Msphinx HandBook

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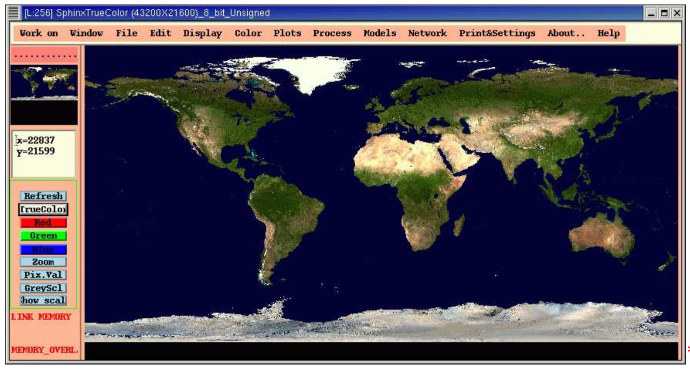


*

NAME

Msphinx
SPHINX: System for Processing and Handling Images uNder X
M for Motif

SYNOPSIS

Msphinx [options]

The software can be used in interactive mode or by means of commands files.

DESCRIPTION

Msphinx [file name]	*loads an image and displays it with Msphinx in interactive.*
Msphinx [options]	*starts Msphinx in interactive mode.*

OPTIONS

-ScrollPage 1024 Size of the page in scroll mode (ex: 1024*1024 pixels)

-F /My_Path/to/Mfiles Mfiles directory path

-Width 600 Starting geometry of the main window

-Height 600 ...

-U /tmp Temporary directory

-Home /MyDisc Main directory path of the software (see below .Msphinx).

This option allows the user to change the 'Home directory' of *Msphinx* . By default, the .Msphinx directory will be created under the user's home directory.

-Zoom 75 allows to reduce or increase the size of the Motif widgets. In the example a reduction factor of 75% will be applied. Warning! It will be necessary to modify the default font size in the following line of the Msphinx.ad file:

Msphinx*FontList: "-Adobe-Courier-Bold-r-Normal-*-12-*-*-....."

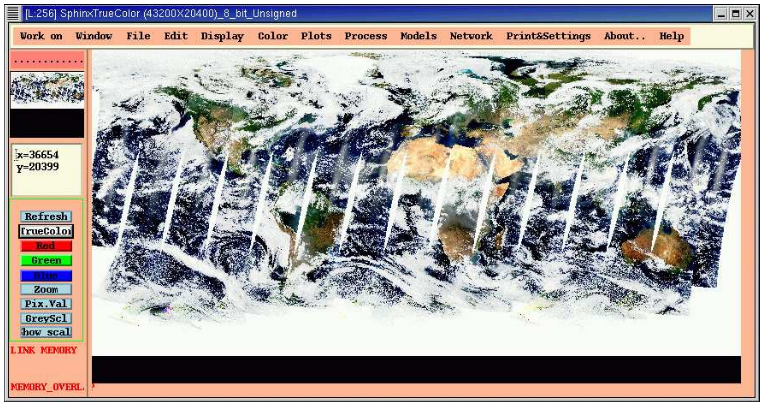
in order to adjust the size of the character font to the size of the widgets.(page 13)

*Blue Marble: http://earthobservatory.nasa.gov/Newsroom/BlueMarble/

Contents

Part I

INTERACTIVE MODE



MODIS image (August,10 2001)

Remarks

* Msphinx creates intermediate files which can be huge. The implicit directory of temporary files is /tmp. The use of option **-U** is able to move the temporary directory to a place having more free disk space.

* The directory containing all the initialization files and project directories called ".Msphinx" is created under the user $home. In case of insufficient disk space, you can correct the problem as follows:

1. First method: Move the .Msphinx directory with a copy and a symbolic link:
```
cp␣-r␣~/.Msphinx␣/MYBIGDISC/
rm␣-rf␣~/.Msphinx
ln␣-s␣/MYBIGDISC/.Msphinx␣~/.Msphinx
```

2. Second method: Build a directory copy and use option **-HOME** for example:
```
mv␣-r␣~/.Msphinx␣/MYBIGDISC/
Msphinx␣-HOME␣/MYBIGDISC
```

* The option **-zoom** can be integrated into Msphinx.ad; For that purpose, modifies the line:

Msphinx_bin*zoom: 100

* When reducing windows, do not forget to select a smaller font in Msphinx.ad:

Msphinx*FontList: "-Adobe-Courier-Bold-r-Normal-*-12-*-*-*-*-*-*-*"

The Unix command: "xlsfonts" can help you to select a suitable font.

Main characteristics

- Virtual image planes of any size and type. (float,integer(8,16,32 bit))
- Handling color Look Up Tables with 256 levels or true color images with (Red, Green, Blue) planes (16 million colors).
- Data exchange with other processing modules:
  - Mgraph: 2D plot and surface perspectives
  - HDFLook: HDF (Hierarchical Data file) read/write format.
  - HDFLook/MODIS: MODIS images handling.
  - Mpol: POLDER experiment read format.
  - Msixs: simulation of the satellite signal in the solar spectrum.
  - TIFF, GIF, JPG
  - xfig: Facility for Interactive Generation of figures
- Management of the image space in the main computer memory (ram) or in the disk space or using symbolic links.
- Reading image in mode "raw" 1,2 ,10,12 bits, with header, trailer etc...
- Posters, Pages setting and PostScript printing of large image.
- User to user communications (messages, images)

1 GENERAL FUNCTIONS

When installing Msphinx on your computer, the Msphinx.ad file is placed in the system directory:

/usr/lib/X11/app-defaults

by the superuser. It must be readable by all users.

If you can't modify the file, you can implement it locally by using the command:

xrdb -merge Msphinx.ad

In the panels, use the left mouse button to select the options, to activate the push buttons or to point to a position on the request of the software.
Any character string in an editor can be selected using the same button and then pasted into another editor using the central button.

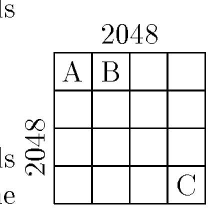
A directory .Msphinx is created under the main user directory ($home). It contains various files of initialization of the software. Under the .Msphinx directory you will also find the various projects you have created, constituting your image data base. If you do not have enough disk space, you can move this directory to another disk and execute a symbolic link under your $home. (See preceding instructions)

Memory data plane architecture

A geometry data plane (width, height, depth) is defined by the user.

The space defined is virtual. It will be created at the computer resources level at the time the images will be created. The sizes (Width, height) of the defined memory are used only as maximum values to avoid inconvenient floods (it can be modified at any time) . The depth is defined by default. It will be effectively freezed for a plane at the first loaded image. (The depth can be modified for a bigger depth (to avoid the data truncations) at any time.

The user can write an import image to any location in the plane hovewer to help the access to a data plane, it will be divided into regular or irregular cells automaticaly recognized by the software.



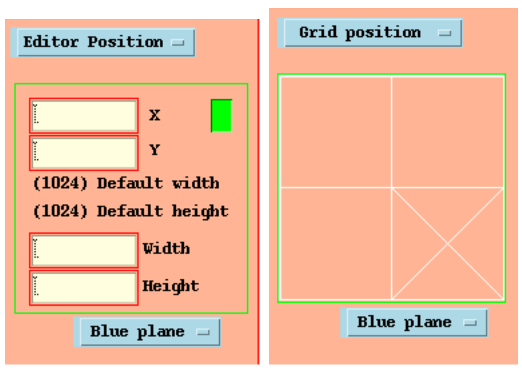
Warning:

If the working space is a 2048×2048×32 bit plane containing 16 cells 512×512: the user reads an image in the first cell at the top left (A). The memory space used is 512×512×4 bytes.

The user adds an image in the adjacent right cell (B): the memory space used becomes 512×512×4×2 bytes.

Now, the users adds an image in the last bottom right cell (C): the space used becomes 512×512×4×16 bytes (16 Mb). The empty cells will be filled with zero values. In conclusion, the memory (ram or disk) resources use areas according to the smallest rectangle containing the group of loaded images.

