Display Plot Result Question": This option is for the "Compute" menu, see item (3). The window for this option is shown in Fig. 4-85. If "Yes" is selected, the window, as show in Fig. 4-31, with the question "Do you want to plot the result?" will pop up after the "Compute" option is done. If "No" is selected, this window will not pop up.

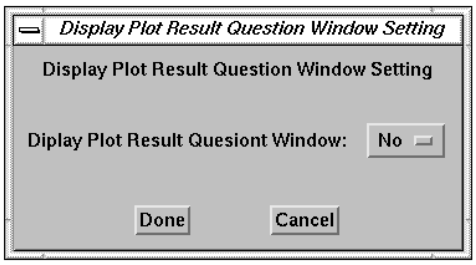

Fig. 4-85. Display Plot Result Question Window

(m) "Multiple Variables Style": When plotting multiple variables plot, use this option to specify the style of each variable to be displayed on the plot. A window, as shown in Fig. 4-86, will pop up for setting the options. With the "Default" option, the line style or the symbol style is used in the order sequence that is specified in the "Style" menu. With the "Manual" option, the style is specified for each data set. During plotting for each data set a window, as shown in Fig. 4-87, will pop up for selecting the style of the data set to be plotted.

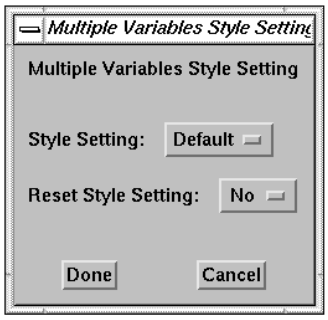

Fig. 4-86. Multiple Variables Style Setting Window

Select a combination of line and/ or symbol to display different data set. After the initial setting of the style, the same sequence of setting will be used for the latest plot.

To reset the "Multiple Variables Style", set the "Reset Style Setting" option in Fig. 4-86 to "Yes". The Select Variable Style Setting Window will pop up for each data set to reset the style. An example for Multiple Variable Style is shown in Fig. 4-20.

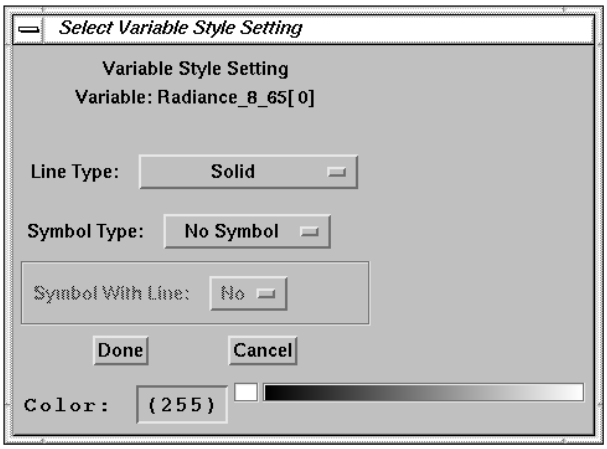

Fig. 4-87. Select Variable Style Setting Window

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(n) "2D Image Plot Order": Set the order to display a two-dimensional image array, see item (16) and item (17). The window for this option is shown in Fig. 4-88. Select the "Bottom-To-Top" option if the image array is in bottom-to-top order. Select the "Top-To-Bottom" option if the image array is in top-to-bottom order. The default is the standard IDL order, "Bottom-To-Top" option.

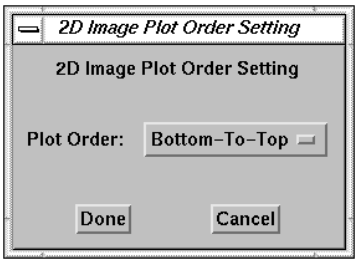

Fig. 4-88. 2D Image Plot Order Setting Window

(o) "3D Mesh Surface Array Sort": This option is for 3D Mesh Surface, see item (29). If this option is selected, a window, as shown in Fig. 4-89, pops up for setting this option. Set this option to "Yes", the array will be sorted with respect to the X variable in ascending order before creating the 3D Mesh Surface plot. If "No" is selected, no sorting will be performed. The default is "Yes".

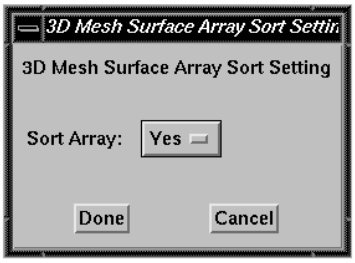

Fig. 4-89. 3D Mesh Surface Array Sort Setting Window

(p) "Browse Image Plot Type": Specify the settings to create a Browse Image plot, see item (39) and item (40). The window for this option is shown in Fig. 4-90. The fields include:

(i) "Plot Type": There are three options to display a Browse Image:

1. "Plot As Image": A two-dimensional data set will be converted into two-dimensional uniform gridded data set and displayed as an image. This is the default.
2. Plot By Grid Cells": The gridded data is displayed region by region.
3. Plot By Points": The data set is plotted point by point.

(ii) "Number Shots per One Km": Specify the number of laser shots (or profiles) per km. This value is used to convert number of profiles to horizontal distance along the Earth surface. The default is 3 shots per km (for CALIPSO, see Ref. 6).

(iii) "Color Bar Setting": Set using pre-defined, user's defined, or auto scale ranges for the

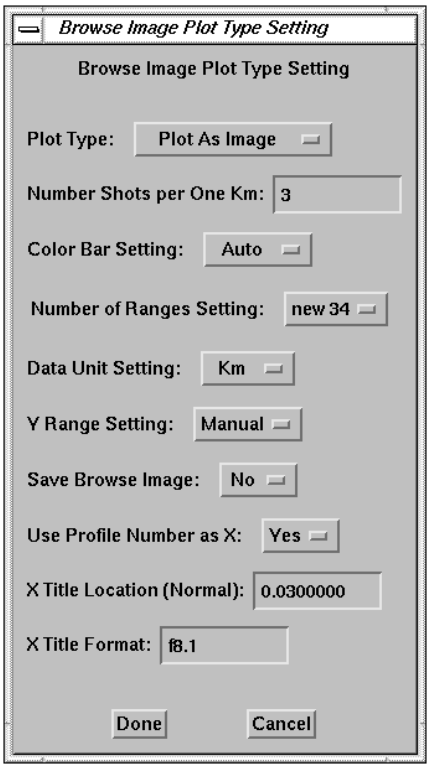

Fig. 4-90. Browse Image Plot Type Setting Window

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color bar. Set this field to “Auto”, use the pre-defined ranges to represent the data. The pre-defined ranges are based on the CALIPSO LIDAR data sets. Set this field to “Manual”, use either user’s defined or auto scale ranges that depends on the setting of the “Axis” menu; see item (6). The default is “Auto”.

(iv) “Number of Ranges Setting”: Select number of ranges of data shown in the color bar if “Color Bar Setting” is set to “Auto”. There are three pre-defined color ranges built-in:

1. “14”: Use 14 levels to represent the data. This color range is similar to LITE browse image. This is the default option.
2. “new 34”: Use the latest 34 levels version to represent the data.
3. “34”: Use the old 34 levels version to represent the data

(v) “Data Unit Setting”: Set the unit of the sample data. The unit of this field is either “Km” or “meter”. The default is “Km” option.

(vi) “Y Range Setting”: Set using pre-defined, user’s defined, or auto scale Y range. Select this field to “Auto”, use the pre-defined Y range that is from -2 to 30. Set this field to “Manual”, use either user’s defined or auto scale ranges depended on the setting of the “Axis” menu; see item (6). The default is “Auto”.

(vii) “Save Browse Image”: Set this field to “Yes”, save the Browse Image in the Current Subset list. The default is “No”.

(viii) “Use Profile Number as X”: Set this field to “Yes”, use the profile number (or record index) to as X-axis scale to display the data, but use the values of selected X variable to label on the X-axis. Set this field to “No”, use the values of the selected X variable as X-axis scale to display the data, as well as the label. The default is “No”.

(ix) “X Title Location (Normal)”: Set the location of the X title under the X-axis if the “Use Profile Number as X” field is set to “Yes”. The value is in normal coordinates. The default value is 0.045.

(x) “X Title Format”: Set the format of X label display on the X-axis f the “Use Profile Number as X” field is set to “Yes”. The default format is ‘f8.1’.

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(q) "Encapsulated Postscript": Specify the setting for creating an encapsulated postscript output. The window for this option is shown in Fig. 4-91. The fields include:

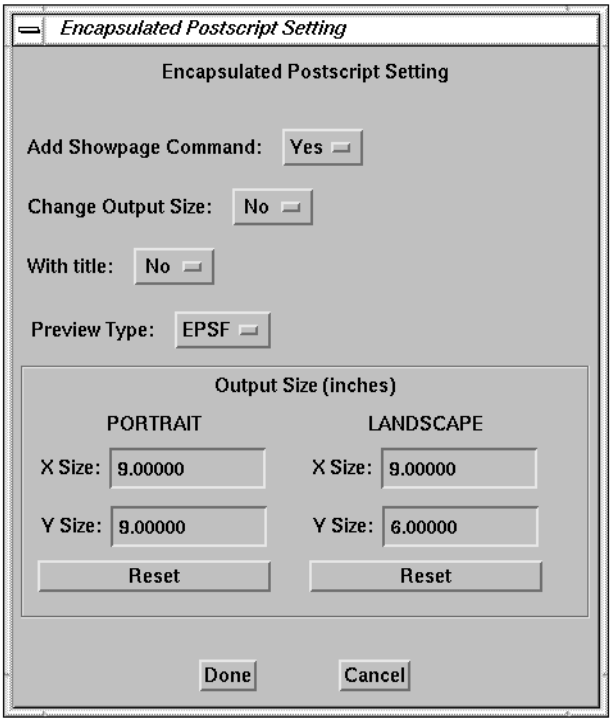

Fig. 4-91. Encapsulated Postscript Setting Window

(i) "Add Showpage Command": A "showpage" command is not added into the encapsulated postscript (EPS) file because an EPS file is usually imported into a word processor. But some graphics or print commands need the "showpage" command in the file to make them work properly. Setting "Yes" in this field will check the existence of a "showpage" command. If the command does not exist, the "showpage" command is added into the file. By setting "No" in this field, the check is not performed. The default is "Yes". Note: if the file is too long, it will take a while to check the command.

(ii) "Change Output Size": By setting this option to "Yes", the size of output will be adjusted to eliminate spaces between the title and the plot and between the plot and the color bar. By setting this option to "No", the specified output sizes (portrait or landscape) are used. The default is "No".

(iii) "With Title" By setting "Yes" in this field, the main title of the plot is written into the plot. By setting "No" in this field, the main title is not written. The default is "Yes".

(iv) "Preview Type": The type of preview is written to the file. The options are:

1. "No": No preview is written to the file.
2. "EPSI": An EPSI preview is written to the file. This type of preview can be viewed with UNIX **xv** and **ghostview** commands, but it cannot be viewed in Windows **MS Word** program.
3. "EPSF": An EPSF preview is written to the file. This option is valid only for IDL version 5.3 and later. This type of preview can be viewed in Windows **MS Word,** but it cannot be viewed with UNIX **xv** and **ghostview** commands.

The default of this option is "EPSI".

(v) "Output Size": Specify the output size of EPS file. The sizes are in inches. For portrait output, the default size is 5.4 X 7.0. For Landscape output, the default size is 9.0 X 6.95. Note: Select the "No" option in the "Change Output Size" field to

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make this option operate.

(9) "Help": Call up this user guide, release note, IDL on-line help menu, or see information about view_hdf. The options are shown in Fig. 4-92.

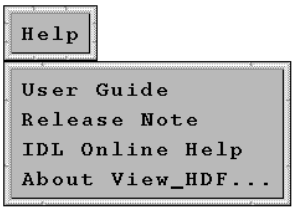

Fig. 4-92. Help Menu

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

(b) "Release Note": See the release note which includes latest updates for the view_hdf applications since this user guide was completed.

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

(d) "About View_HDF...": If this option is selected, a window, as shown in Fig. 4-93, pops up to display the URL of the view_hdf applications, the current version number, the date of last update, and contact information. Click on the "Done" button to close this window.

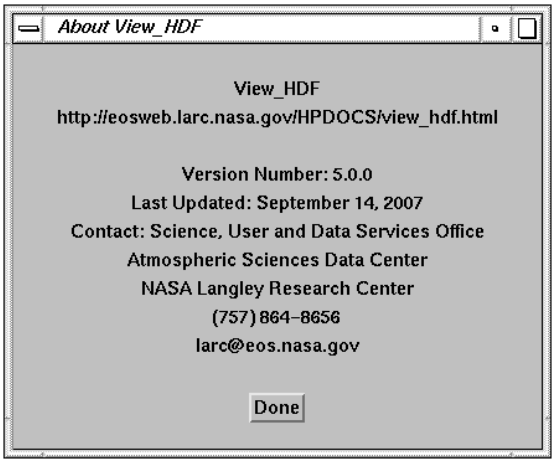

Fig. 4-93. About view_hdf Window

(10) "Current Filename": Display the name of the current input data file. A file can be opened by entering the filename in this field and pressing the return key. Either a path name or the "*" wildcard character are acceptable input. In the case of the "*" wildcard character, a window, as shown in Fig. 3-3, will pop up for selecting a file if more than one filename matched. If only one filename matched, that file will be opened.

(11) "Switch File": Switch the current input data file from among the last five files opened in the current session without reopening the file. When this button is clicked, a window listing the last five files opened pops up, from which the user can select a new current input data file.

(12) "INPUT": Display the names of the SDS and Vdata sets in the current HDF file. The user can set the "Range Type" field to select the range of imported data by record number, by time (if the time variable is recognized; see Section 5.0 for a list of time variables that are recognized),

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or from multiples files. 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 as 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 the time variable is not recognized, "Record Number" is automatically used for the range type. If the "Time" option is selected, a window, as shown in Fig. 4-94, pops up for entering the time range. The starting time initially shown is the time of

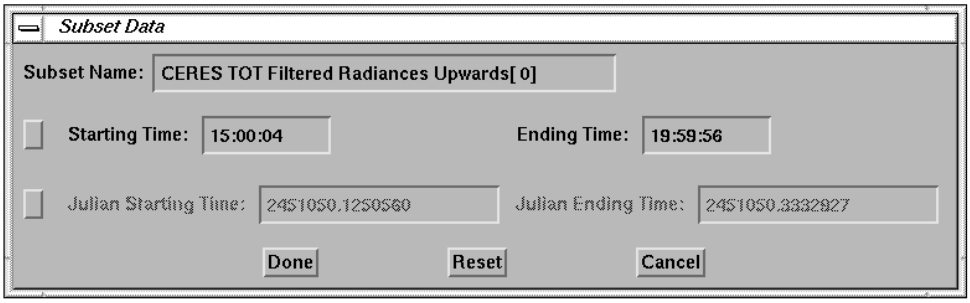

Fig. 4-94. Time Range Input Window

the first record and the ending time is the time of the last record. The user can choose to use either clock time format, the upper line, or Julian date time format, the lower line, to enter the time range by clicking the button in front of the option. 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.

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(c) “Multi Files”: Read a same SDS data set or Vdata set from multiples HDF4 files which have the same name format with last several digits as increment. For example, if the user wants to read the SDS1 data set from files with a filename as hdf_file_01, hdf_file_02,... a window, as shown in Fig. 4-95, pops up for entering the settings. The settings include:

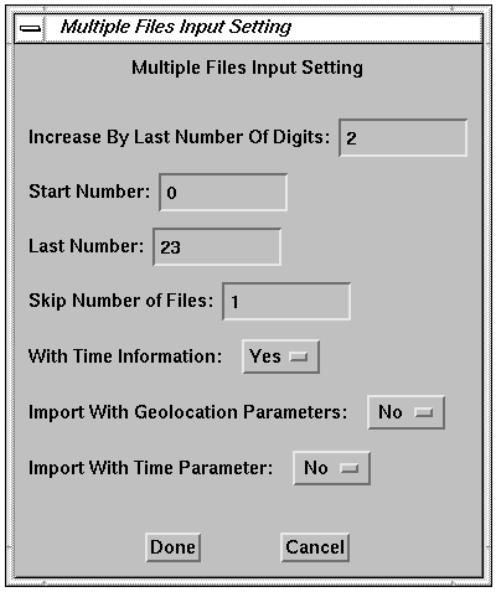

Fig. 4-95. Multiple Files Input Setting Window

(i) “Increase By Last Number of Digits”: Number of digits at the end of the filename as an increment. The default is 2.

(ii) “Start Number”: The start number of these digits to be read. The default is 0.

(iii) “Last Number”: The last number of these digits to be read. The default is 23.

(iv) “Skip Number”: The number of files in the sequence to be skipped. The default is 1.

(v) “With Time Information”: If the time parameter is available and recognized in the file (See Section 5.0), it can be attached to the data set such that the plot will show the time range on the title. By setting this field to “Yes”, the time information is attached. The default is "Yes".

(vi) “Import With Geolocation Parameters”: By setting this field to "Yes", the geolocation parameters are imported to the Current Subsets area at the same time if they are available and recognized (See Section 5.0). If the data will be plotted on a map projection, by setting this option to "Yes", these parameters don’t need to import separately. If this field is set to "Yes", it will be automatically set to "No" after the geolocation parameters are read. If the user wants to make a plot with another data set with same data range, the geolocation parameters do not need to be imported again. The default is "No". Note: Since the data are from multiple files, it is difficult to read in the geolocation parameters automatically. The user will be asked to select the geolocation parameters from the Current Subset list.

(vii) “Import with Time Parameter”: By setting this field to “Yes”, the time parameter is imported into Current Subsets area if it is available and recognized (See Section 5.0). The time is converted to seconds of the day. The default is "No".

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With the “Range Type” setting on the “Multi Files” option, open any file in the series of files like opening an HDF file. Click on the desired SDS or Vdata from the INPUT area, a window, as shown in Fig. 4-96, pops up to display the multiple files settings. Click the “OK” button to read the data if all the settings are correct. Click the “Cancel” button to cancel the process. After reading all the data set from all the files, a Subset Data window, as shown in Fig. 4-97, pops up with Starting, Ending, and Increment fields for each dimension of the data. A range of data can then be selected to be imported. If the dimensions of geolocation parameters and the time parameter are not same, this window will pop up again for these parameters, otherwise, these parameters are imported with same range as the data set. Click the “Done” button after finishing the input range to import data. The name of the data set, as well as the geolocation parameters and/or time parameter if they are selected, will display on the Current Subsets area. This data set can be accessed from the Current Subset list. Note: The filename displayed on the plot in the title is the opened filename.

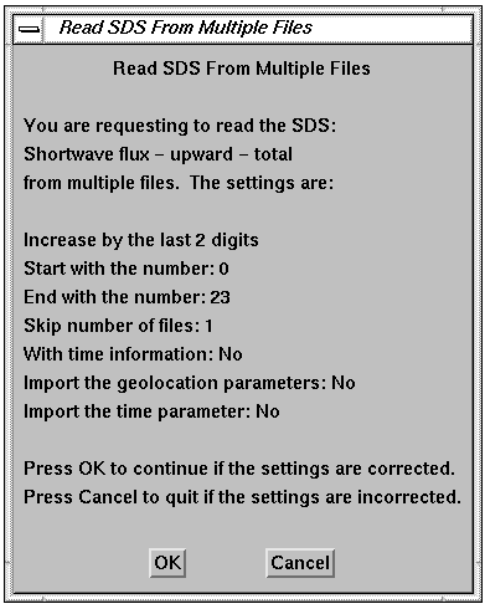

Fig. 4-96. Read Data From Multiple Files Window

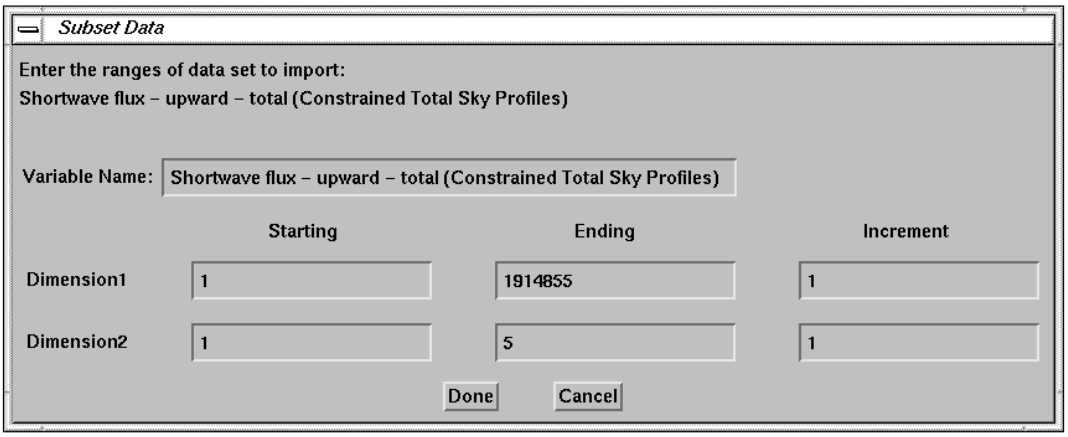

Fig. 4-97. Multiple Files Data Range Input Window

The options “Do Not Display Attributes”, “Display Attributes”, and “Display Attributes Only” are 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 in an editor window along with the Range Input Window, as shown in Fig. 4-98.

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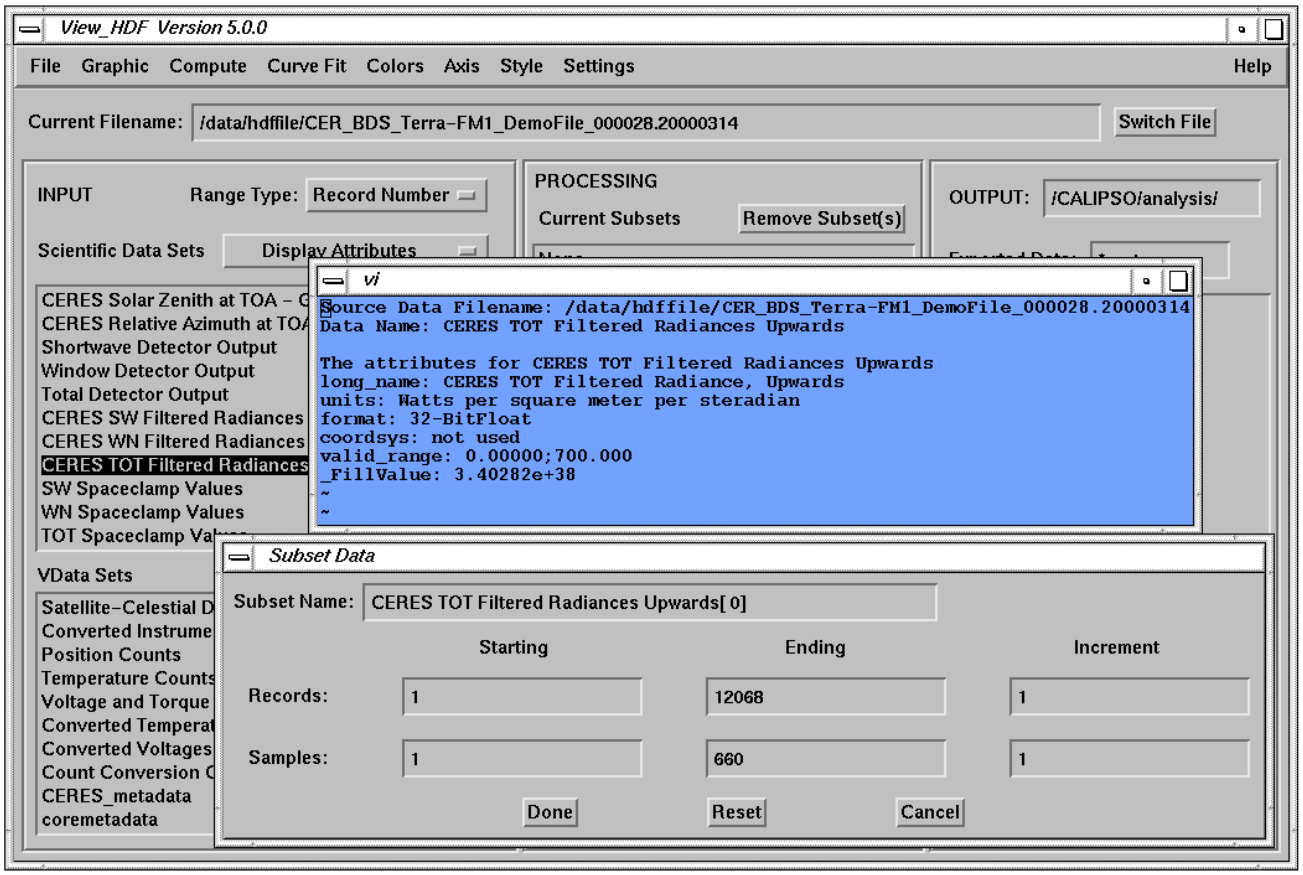

Fig. 4-98. Display Data Attributes

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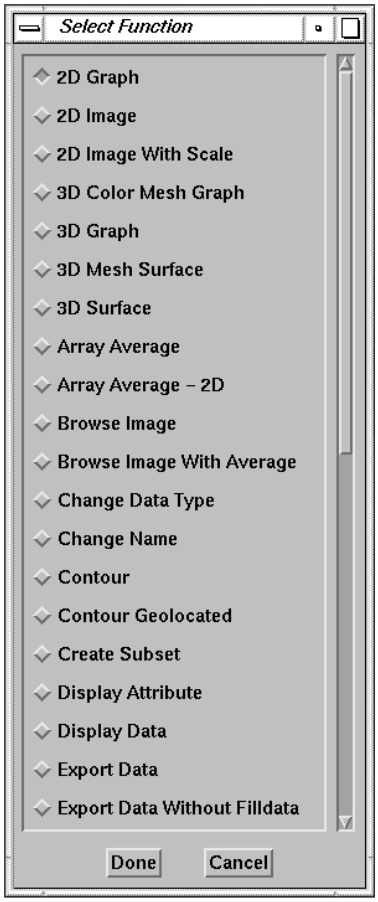
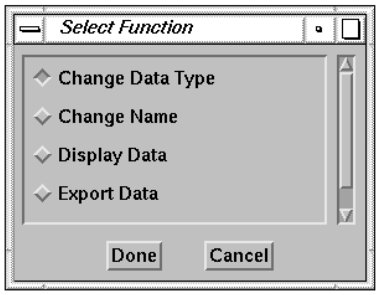
(13) "PROCESSING": Display the names of the imported data sets. These data sets can be accessed for plotting, displaying, or exporting. Click on any subset data in this list and a function menu, as shown in Fig. 4-99, pops up. Choose the selection and click the "Done" button. To cancel this selection, click the "Cancel" button.

The menu shown in Fig. 4-99a is for numerical data and the menu shown in Fig. 4-99b is for text data. Descriptions of these menus are given in Section 4.2: Select Function Menu.



(a) For Numerical Data



(b) For Text Data

Fig. 4-99. 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 Y Variables"; see item 2(a)

(14) "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 Preferences" option in the "File" menu can be used to specify the output directory; see item 1(k) 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. 4-100, 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.

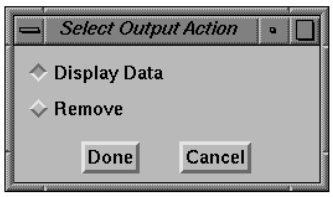


Fig. 4-100. Output Action Window

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4.2 Select Function Menu

This section describes the different graph styles from the "Select Function" menu (Fig. 4-99):

(15) "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.

(16) "2D Image": Display a two-dimensional data array as an image. An example of a 2D image plot is shown in Fig. 4-101.

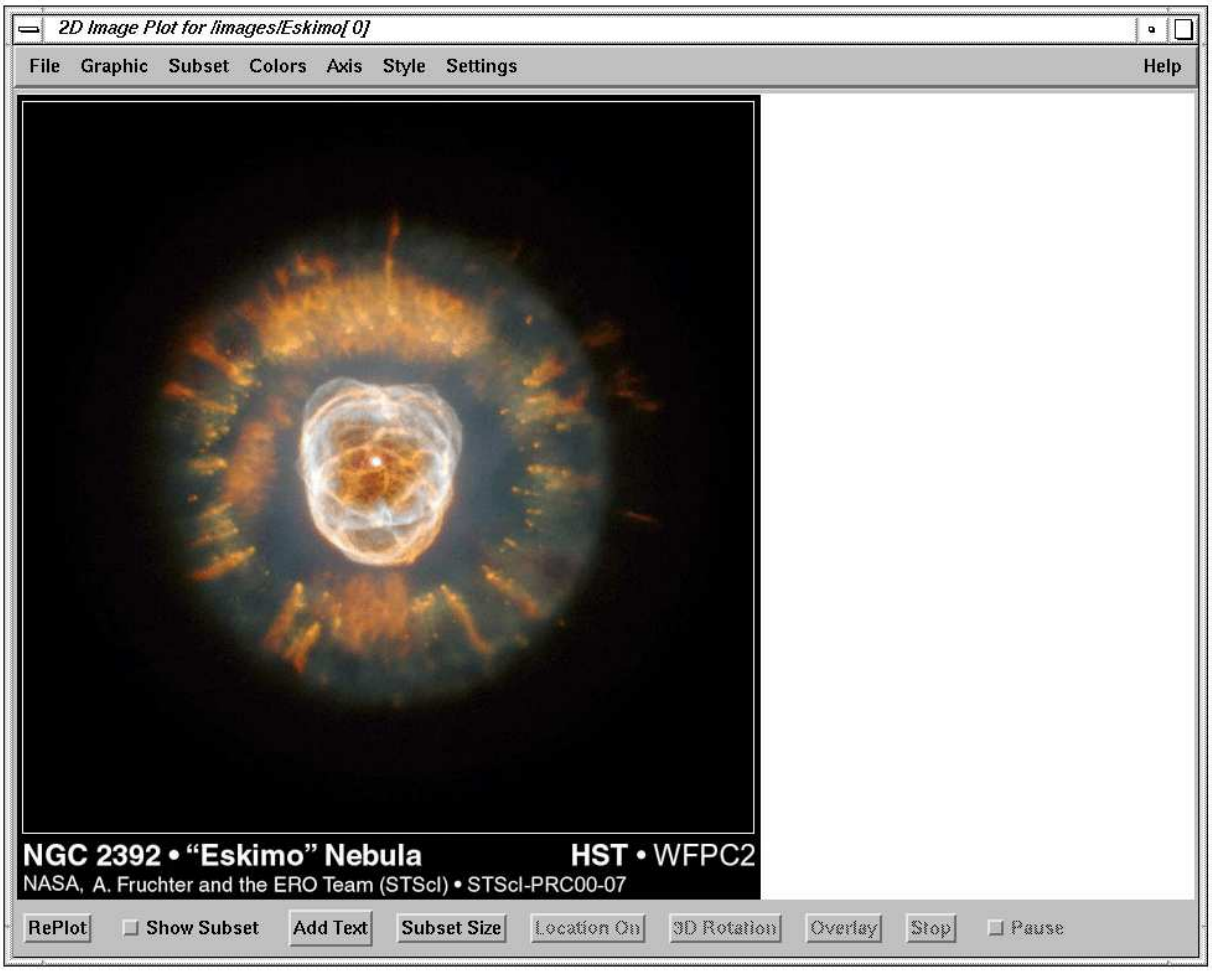

Fig. 4-101. 2D Image Plot

(17) "2D Image With Scale": This option is the same as "2D Image" except the data set will be interpolated to fit the size of view window before displaying the data as an image.