Memory geometry in the menus



In the various menus, the most useful widget concerns the memory geometry of the work space; it is divided into 3 objects:

- A menu concerning the geometry of the zone:

"Editor position": the 4 editors (*X, Y, Width, Height*) will be used. A click on the green point will fill the editors with the real plane size or with the virtual plane size according to the selected menu.

"Grid position": The cell division is displayed; click on a cell to activate it.

"Mouse position": The size is free; the user determines with the mouse, in an active window, (Main Window or Zoom) the position and the size of the zone.

"Free contour": In an active window, we will draw a track to define a zone. The right-hand button allows you to create the points delimiting the contour, the left button is used in the last segment to stop the insertion. The program automatically closes the area by joining the last point to the first one.

- A menu concerning the data planes to select:

  "Red plane"

  "Green plane"

  "Blue plane"

  "RGB" (3 planes at a time)

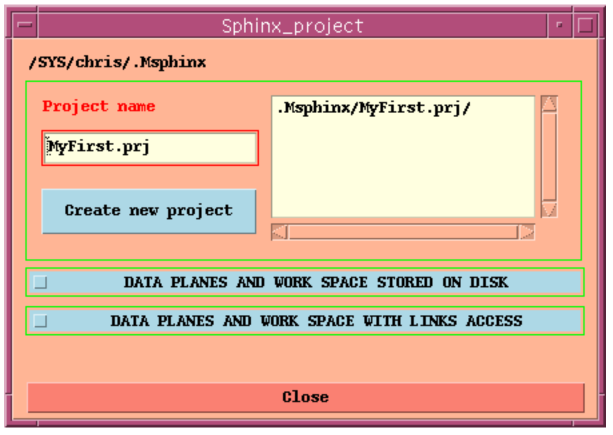
  "All planes" All the filled data planes

  "Plane no" A plane, or a series of planes, to fix in the editors which appear.

- A pool of editors defines the image geometry.

2 WORK ON

2.1 WORK ON→ DEFINE PROJECT



This menu allows the user to define a new project where the image structures and the visualization planes will be archived.
Two options are available:

- *"DATA PLANES AND WORK SPACE STORED ON DISK"*
- *"DATA PLANES AND WORK SPACE WITH LINKS ACCESS"*

2.1.1 Data planes and Work space stored on disk

In this case, the image memory of Msphinx goes on disk space:

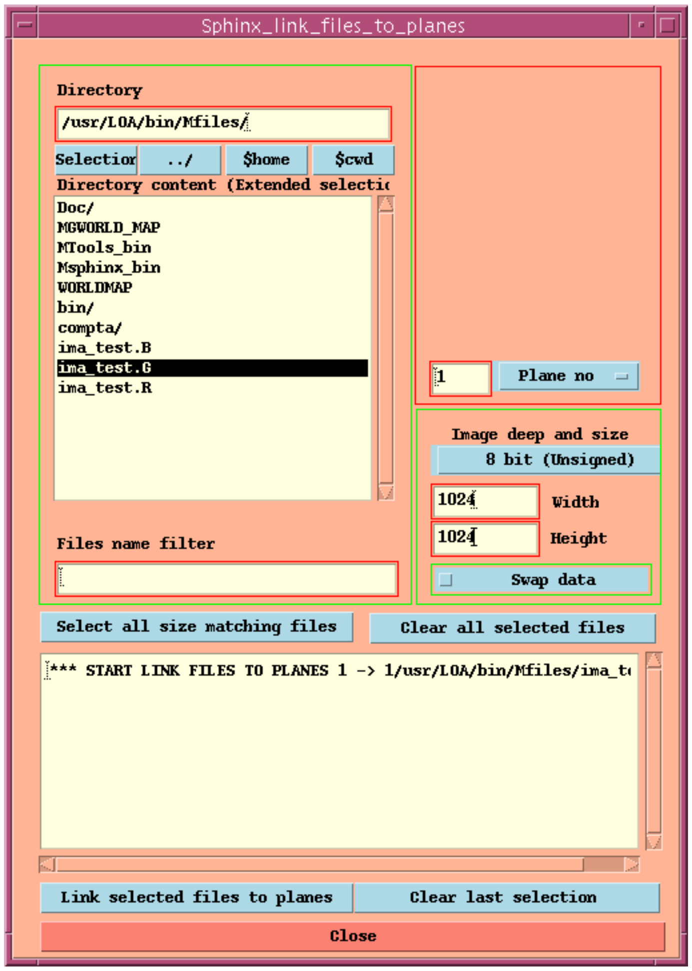
- One file by image plane.
- 3 planes of 8 bits for the display memory.
- A (4+4) bits plane for the overlays (memory masks and graphic).

2.1.2 Data planes and Work space with links access

In this mode, the images will be available only in reading mode. This mode allows the user to quickly load a great quantity of images with the same structure.
The image structure must be very simple: an array of lines by columns, not requiring any decoding (headers, trailers, etc...).

View planes overlap data planes

This option is used for the visualization of large images in 8 bit depth. The software will use the data planes as view planes. In this mode, the modification of the view planes content by *Msphinx* functions will destroy the original data.



If there is **NOT ANY** link activated, this menu appears; it will allow you to associate a series of images of the same type to a series of data planes.

- Type, in the editor *plane no*, the number 1.
  The images will be loaded from the plane 1.
- Select the type of data: 8,16,32 bits etc...
- Select *"Swap data"*, if data come from a computer of a different data encoding: (big-endian(HP, IBM), little-endian(DEC, PC)) (If the swapping is wrong, the image will be very noisy in the main window display.)
- Enter the geometry (editors *"Width"* and *"Height"*) of the images that must be lower than the virtual geometry previously defined for the plane.

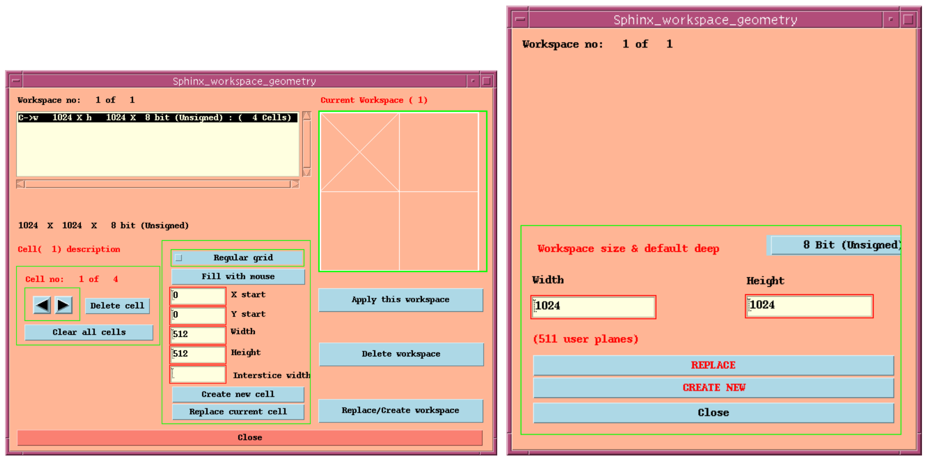
- In the window *"selection of files"*, choose the images directory and click on the first image. If the size corresponds with your choices (width, height, depth), the format will appear in the list of selections. Then, you can select images in three ways:
    1. one by one
    2. many at a time (mouse click + *Control*)
    3. choose *"Select all size matching file"*
- activate *"Link selected files to planes"*

Images appear in the main window.

If a link already **EXISTS**, the button *"DATA PLANES AND WORKS SPACE WITH LINKS ACCESS"* is replaced by an another one *"CREATE/ADD DATA PLANE LINKS"*. A menu is drawn with the various planes and images used. Three choices:

1. *"Clear all links and create new ones"*
2. *"Add new links"* (See Upper §2.1.2)
3. *"Cancel"*

2.2 WORK ON→ WORKSPACE GEOMETRY



This menu allows the user to define or to modify the virtual work space geometry. The list of spaces already defined appears at the top left side. The symbol C→ (Current) shows the space in use.
Click on another space and the symbol P→ (Pending) appears.

OPTIONS:

- Definition of the working space
  "Replace/Create workspace" allows you to create or to modify a work space.
  "Apply this workspace" allows you to swap to the pending geometry and keeping images.
  If the memory contains images, a *"Warning"* panel showing the memory planes in use appears.
  If the depth of the new space is different from the existing planes, the planes will keep their initial depths.
  On the other hand, if the geometry (Width, Height) is different from the existing planes, the existing planes will be resized with possible loss of columns and lines (right and botton plane side). (warning options: *"Do it"* or *"Cancel"*)

- Definition of the cell geometry
  "Clear all cells" allows you to start with an empty set.

  Case of irregular cells:

  - type the geometry of the cell in the editors and select *"Create new cell"*
  - or click the button *"fill with mouse"* and draw it in the top right side drawing geometry window. (Using the left button of the mouse) then activate *"Create new cell"*.

  To modify the geometry of a cell, select it directly with the mouse in the drawing geometry window or use the arrows (◁ ▷) to move from one to the next defined cell, modify the geometry in the editors and activate *"Replace current cell"*.

Case of regular cells:
Select the toggle *"Regular grid"*; type the geometry in the editors ex :

X = 0 Y = 0 Width = 100 Height = 100

then click *"Create new cell"*: The area from the starting (X,Y) coordinates will be drawn with a grid of cells.

- Particular case:
  Two regular different grids in the same space:
  activate the toggle *"Regular grid"*, type the first geometry in the editors eg:

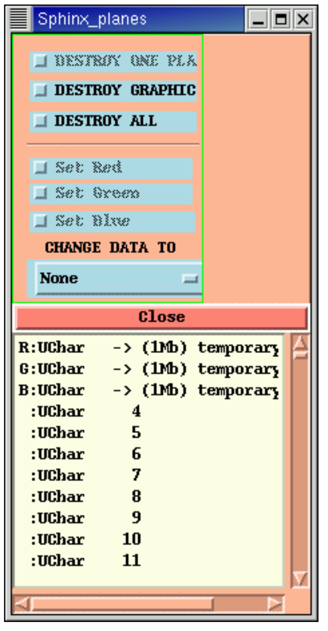
  X = 0 Y = 0 Width = 512 Height = 512

  activate *"Create new cell"*; click on the cell at the lower right side then *"Delete cell"*;
  type the second geometry in the editors eg:

  X = 512 Y = 512 Width = 256 Height = 256

  then click *"Create new cell"*.

2.3 WORK ON→ SET VIEW PLANES



The menu has several options:

1. This menu allows you to assign the 3 visualization planes (8 bits) representative of the Red, Green and Blue color intensities of the displayed image in true color mode or representative of an index (0→ 255) to a (Red, Green, Blue) look up table in the single display plane mode.
   A crucial automatic work of pixel transformation is realized during the

transfer of a data plane to a display plane when the original data was not coded between 0 and 255.

The user can defined this linear transformation by using the menu *"Display→ Enhance display"*

Select a plane in the list. Activate the toggle "Red" "Green" or "Blue". If the main window displays the same plane or works in true color mode, the new image appears. After the first selection, a double click on a listed plane will select the new one.

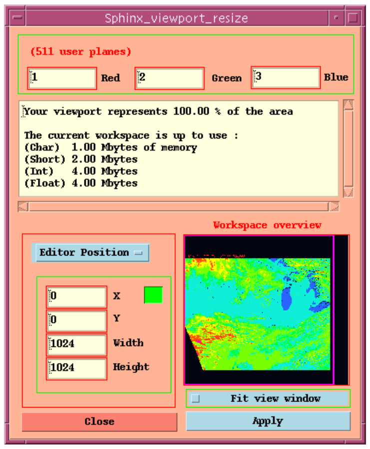
2. This menu allows you to completely destroy a plane and to free the corresponding memory or file ressources. Select, in the list, a plane then activate the toggle *"Destroy"* (Unlike to single plane selection, only a plane can be destroyed at a time).

3. This menu allows you to destroy the graphic overlay plane.

4. This menu allows you to clear the view and data banks structures.

5. This menu allows you to modify the type of data and so the depth of a plane; select, in the list, a plane; activate the menu *"None"* and choose one of these options: *"Unsigned char"*, *"Signed char"* ...
The data plane switches to the new type. (Now a double click on a plane will shift to the new data type). This transformation is only ascending to avoid data truncations: the type of data containing the others is *"Float"* 32 bits.

2.4 WORK ON→ DEFINE VIEWPORT



This menu allows you to define quickly the visualization planes R, V, B, as well as a viewport from the real space. It works as a permanent zoom.

- Color:
Modify, if necessary, the editor values *"Red" "Green" "Blue"* then select *"Apply"*.

- Geometry:
  Modify the editors *"X, Y, Width, Height"* directly or with the option *"Grid position"* or *"Mouse position"*, then choose *"Apply"*.

- The option *"Fit view window"* destroys the proportionality (width, height) of the selected zone within the width, height of the main window.

3 WINDOW

3.1 WINDOW→ STANDARD WINDOW

This mode realizes a (line, column) sampling of the image to adapt it to the size of the display window, always maintaining the width/heigth proportions of the basic image.

If the original image has a regular grid or if the graphic plane is drawn with a regular grid, this one will not appear in the display window. To see it, it will be necessary to switch to the *"Window→ Scroll window"* mode of visualization.

3.2 WINDOW→ SCROLL WINDOW

The display is in full resolution but you see only a part of the image. This mode should be used with a maximum main window size according to your display size.
To move it, use the bottom and right scrolled bars (The red zone in the scroll bar shows the area where the movement will be immediate).
To change the visualization area use the small window at the top left of the main window just click in a zone (or move with button held down). Two modes of work are implemented.

- The command option *"-ScrolledPage [Page size]"* is bigger than the defined workspace.
  In this mode, to build the pixmap image for the terminal will take more time but all the movements will be instanteneous.

- The scrolled page defined is smaller than the workspace.
  In this mode the pixmap images are builded at each change. Biggest is your display window, slowest will be the image refresh.

3.3 WINDOW→ REFRESH

Redraw the main window.

3.4 WINDOW→ MASK/UNMASK OVERLAY PLANE

The graphic plane is a 8 bit (*"Overlay"*) on the image plane. This option allows the user to momentarily mask the overlay.

3.5 WINDOW→ CLEAR GRAPH PLANE

The 4 bit graphic part of the overlay plane (annotations, graphics) is initialized again with a transparent color.

3.6 WINDOW→ CLEAR MASK PLANE

The 4 bits mask part of the overlay plane (menu Edit→ Pixel & mask §5.5) is reinitialized again with a transparent colour

4 FILE

Global rules:

All the input/output menus contain the same options for the Working directory selection and the same options for the image geometry and plane space.

- The working directories:

  The working directory is shown in the editor at the top of the window. You can directly type a new directory in the editor (and press return) or click on the desired directory in the Unix file structure displayed.

  Selection Moves to the editor directory and refreshes the file scrolled list.

  .. Moves a directory upwards.

  $home Loads your home directory.

  $cwd Loads the directory from which Msphinx is being run.

  To select a file you can type its name in the editor "file" or click on its name in the list of the files. The editor "File name filter" allows you to sort out files matching a specific string (Unix Notation). The sorted files appear at the top of the list followed by the remaining files.

  ex:

Type:	the head of the list will be:
⋆data	all the files ending with "data".
data⋆	all the files beginning by "data".
⋆data⋆	all the files having "data" in their name.

- The working space:
  See upper (page 14) the plane selection options.

Peculiarity:

- File→ Simple file read
  If you read a single image but the working space is in True Color mode, the image will be duplicated in the *"Red Green Blue"* planes.