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(18) “3D Graph”: Draw a wire-mesh representation of a two-dimensional array projected onto two dimensions. The plot is generated as a function of the array index of each element of data.

(19) “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. 4-102

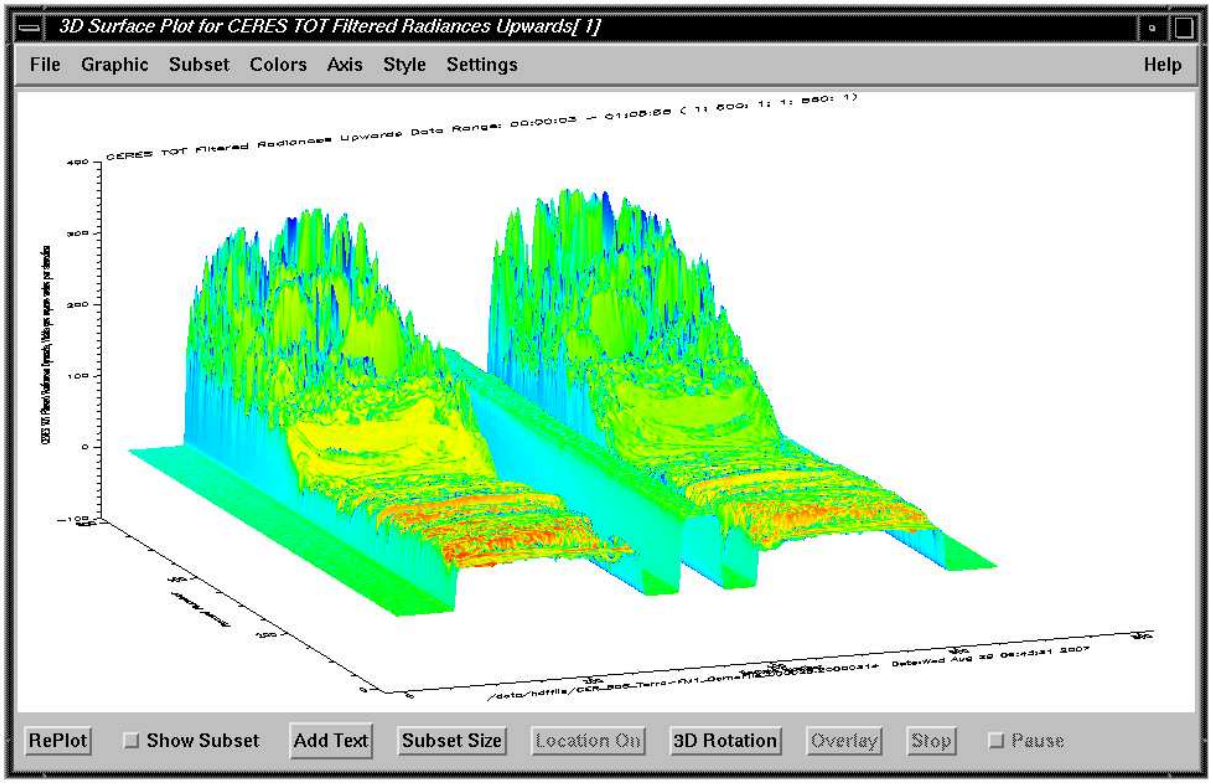

Fig. 4-102. 3D Surface graph

(20) “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.

(21) “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 latitude, and the second is 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 hour data set 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 by increasing the first dimension index. A window, as shown in Fig. 4-103, 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

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to stop the increment. See item 8(c) for a description of how the gridded data are arranged. A color bar displays the scale value.

Fig. 4-103. Question for Displaying Next Plot

(22) "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 zonal 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. 4-104.

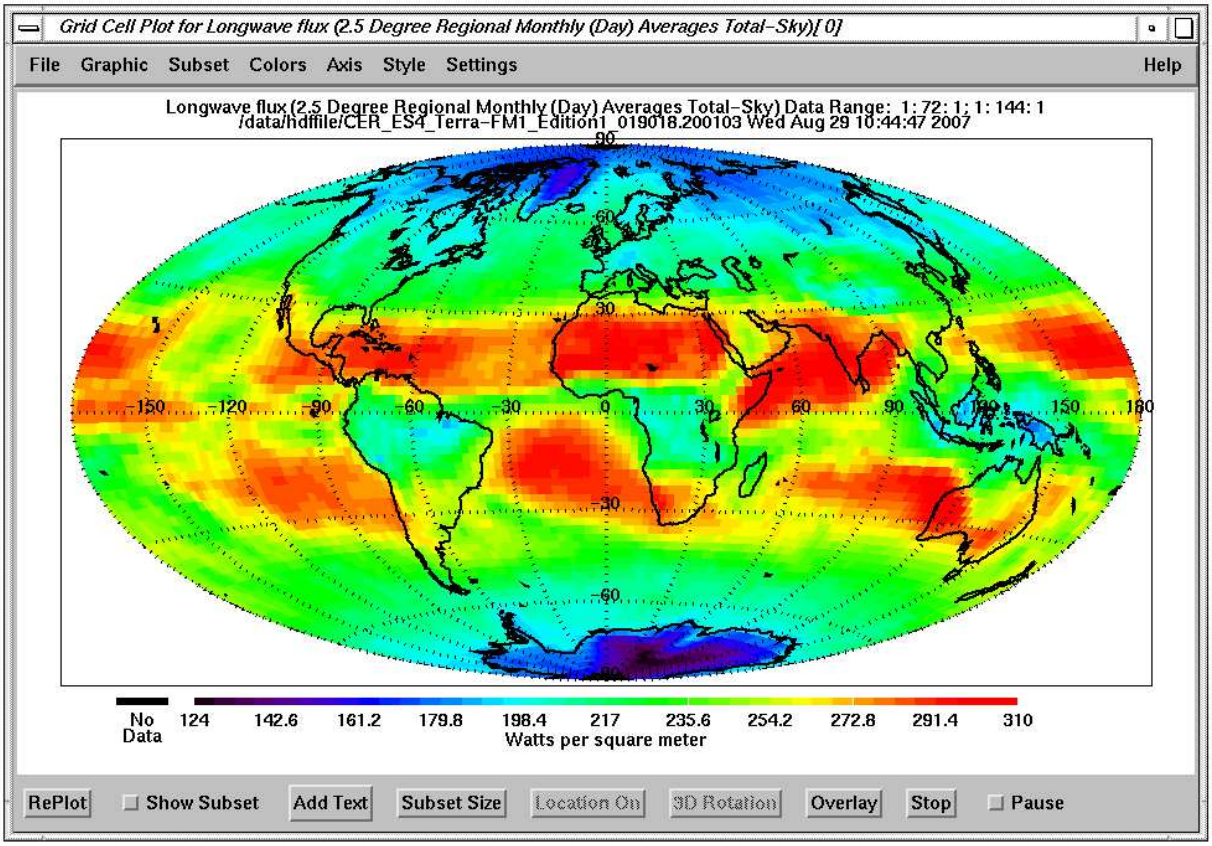

Fig. 4-104. Grid Cell Plot

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(23) "Grid Cell - Region": This option is similar to "Grid Cell", item (22), except the gridded data are arranged by region number instead of by latitude and longitude. The corresponding region numbers are stored in a different variable array which has already been imported into the Current Subset list before this option is selected. If this option is selected, a window, as shown in Fig. 4-105, 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. 4-104 will be displayed on the screen. Click the "Cancel" button to cancel this selection.

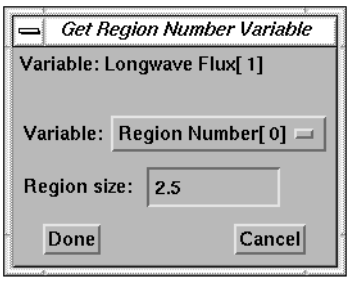

Fig. 4-105. Get Region Number Variable

(24) "Statistics": Calculate the mean, standard deviation, maximum, minimum and number of samples for one- or two-dimensional arrays. A vdata set is considered as two-dimensional array if its order is greater than one. 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 12891x600 data array results in five arrays with a dimension of 600 each. Each array is for one statistics parameter. Each element of these arrays is the result for 12891 samples. The results are written to a file. A window, as shown in Fig. 4-106, pops up for entering the filename.

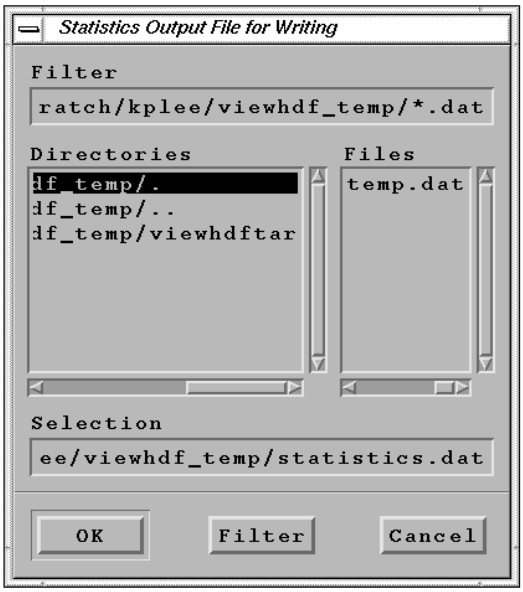

Fig. 4-106. Enter Filename Window

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The results are also displayed in an editor window on the screen. Figure 4-107 shows an example of the statistics results for a two-dimensional array.

```
vi
Source Data Filename: /data/hdffile/CER_BDS_TRMM-PFM_DemoFile_000026.19980824
Subset Name: CERES TOT Filtered Radiances Upwards[ 0]
Unit:  Watts per square meter per steradian
Data Range:  15:00:04 - 19:59:56 ( 1: 2727: 1; 1: 660: 1)

  Sample        N          StdDev           Mean        Maximum        Minimum
       0     2694         0.09766       -0.02496        0.37713       -0.43764
       1     2694         0.09513       -0.03430        0.25474       -0.43293
       2     2694         0.09701       -0.03802        0.29765       -0.43001
       3     2694         0.09755       -0.03010        0.27575       -0.41668
       4     2694         0.09494       -0.03843        0.26547       -0.41876
       5     2694         0.09400       -0.03772        0.31750       -0.35480
       6     2694         0.09305       -0.03330        0.30986       -0.44956
       7     2694         0.09628       -0.03538        0.31020       -0.44177
       8     2694         0.09568       -0.03771        0.31485       -0.32252
       9     2694         0.09355       -0.03821        0.37569       -0.37006
      10     2694         0.09583       -0.04372        0.27637       -0.39137
      11     2694         0.09572       -0.03918        0.23844       -0.39163
      12     2694         0.09500       -0.03591        0.26242       -0.38107
      13     2694         0.09179       -0.03318        0.28140       -0.34912
      14     2694         0.09308       -0.03460        0.26210       -0.38059
      15     2694         0.09259       -0.03903        0.27298       -0.36752
      16     2694         0.09172       -0.03539        0.27279       -0.42529
"/home/kplee/viewhdf/temp1.out" [Read only] 666 lines, 51132 characters
```

Fig. 4-107. Display Statistics Result

A plot, as shown in Fig. 4-108, with mean and standard deviation, will display results for a two-dimensional array on the screen. A plot is not produced for one-dimensional array.

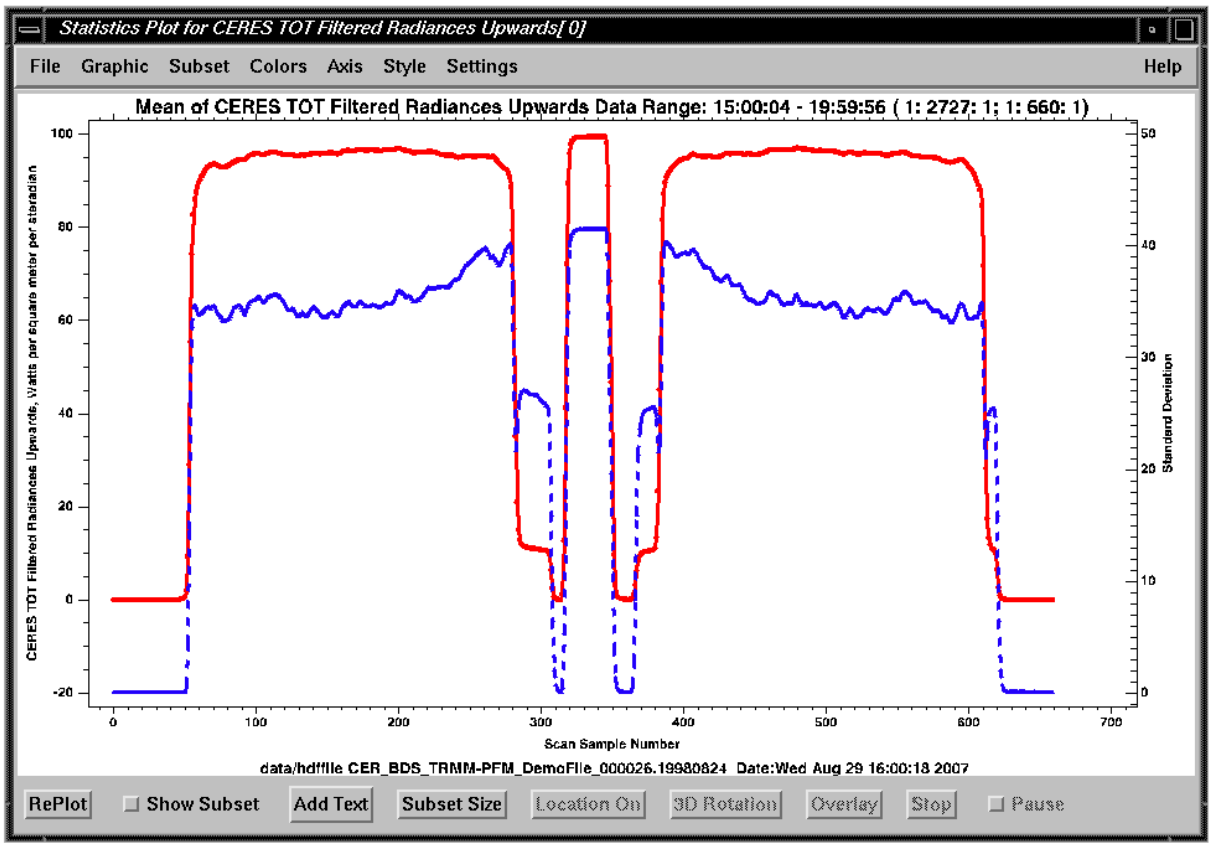

Fig. 4-108. Mean and Standard Deviation Plot

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The results are also placed in the Current Subsets list, as shown in Fig. 4-109.

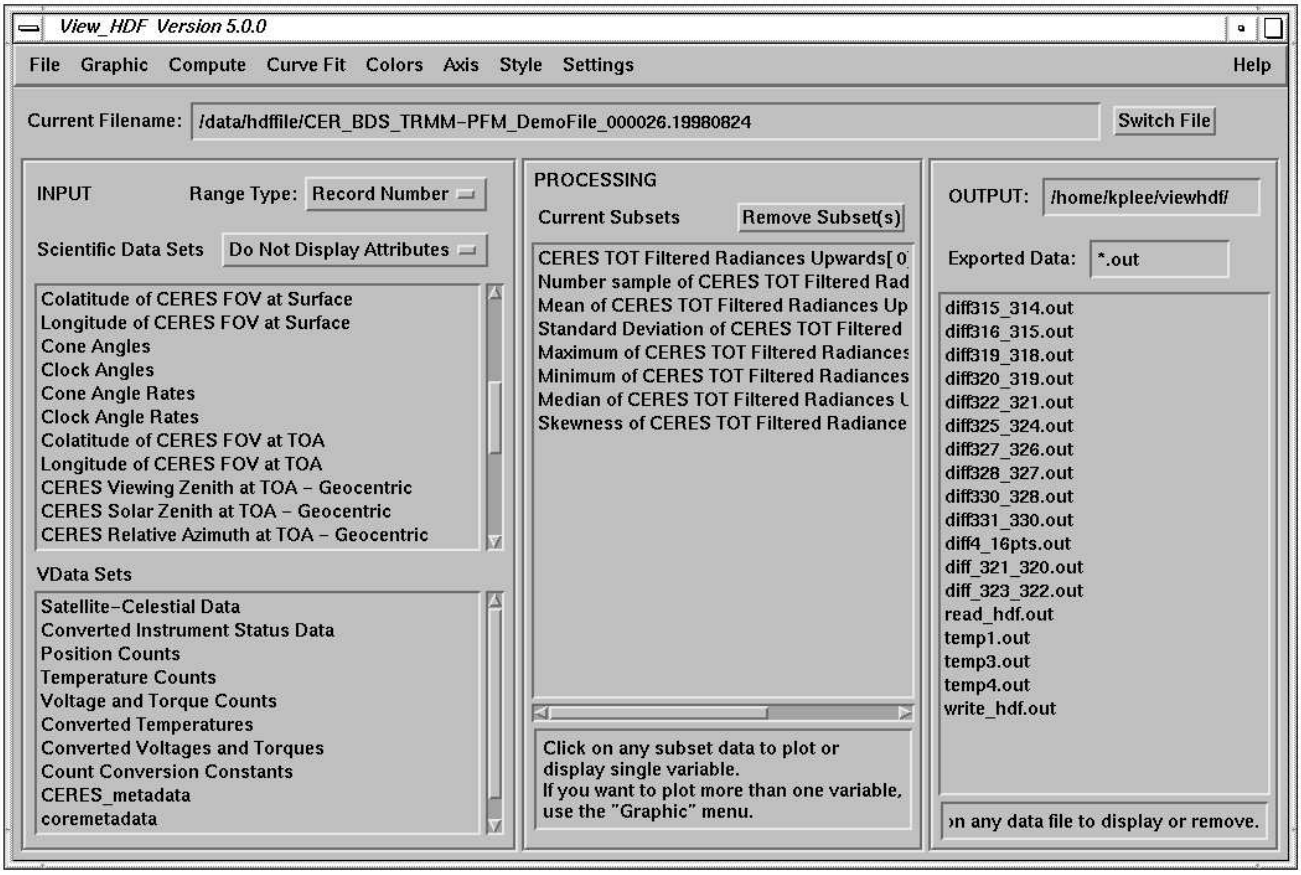

Fig. 4-109. Statistics Parameters in Current Subsets

(25) "Statistics For Whole Subset": Calculate the mean, standard deviation, maximum, minimum and number of samples for a whole array. The results are written to a file, as shown in Fig. 4-110.

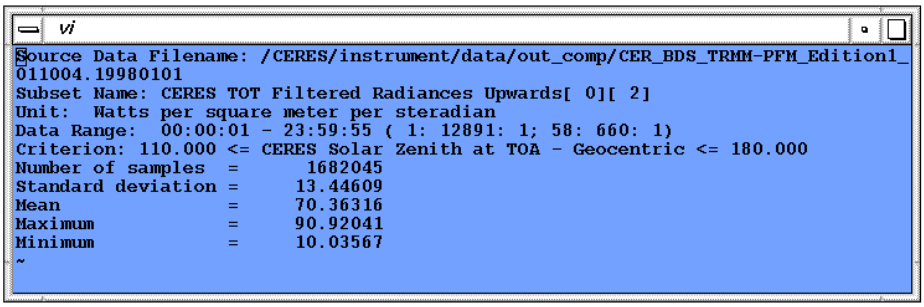

Fig. 4-110. Statistics For Whole Subset Result

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(26) "Histogram: Create a sample histogram of the data with the option to write the results to a file. If this option is selected, a window, as shown in Fig. 4-111, pops up for entering "Bin Size", the size of bin, "Max Value", the maximum value, and "Min Value", the minimum value of the histogram. After entering the values, click the "Done" button.

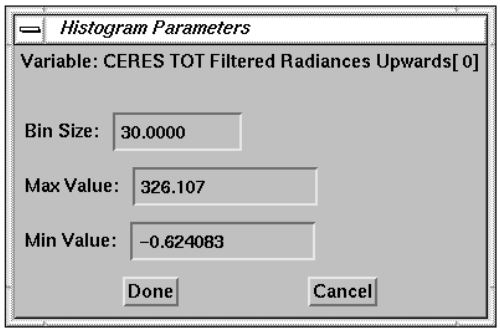

Fig. 4-111. Histogram Parameters Window

Another window, as shown in Fig. 4-112, pops up asking whether to write the results to a file. Click the "Yes" button to write the results to a file. A sample result and a plot of the histogram are shown on Fig. 4-113 and Fig. 4-114.

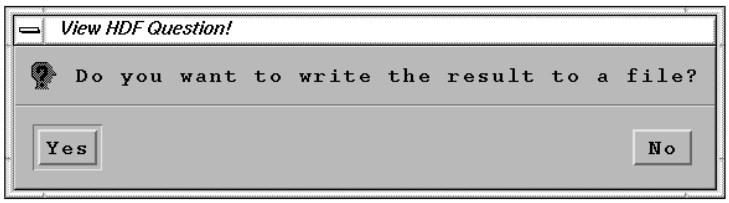

Fig. 4-112. Question for Writing Result to a File

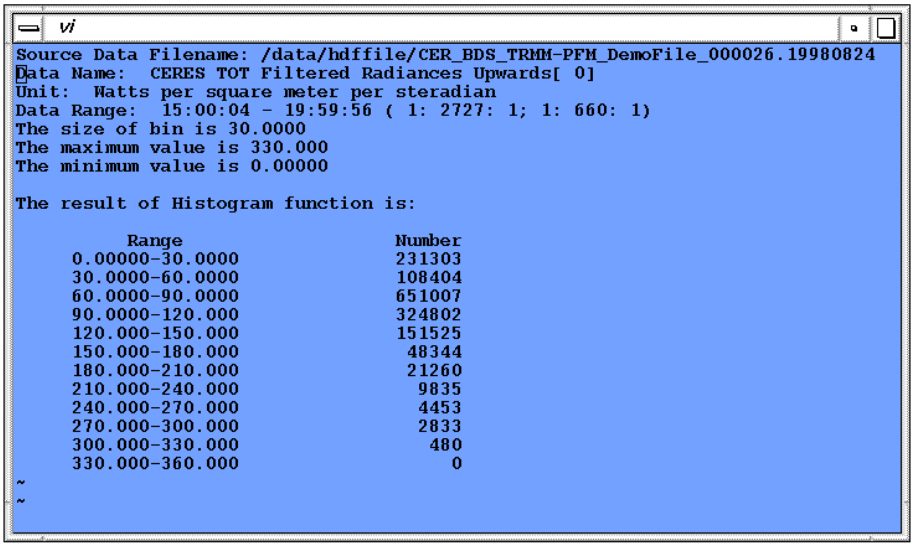

Fig. 4-113. Histogram Result

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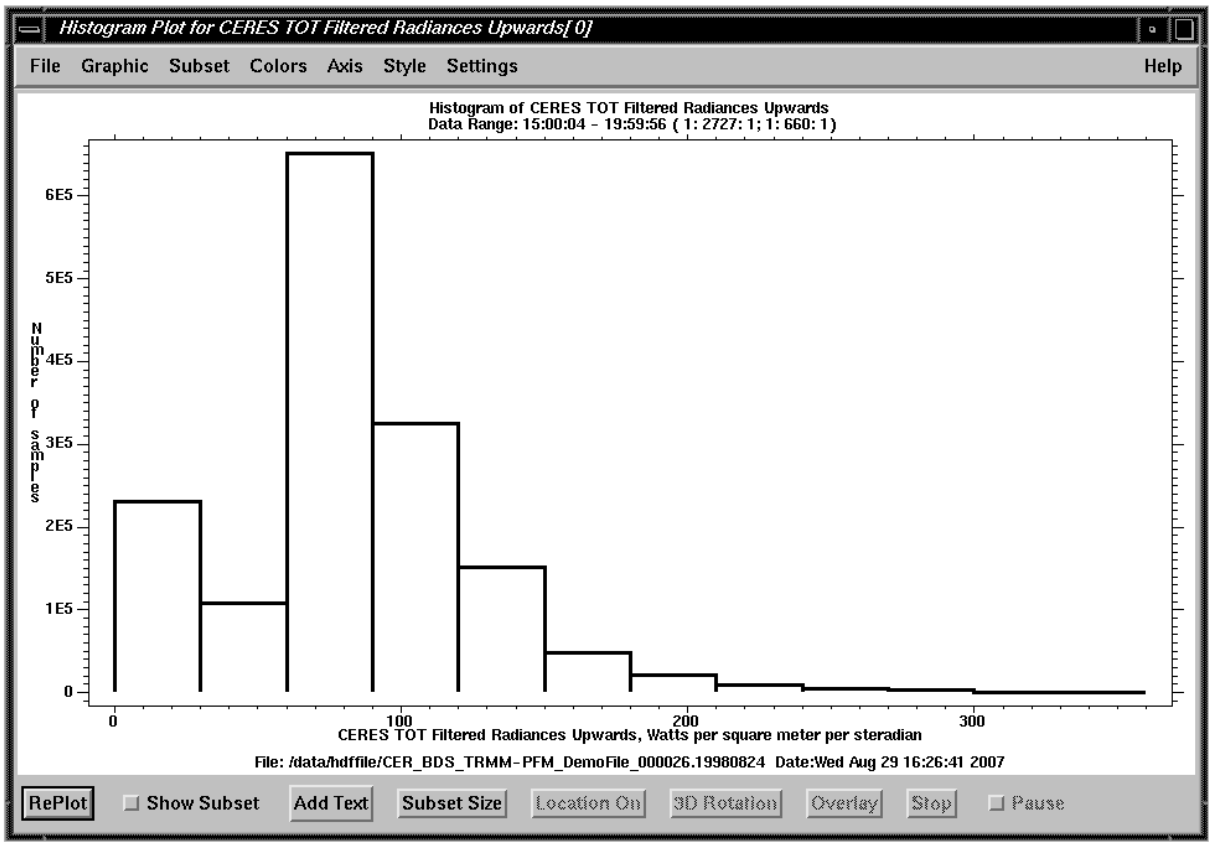

(27) "XY Graph": Display data against time, sample number, record number, or packet number if these variables are recognized; see Section 5.0 for variables that are recognized. The X variable can also be selected from the Current Subsets list. A window, as shown in Fig. 4-115, pops up for selecting the X field variable. Click the "X Fields Selection" button.

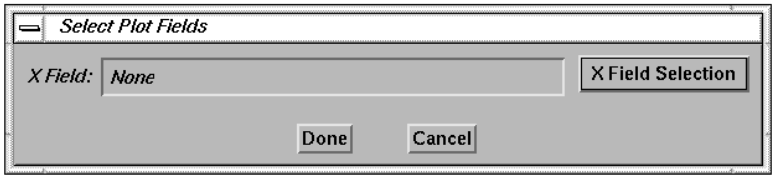

Fig. 4-115. Select X Field Window

A list, as shown in Fig. 4-116, displayed for selecting the X field. After the X Field Selection has been made, click the "Done" button to close the window. If "Select Variable" is selected, another window will pop up for selecting the X variable from the Current Subsets list.

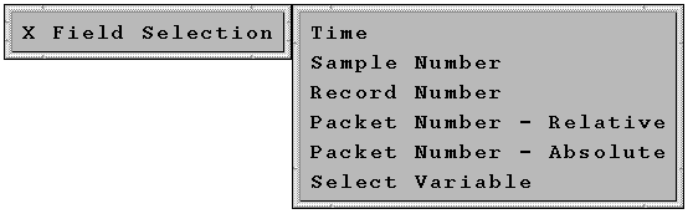

Fig. 4-116. X Field List

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(28) "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. 4-117, pops up for selecting the X and Y variables. After selecting the variables, click the "Done" button.

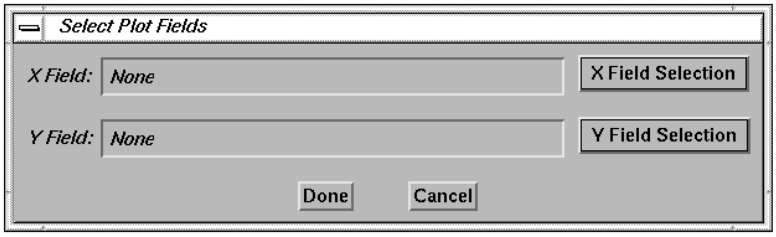

Fig. 4-117. Select X and Y Field Window

(29) "3D Mesh Surface": Display the data set on a 3D mesh surface data sets, X, Y, and Z. The data set and the X, Y, and Z variables are two-dimensional array.

(30) "3D Color Mesh Graph": Display the data set on a 3D mesh data sets, X, Y, and Z. The data set and the X, Y, and Z variables are two-dimensional array. An example of a "3D Mesh Graph" plot is shown in Fig. 4-118.

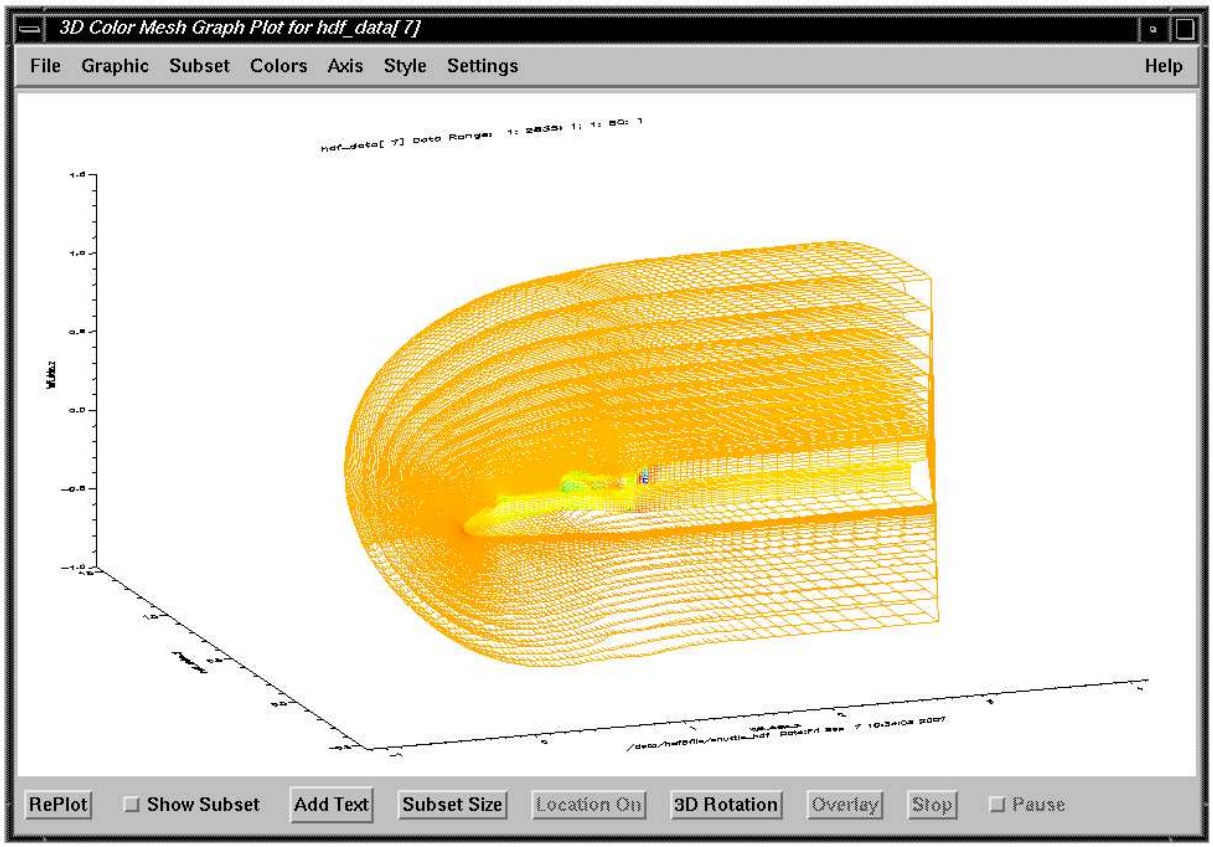

Fig. 4-118. 3D Color Mesh Graph Plot

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(31) "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. 4-119, 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. 4-73, pops up for entering the parameters. Either latitude or colatitude position of the data can be selected. Also, the positions of the satellite or the 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. 4-120.

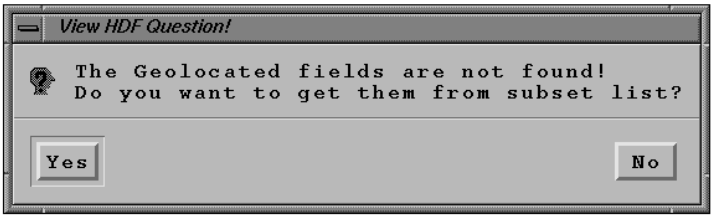

Fig. 4-119. Question for Getting Geolocated Parameters

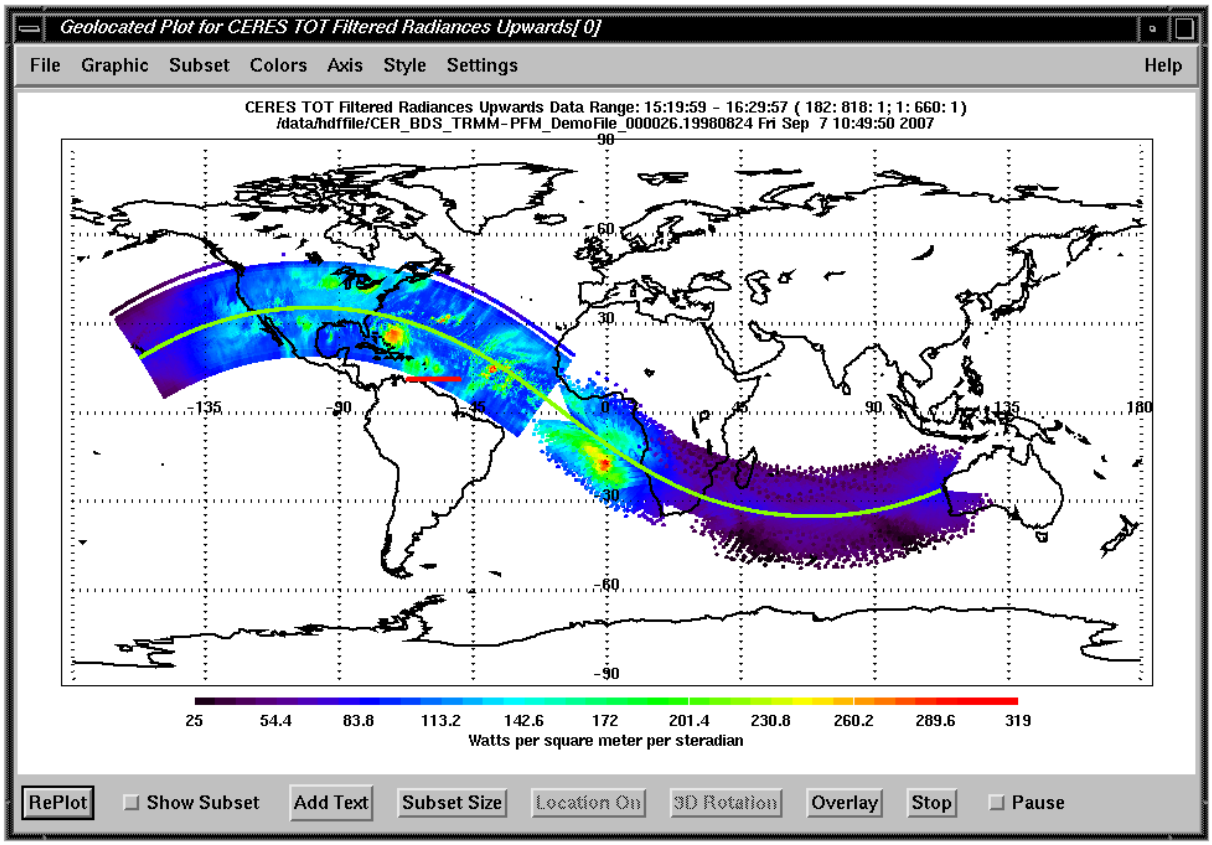

Fig. 4-120. Geolocated Plot

(32) "Contour Geolocated": This option is similar to the "Geolocated" graphic option, see item (31). Instead of plotting the data point by point on a map projection with the corresponding geolocated parameters, a filled contour is created and plotted on a map

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projection. The data will be converted into a two-dimensional regular grid before a contour is created. The default size of grid is 360 cells in longitude and 180 cells in latitude. The user can change these values by using the "Number of Grids for Contour Geolocated" field under the "Map" option in the "Settings" menu; see item 8(b). There are also six options in the "Contour Geolocated" field under the "Map" option to adjust the contour; see item 8(b). An example of a contour geolocated plot with the "Filter With Smoothing" option is shown in Fig. 4-121.

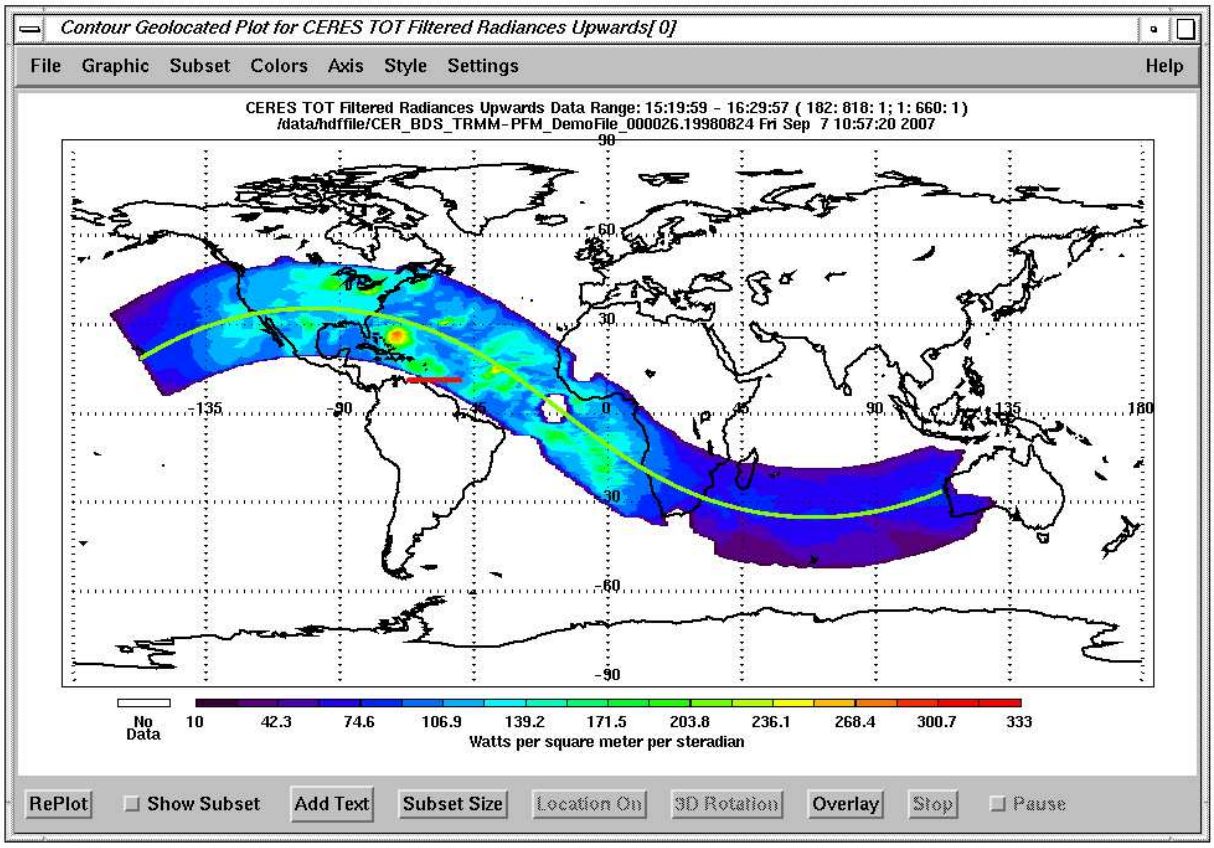

Fig. 4-121. Contour Geolocated Plot

(33) "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. 4-122, pops up for selecting the criterion variable and the range. The "Inside the range" option includes data within the minimum and maximum values of the criterion variable. The "Outside the range" option includes data less than the minimum value or greater than the maximum value of criterion variable. The default is "Inside the range". Click the "Done" button after selecting the proper values. A window will pop up for entering the name

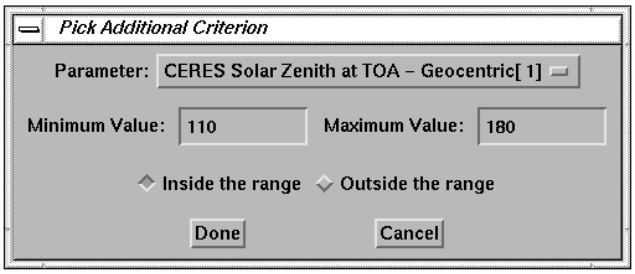

Fig. 4-122. Get Criterion Window

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of the variable for the result of this operation, as shown in Fig. 4-30. A subset of the selected variable is created and put into the Current Subsets list, as shown in Fig. 4-123. 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.

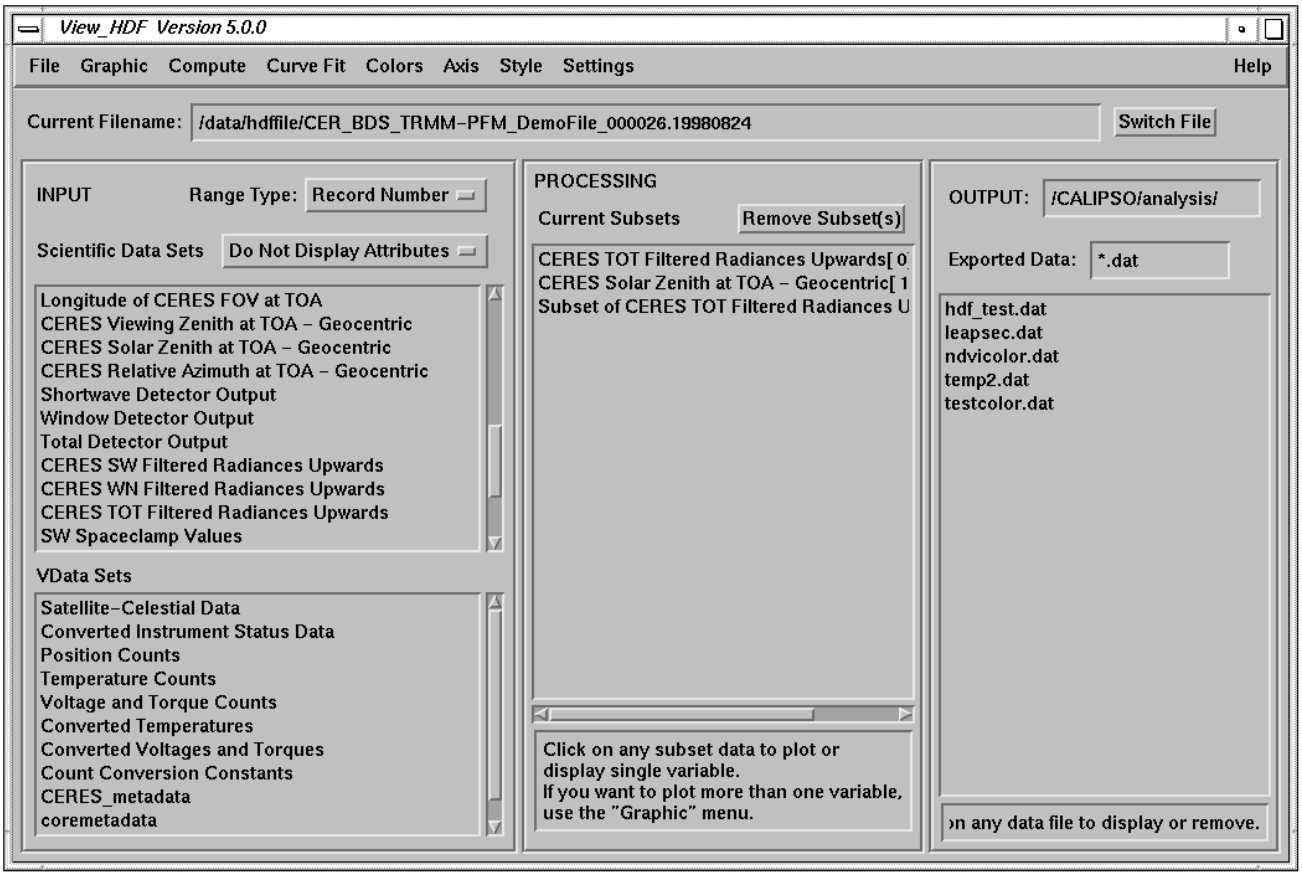

Fig. 4-123. Name of Subset Data

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Figure 4-124 shows the plot generated with the “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.

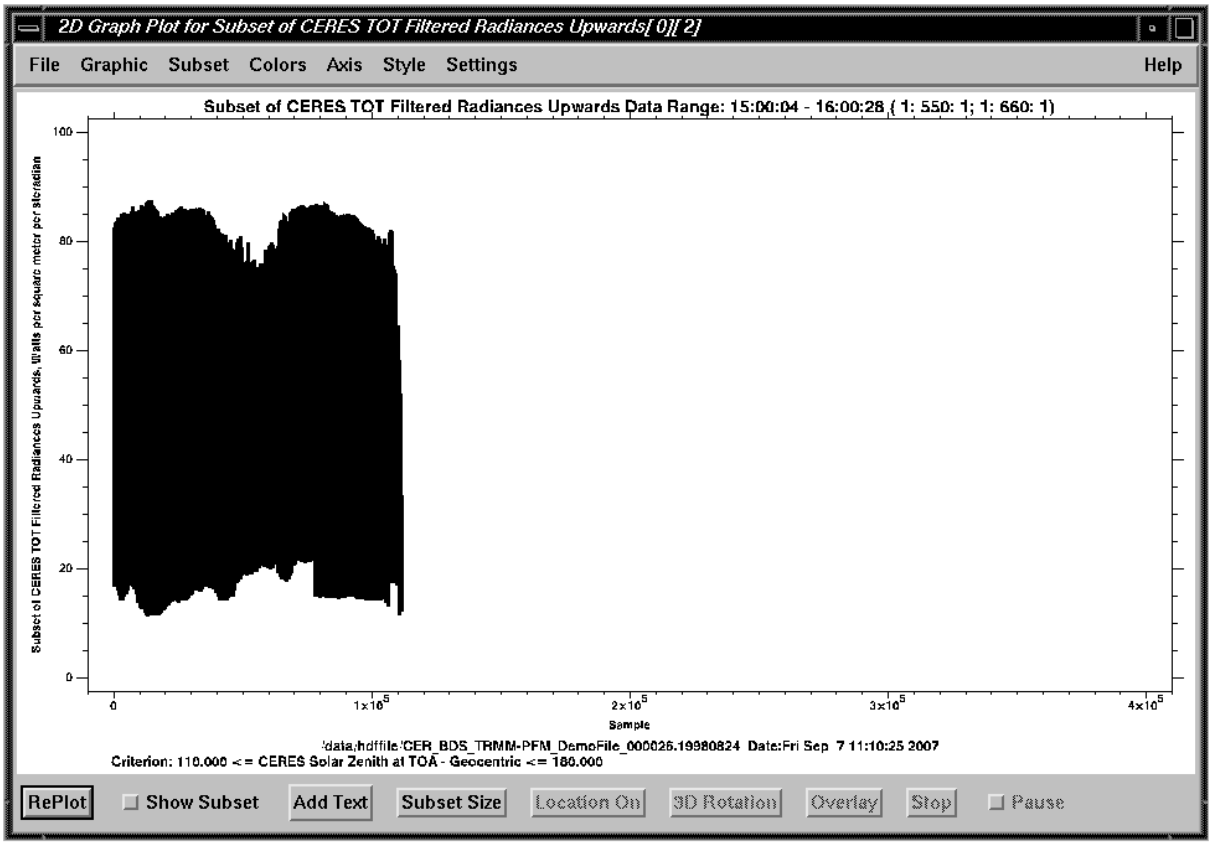

Fig. 4-124. 2D Plot with Criterion

(34) “Subsampling”: Subset the data set already imported into Current Subsets list. A window, as shown in Fig. 4-125, pops up with the dimension of the data. The dimension of the data is the current dimension in IDL format and is not relative to the original. The default variable name can be changed in the “Variable Name” field.

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After finishing the input, click the “Done” button. The new subsampling variable is added into Current Subsets list.

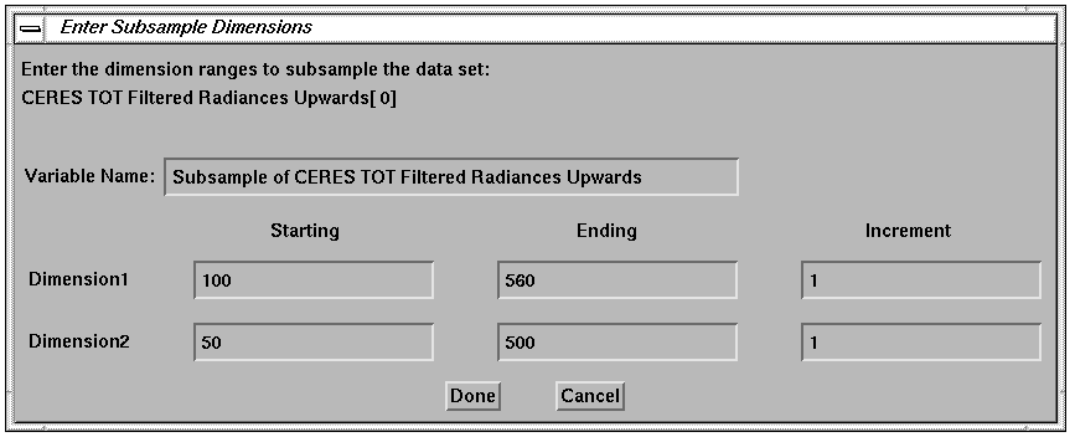

Fig. 4-125. Enter Subsample Dimensions Window

(35) “Array Average - 2D”: Average one- or two-dimensional array with option to select either row or column to do averaging first. When this option is selected, a window, as shown in Fig. 4-126, pops up for selecting the settings. The settings include:

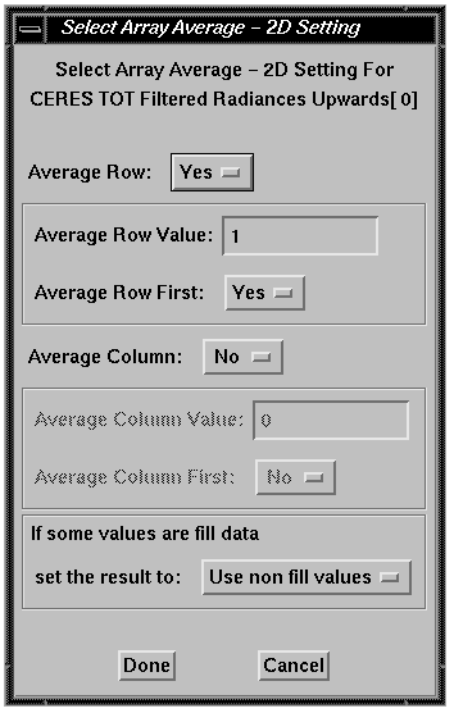

Fig. 4-126. Array Average - 2D Setting Window

(a) “Average Row”: Select “Yes” to do averaging of the row dimension of the array. For an one-dimensional array, this field has to set to ‘Yes” to do averaging. The default is “Yes”.

(b) “Average Row Value”: Specify the number of rows to do averaging for each column index.

(c) “Average Row First”: Select “Yes” to do the averaging of the row dimension first if an array is a two-dimensional. For an one-dimensional array, this field will be ignored. The default is set to “Yes”.

(d) “Average Column”: Select “Yes” to do averaging of the column dimension of an two-dimensional array. For an one-dimensional array, this field will be inactivated. The default is set to “No”.

(e) “Average Column Value”: Specify the number of columns to do averaging if item 35(d) is set to ‘Yes”.

(f) “Average Column First”: Select “Yes” to do the averaging of the column dimension first if item 35(d) is set to ‘Yes”. The default is set to “No”.

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(g) "If some values are fill data": Select "Use non fill values" for this field, use all the non fill data to calculate the mean value. Select "Fill value" option to set the average to fill data if one or more data are fill data. The default is set to "Use non fill values"

(36) "Array Average": Average an array with rank up to four. The order of the averaging is same as the order of the rank; first dimension of the array is averaging first, then the second, ... A window, as shown in Fig. 4-127, will pop up when this option is selected. Enter the "Starting", "Ending", and "Average Value" for each dimension, click the "Done" button to do the averaging, or click "Cancel" button to cancel this option.

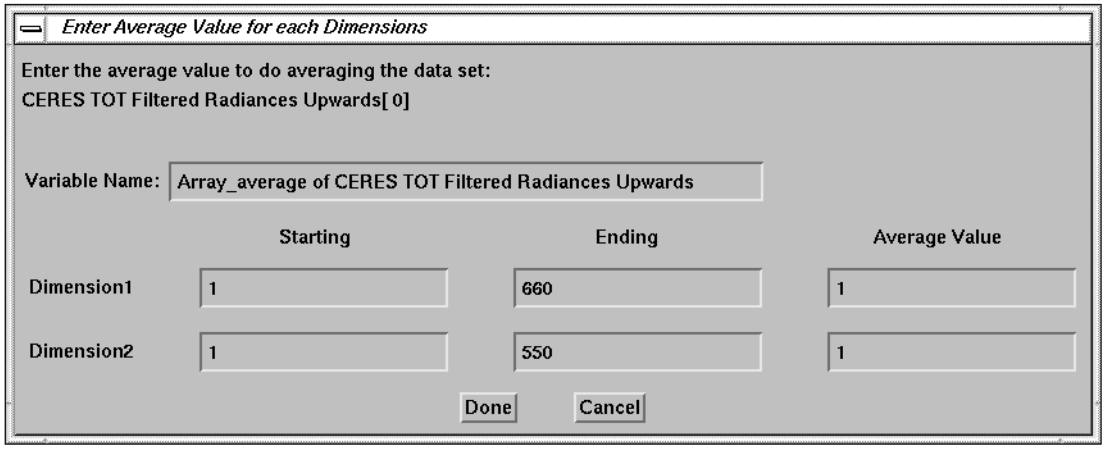

Fig. 4-127. Array Average Setting Window

(37) "Regression": Do a multiple linear regression fit. The calculated values and errors for the regression fit are added into the Current Subset list. The coefficients can optionally be written to a file. A window, as shown in Fig. 4-128, pops up for selecting the independent variables which have already been imported in the Current Subset list. "Time", the time of the day, and "Sample", the index of the data array, are added to the list. One or more independent variables can be selected. Click the "Done" button after selecting the variable(s). A procedure similar to "Curve Fit"; see item (4), is used which asks for the name of the variable for a calculated

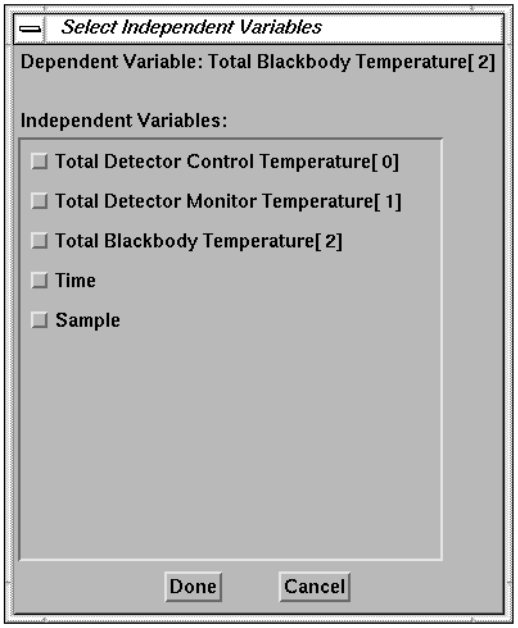

Fig. 4-128. Select Independent Variable Window

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result, writes the result to a file, and plots the result and errors. A sample result and plot are shown in Fig. 4-129 an Fig. 4-130

```
vi
Source Data Filename: /data/hdffile/CER_BDS_TRMM-PFM_DemoFile_000026.19980824
Data Name:  Total Blackbody Temperature[ 2]
Unit:  degrees centigrade
Data Range:  15:00:04 - 19:59:56 (1:2727:1; Order: 1:12:1)
The regression equation is:

    Y = 162.86734 - 5.7731831 X1 + 2.0140287 X2

    Y = Total Blackbody Temperature, degrees centigrade
    X1 = Total Detector Control Temperature, degrees centigrade
    X2 = Total Detector Monitor Temperature, degrees centigrade

Multiple correlation coefficient = 0.89455911

Linear correlation coefficient for X1 = -0.79079752
Linear correlation coefficient for X2 = 0.33146151
~
~
```

Fig. 4-129. Regression Fit Result

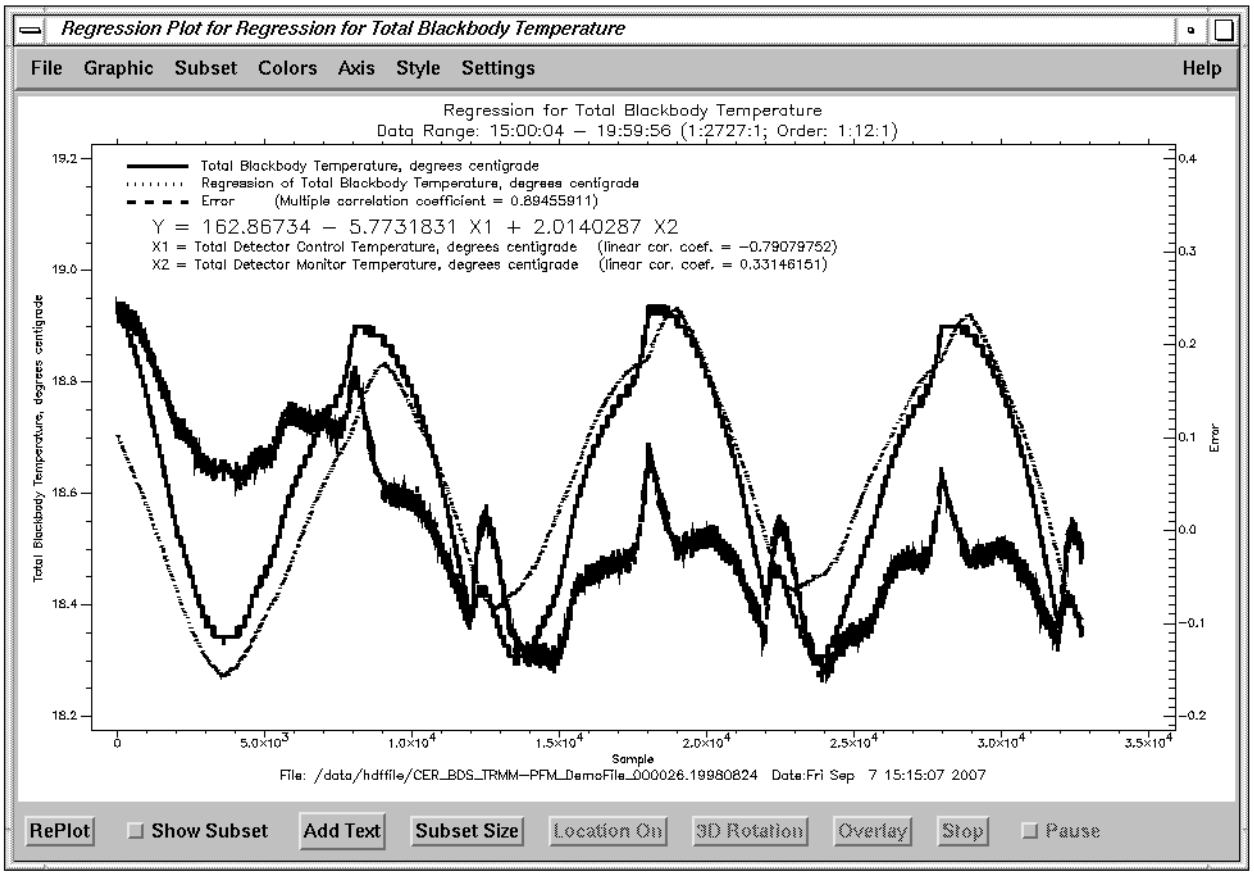

Fig. 4-130. Regression Fit Plot

(38) "Extract Bits": Extract specific contiguous bits from an integer variable. See item 3(p).