- File→ Tiff Gif Jpg ppm (etc...) read
  You select a true color image, for example in tiff or jpg format:

– If your working space is in RGB mode, the three planes will be loaded with RGB color intensities.

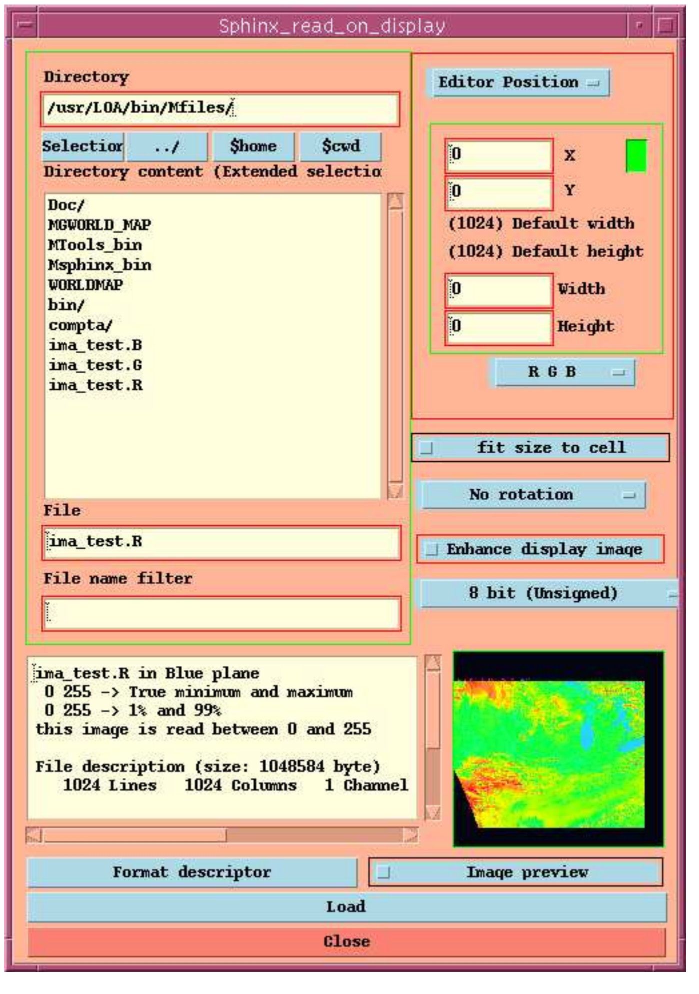
– If your working space is Red or Green or Blue or any another plane, the image will be transformed into the best possible 8 bit look up table image (Image and lut will be loaded in the work plane)

You select a look up table image (8 bit index + lut), for example in gif or tiff format:

– If your working space is in RGB mode, the image will be transformed into three planes Red, Green, Blue containing the RGB color intensity.

– If your working space is Red or Green or Blue or any another plane, the image and its associated LUT will be loaded in the work plane.

4.1 FILE→ SIMPLE FILE READ



By selecting a file in the list, one of two things will occur:

- the software is able to determine its size (width, height) according to the type of data selected. The type and size of images already read are registered in a file (*"sphinx_fmt"* in *$home/.Msphinx*). If Msphinx recognizes the image, its description is shown in the editor and you have just to activate *"Load"*.
- otherwise, it is necessary to give additional information on the file structure, in the menu *"Format descriptor"* (See the §4.1.2).

4.1.1 General options:

- *"fit size to cell"*

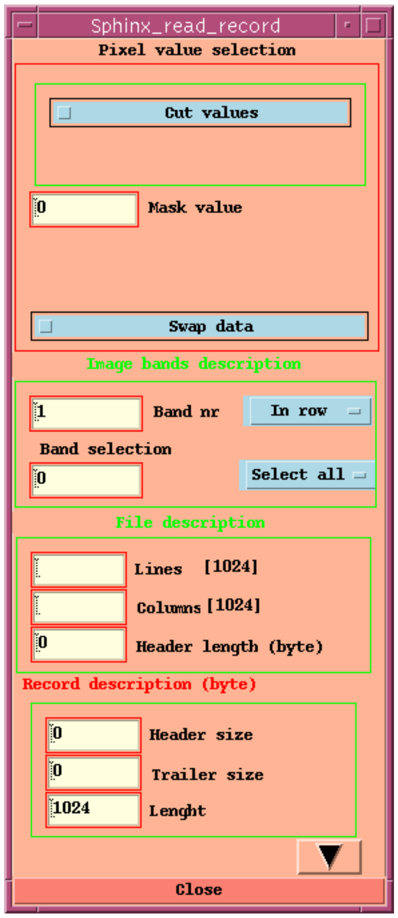
- *"No rotation"*
  Is a multiple case menu; it allows you to choose the new orientation of the image:
  - No rotation
  - Up side down
  - Left side right
  - Up/down & Left/right
- *"Enhance display image"*

- *"8 bit (Unsigned)"*
  This menu allows you to fix the type of data.
  - 8 bit (Unsigned)
  - 8 bit (Signed)
  - 16 bit (Unsigned)
  - 16 bit (Signed)
  - Integer (32 bit Unsigned)
  - Integer (32 bit Signed)
  - Float (32 bit)
  - Free Format
    This option allows you to read the images with pixels coded in a specific format. It is described in the menu *"Format descriptor"* see the §4.1.2
- *"Format descriptor"*
  calls the image description menu when the image is not recognized (See the §4.1.2).

- *“Image preview”*
  calls the selection menu which extracts a zone inside the global image. (See the §4.1.3).

The green rectangle, in the lower left, contains a preview of the read image.

4.1.2 Format descriptor

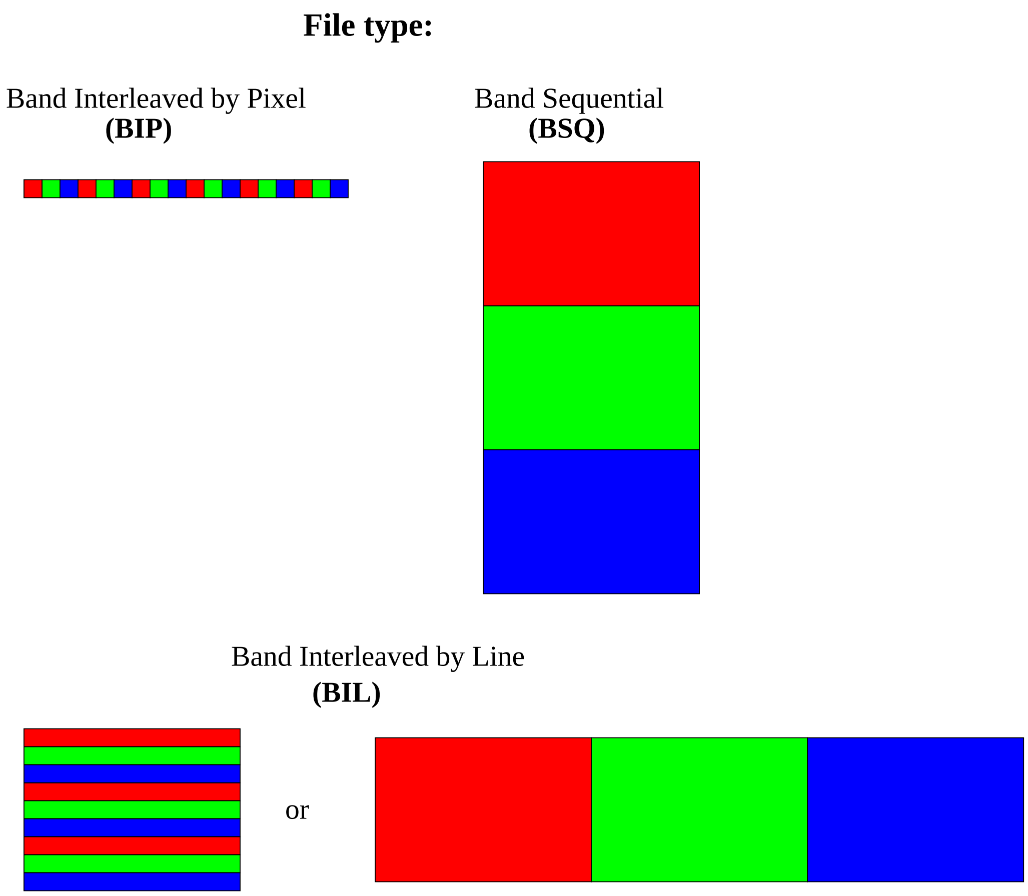


Starts the file menu detailed format description.

- Actions on read (*“Pixel value selection”*).
  The following options allow the user to modify the pixel values.
  - “Cut values”
    Allows one to cut the pixel values:
    The values smaller than the “minimum” are set to this minimum.
    The values greater than the “maximum” are set to this maximum.
  - “Best (Min,Max)”
    An automatic search is computed: 1% of pixels gives the minimum value, 99% of the pixel gives the maximum value.

   – “Mask value”
     computes a filter on data:
     for ex: if mask=“00ff” then the operation “pixel & 00ff” is done and the bits of strong weight (> 255) are suppressed.

- In the case of files containing several images *“Image bands description”*:

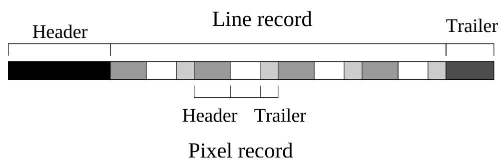


in the case of “Interleaves” files, *“Band nr”* is the number of different slices, composed with records (lines or columns), such as ex: (3 line interleave bands):

ligne1	...	data	...	(canal1)
ligne1	...	data	...	(canal2)
ligne1	...	data	...	(canal3)
ligne2	...	data	...	(canal1)
ligne2	...	data	...	(canal2)
ligne2	...	data	...	(canal3)

You must notify *“Band nr”*=3 and select *“In row”*.
“Band selection” is the slice to extract.

- (*"File description"*).



  3 editors:

  - Lines [default]: number of lines in the image
  - Columns [default]: number of columns in the image
  - Header length: the zone to jump (in bytes) at the beginning of the file before finding the first line.

  The "[default]" is the number of lines or columns that *Msphinx* has recognized.

- (*"Record description"*).
  In a basic record:

  - Header size: the zone to jump at the begining of the record
  - Trailer size: the zone to jump at the end of the record
  - Length: the record size "Header size" and "Trailer size" included

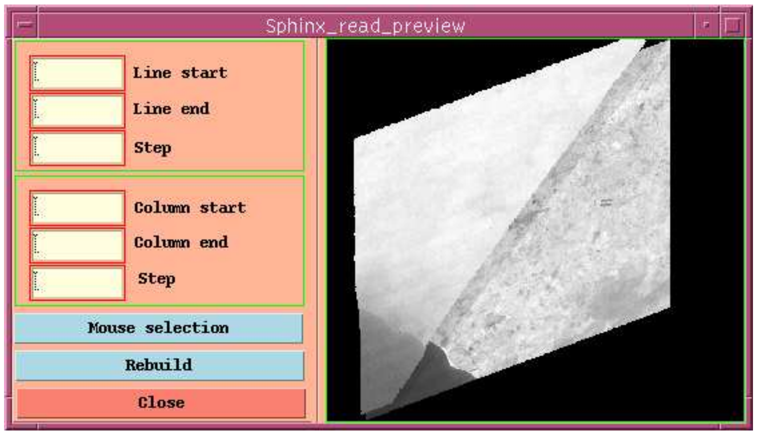
  All sizes are in bytes.

- Description of a pixel in the case of a *"Free format"* reading.
  This option is available when you click on the triangle at the bottom of the window.
  4 editors:

Pixel length	Block length
Header	Trailer

  All sizes are in bits.

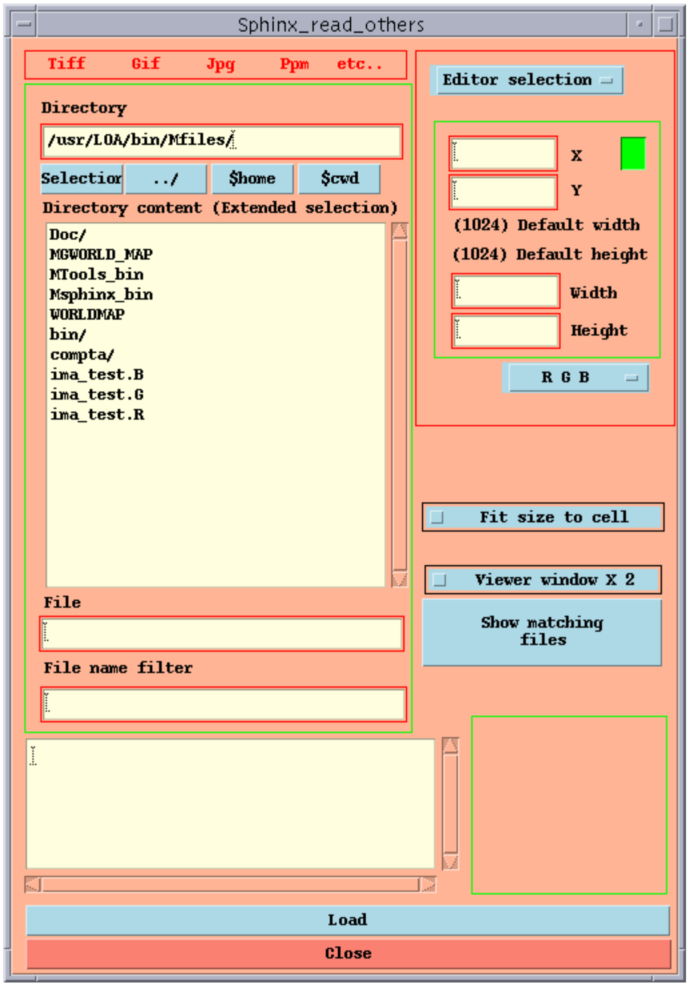
4.1.3 Image preview



The panel *"Sphinx_ read_ preview"* can be enlarged for a better image definition.

This menu allows the user to sample a zone of the input image. To do so, it is necessary to fill the editors by hand (*Line start, end* and *step*),(*Column start, end* and *step*), or to use the mouse option *"Mouse selection"*.
Activate the button *"Load"* into the menu *"Sphinx_ read_ on_ display"* to load the image into the data plane. The option *"Rebuild"* reconstructs the image preview.

4.2 FILE→ TIFF GIF JPG PPM READ



This menu reads standard file image formats. The button *"Show matching files"* allows the user to analyze all the files into a directory and displays the type of each file encoding. They are presented as [display software name] file name.
In example:
[xanim] aa.avi
[Msphinx] bb.jpg
Only the file "bb.jpg" can be loaded by *Msphinx* . However, if the file aa.avi is selected, *Msphinx* will use the software "xanim" for its visualization.

The window *"Directory content"* allows the user to select one or multiple files of any type. In this last case, several external viewers will be executed and, may be, several images are going to be loaded in the data planes.

If the selected data plane is unique(Red or Green or Blue), the images crash one after one in the same plane. If the selected data plane is *"Plane no"* with a number of plane, from 1 to 511, the plane number will be incremented at each image and all the readable images will be loaded in the corresponding data planes.