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(39) "Browse Image": Display a two-dimensional data array with two one-dimensional arrays, X and Y variables. The number of elements of the X variable is equal to the number of elements of the first dimension, and the number of elements of the Y variable is equal to the number of elements of the second dimension. A window, as shown in Fig. 4-21, pops up for selecting the X and Y variables. The "Profile Number" in "X Field Selection" is the index of the first dimension of the data, and the "Slab Number" in "Y Field Selection" is the index of the second dimension of the data. The "Locate" option in "Subset" menu, see item 51(b), is automatically turned on. A separated window will pop up to display an individual profile at the location where the left mouse button is pressed inside the browse image plot.

(40) "Browse Image With Average": This option is similar to the "Browse Image" graphic option, see item (39). Instead of plotting every profile, the index of the first dimension of the data set, this option allows the user to calculate an average for any number of profiles before plotting the result. A window, as shown in Fig. 4-131, pops up for entering the number of profiles to be averaged. Click the "Done" button after entering the value or the "Cancel" button to cancel this selection. An example of a browse image with 15 profiles average is shown in Fig. 4-132.

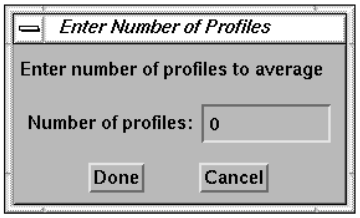

Fig. 4-131. Enter Number of Profile Window

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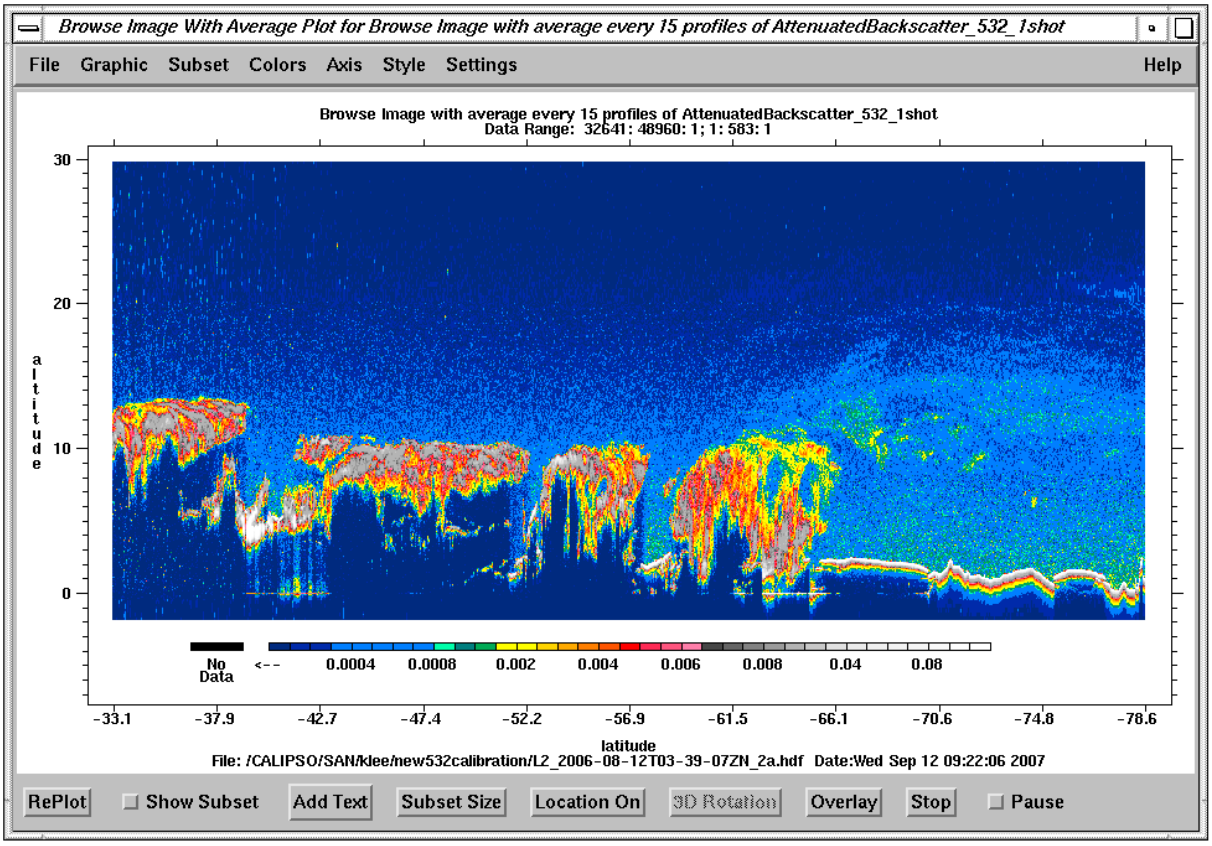

Fig. 4-132. Browse Image Plot

(41) "Vertical Feature Mask": This option is for Cloud - Aerosol Lidar Infrared Pathfinder Satellite Observation (CALIPSO) LIDAR Level 2 Vertical Feature Mask data product. This data product contains scene classification data and LIDAR lighting and land/water indicators. The spatial resolution for this product varies as a function of altitude. Each record contains 5 km horizontal segment of data that store in a 5515 elements array. For a detail description of this dataset, see the CALIPSO Data Product Catalog (Ref. 6).

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If this option is selected, a window, as shown in Fig. 4-133, pops up for selecting the feature to be displayed and settings which include:

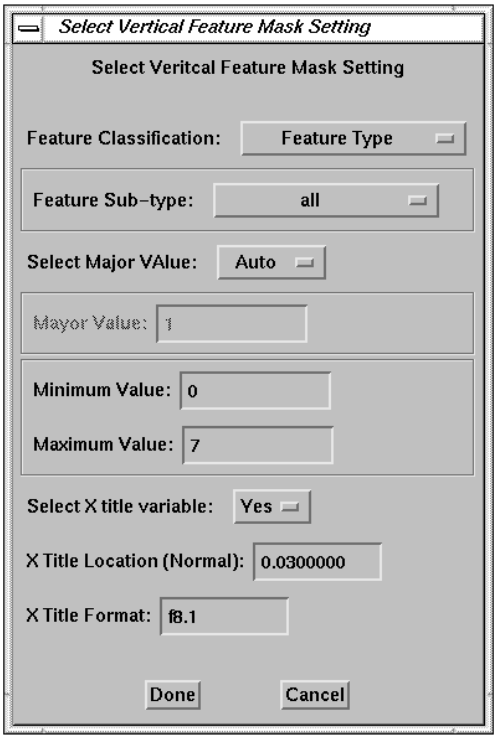

Fig. 4-133. Select Vertical Feature Mask Setting Window

(a) "Feature Classification": Select the "Feature Type", "Ice/Water Phase", and "Horizontal Averaging" type to display. The default is "Feature Type" option.

(b) "Feature Sub-type": If the "Feature Type" is selected, this field becomes activated to be selected the sub-type. The sub-types include "invalid", "clear air", "cloud", "aerosol", "stratospheric feature", "surface", "subsurface", "no signal", and "all". If "all" option is selected, all the features are displayed. The default is "all" option.

(c) "Select Major Value": Set the color represented for the major feature to display on the image first, then the other features will overplot on the image to speed the process. Select "Auto" option to let the tool selects the major color, select "Manual" to specify the major color by the user. The default is "Auto".

(d) "Mayor Value": This field will become activated to let user to enter the major color index, if "Select Major Value" option is set to "Manual".

(e) "Minimum Value": Specify the minimum value to display on the image. The default value is "0".

(f) "Maximum Value": Specify the maximum value to display on the image. The default value is "7".

(g) "Select X title variable": The default X title is set to "km" which is the distance along the Earth surface. This the setting in the Vertical Feature Mask output files (see Ref. 6). If this field set to "Yes", user can select another variable to display on the X axis instead of the default. This variable has to be imported to the Current Subset Field before selecting this option. The default is 'No".

(h) "X Title Location (Normal)": Specify the offset from the X-axis to display the X title if the "Select X title variable" is set to "Yes" option. The value is in normal coordinates. The default is "0.045".

(i) "X Title Format": Specify the output format to display the X labels on the X-axis. The default format is "f8.1".

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An example of vertical feature mask plot with selecting “Feature Type”, Sub-type set to “all”, and ‘Latitude” as “Select X title variable” options is shown in Fig. 4-134.

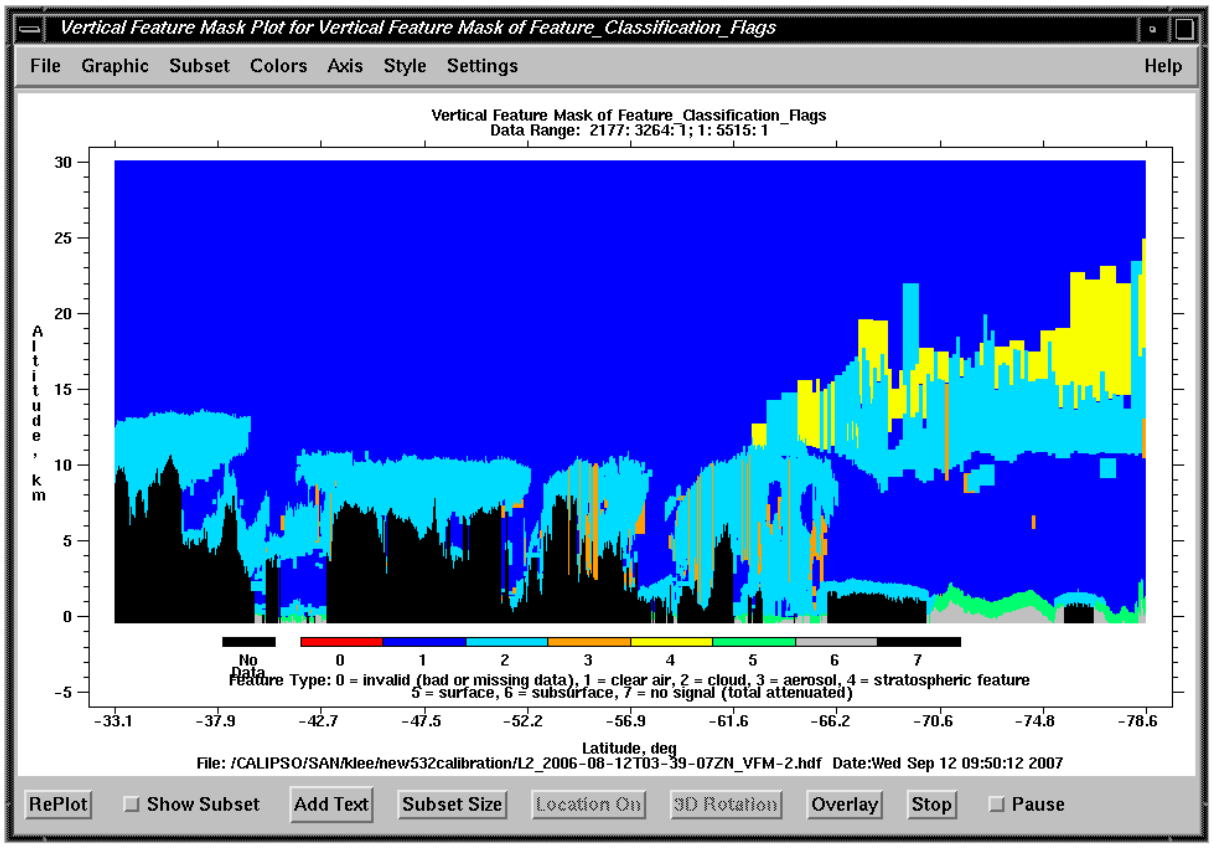

Fig. 4-134. Vertical Feature Mask Plot

(42) “Transpose”: Transpose a two-dimensional data array. A window, as shown in Fig. 4-30, pops up for entering the new variable name. As described in the “Statistics” option, see item (24), 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 needed for all elements from the second dimension on each first dimension array index, the two-dimensional data array needs to be transposed before the “Statistics” option is selected. Note: A vdata set with order greater than 2 is treated as a two-dimensional array.

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(43) “Display Data”: Display data on the screen in an edit window. The currently selected editor is used; see item 1(i). An example using the vi editor to display data is shown in Fig. 4-135.

```
vi
Source Data Filename: /QA/CERES/instrument/data/out_comp/CER_BDS_TRMM-PFM_Editio
n1_006000.19980105
Subset Name: Subset of CERES TOT Filtered Radiances Upwards[ 0][ 2]
Unit:  Watts per square meter per steradian
Criterion: 110.000 <= CERES Solar Zenith at TOA - Geocentric <= 180.000

      29.2709      39.5019      41.4779      39.9227      38.9713      40.1745
      45.6627      55.4222      64.5688      69.8919      72.2954      73.3363
      74.0708      74.6658      75.2468      75.8261      76.2520      76.8319
      76.9625      77.0855      77.3711      77.4885      77.6104      77.7608
      77.8883      78.0267      78.0066      78.1214      78.2583      78.4008
      78.5215      78.8246      79.1106      79.2366      79.2204      79.0593
      78.8965      78.8986      78.5816      78.5498      78.8419      79.2797
      79.7415      79.8826      79.7170      79.0970      78.7823      79.5511
      80.4513      81.0531      81.3415      81.4823      81.4842      81.3147
      80.5341      79.1576      78.0908      77.9383      78.8452      79.4497
      79.5979      79.1284      77.8897      76.6682      76.0570      76.0552
      77.2768      79.1193      79.5771      78.5046      77.4341      77.8822
      79.5446      80.6133      81.3681      81.9696      82.4306      82.5745
      82.4340      82.4266      82.1235      81.6578      81.4960      81.5010
      81.3457      81.1756      81.4695      81.4825      81.1811      81.0190
      81.0113      81.3145      81.7780      82.0684      82.0666      81.7780
      80.9932      80.3833      79.9192      79.9229      80.0721      80.3652
```

Fig. 4-135. Display Data

(44) “Display Attribute”: Display the attributes of the data set on an editor window. A sample display is shown in Fig. 4-136.

```
vi
Source Data Filename: /CERES/instrument/data/out_comp/Validation_Data/CER_BDS_TR
MM-PFM_Edition1_009001.19980105
Data Name: CERES TOT Filtered Radiances Upwards

The attributes for CERES TOT Filtered Radiances Upwards
long_name:  CERES TOT Filtered Radiance, Upwards
units:  Watts per square meter per steradian
format:  32-BitFloat
coordsys:  not used
valid_range:  0;700
_FillValue:  3.40282e+38
~
~
~
```

Fig. 4-136. Display Data Attributes

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(45) "Export Data": Export data to a file. A window, as shown in Fig. 4-137, pops up for entering the path and name of a file where the 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 1(i).

(46) "Export Data Without Filldata": This option is the same as the "Export Data" option, see item (45), except the fill data values are not written to the file.

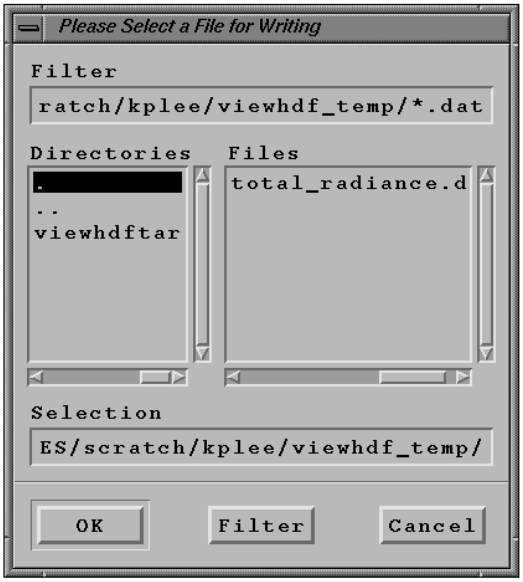

Fig. 4-137. Enter Export File Window

(47) "Change Name": Change the name of a variable in the Current Subsets list. A window, as shown in Fig. 4-30, will pop up for entering the new variable name if this option is selected. The "Clear" button clears the name field in the window. The new variable name will replace the old variable name in Current Subsets list.

(48) "Change Data Type": Change the data type of a variable in the Current Subsets list. if this option is selected, a window, as shown in Fig. 4-138, pops up for selecting the new data type. The original data type of the data set is also shown in the window. Click the new data type to change the data type of the data set or click the "Cancel" option to cancel this selection. Note: the DFNT_64 and the unsigned integer types, DFNT_UINT16, DFNT_UINT32, and DFNT_UINT64, are supported only in the IDL version 5.2 and later.

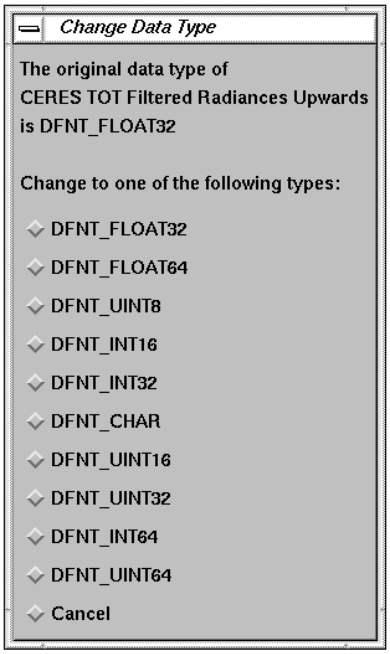

Fig. 4-138. Change Data Type Window

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(49) "Replace Data Value": Replace a range of data values or any particular data value to an assigned value. If this option is selected, a window, as shown in Fig. 4-139, pops for entering the range of data values to be replaced and the replacement value. There are three options for selecting the ranges. They are:

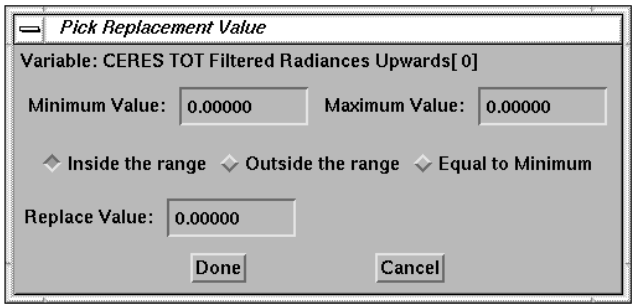

Fig. 4-139. Replace Data Value Window

(a) "Inside the range": Include data greater than or equal to the minimum value and less than or equal to the maximum values.

(b) "Outside the range": Include data less than the minimum value or greater than the maximum value.

(c) "Equal to Minimum": Include data equal to the minimum value.

Click the "Done" button to replace the data values of the data set which is in the Current Subsets list or click the "Cancel" button to cancel this selection.

(50) "Scale Data Value": Scale a data set with scale factor and offset values. When a data set is scaled using a scale factor and an offset value, the data can be stored using a smaller data type array to reduce the size of file. Therefore, some data sets in an HDF file need to be scaled back to their original values. If this option is selected, a window, as shown in Fig. 4-140, pops up to list eight equations for scaling data set.

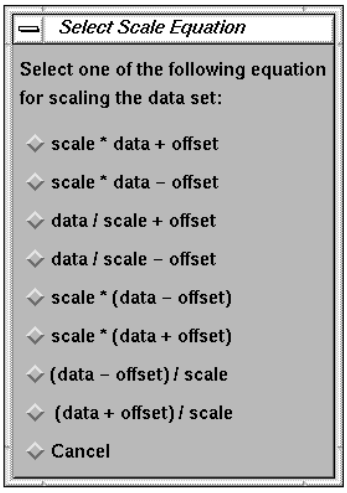

Fig. 4-140. Scale Equations Window

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After selecting one of these equations, another window, as shown in Fig. 4-141, will pop up for selecting how to get the scale factor and offset values.

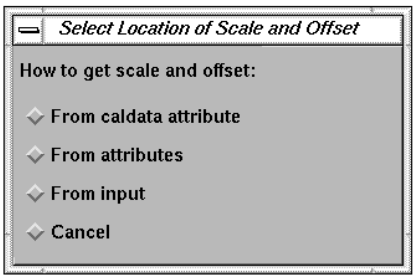

Fig. 4-141. Select Location of Scale and Offset Window

There are three options:

(a) "From caldata attribute": The scale factor and offset values are stored in the HDF calibration attribute for an SDS data set. This option is only valid for the fifth equation in the list. The scale factor and offset will be searched for automatically. If the calibration attribute is not found, a window, as shown in Fig. 4-142, pops up for selecting the values from other sources.

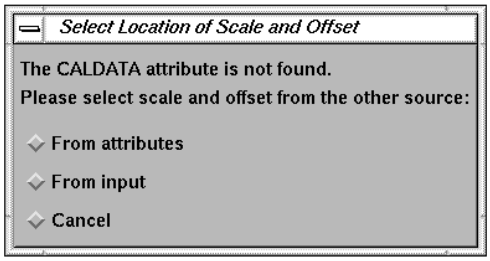

Fig. 4-142. Select Scale and Offset from Other Source Window

(b) "From attributes": The scale factor and offset values are obtained from the attributes of the data set. If this option is selected, two windows, as shown in Fig. 4-143, pop up with a list of the attributes for the data set from which to select the scale factor and offset values. Click the corresponding attributes, and the values of those attributes will be used to scale the data set.

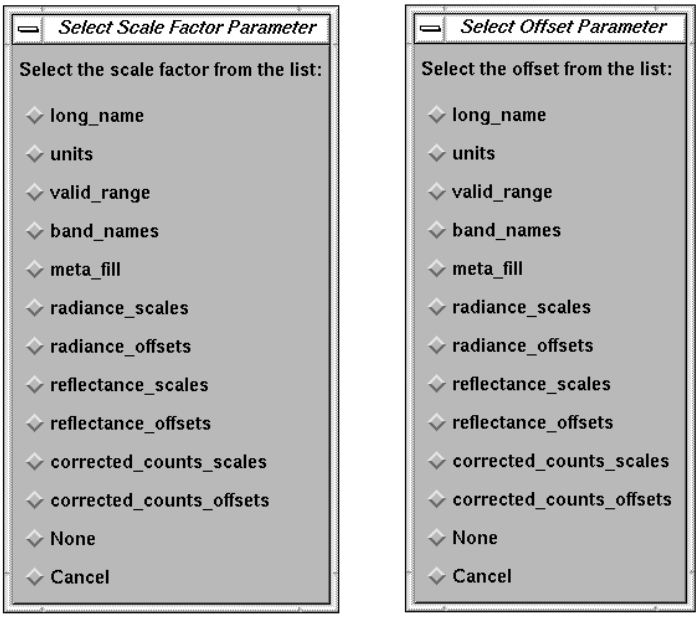

Fig. 4-143. Select Scale and Offset from Attribute Window

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(c) "From input": The scale factor and offset values are input by the user. If this option is selected, a window, as shown Fig. 4-144, pops up for entering the values of the scale factor and offset. Click the "Done" button to use the values, click the "Cancel" button to cancel this selection.

After the data values are scaled, the scaled data set will replace the data set in the Current Subsets list. No new data set is generated.

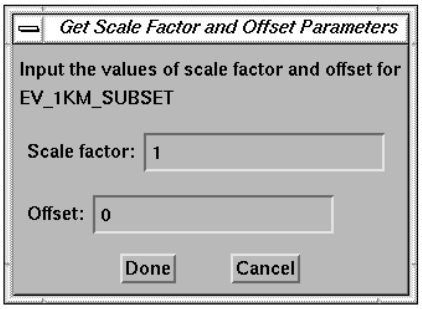

Fig. 4-144. Input Scale and Offset Window

(51) "Remove": Remove the name of a variable from the Current Subsets list. This option can be used to remove any subset which is no longer needed in order 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. 4-124):

(52) "File": This menu includes options for saving the plot in Postscript, encapsulated Postscript, GIF, PNG, JPEG, or MPEG format, exporting data to a file, printing the plot, making viewgraphs, changing settings, and closing the plot window. The menu is shown in Fig. 4-145.

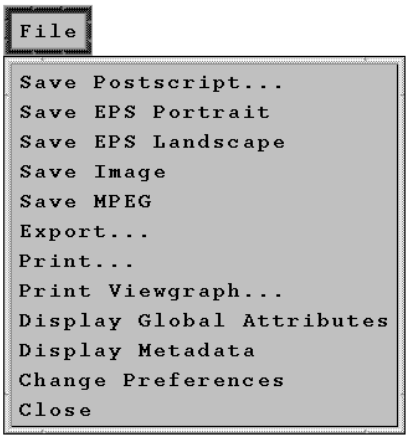

Fig. 4-145. File Menu

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The options are:

(a) "Save Postscript...": Save the plot to a file in Postscript format. A window, as shown in Fig. 4-146, 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. 4-146 pops up for entering the filename.

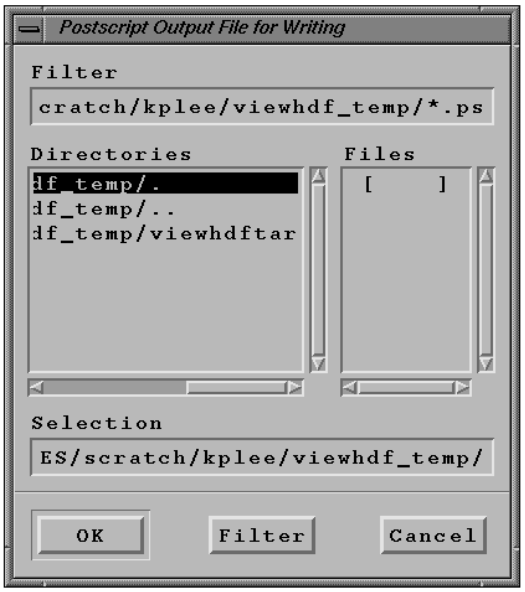

Fig. 4-146. Enter Postscript File Name Window

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

(d) "Save Image": Save the plot to a file with different format. A window, as shown in Fig. 4-147, with different kind of image formats will pop up let user to select the output image type. The image types include BMP (Microsoft Window Version 3 device independent bitmap), GIF (Graphics Interchange Format), JPEG (Joint Photographic Experts Group), PNG (Portable Network Graphics), PPM, SRF (Sun Raster File), and TIFF. After selecting the type of image to save, a window similar to Fig. 4-146 pops up for entering the filename. Click the "Ok" button to save the plot, or "Cancel" button to cancel saving the plot in a file. Note: GIF feature is not supported in IDL version 5.4 or later if a GIF license is not obtained from Unisys. In this case, the Portable Network Graphics (PNG) format can be used to save the plot.