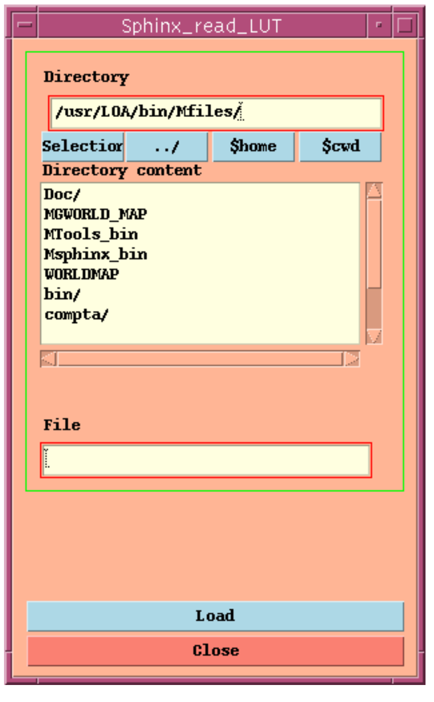
4.3 FILE→ HDF READ

This menu launches the external module (*HDFLook*) reading of files in the HDF (Hierarchical Data File) format. This module has its own manual. *HDFLook* allows you to generate or to modify an existing project and to add images in the data planes of *Msphinx* .

4.4 FILE→ SATELLITES→ POLDER

This menu launches the external module (*Mpol*) reading of files in the POLDER format. The module has its own manual. *Mpol* allows you to generate or to modify an existing project and to add images in the data planes of *Msphinx* .

4.5 FILE→ LUT READ



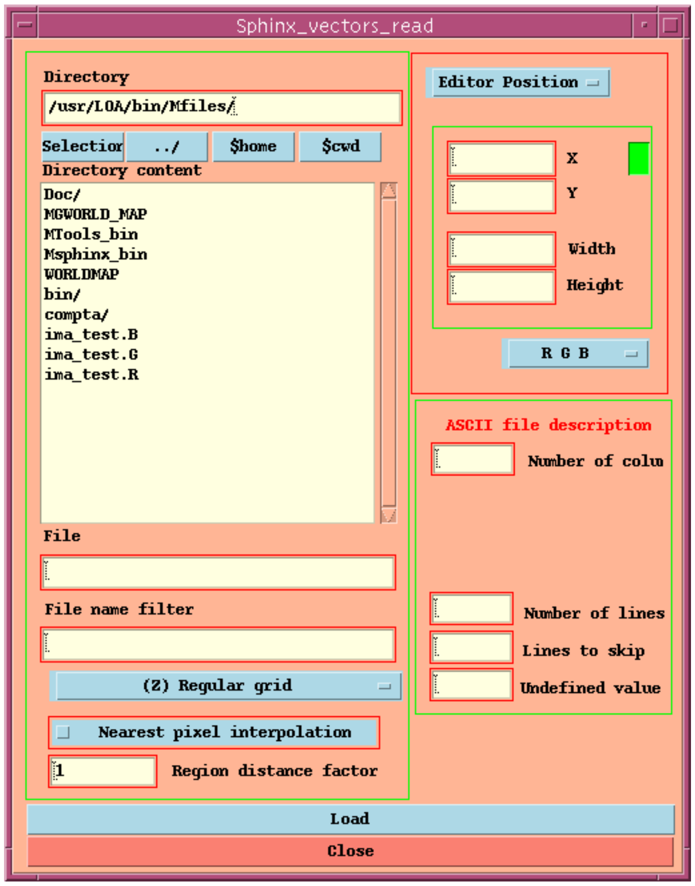
This menu allows the user to add look-up-tables with user color preferences to the default tables *"Color→ More palettes→ user lut base"* menu. The file is in ASCII form and its format is: Pixel no (0-255) Red Green Blue intensities (0-255)

Example of a grey level scale:

0	000	000	000
1	001	001	001
2	002	002	002
3	003	003	003
4	004	004	004
5	005	005	005
6	006	006	006
7	007	007	007
8	008	008	008
.	...	...	...
255	255	255	255

After the mouse file selection, select the button *"Load"* that checks the file format. An editor *"Base lut name"* appears: Type the name of the palette which will be shown in the color-name file base. Activate *"Save on base"*. To load the color LUT, use the *"Color→ More palettes→ user lut base"* menu.

4.6 FILE→ ASCII FILES



This menu allows the user to decode ASCII files with specific data.

- regular or irregular surfaces Z or X,Y,Z
- graphics files drawing lines symbols or text in the graphic Msphinx overlay
- fields of arrows

4.6.1 Building an image from an ASCII files of Z values

the different options are:

- *"(Z) Regular grid"*
  it is a file with Z values on a regular grid.

  The final surface will have the size of the defined work space (X, Y, Width, Height). The surface will be interpolated with triangles or using a *"Nearest pixel interpolation"* if the toggle is activated. If holes (zones without results) appear in the final image, the *"Region distance factor"* should be incremented.

  The editors:

- *"numbers of columns"* Clarify the number of columns of the ASCII file (Optional)
- *"Number of lines"* Clarify the number of lines (Optional)
- *"Lines to skip"* Fix the number of lines to skip at the beginning of the file
- *"Undefine value"* If a particular number, representing a mask, should not be used in the interpolations.

Activate " *Load*"; the surface appears in the selected zone.

- *"(X Y Z) Regular or Irregular grid"*
data is represented as X , Y, Z terms.

  The same options for *"Regular grid"* exist with 3 additional editors to allow the selection of particuliar columns of the file to represent the X, Y, Z terms.

  Activate " *Load*"; the surface appears in the selected zone.

4.6.2 Drawing lines, symbols or texts

- *"Plot (X Y) file"*
This menu allows the user to draw in the graphic overlay plane. The final drawing space has the size of the defined work space.
ATTENTION: The origin point (0,0) of the plot is the lower left corner of the defined work space.

  An example of file is given in the directory:
DEVEL_DOCUM/TUTOR_MSPHINX/IMAGES/ASCII ASCII_DRAWING

  - File format:
Plotting geometry: it can be introduced into the editors *"Field geometry" (X min, Xmax, Y min, Y max)* in the units of X, Y you have to draw. A simple ASCII file is a series of X, Y values drawn with the colour selected in the menu *"Red"* and the thickness of the editor *"line width"*.
  - Directives format:
Directives can be introduced directly into the file. The character # comments the line. The character \ allows you to introduce a continuation line. The word "Break" interrupts the plot.
The word "NewCurve" separates the curves.
Several fonts in format (TTF) are stored in the directory Mfiles/Fonts
The user is able to add new font files to the directory.

Verbose	
XLimits	**MINIMUM**=-1 **MAXIMUM**=-1
YLimits	**MINIMUM**=-1 **MAXIMUM**=-1
LineStyle	**CURVE**=1 **STYLE**=Solid **COLOR**=Black **THICKNESS**=1
PlotText	**X**=0 **Y**=0 **FONTNO**=1
	FOREGROUNDCOLOR=Black **BACKGROUNDCOLOR**=White
	BORDERTHICKNESS=1 **TEXT**="text to plot"
PlotMark	**X**=0 **Y**=0
	COLOR=Black **STYLE**=BigDot **SIZE**=1
PlotBox	**X1**=0 **Y1**=0 **X2**=0 **Y2**=0
	COLOR=Black **STYLE**=BigDot **THICKNESS**=1
PlotLine	**X1**=0 **Y1**=0 **X2**=0 **Y2**=0
	COLOR=Black **STYLE**=Solid **THICKNESS**=1
PlotArrow	**X1**=0 **Y1**=0 **X2**=0 **Y2**=0
	COLOR=Black **STYLE**=Solid **THICKNESS**=1

Color : Red Blue Magenta Black Green Forest Sienna Yellow Coral Violet Plum Cyan Turquoise

LineStyle : Solid NoLine MicroDash SmallDash Dash LongDash DashDot LineDot

MarkStyle : NoMark BigDot SmallDot Cross X Square Diamond TriangleUp TriangleDown Circle FSquare FDiamond FTriangleUp FTriangleDown Fcircle

– Example of file:

```
# as first character comments the line
#Verbose
Xlimits  Minimum=1 Maximum=2.875
Ylimits  Minimum=5.148 Maximum=174.8

#  curves are separated by the word NEWCURVE
# inside a curve:
#               -the word BREAK interrupt the plot
#               -a word with a color name modify the current color style
# in the command LINESTYLE:
#               -if CURVE=-1 (apply to all curves)

LineStyle Curve=1 Style=MICRODASH Color=YELLOW Thickness=2

PlotText X=1.08  Y=170 ForegroundColor=BLACK BackgroundColor=WHITE FontNo=0 \
                       BorderThickness=2  "CONTOUR DRAWING"

PlotMark Color=RED Style=FDIAMOND Size= 6 x=2.552 y=150.673

                        1.45781 57.8183
                        1.46869 57.3763
                        1.59857 50.015
                        1.61742 48.9019
                        1.75384 43.2077
                        ...
                        Break
                        1.57157 107.341
                        1.5755 107.437
                        1.6927 110.763
                        1.7308 111.119
                        1.80193 113.415
                        ...
                        NewCurve
```

- *"Arrow field (X,Y,Ro,Teta)"*
  Plotting a field of arrows defined by a vector: start position, module and argument. The drawing plane geometry: it can be introduced into the editors *"Field geometry" (X min, Xmax, Y min, Y max)* in the units of X, Y to draw; they correspond to the defined work space in pixel units. Three options are available:

  1. the colour
  2. the line thickness
  3. an arbitrary factor *"Length factor"* allowing you to adjust the arrow lengths in the plane.

4.7 FILE→ WRITE

Notice: The writing menus are applied either to the data planes, (any size and depth, see page 1), or to the view planes (3 planes of 8 bits with a lookup table, see §2.3).

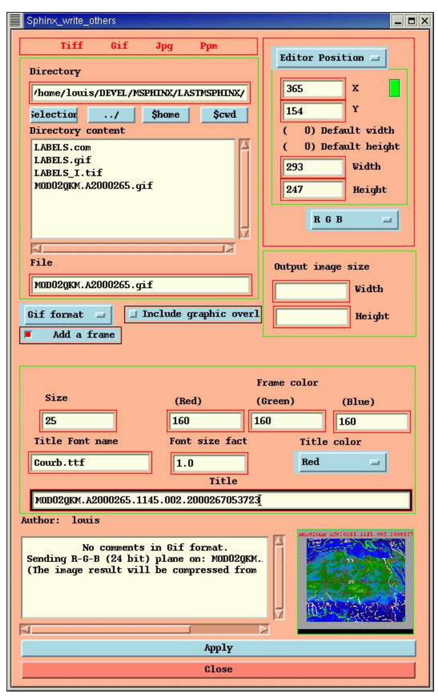
The Jpeg, Tiff and Gif formats are generally used for the visualization. They are adapted to the VIEWING planes.

The other formats (HDF and simple) allow the data safety of the WORKING planes in any format.

4.7.1 File→ WRITE→ Simple file write

This menu allows the generation of disk files from images archived in the data planes. If the selected planes are *"RGB"*, the generated file names will have the format name as: myfilename.R, myfilename.G, myfilename.B. If the selected planes are *"All planes"*, the generated file names will have the format name as: myfilename.P001, myfilename.P002 etc... In the general case, the file name will be the content of the editor *"File"*.

4.7.2 File→ WRITE→ Tiff Gif Jpg Ppm write



This menu allows the user to generate disk files from images archived in the visualization 8 bit planes with the look-up-table associated.
This menu allows you to add a frame border to the image with a text.

4.7.3 File→ H.D.F. Write

This menu allows one to create or to add records to a HDF file (Hierarchical Data File):
from the data planes, by creating SDS records (Scientific Data Set)
from the visualization 8 bit planes, by creating HDF raster format images:

- raster format images with the associated look-up-table for single Red or Green or Blue plane

- raster true color images for (RGB) planes (3 Plans of 8 bits representing the intensities of red, green, blue of image).

4.7.4 File→ Write LUT in user's lut base

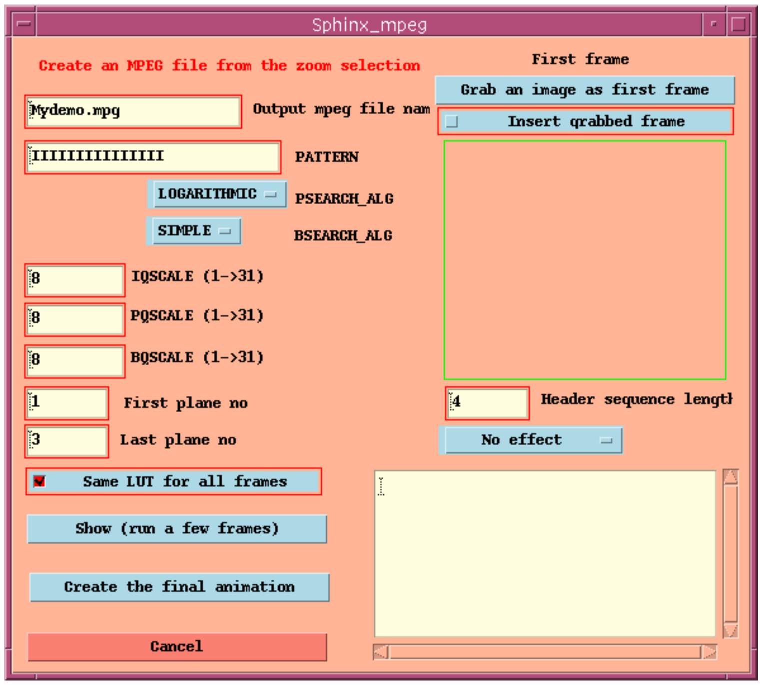
This menu allows the user to create a file with the contents of the look up table used in the visualization of the simple plane mode (Red, Green or Blue). The output format is:
pixel no (0-255), "Red", "Green", "Blue" intensity (0-255)

Example of a grey level scale:

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
.	...	...	...
255	255	255	255

The output directory for the ASCII file is: .Msphinx/USER_LUTS

4.8 FILE→ MPEG ANIMATION



This menu allows the creation of an animation in mpeg format from images stored in consecutive data planes. The animation result is independent of the size and type of the original images. The software computes the data and geometry scale conversions.

When starting the menu, the window *"Sphinx_zoom"* appears. This window represents exactly the size of the final mpeg animation.

step 1 activate *"Select area"* in the window *"Zoom"*; then select all or a part of the image in the main window display. Adjust the size of the zoom according to the size of the final animation that you want to create.

step 2 Fill the editors *"First plane" "Last plane"* with the beginning and the end of the animation data planes

step 3 Activate *"Same LUT for all frames"* if you want the same look-up-table for all planes. Fill the editors *"Minimum" and "Maximum"* to have the same stretch for all the data planes. (The stretch is a linear conversion between the original data and the look-up-table indexes from 0 to 255).
Minimum will be the color of the index 0.
Maximum will be the color of the index 255.

Remarks if the series of images was obtained by reading tiff, gif, jpeg formats, every plane has been loaded with its own LUT, so deactivate the option *"Same lut for all frames"*; and clear the *"Minimum" and "Maximum"* editors.

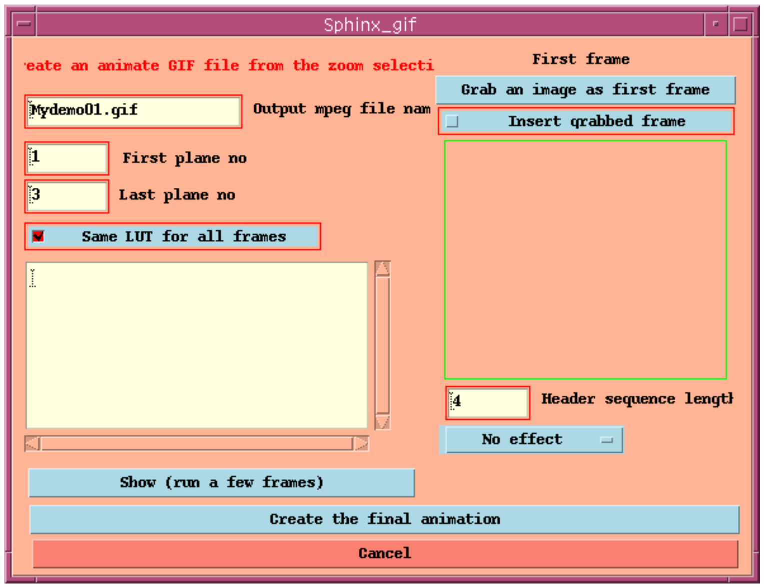
You can insert a grabbed image of the same size at the begining of your animation.
For example: execute *"Print&Settings→ XFIG tools"*, type some text in the XFIG page, execute *"Grab an image as first frame"*, select your text and press on a mouse button, the image is grabbed.
Execute *"Show (run a few frames)"*;
At the end: Execute *"Create the final animation"*, the file mpeg has been created with the name introduced in the editor *"Output mpeg file name"*.