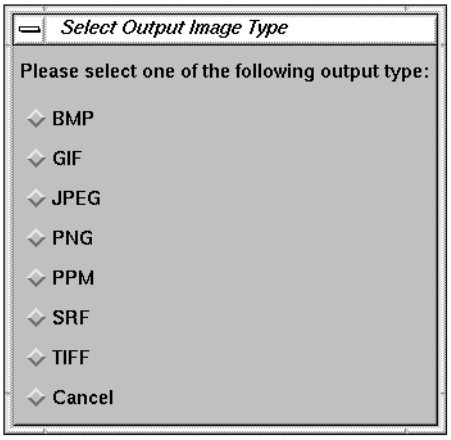

Fig. 4-147. Select Output Image Type Window

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(e) "Save MPEG": Save a "Geolocated" plot to a movie file with Moving Picture Experts Group (MPEG) format. A window similar to Fig. 4-146 pops up for entering the filename. After entering the filename, click the "Done" button. Another window, as shown in Fig. 4-120, pops up for entering the number of frames for the file. The playback speed is about 30 frames per second. Click the "Done" button to start generating the file, or click the "Cancel" button to cancel this selection. Note: It will take a while to create a mpeg file.

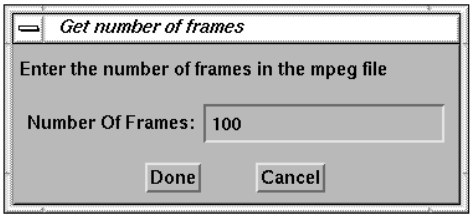

Fig. 4-148. Enter Number of Frames Window

(f) "Export...": Export data to a file. A window, as shown in Fig. 4-137, pops up for entering the name of the file to which the data are to be written. Click "OK" after entering the filename. There are two options:

(i) "Without Filldata": Does not write any data values greater than or equal to the fill data value if the fill data value is positive or any data values less than or equal to the fill data value if the fill data value is negative.

(ii) "With Filldata": Write all data values to a file, including fill data values.

The output format can be changed by using the "Format" option; see item 1(i).

(g) "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. 4-149, 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.

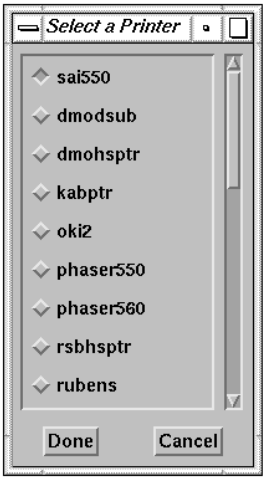

Fig. 4-149. Select Printer Window

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(h) “Print Viewgraph...”: Create a viewgraph of the plot. A window, as shown in Fig. 4-150, pops up for selecting the viewgraph printer. The first two entries specify CERES project-specific Tektronix Phaser 550 printers.

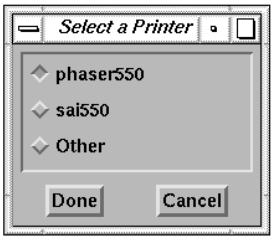

Fig. 4-150. Select Viewgraph Printer Window

If “Other” is selected, a window, as shown in Fig. 4-151,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.

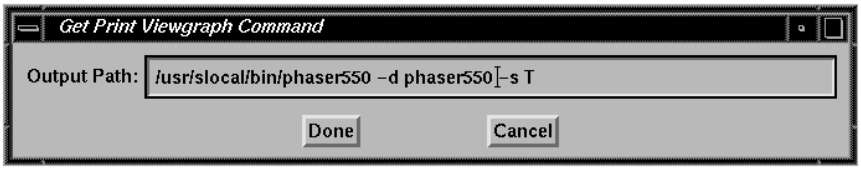

Fig. 4-151. Enter Print Viewgraph Command Window

(i) “Display Global Attributes”: Display the global attributes of an HDF file if this information is available. See item 1(d).

(j) “Display Metadata”: Display the metadata stored in an HDF file. The metadata is stored in vdata with name contained “metadata”. See item 1(e).

(k) “Change Preferences”: Change the default settings of the input and output directories, user-defined procedure directory, temporary directory, home directory, editor, open file filter, default color table, open format, and screen size. See item 1(k). If the screen size is changed, the graph will be replotted automatically.

(l) “Close”: Close the plot window.

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(53) "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. 4-152. See Section 4.2: Select Function Menu for a description of these options.

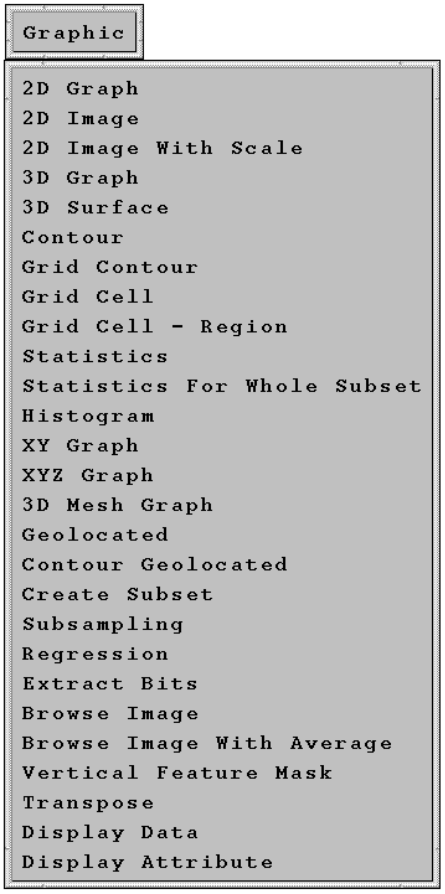

Fig. 4-152. Graphic Menu

(54) "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. 4-153.

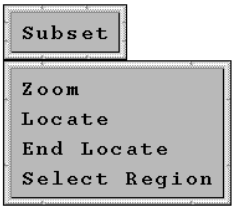

Fig. 4-153. Subset Menu

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 display the position. The position information is displayed in the window where IDL was started. Select "End Locate" to end this selection.

For "Browse Image" graphic options, see item (39) and item (40), the individual profile will be displayed at that location on the other window. An example of locating an

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individual profile with a browse image, as shown in Fig. 4-132, is given in Fig. 4-154.

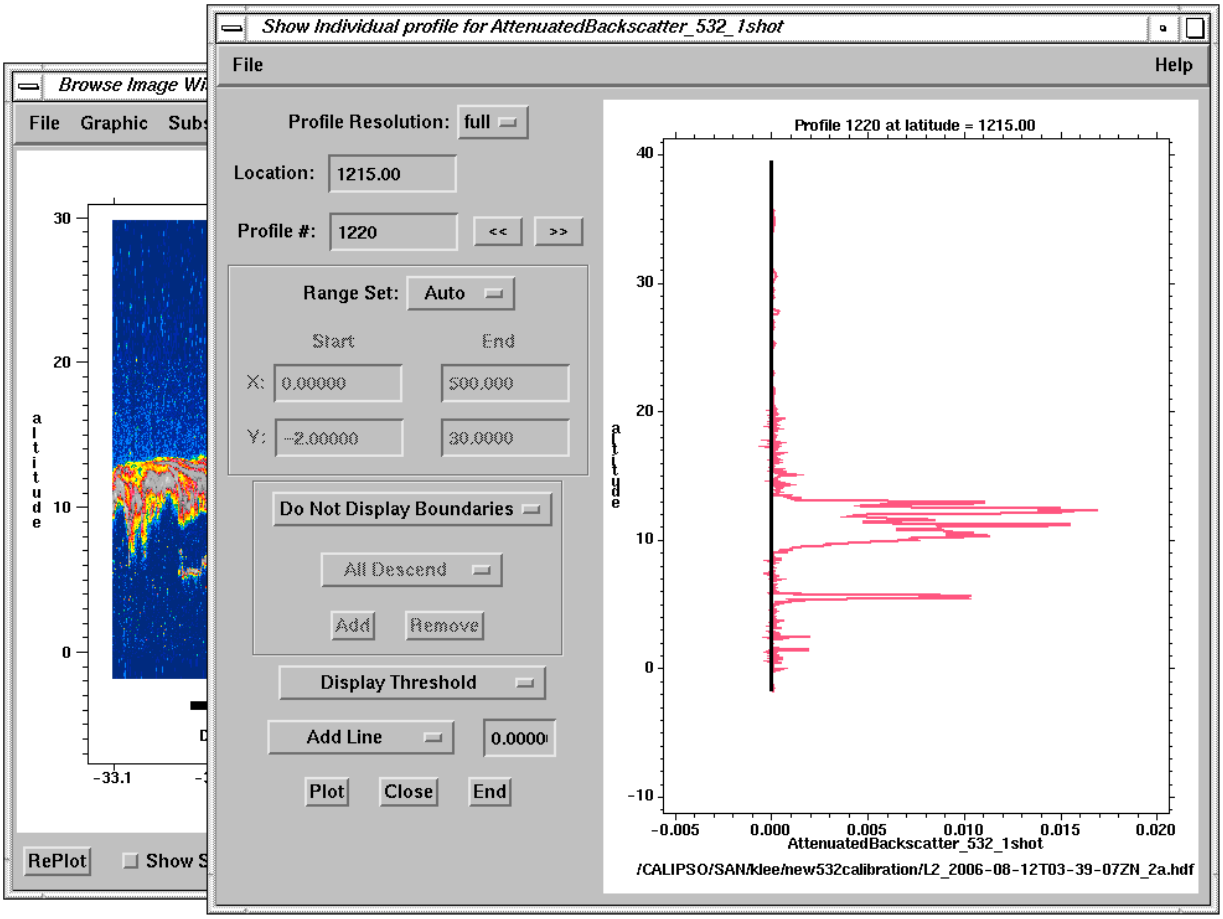

Fig. 4-154. Display individual profile from browse image plot

The fields in this separated window include:

(i) "Profile Resolution": Select the profile resolution to display the individual profile. The CALIPSO LIDAR Level 2 cloud and aerosol layer products are produced at different horizontal resolutions: full (1/3 km), 1 km, 5 km, 20 km, and 80 km. For a detail description of this data product, see the CALIPSO Data Product Catalog (Ref. 6).

(ii) "Location and Profile Number": Show the location of the X axis value and profile number of the displayed profile. The user can change the value to display any profile at a particular location or profile number. The "<<" button displays the previous profile and ">>" button displays the next profile.

(iii) "Range Set": Set the range to display the individual profile. The "Auto" option sets the range automatically. The "Manual" option allows user to set the range. The default is "Auto" option.

(iv) "Display Boundaries": Display or do not display the boundaries of the features on the browse image plot. This information is stored in the CALIPSO LIDAR Level 2 product; see the CALIPSO Data Product Catalog (Ref. 6). Any resolution

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boundary can be added or removed by using the “All Descend”, “Add”, and “Remove” buttons. The default is “Do Not Display Boundaries”. An example of a browse image, as shown in Fig. 4-132, with displaying the boundaries of features is given in Fig. 4-154.

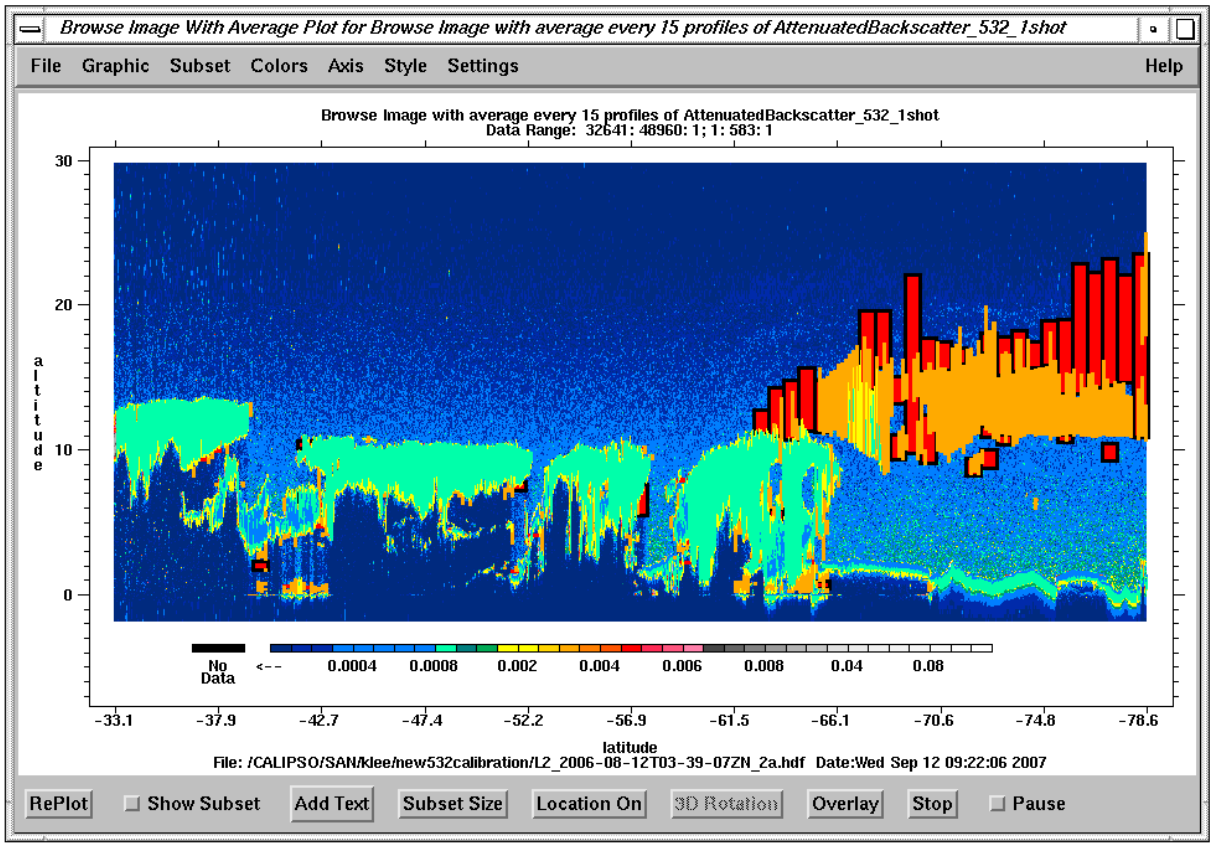

Fig. 4-155. Browse image plot with displaying boundaries of features

(v) “Display Threshold”: Display or do not display the threshold value on the plot. The default is “Display Threshold” option.

(vi) “Add Line”: Add a vertical line with specified value of the X axis on the plot or do not add a line. The default is added a vertical line at X equal to 0.0.

(viii) “Plot”: Display the individual profile again.

(ix) “Close”: Close this window (not this selection). This window will be appeared again if the left mouse button is pressed in the browse image plot.

(x) “End”: End this selection.

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

(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 mouse 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. 4-156.

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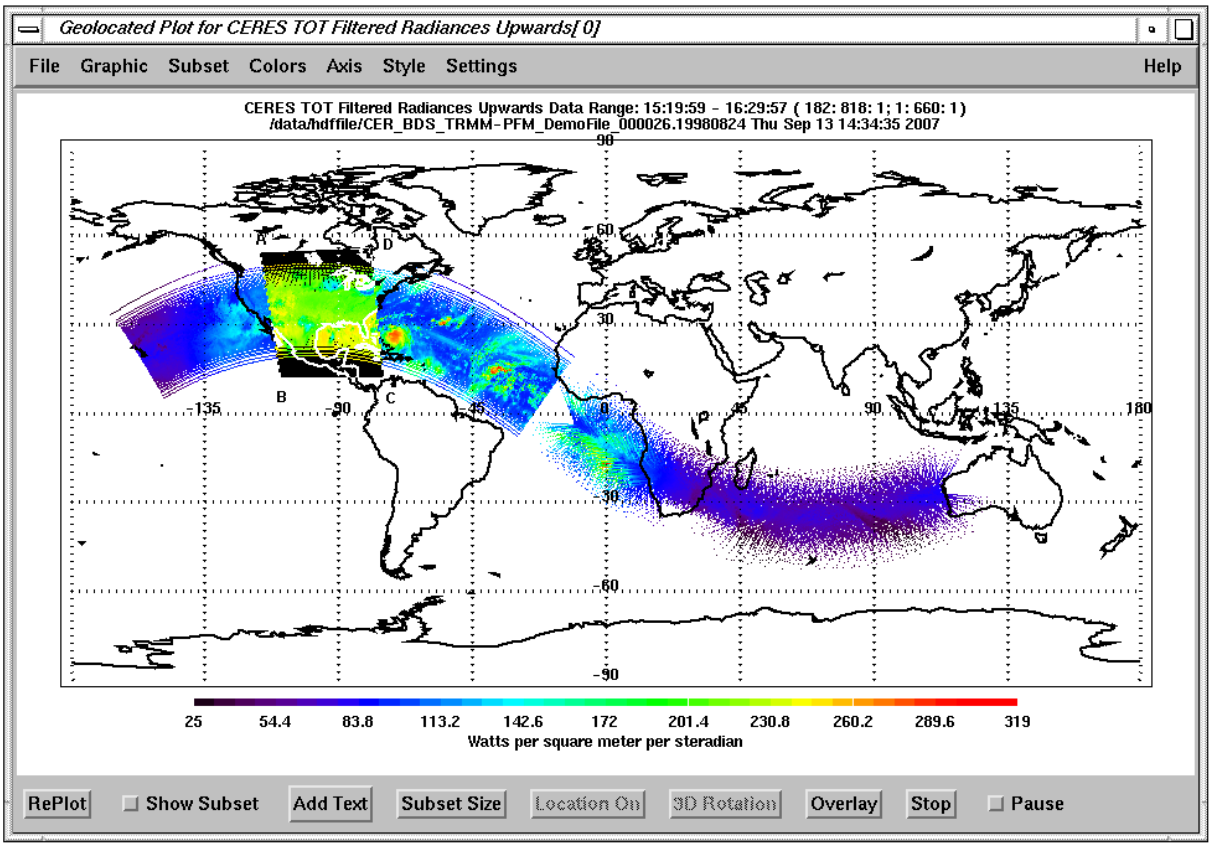

Fig. 4-156. Select Subset Region

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. 4-157, pops up for selecting options.

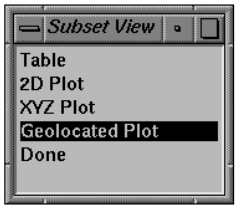

Fig. 4-157. Subset View Menu

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 selected region of the map projection. The values of the data are scaled by color.
(v) "Done": End the "Select Region" option.

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A “Geolocated Plot” for the selected region is shown in Fig. 4-158.

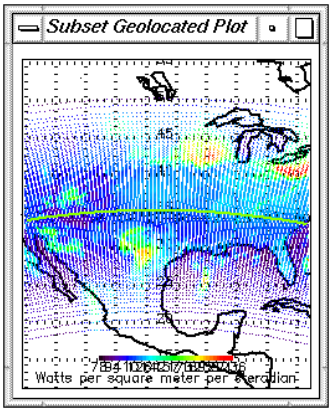

Fig. 4-158. Select Region Plot

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

(56) “Axis”: Set the ranges of the X, Y, and/or Z axes manually or automatically, use linear or logarithmic axes, or draw grid lines. See item (6).

(57) “Style”: Set the line type, symbol type, and symbol size to display data. See item (7).

(58) “Settings”: Set the X, Y, and/or Z axes ranges manually or automatically, set the display for any geolocated plot, set the longitude location of the first grid for a “Grid Cell” plot, set the display/not display option for a color bar, set the line or symbol and symbol size, fill data values, display time type, and select scale factors automatically or manually. See item (8).

(59) Help”: Call up this user guide, release note, IDL on-line help menu, or see information about view_hdf. See item (9).

(60) “RePlot”: Replot the graph. Press this button to replot the graph with any new setting.

(61) “Show Subset”: This option can be used to vary the subset that is displayed. After this option is selected, a window, shown in Fig. 4-159, will pop up with the “Range”, “X Start”, “Start”, and “Close” fields. These four fields are used to control the subset data:

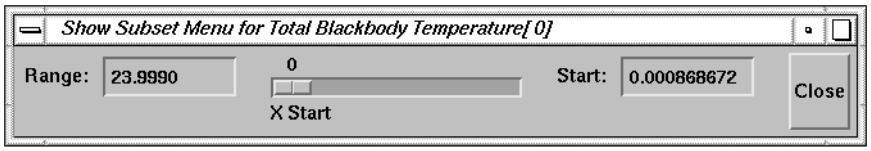

Fig. 4-159. Show Subset Menu Window

(a) “Range”: Set the range of the X axis. 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”.

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(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. 4-160 in which the range is set to 1 and X starts at 0.0.

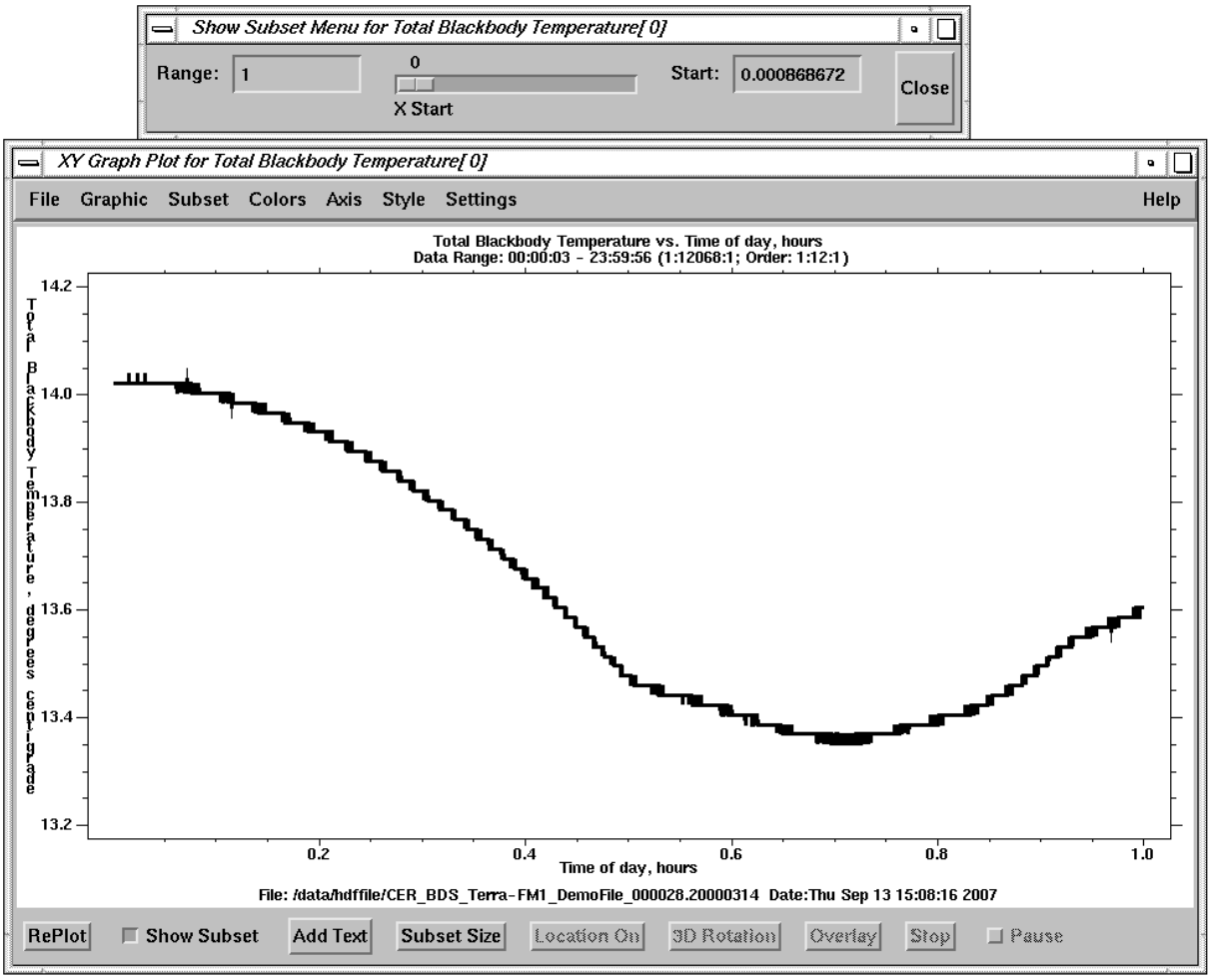

Fig. 4-160. Show Subset Plot

(62) “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. 4-161, pops up for entering text. The following fields are used to control this selection:

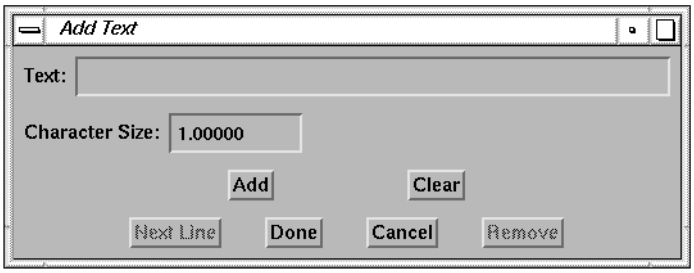

Fig. 4-161. Add Text Window 1

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(a) "Add": Add text to the plot. After this button is clicked, the text is added to the plot, and the Add Text window will display as shown in Fig. 4-162.

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

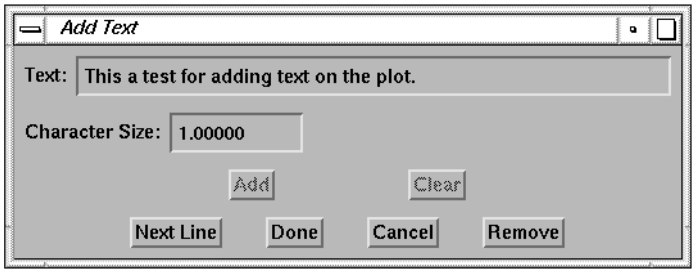

Fig. 4-162. Add Text Window 2

(c) "Next Line": Enter next line under the previous line. After this button is clicked, the Add Text window will be as shown in Fig. 4-161.

(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 to a plot is shown in Fig. 4-163.

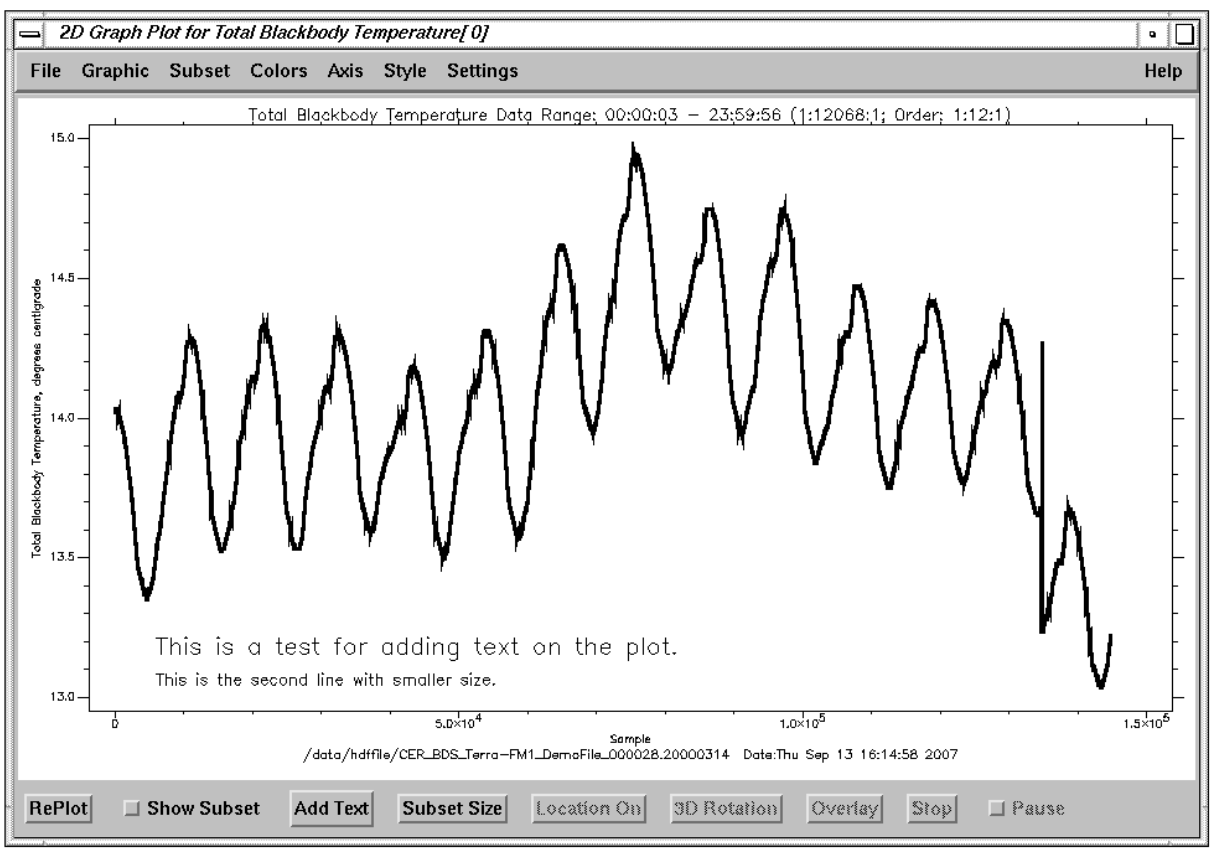

Fig. 4-163. Adding Text on a Plot

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(63) "Subset Size": Resize the subset plot window for "Select Region" (see item 51(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. 4-164, 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.

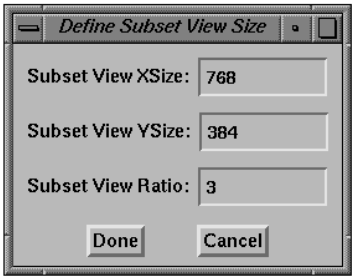

Fig. 4-164. Subset View Size Window

(64) "Location On": This button becomes activated if the "Locate" option in "Subset" menu is selected, see iitem 51(b). The button becomes inactivated again when the "Locate" option is turned off by selecting the "End Locate" option in the same menu, see item 51(c). This button can also turn off the "Locate" option.

(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. 4-165, pops up for entering the angles. The two angles are defined as:

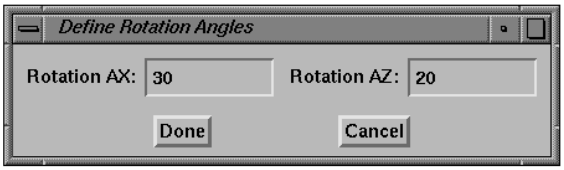

Fig. 4-165. 3D Rotation Window

(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.

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(66) "Overlay": This option lets user to overlay another data set on "XYZ Plot", "Scatter Contour Plot", "Grid Contour", "Grid Cell", "Grid Cell - Region", "XYZ Graph", "Geolocated", and "Contour Geolocated" graphic type plots. When one of these graphic types is selected, this button will be activated. Before overlaying another data set on one of these plots, the overlay data set and its X and Y parameters need to be imported into the Current Subsets area. Click the "Overlay" button, a window, as shown in Fig. 4-166, pops up for selecting the overlay parameters. They are:

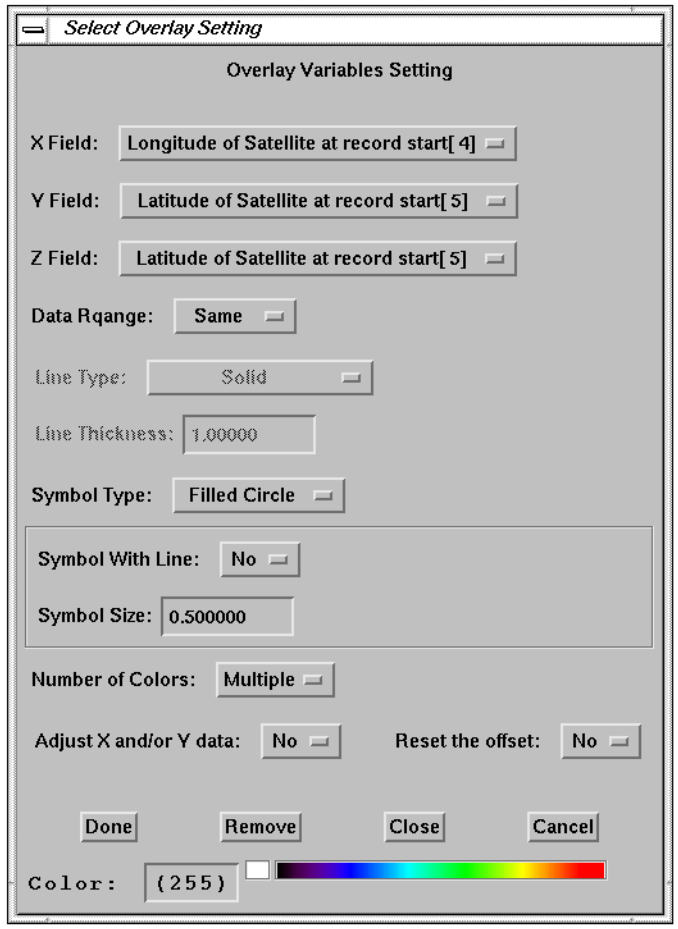

Fig. 4-166. Overlay Variable Setting Window

(a) "X Field": X parameter for the overlay data. Select "Index" to use the index of the array selected in the "Z Field" as X Field. The longitude is an example for a "Geolocated" plot.

(b) "Y Field": Y parameter for the overlay data. The latitude is an example for a "Geolocated" plot.

(c) "Z Field": Data set that will be overlaid on the plot.

(d) "Data Range": Use the same or different data range from the original data set. If "Different" is selected, the data range of the overlay data is set from the minimum to the maximum of the overlay data set. The default is "Same".

(e) "Line Type": The line type used to join data points.

(f) "Line Thickness": The thickness of the line that is used to join data points.

(g) "Symbol Type": Select line or symbol to display data points. The "No Symbol" option use a line to display data. This is the default option.

(h) "Symbol With Line": Select to use a line to connect all the symbols if a symbol is selected to mark the data points. The default is "No".

(i) "Symbol Size": Select the size of the symbol to mark the data points. The default is 1.0.

(j) "Number of Colors": Use a single color to display data points or use multiple colors to show different values of the data points. The default is "Single".

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(k) "Adjust X and/or Y data": By setting this field to "Yes", the X and/or Y values of the overlay data set can be adjusted. A window, as shown in Fig. 4-167, will pop up after the overlay data is plotted. The fields in this window are:

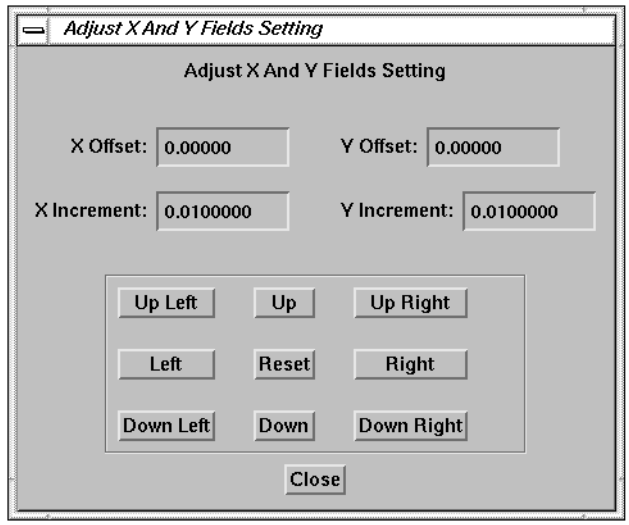

Fig. 4-167. Adjust X and Y Fields Setting Window

(i) "X Offset": The offset value of X parameter from the original X position. A negative value means the X values move left, while a positive value means the X values move right.

(ii) "Y Offset": The offset value of Y parameter from the original Y position. A negative value means the Y values move down, while a positive value mean the Y values move up.

(iii) "X Increment": The increment value or decrement value of X parameter for each time the "Right" or "Left" button is pressed. This value can be changed during the process.

(iv) "Y Increment": The increment value or decrement value of Y parameter for each time the "Up" or "Down" button is pressed. This value can be changed during the process.

(v) "Direction Buttons": These buttons control the direction movement of the overlay data set. The middle button is "Reset" which resets the X offset and Y offset to zero; i.e., the original position of X and Y parameters.

(vi) "Done": Click the this button if the adjustment is done.

By setting this field to "No", the adjustment will not be performed. The default is "No".

(l) "Reset the offset": By setting this field to "No", the value of "X Offset" and the value of "Y Offset" use the last values and the overlay data are plotted with these offsets. By setting this field to "Yes", the value of "X Offset" and the value of "Y Offset" are reset to zero and the overlay data are plotted with the original X and Y values. The default is "No".

(m) "Color": Select the color to display the overlay data points if the "Number of Colors" field is set to "Single". Select the color either by entering the color index or by clicking on the color bar.

(n) "Done": Click this button to start plotting the overlay data set on the plot after entering all the fields.

(o) "Remove": Remove the overlay data set from the plot; i.e., display the original plot again.

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(p) “Close”: Close this window.

(q) “Cancel”: Cancel this process.

An example for overlaying the ground track of Terra satellite on the ground track of Aqua satellite is shown in Fig. 4-168.

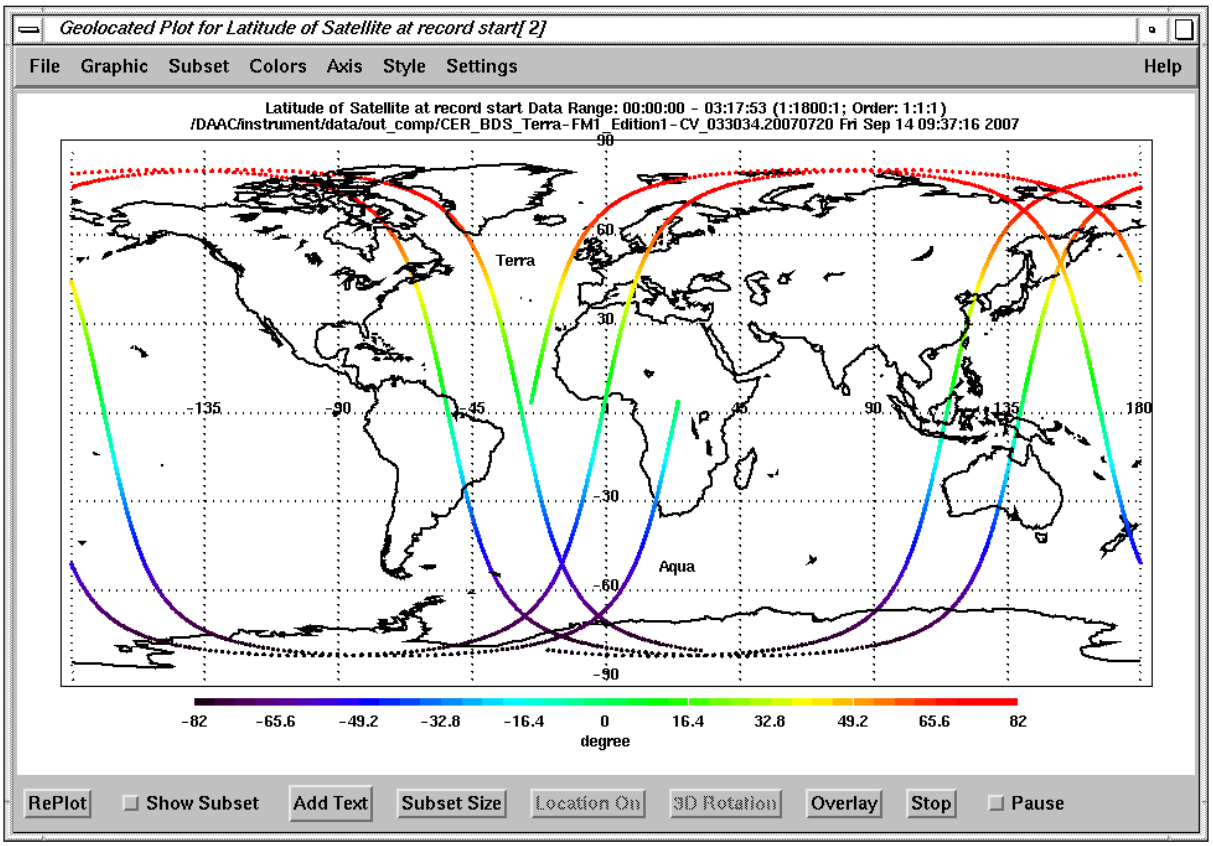

Fig. 4-168. Overlay a Data Set on a Geolocated Plot

(67) “Stop”: When this button becomes activated, click this button to stop the plotting.

(68) “Pause”: When this button becomes activated, click this button to pause the plotting. Click the button again to continue the plotting, or click “Stop” button to stop the process.

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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 (12)). 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 (12)) and "XY Graph" (item (27)) with the "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 Julian date. 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 format. 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.

(e) "Profile_UTC_Time": This is an one-dimensional SDS variable with double data type. The time is in UTC time with yymmdd.ffffff where yy is the two digits of the year, mm is the month, dd is the day, and ffffff is the fractional of the day. This variable is in the CALIPSO LIDAR output products.

(f) "Lidar_Shot_UTC_Time": This is an one-dimensional SDS variable with double data type. It has the same format as "Profile_UTC_Time". This variable is in the CALIPSO IIR and WFC output products.

(2) "Sample Number": These variables are used for the "XY Graph" (item (27)) with the "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.

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(3) "Packet Number - Relative": These variables are used for the "XY Graph" (item (27)) 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 (27)) 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 (31)) 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 the 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 the 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 the 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.

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(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.

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(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.

(y) “Longitude” or “longitude”: This is a SDS variable for the longitude of the FOV. The number of elements is equal to the number of elements in the data set.

(z) “Latitude” or “latitude”: This is a SDS variable for the latitude of the FOV. The number of elements is equal to the number of elements in the data set.

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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 settings. 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 and includes the items listed in Table 6-1. The user can change the settings with any editor.

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.filldata	value represents bad data.	1.0E+35
info.color_bar	draw color bar; 1 on, 0 off.	1
info.color_table	number of default color table.	13
info.open_path	path for open HDF file.	local directory
info.ascii_file.open_path	path for open ASCII 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_out.path	path for saving encapsulated Postscript output file.	local directory
info.eps_our.file	encapsulated Postscript output file name.	plot.eps
info.eps_out.check	check the existence of a "showpage" command in an encapsulated Postscript file; 0 yes, 1 no.	0
info.export_path	path for saving export data file.	local directory
info.export_file	export data file name.	export.dat
info.hdf_path	path for saving HDF data file.	local directory
info.hdf_filename	output HDF data file.	export.hdf
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.userdefine.old_path	path for last open user defined module.	local directory
info.userdefine.file	file name for last open user defined module.	
info.userdefine.path	path for user defined module.	
info.userdefine.name	module name of user defined module.	
info.userdefine.num_para	number of arguments for user defined module.	
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.home_path	path for home directory	from "HOME" environment variable
info.eps_out.type	type of encapsulated Postscript output file; 0 portrait, 1 landscape.	
info.eps_out.newsize	adjust the size of encapsulated Postscript output; 0 no, 1 yes.	0
info.eps_out.title	display the main title on an encapsulated Postscript output; 0 yes, 1 no.	0
info.eps_out.preview	type of preview is written to an encapsulated Postscript output; 0 none, 1 EPSI, 2 EPSF.	1
info.eps_out.p_xsize	horizontal size of portrait encapsulated Postscript output.	5.4 inches

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Table 6-1. Configuration File Settings

Configuration Item	Description	Default
info.eps_out.p_ysize	vertical size of portrait encapsulated Postscript output.	7.0 inches
info.eps_out.l_xsize	horizontal size of landscape encapsulated Postscript output.	9.0 inches
info.eps_out.l_ysize	vertical size of landscape encapsulated Postscript output.	6.95 inches
info.editor_type	type of editor; 0 vi, 1 emacs, 2 ieditor.	0
info.editor	name of editor for “Other” option.	vi
info.menu_order.flag	set the order to display options in Graphic menu and Select Function menu; 0 auto, 1 alphabetic, 2 favorite	0
info.menu_order.select	selected options that display at the beginning of the menu.	
info.printcommand	command for print viewgraph for “Other” option.	
info.style.linetype	line type for displaying data points.	0 for solid line
info.style.linethick	thickness of line that is used to join data points.	1.0
info.style.symbol	symbol type for displaying data points.	0 for no symbol
info.style.usersym	user defined type symbol.	
info.style.symbolsize	symbol size for marking data.	1
info.style.symbolline	connect symbols with line; 0 no line, 1 with line.	0
info.style.grid	draw grid lines on major tick marks; 0 no grid lines, 1 with grid lines.	0
info.style.colorindex	color index to display data on the plot.	foreground color
info.char.size	character size.	0.6 for (SGI); 1 for (Sun)
info.char.font	set the font of text display on plot: 0 vector, 1 hardware, 2 True-Type Outline.	0
info.char.fontname	name of the font if hardware or True-Type Outline selected.	
info.char.fontsize	set the font size if hardware or True-Type Outline selected.	12
info.char.spacesize	set the line spacing if hardware or True-Type Outline selected.	12
info.greenwich.greenloca	longitude location at the center of map projection.	0 degree
info.greenwich.lat_loc	latitude location at the center of map projection.	0 degree
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.with_level	type of color mapping to data value; 0 continue, 1 discrete, 2 log discrete.	0
info.greenwich.ext_level	display out of range data as bad data; 0 no, 1 yes.	0
info.greenwich.n_level	number of levels for discrete or log discrete color bar option.	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.smooth	option for contour geolocated graphic option.	0 for with smoothing
info.greenwich.n_x_grid	number of grids in longitude location for contour geolocated graphic option.	360
info.greenwich.n_y_grid	number of grids in latitude location for contour geolocated graphic option.	180
info.greenwich.continents	redraw the continents boundaries; 1 on, 0 off.	0
info.greenwich.mlinethick	line thickness for drawing the boundaries of continents.	1
info.greenwich.high_resol	use high resolution map if it is available: 0 no, 1 yes.	1
info.greenwich.coasts	draw coastline, lake, island on a map: 0 no, 1 yes	1
info.greenwich.grid	display the meridian lines on the map; 0 no, 1 yes.	1
info.greenwich.glinethick	line thickness used to draw the meridian lines.	1.0
info.greenwich.noborder	draw a border around the map; 0 yes, 1 no.	0
info.greenwich.contour	type of contour displayed on a Contour Geolocated plot; 0 contour, 1 image.	0
info.greenwich.altitude	distance of the point of perspective from the center of the globe for Satellite projection; ratio of Earth radius (6371 km).	2.0
info.greenwich.tilt	downward tilt of the camera for Satellite projection.	0.0 degree

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Table 6-1. Configuration File Settings

Configuration Item	Description	Default
info.greenwich.rotation	rotation of the projection plane for Satellite projection; expressed in degrees clockwise from north.	0.0 degree
info.greenwich.baddata	set the color that represents bad data.	!P.BACKGROUND
info.greenwich.barsize	set the horizontal size of each color in the color bar (normal coordinates).	0.011
info.greenwich.setformat	set the format display under the color bar: 0 auto, 1 manual	0
info.greenwich.bformat	set the format if info.greenwich.bformat set to manual.	f8.1
info.greenwich.colborder	display the border for each color in the color bar: 0 no, 1 yes.	1
info.greenwich.displaybad	display the color that represents bad data: 0 no, 1 yes.	1
info.grid_start.long	the longitude location of first grid data; value greater than 360 means auto.	500
info.browse_image.type	how a browse image is created; 0 image, 1 grid cells, 2 points	0
info.browse_image.shotscale	set the number of lidar shots per km.	3
info.browse_image.btype	set the color bar range: 0 predefined (auto), 1 manual.	0
info.browse_image.rtype	set the color table: 0 14 levels, 1 new 34 levels, 2 old 34 levels.	0
info.browse_image.utype	set the unit of the profiles: 0 km, 1 meter.	0
info.browse_image.ytype	set the y range: 0 predefined (auto), 1 manual.	0
info.browse_image.xlocat	set the vertical location of x title from the x-axis (normal coordinates).	0.045
info.browse_image.useprofile	use the profile number as X scale to display the data instead of selected X-field variable: 0 no, 1 yes.	0
info.vfm.usesubset	use selected X-field variable as X values to display on the X-axis:0 no, 1 yes.	0
info.vfm.xlocat	set the vertical location of x title from the x-axis (normal coordinates).	0.045
info.d2_image.image_order	set the display directory of a 2D Image: 0 Bottom-To-Top, 1 Top-To-Bottom.	0
info.d2_image.colorbar	display a color bar on a 2D Image plot: 0 no, 1 yes.	0
info.d2_image.yoffset	set the y location of color bar (normal coordinates).	0.15
info.d2_image.deltx	set the horizontal size of each color in the color bar (normal coordinates).	0.44
info.d2_image.delty	set the vertical size of each color in the color bar (normal coordinates).	0.022
info.d2_image.bar_offset	set vertical offset from the color bar to display the text (normal coordinates).	0.038
info.time_type.old	time type; 0 hours, 1 minutes, 2 seconds.	2
info.time_type.new	time type; 0 hours, 1 minutes, 2 seconds.	2
info.screen.pick	type of screen size; 0 1024x600, 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
info.previous_file.max	maximum number for storing previous open files	5
info.previous_file.store	file name for previous open file	

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7.0 Examples

This section gives examples for making some special plots using view_hdf. The first example is a plot of total filtered radiances for nighttime from a BDS file (Ref. 5) on a map projection. The procedure is:

(1) Open a BDS file with “File” --> “Open HDF Files”.
(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.

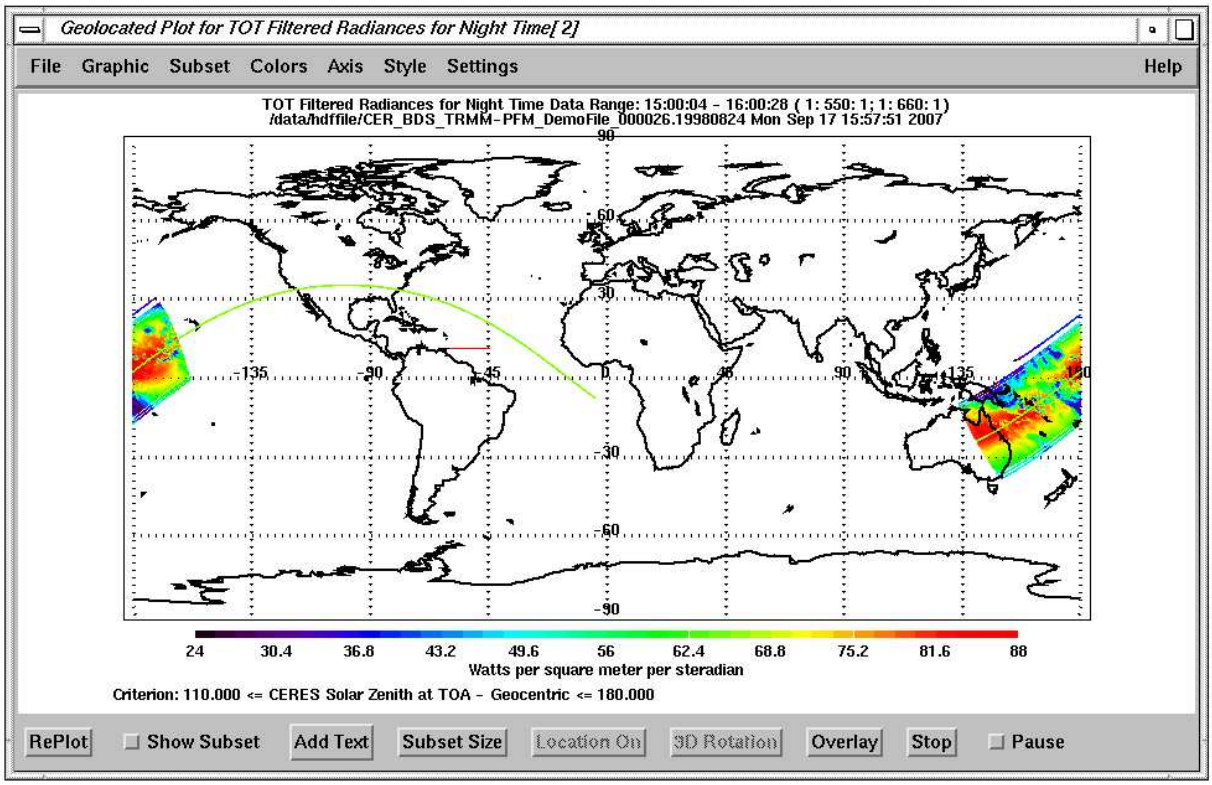

Fig. 7-1. Total Filtered Radiances for Night Time

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The second example is a plot of scene ID from an ES8 file (Ref. 5) 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” --> “Change Preferences” to change the “Open File Filter” to “CER_ES8_*”.
(2) Open an ES8 file with “File” --> “Open HDF file”.
(3) Import “ERBE scene identification at observation” data set from 15:00:00 to 16:35:00.
(4) Select “Settings” --> “Color Bar” --> “Discrete” to display the data with discrete color mapping. The “Number Of Discrete Intervals” field becomes activated.
(5) Enter “13” in “Number Of Discrete Intervals” 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.

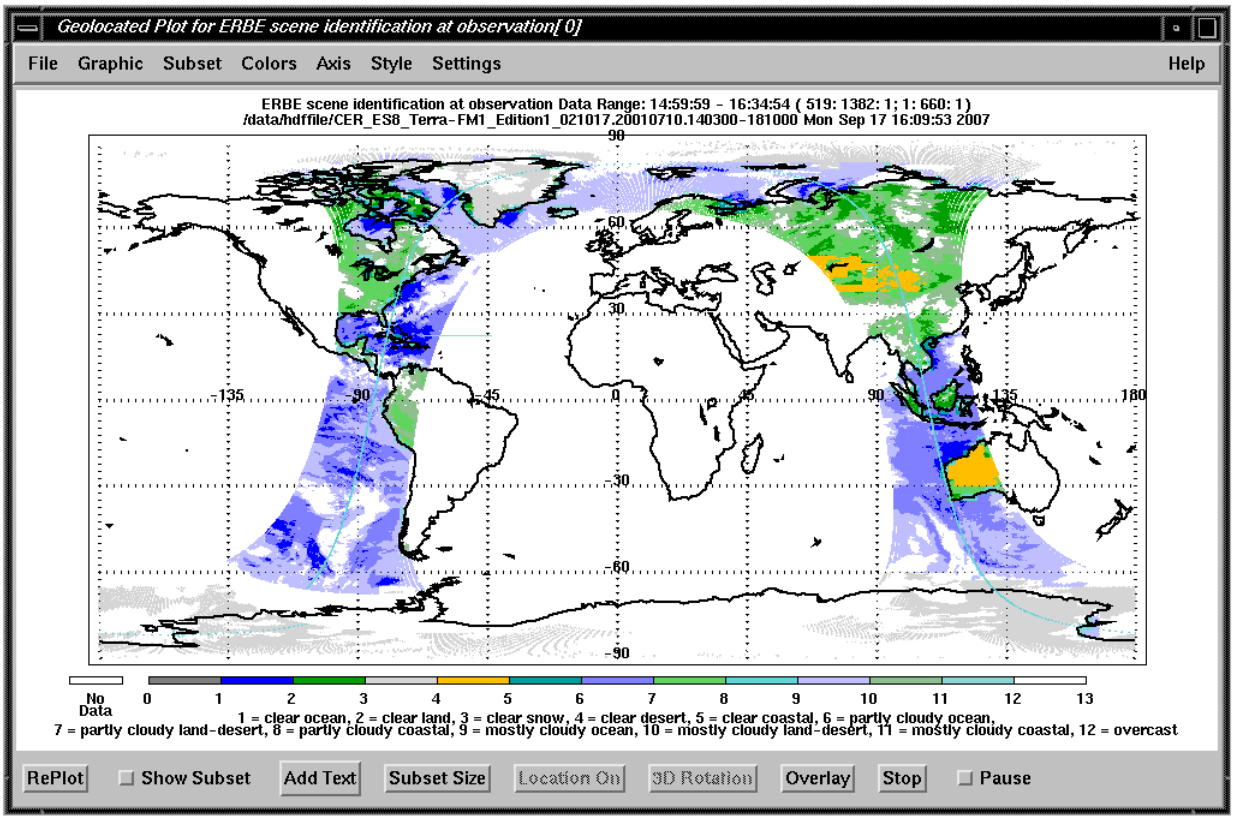

Fig. 7-2. Scene ID with 13 Levels

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To change back to continuous color, the procedure is:

(1) Select “Settings” --> “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 third example shows how to use “Extract Bits” option to extract some specific contiguous bits from an integer variable. The “Radiance and mode flags” in a CERES BDS file (Ref. 5) contain the filtered radiance quality flags and instrument mode flags. The bits from 10 to 13 represent the “Elevation scan plane”. The definition of the bit patterns is given in the BDS Collection Guide (Ref. 5). The procedure is:

(1) Use “File” --> “Change Preferences” to change the “Open File Filter” to “CER_BDS_*”.

(2) Open a SSF file with “File” --> “Open HDF File”.

(3) Import “Radiance and mode flags” SDS from SDS field 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 up for entering the starting location bit and the number of bits to extract. Enter 10 for Start Bit field and 4 for Number of Bits field and click the “Done” button.

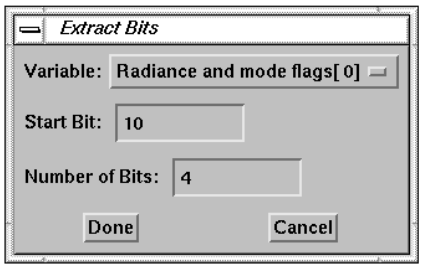

Fig. 7-3. Extract Bits Window

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

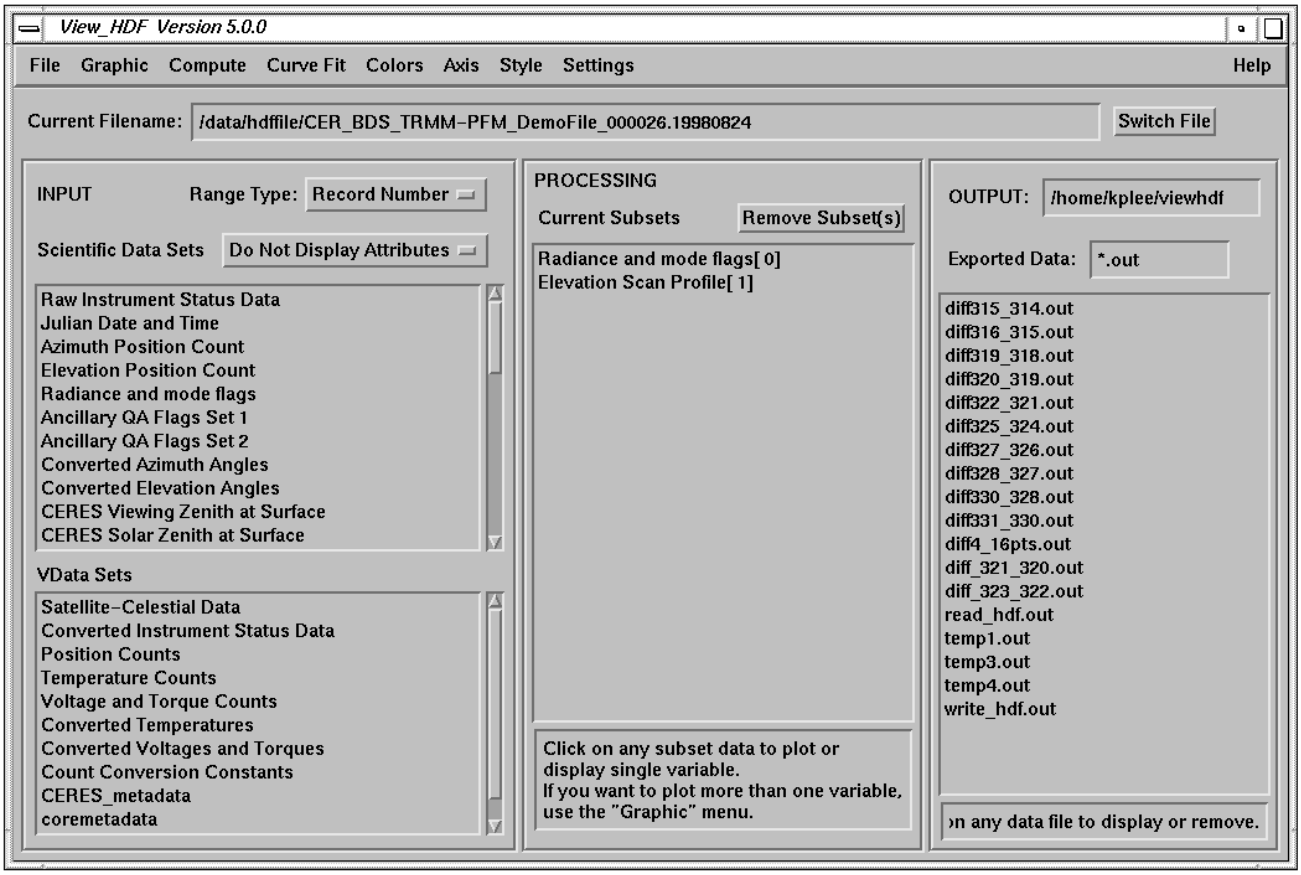

Fig. 7-4. Extract Elevation Scan Plane Flag

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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, one represents the elevation scan profile in Short Earth Scan mode, four represents the stowed profile, and five represents Other profile.

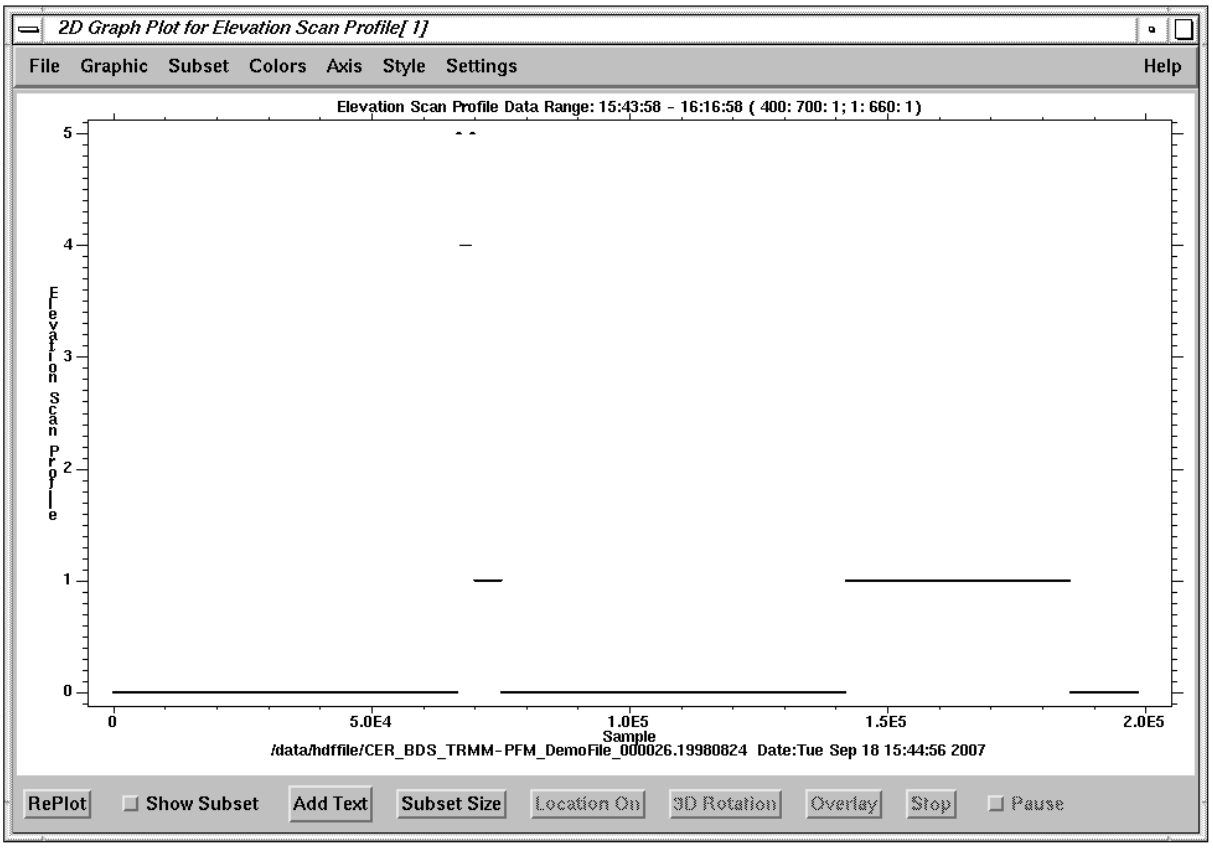

Fig. 7-5. 2D Plot for Elevation Scan Plane Flag

The fourth example shows how to use the "Create an HDF File" and "Add Data to an HDF File" options to combine data sets from two different files. The "Geolocated" graphic option plots only one variable at a time. If a user wants to plot two data sets from two different files on a map projection, the two data sets are written into one HDF file, which is then opened for plotting. The procedure is:

(1) Open a BDS file (Ref. 5) for the TRMM instrument with "File" --> "Open HDF Files".
(2) Import "CERES TOT Filtered Radiances Upwards", "Colatitude of CERES FOV at Surface", and "Longitude of CERES FOV at Surface" variables into Current Subsets list.
(3) Select "File" --> "Create an HDF File" option.
(4) Enter the filename "TRMM_Terra.hdf in the select file window and click "OK" button.
(5) Click the "All Variables" button to select all the variables from the Current Subsets list to be written into the HDF file.
(6) After all selected data written to the file, open the second file, a BDS file for the Terra instrument, with "File" --> "Open HDF Files".
(7) Import the same three variables into the Current Subsets list.
(8) Select "File" --> "Add Data to an HDF File" option.
(9) Select the same HDF file, TRMM_Terra.hdf, from the select file window.

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(10) Click the “Selected Variables” button and select the three variables imported from the second file from the “Select Output Variables” window to add into the file.
(11) Since the data sets have the same names as the data sets already in the file, the Write HDF Question window pops up. Select the “Append data to the data set” to append the new data sets at the end of each corresponding data set. The window will pop up three times, one for each data set.
(12) Open the newly created HDF file, TRMM_Terra.hdf, with “File” --> “Open HDF Files”.
(13) Import “CERES TOT Filtered Radiances Upwards” into the Current Subsets list.
(14) Click the variable in the Current Subsets list and select the “Geolocated” option from the popped up “Select Function” window. Click the “Done” button.

The result plot is shown if Fig. 7-6.

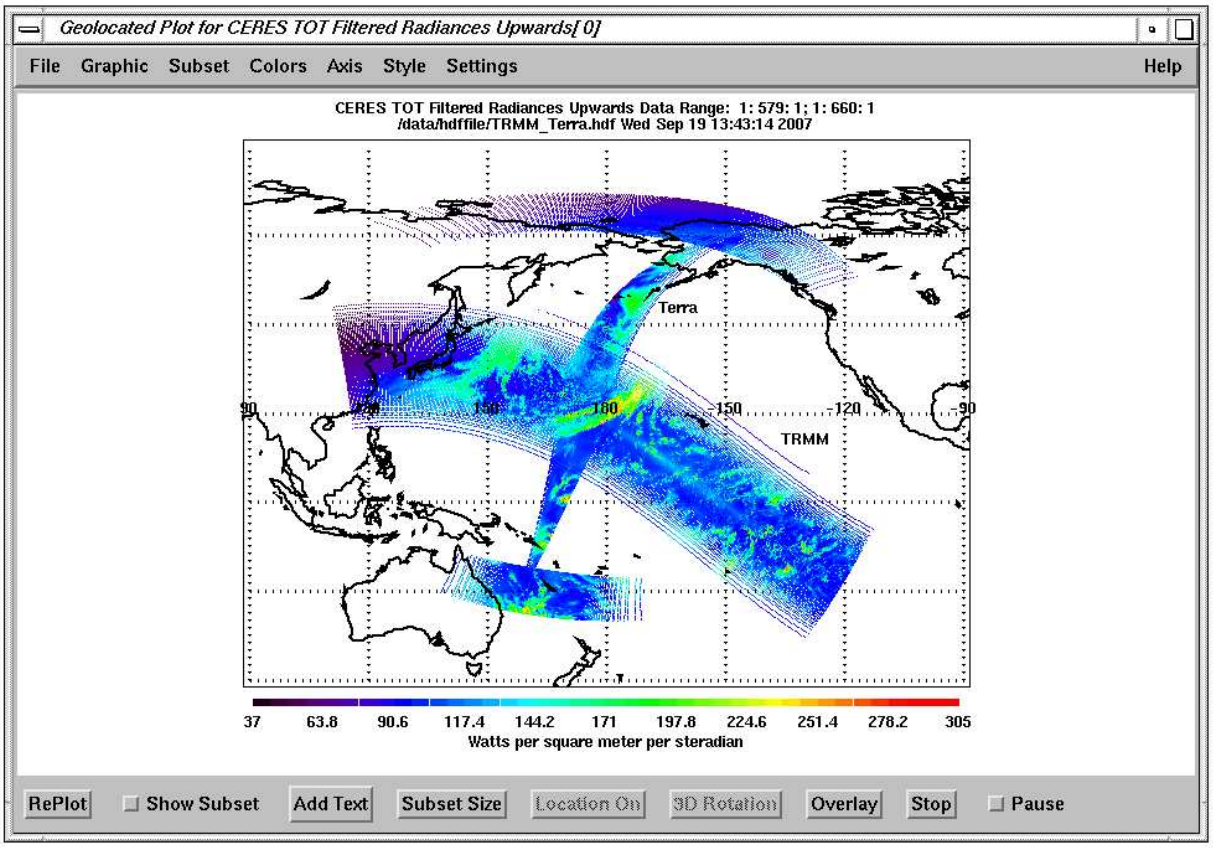

Fig. 7-6. Geolocated plot for two data sets from two different files

The fifth example shows how to use the “Multi Files” option in the “Range Type” field to read data sets from multiple files. One CERES SSF data product (Ref. 5) contains one hour of instantaneous CERES data for a single scanner instrument. The following procedure shows how to read one SDS from 24 CERES SSF data products to create one day plot. The procedure is:

(1) Open the first hour SSF file for the Aqua instrument with “File” --> “Open HDF Files”.
(2) Select the “Multi Files” option from the “Range Type” field. The “Multiple Files Input Setting” window pops for entering the setting.

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(3) Set “Increase By Last Number of Digits” field to 2 (00-23 hours), “Start Number” field to 0 (first hour), “Last Number” field to 23 (last hour), “Skip Number of Files” field to 1 (read all 24 files), “With Time Information” field to “Yes” (include time information), “Import With Geolocation Parameters” field to “Yes” (import the latitude and longitude at the same time), and “Import With Time Parameter” field to “No” (do not need time parameter). Click the “Done” button.
(4) Select the “CERES LW TOA flux - upwards” SDS from the “TOA and Surface Fluxes” Vgroup. The “Read SDS From Multiple Files” window pops up. Click the “OK” button if all the settings are correct.
(5) Click the “Done” button on the “Subset Data” window to import all the data to the Current Subset list. The geolocation parameters also appear in the Current Subset list.
(6) Import the “CERES solar zenith at surface” SDS from the “Viewing Angles” Vgroup to the Current Subset list.
(7) Click “CERES LW TOA flux - upwards[0]” from the Current Subsets list. The “Select Function” menu pops up.
(8) Select “Create Subset” and click the “Done” button. The “Pick Additional Criterion” window pops up.
(9) Select “CERES solar zenith at surface[3]” as parameter and enter minimum value as 0 and maximum value as 90. Note: daytime is defined here as solar zenith angle less than 90 degrees. Click the “Done” button.
(10) Name the new subset data as “Daytime CERES LW TOA flux - upwards” and click the “Done” button. This new data set is created and imported into the Current Subset list.
(11) Click on the new data set in the Current Subsets list; the “Select Function” menu pops up again. Select “Geolocated” and click the “Done” button. The “Select Geolocated Fields” window pops up for selecting the geolocation parameters.
(12) Select the geolocated parameters and click the “Done” button.

A plot for the 24 hours longwave radiances flux for daytime appears on the screen as shown in Fig. 7-7. From the data range on the plot, it showed it was 24 hours data.

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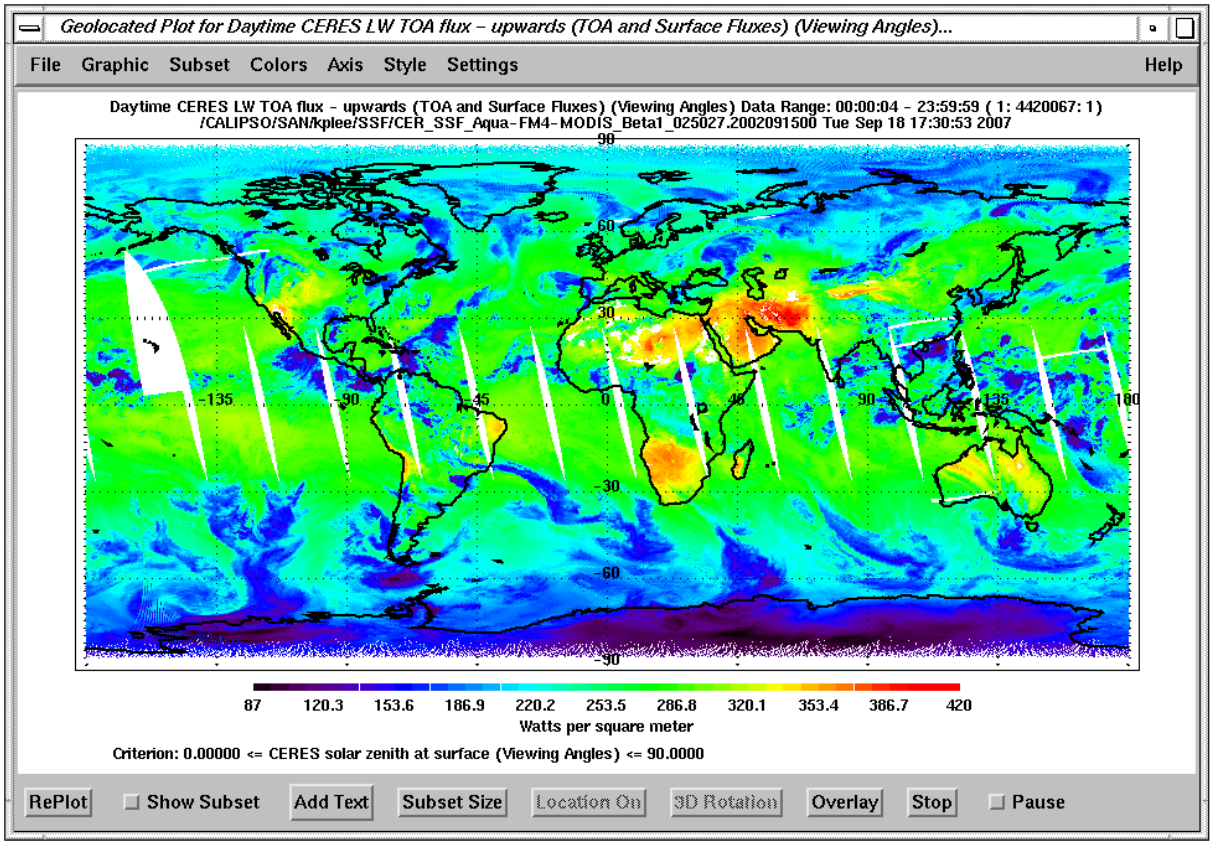

Fig. 7-7. Geolocation plot of CERES longwave flux from 24 SSF files.

The sixth example shows how to add another data set on a geolocated plot by using the "Overlay" function. The "Geolocated" function displays only one data set on a map projection. If more than one data display on the map projection, the "Overlay" option has to be used. The procedure to display more than one data on the map projection is:

1. Use the "Open HDF File" option from the "File" menu to open "Baja_subset_125m.hdf" which include a image at Baja.
2. Import all the SDS data sets, "Latitude_125m", "Longitude_125m", "Image_125m", "longitude_coast", and "latitude_coast", from the file to Current Subset list.
3. Set the range of longitude from -114.3^0 to -113.8^0 and the range of latitude from 26.8^0 to 27.1^0 by using "Axis" --> "Manual" --> "XY Only" option.
4. Click the "Image_125m" in the Current Subsets list and select the "Geolocated" option from the popped up "Select Function" window. Click the "Done" button.
5. Since the geolocation parameters in this file are not recognized, the "Select Geolocated Fields" window pops up for selecting the geolocation parameters. Select the "Longitude_125m" in the "Longitude Field" and the "Latitude_125m" in the "Latitude Field" and click the "Done" button.

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6. After the geolocated plot is done, click the “Overlay” which is activated and the “Select Overlay Setting” window pops up for selecting the overlay parameters.

7. Select the “longitude_coast” in the “X Field” and the “latitude_coast” in the “Y Field” and “Z Field”. Set the “Data Range” as “Same”. Use the “Filled Circle” symbol type with size 0.25 to display the overlay data. Set the “Number of Colors” to “Single”. Set the “Adjust X and/or Y data” field to “Yes” and click the “Done” button.

8. The geolocation plot with overlay data is shown in Fig. 7-8. The “Adjust X And Y Fields Setting” window also pops up for adjusting the overlay X and Y Fields values.

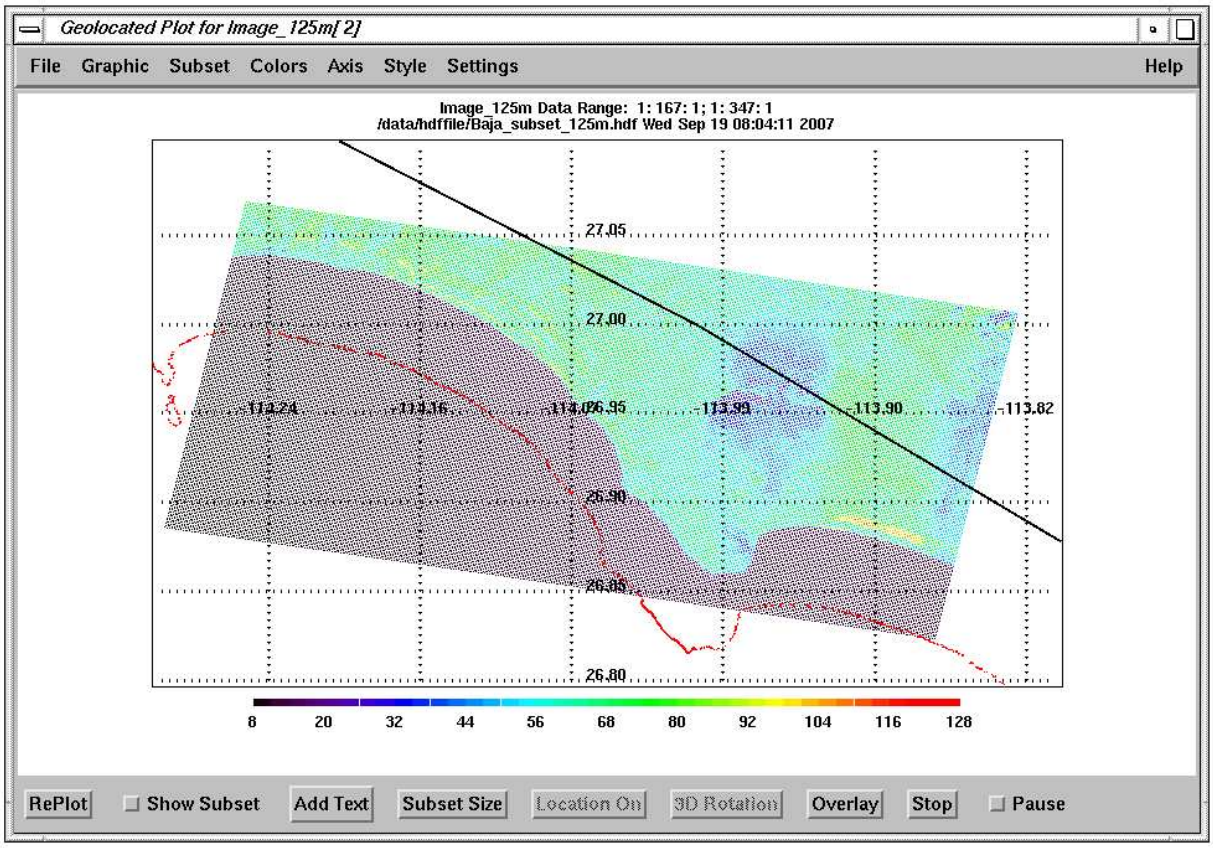

Fig. 7-8. Geolocation plot with overlay the other data set.

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9. Adjust the “X Offset” and “Y Offset” fields until the overlay data are matched the coast line of the Baja. The “X Offset” and “Y Offset” values are shown in Fig. 7-9.

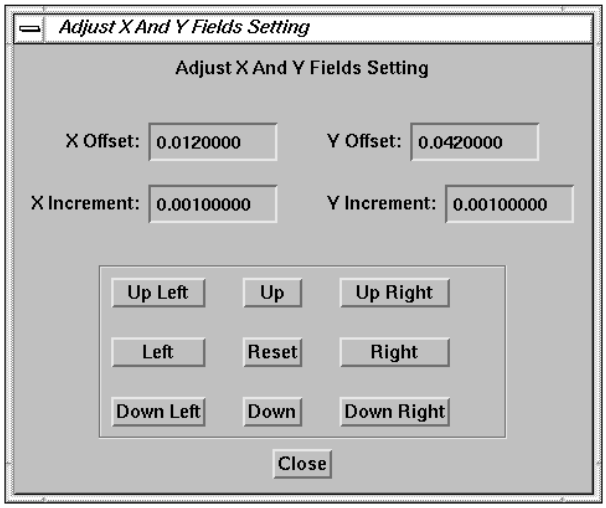

Fig. 7-9. The X and Y offset values.

The final geolocation plot with overlay the other data set is shown in Fig. 7-10.

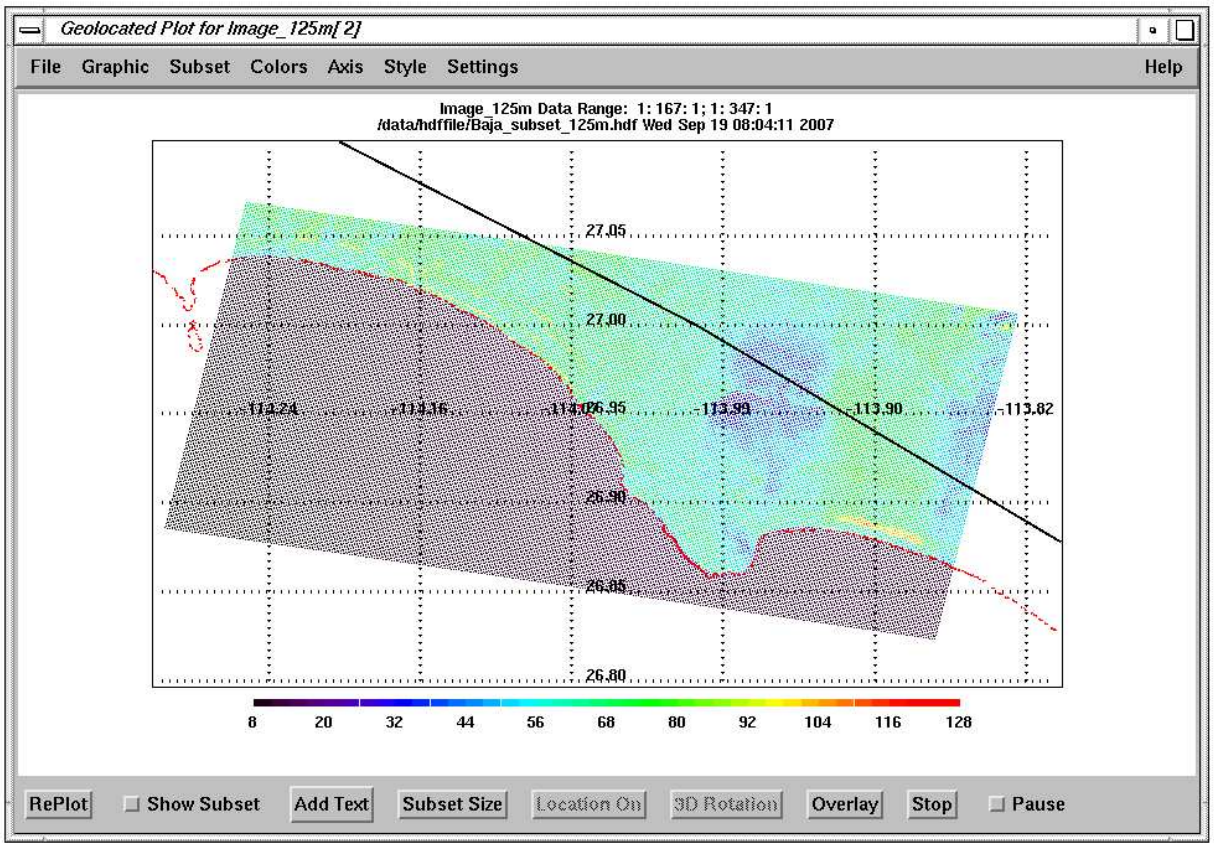

Fig. 7-10. Geolocation plot with adjustion overlay X and Y Fields values.

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The seventh example shows how to create a browse image from CALIPSO LIDAR Level 1B products (Ref. 6). The browse image can be used to verify the data product. The following procedure can be used to create a browse image:

1. Use the "Open HDF File" option from the "File" menu to open a CALIPSO LIDAR Level 1B output file.
2. Import the "Lidar_Data_Altitudes" from the "metadata" Vdata set.
3. Import the SDS data sets, "Total_Attenuated_Backscatter_532" and "Latitude", from the SDS field with selecting records from 28321 to 42720 to Current Subset list.
4. Select the "Browse Image Plot Type" option from the "Settings" menu. Set all the fields as shown in the Fig. 7-11. Click the "Done" button. Set the field "Use Profile Number as X" to "Yes" option that means using profile number as X-axis scale but using selected X variable as X-axis label.
5. Click the "Total_Attenuated_Backscatter_532" in the Current Subsets list and select the "Browse Image with Average" option from the popped up "Select Function" window. Click the "Done" button.
6. Select the "Latitude" as X Field and "Lidar_Data_Altitudes" as Y Field in the Select Plot Fields window and click "Done" button.
7. Set the "Number of profiles" to 15 to average every 15 profiles. Click the Done button. The browse image will appear on the screen as shown in Fig. 7-12.

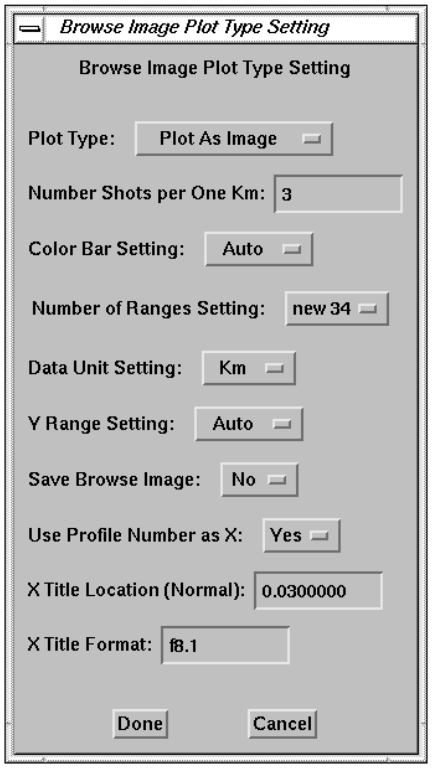

Fig. 7-11. Select Browse Image Plot Type Settings

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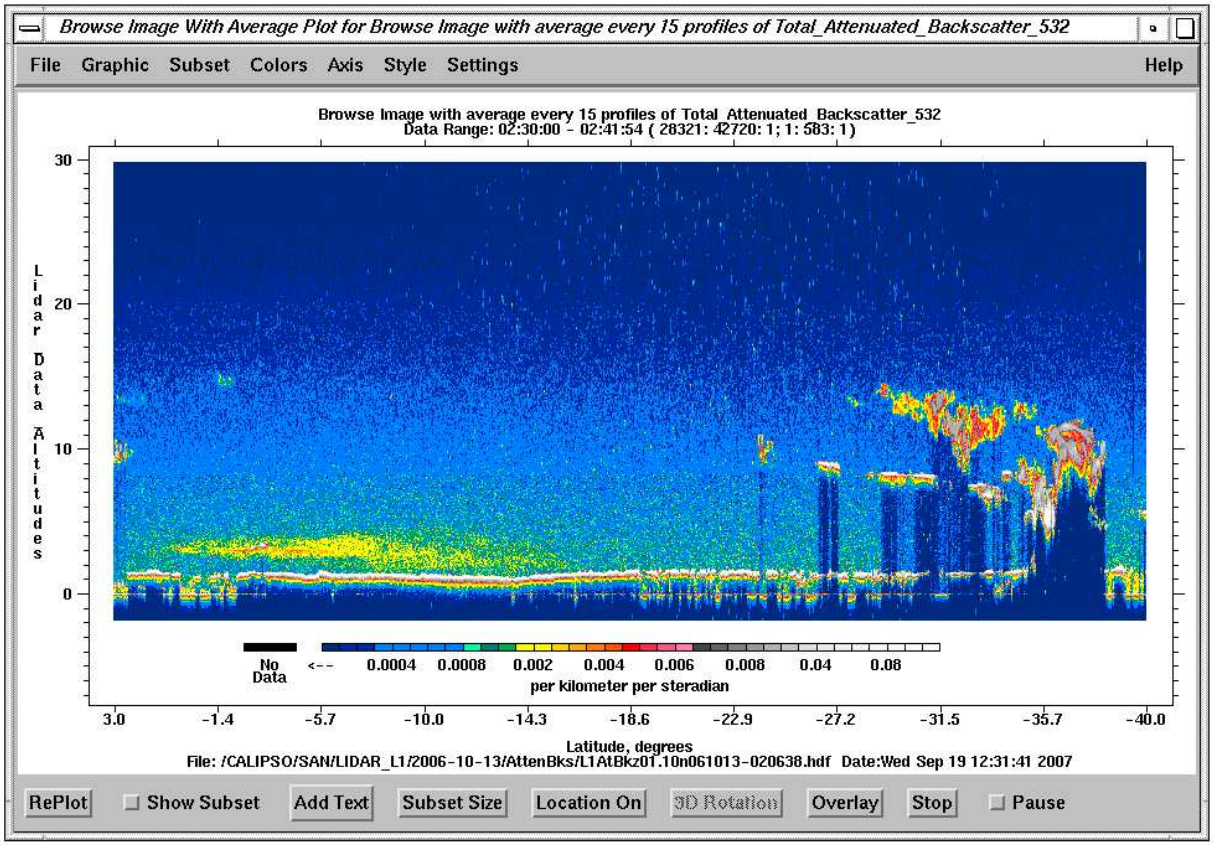

Fig. 7-12. Browse Image with Average

The "Use Profile Number as X" for the above browse image is set to "Yes", so the browse image shown in Fig. 7-12 uses the profile number (or record number) as the X-axis scale to display the image and uses the values of "Latitude" (X Field selected variable) to display on the X-axis. From this Fig. 7-12, the values of the latitude are from North (high latitude) to the South (low latitude), it is same as the flight direction of the satellite.

If the "Use Profile Number as X" is set to "No", it will use the actual values of selected X Field variable, in this case the "Latitude", as X-axis scale and label. The browse image for this case is shown as in Fig. 7-13. The values of the X-axis are from low value (South) to high value (North) that is the opposite direction of flight direction of the satellite.

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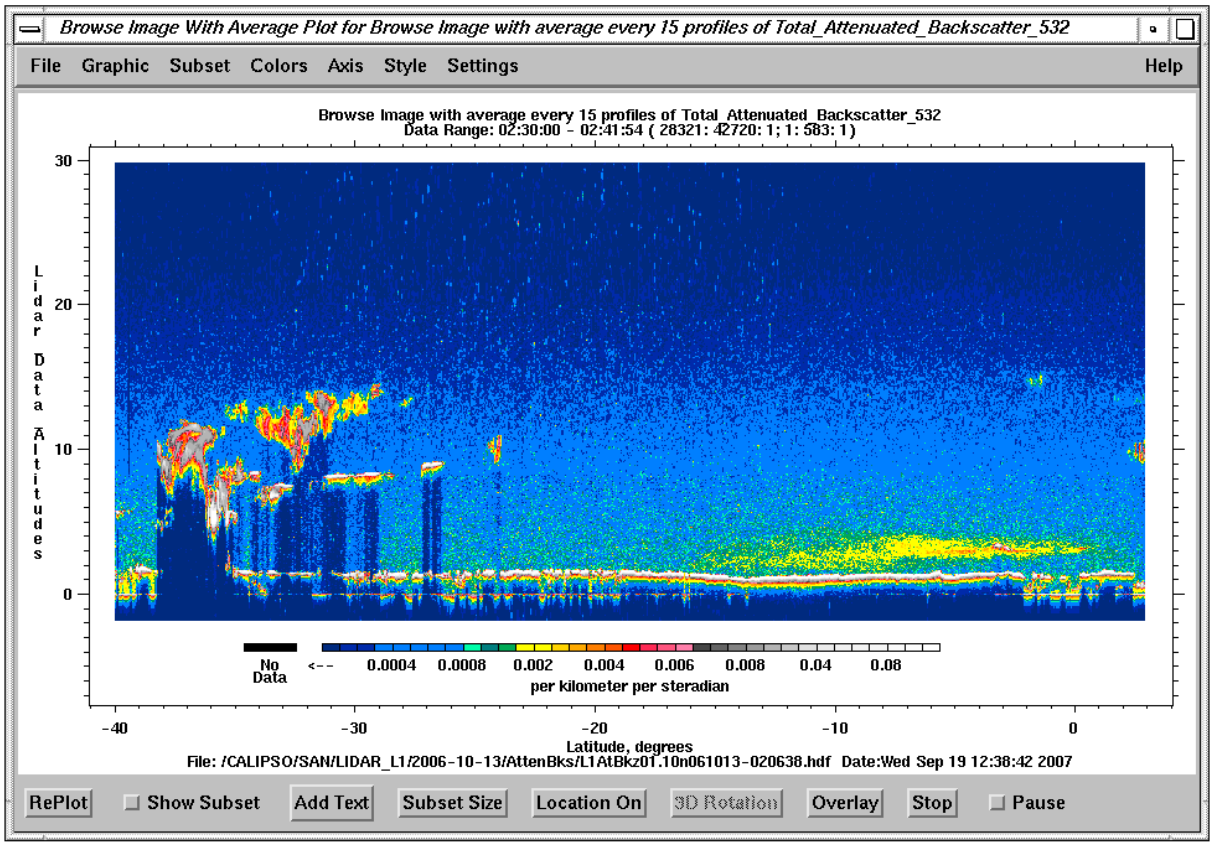

Fig. 7-13. Browse Image with Average: “Use Profile Number as X” set to “No”

The “Y Range Setting” for the above images is set to “Auto”, the range of the Y-axis is set to predefined range, -2 to 30. If user wants to set the range of Y-axis manual, the procedure is:

1. Select the “Browse Image Plot Type” option from the “Settings” menu.
2. Set the “Y Range Setting” to “Manual” and click “Done” button.
3. Select the “Axis” --> “Manual” --> “Y Only” option. From the pop up window, set the Y Start as -2 and Y End as 20 to display only from -2 to 20 km data. Click the “Done” button.
4. Click the “Total_Attenuated_Backscatter_532” in the Current Subsets list and select the “Browse Image with Average” option from the popped up “Select Function” window. Click the “Done” button.

The browse image with the y range from -2 to 20 km will display on the screen as shown in Fig. 7-14.

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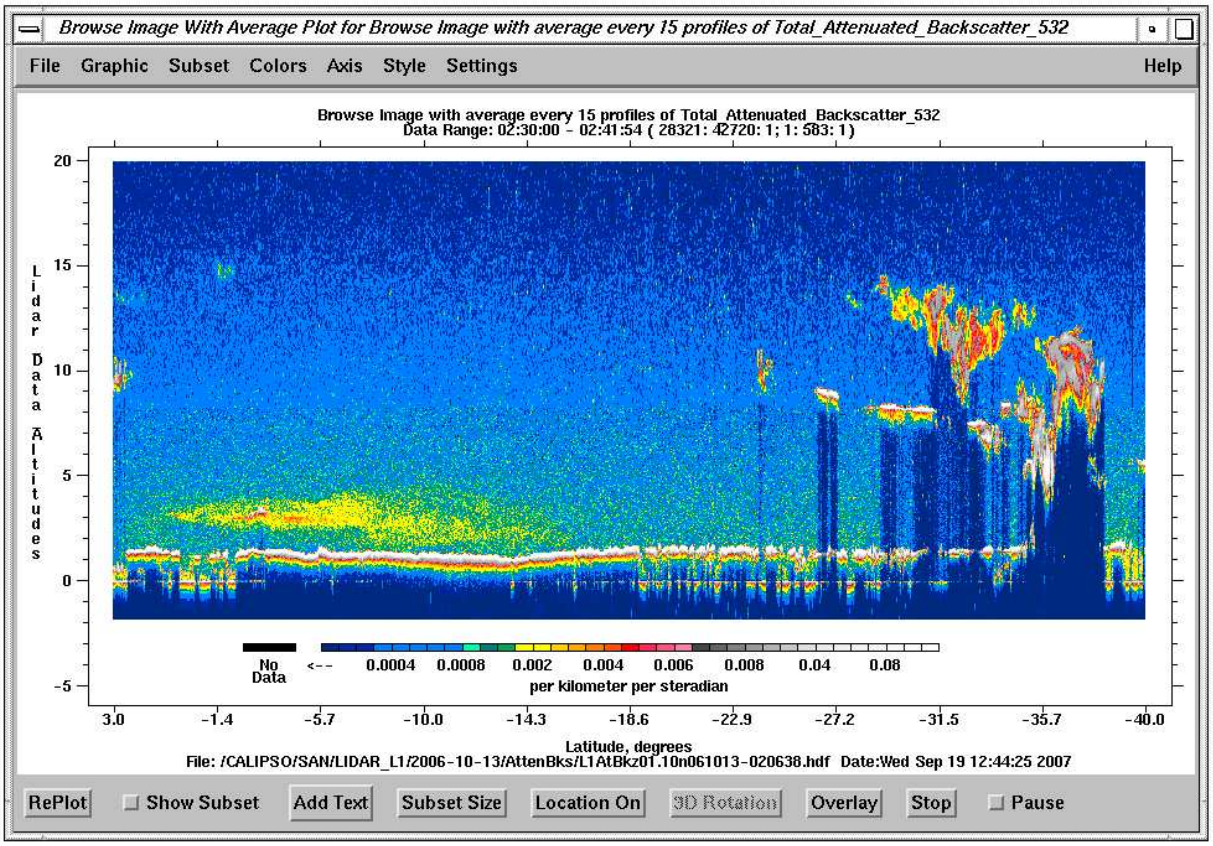

Fig. 7-14. Browse Image with Average: Y Range Setting to “Manual”

The eighth example shows how to add feature boundaries on a browse image with the CALIPSO LIDAR Level 2A products (Ref. 6). This product contains the feature boundaries information. The procedure is:

1. Use the “Open HDF File” option from the “File” menu to open a CALIPSO LIDAR Level 2A output file.
2. Import the SDS data sets, “altitude”, “latitude” and “AtteunatedBackscatter_532_1shot”, from the SDS INPUT field to Current Subset list.
3. Create a browse image plot as described in seventh (previous) example. Click on any location within the image to pop up the profile window as shown in Fig. 7-15.

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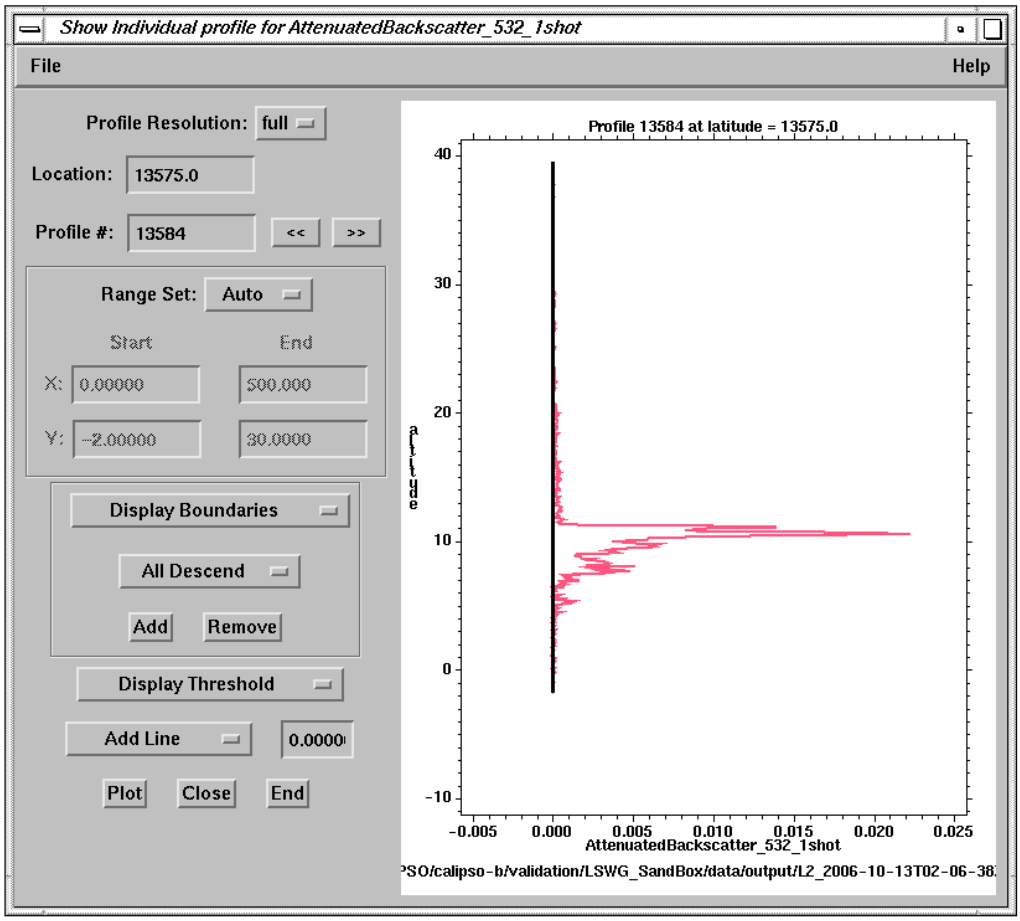

Fig. 7-15. Show Individual Profile window

4. Select the “Display Boundaries” option from “Do Not Display Boundaries” option. After the selection, the “All Descend”, “Add”, and “Remove” buttons become activated.
5. Select the “All Descent” option to display all the feature boundaries with all resolutions from low resolution (80 km) to high resolution (single shot). User can select “All Ascend” option to display all the features from high resolution to low resolution, or display only one resolution of feature on the browse image.
6. Click the “Add” button to add the selected feature boundaries on the browse image plot, as shown in Fig. 7-16.

User can use the “Remove” button to remove all or any selected feature boundaries from the browse image plot.

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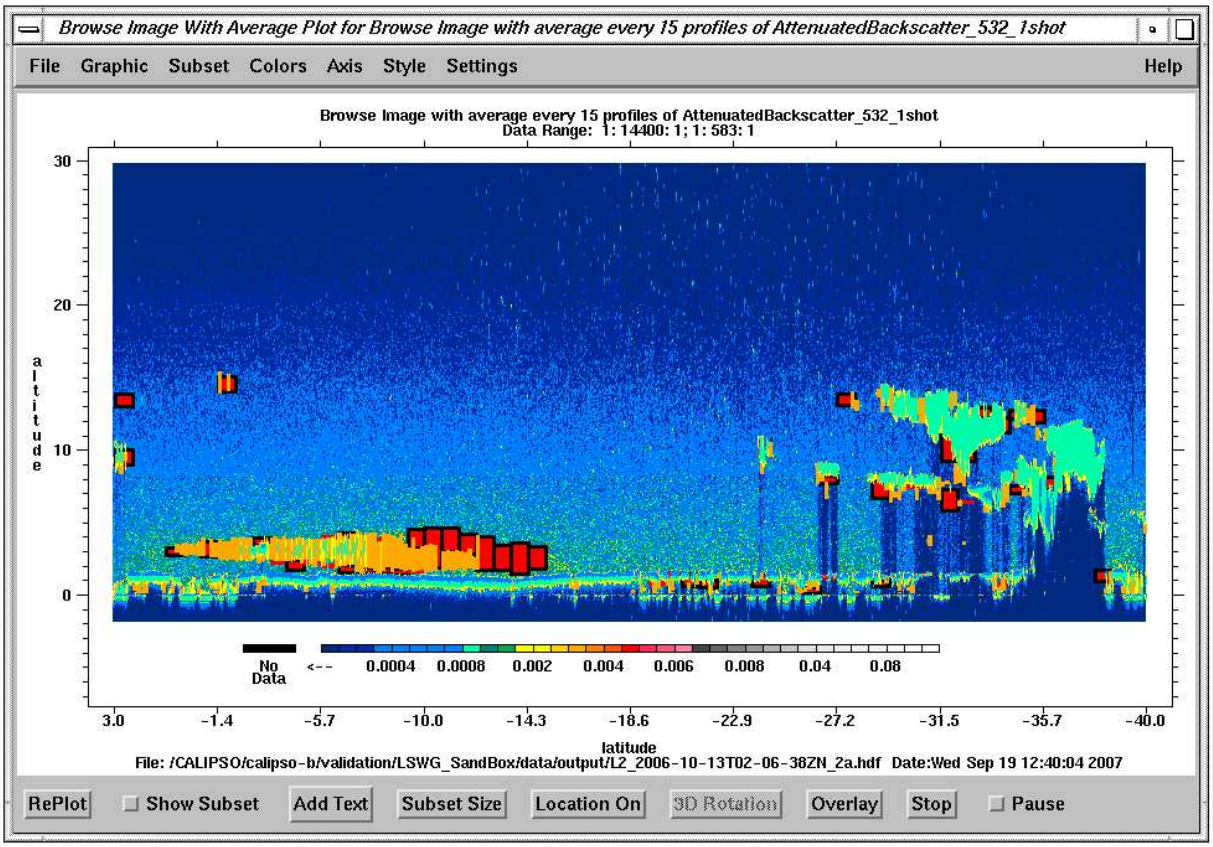

Fig. 7-16. Brows Image plot with feature boundaries displayed

The ninth example shows how to display a vertical feature mask from CALIPSO LIDAR Level 2 VFM output file (Ref. 6). The VFM file contains scene classification data and lidar lighting and land/water indicators. The detail description of this product is given in (Ref. 6). The procedure is:

1. Use the "Open HDF File" option from the "File" menu to open a CALIPSO LIDAR Level 2 VFM output file.
2. Import the SDS data sets, "Feature_Classification_Flags" and "Latitude", from the SDS field with selecting records from 1889 to 2848 to Current Subset list. The range is matched with the range of the browse image in the two previous browse image plots (seventh and eighth examples).
3. Click the "Feature_Classification_Flags" in the Current Subsets list and select the "Vertical Feature Mask" option from the popped up "Select Function" window. The "Select Vertical Feature Mask Setting" window will pop up.
4. Select the "Feature Type" from the "Feature Classification" field, select "all" from the Feature Sub-type" field, and select "Yes" from the "Select X title variable" field. Click the "Done" button.

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5. The “Select X Axis Variable” window will pop up to select the X-axis variable. Select the “Latitude” as the X-axis variable. Then the vertical feature mask plots will display as shown in Fig. 7-17.

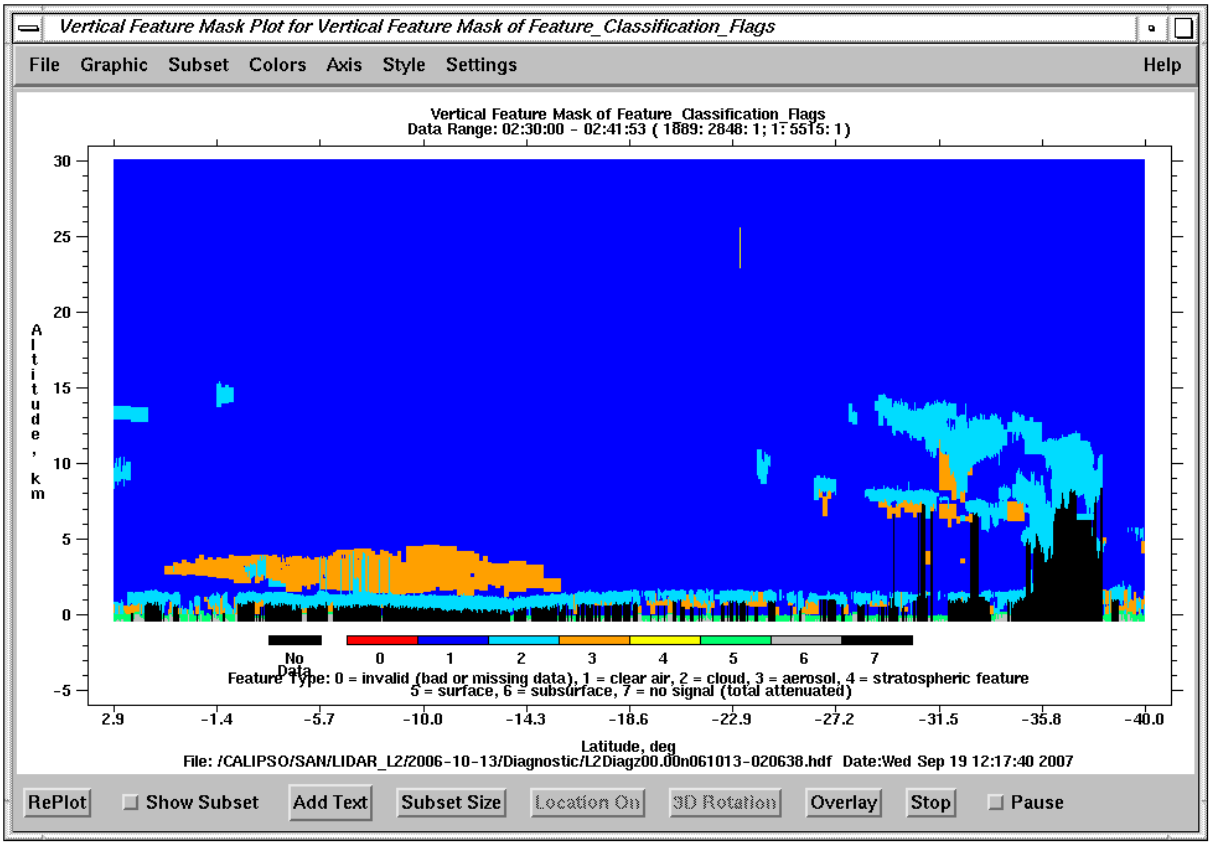

Fig. 7-17. Vertical Feature Mask plot

The “Select X title variable” for the above vertical feature mask image is set to “Yes”, so the image shown in Fig. 7-17 uses the horizontal distance from the first profile along on the Earth as X-axis scale, but uses the values of “Latitude” (Selected variable) to display on the X-axis.

If the “Select X title variable” is set to “No”, it will use the horizontal distance from the first profile along on the Earth as X-axis scale and label. The vertical feature mask image for this case is shown as in Fig. 7-18. The values of the X-axis are the horizontal distance in km.

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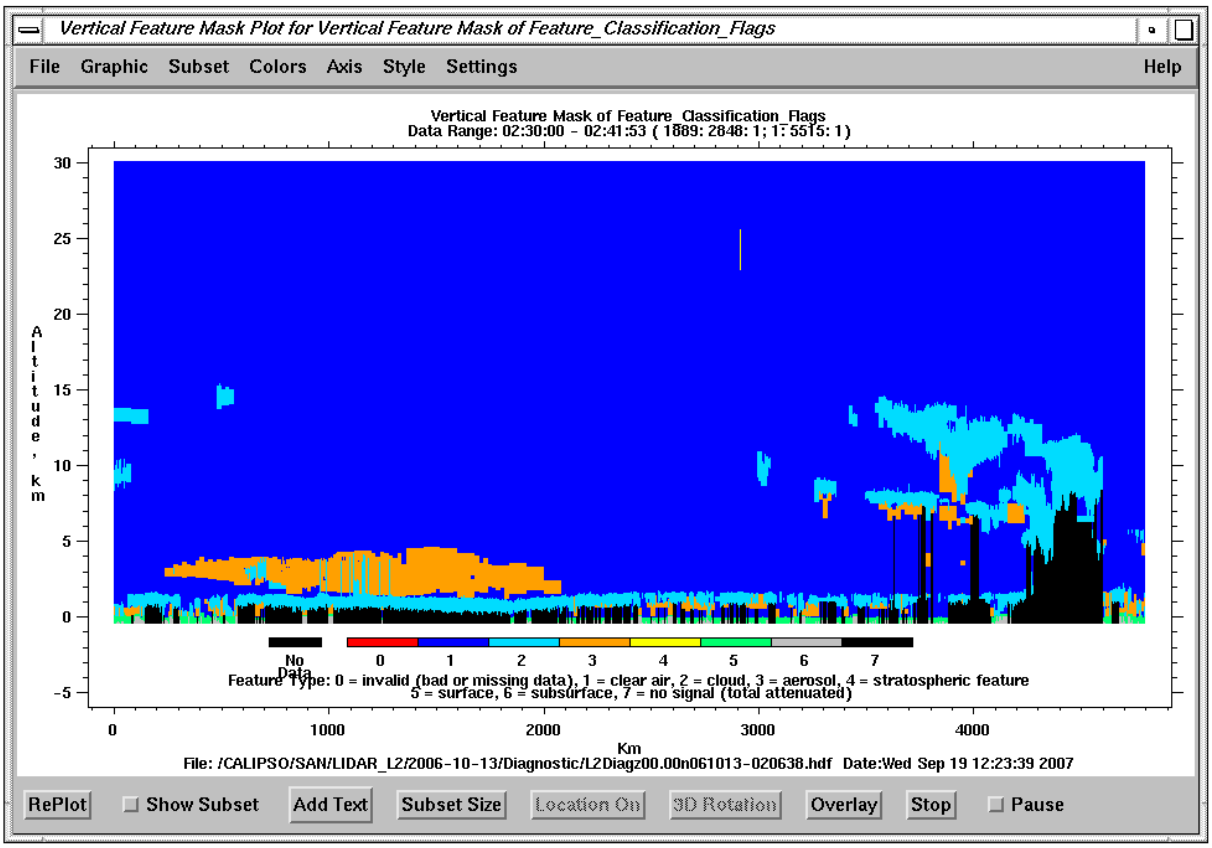

Fig. 7-18. Vertical Feature Mask Plot: “Select X title variable” set to “No”

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 for some functions; however, the following procedure can be used:

1. Move the cursor to the window in which IDL was started.
2. Press the <CTRL> C to interrupt the process. The IDL prompt will appear. Note: if the 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. 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.

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8.0 References

1. Cloud's and the Earth's Radiant Energy System (CERES) Bi-directional Scans (BDS) Collection Document; Release 3, Version 2, June 2000.
   {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; Release 3, Version 4, January 2003.
   {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 4, Version 12, November 2005.
   {URL = http://earth-www.larc.nasa.gov/ceresdoc/DPC/DPC_current/DPC.html}
4. HDF User's Guide, Version 4.1r5, November 2001; HDF5 User's Guide, Working Draft, Version 1.6, June 2003, (from NCSA).
   {URL = http://eosweb/HBDOCS/hdf.html}
5. Cloud's and the Earth's Radiant Energy System (CERES) Single Scanner Footprint, TOA and Surface Fluxes and Clouds (SSF) Collection Document, Draft; Release 2, Version 1, March 2003.
   {URL = http://asd-www.larc.nasa.gov/ceres/collect_guide/list.html}
6. Cloud Aerosol LIDAR Infrared Pathfinder Satellite Observations (CALIPSO) Data Management System Data Products Catalog, Release 1, April 2003.
   {URL = http://www-calipso.larc.nasa.gov/resources/project_documentation.php}

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9.0 List of Acronyms

ASCII	American Standard Code for Information Interchange
ASDC	Atmospheric Sciences Data Center
BDS	Bidirectional Scan Science Product
CALIPSO	Cloud - Aerosol Lidar Infrared Pathfinder Satellite Observation
CERES	Clouds and the Earth's Radiant Energy System
CRS	Clouds and Radiative Swath Science Product
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
MPEG	Moving Picture Experts Group
NASA	National Aeronautics and Space Administration
PNG	Portable Network Graphics
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

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10.0 Data Center/Data Access Information

1. Contacts

Langley Atmospheric Sciences Data Center
Science, Users, and Data Services
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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 ASDC CERES Web Ordering 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 ASDC 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 ASDC data are used in a publication, the following acknowledgment is requested to be included:

"These data were obtained from the NASA Langley Research Center Atmospheric Sciences Data Center."

The Langley Data Center requests a reprint of any published papers or reports or a brief description of other uses (e.g. posters, oral presentation) which cite the use of data the Langley ASDC has distributed. This will help the data center to determine the use of data distributed, which is helpful in optimizing product development. It also helps the data

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center 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 Revision	Version 3.0	September 2001
Document Revision	Version 4.0	November 2003
Document Revision	Version 5.0	November 2005
Document Curator	The Langley ASDC Science, User & Data Services Office.	
Document URL	http://eosweb.larc.nasa.gov/HPDOCS/view_hdf.html	

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