Some complementary options are available. They perform the input data of the mpeg_encode software which generates the final image:

```
PSEARCH_ALG <algorithm>
     algorithm must be one of {EXHAUSTIVE, TWOLEVEL, SUBSAMPLE,
     LOGARITHMIC}.  Tells what kind of search procedure should be
     used for P-frames.  Exhaustive gives the best compression,
     but logarithmic is the fastest.  You select the desired
     combination of speed and compression.  TWOLEVEL is an
     exhaustive full-pixel search, followed by a local half-
     pixel search around the best full-pixel vector (the PIXEL
     option is ignored for this search algorithm).

BSEARCH_ALG <algorithm>
     algorithm must be one of {SIMPLE, CROSS2, EXHAUSTIVE}.
     Tells what kind of search procedure should be used for B-
     frames.  Simple means find best forward and backward
     vectors, then interpolate.  Cross2 means find those two
     vectors, then see what backward vector best matches the best
     forward vector, and vice versa.  Exhaustive does an n-
     squared search and is EXTREMELY slow in relation to the
     others (Cross2 is about twice as slow as Simple).

IQSCALE <n>
     use n as the qscale for I-frames

PQSCALE <n>
     use n as the qscale for P-frames

BQSCALE <n>
     use n as the qscale for B-frames
```

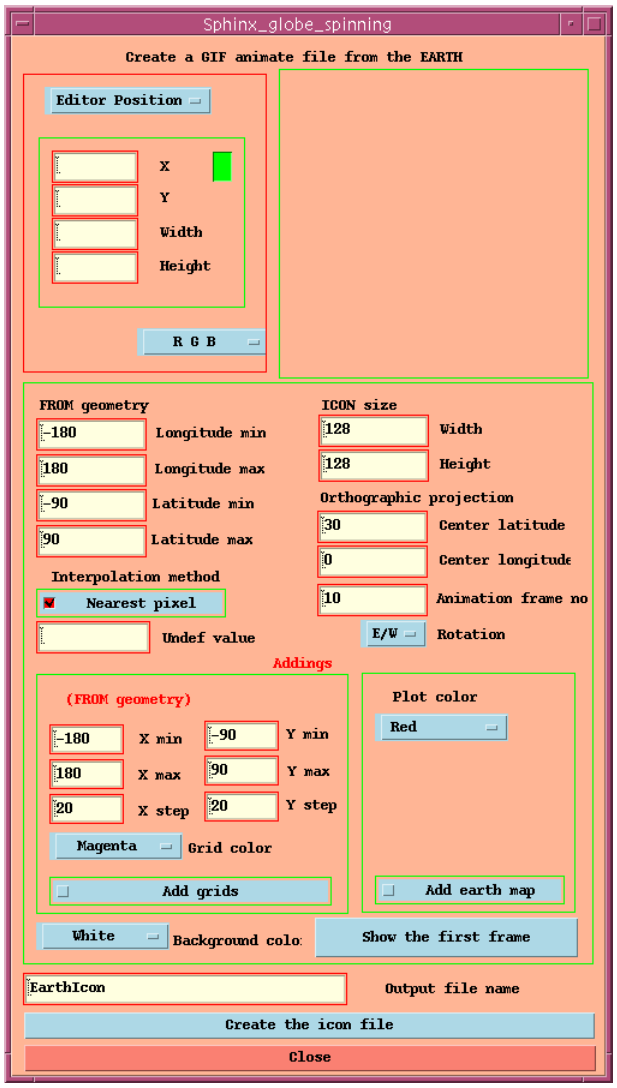
See also the manual of mpeg_encode in annex B.

4.9 FILE→ GIF ANIMATION



This menu allows the creation of a Gif format animation from consecutive images loaded in the data planes. This is independent of the size of the original images. See the preceding procedure *"Create an Mpeg animation"*.

4.10 FILE→ SPINNING GLOBE



This menu allows the creation of a Gif animation representing a rotating earth. It should be directly used in the presentations of web sites. For example, a global image or a part of a global image from the earth of any size loaded into a data plane.

step 1 Select the zone of the data plane using the menu and editors placed at the upper left.

step 2 In the part named *"From geometry"*, select the original geometry (the original projection must be linear) of the selected zone in degrees

step 3 Select the size of the final animation in pixel *"Icon size"*. The greater the size the slower the transfer will be on the web. Determine the latitude and longitude shifts in degrees. Determine the number of images to generate.

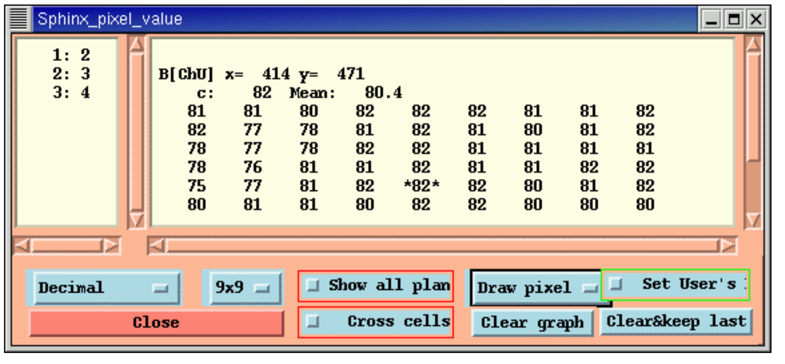
step 4 Select the *"Addings"*: longitude, latitude grids;
type the grid description and color.
Activate *"Add grids"*.
Select the adding: Earth map and the drawing color.
Activate *"Add earth map"*.

step 5 Type the name of the Gif file to generate.

Activate *"Create the icon file"*

5 EDIT

5.1 EDIT→ PIXEL VALUES

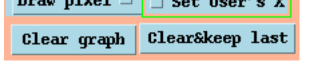


This menu allows you to dump a small zone 3×3 ou 5×5 or 9×9 of the data plane. Click into an active image window to display values. Values are shown in Decimal, Hexadecimal or Binary.The option *"Show all banks"* changes the visualization to a line by data plane. Ex: (only planes 1 2 3 5 6 7 contain data)

```
b= Red[ChU] x=  450 y=  488 v=      92 mean 3X3 =   103.7
b= Gre[ChU] x=  450 y=  488 v=      77 mean 3X3 =    82.3
b= Blu[ChU] x=  450 y=  488 v=      77 mean 3X3 =    78.8
b=    5[ChU] x=  450 y=  488 v=      77 mean 3X3 =    78.8
b=    6[ChU] x=  450 y=  488 v=      77 mean 3X3 =    82.3
b=    7[ChU] x=  450 y=  488 v=      92 mean 3X3 =   103.7
```

Optional:
draw a curve with the value of the pixel or the mean value (3×3 or 5×5 or 9×9) area for all the planes containing data (For example to study a space/time evolution):
Activate the option in the menu *"No plot"*. Click a point on an active window. the *Mgraph* window appears with the curve. Select other points and the curves accumulate in the display window. If bad values disrupt the plot scale, you can remove them by using the menu *"Drawing_ area→ Clear area"* of *Mgraph* .

With this option, new buttons appear:



- *"Clear graph"*
  Erase all the curves in the window.

- *"Clear&keep last"*
  Erase all the curves in the window except the last one.

- *"Set User's X"*
  This is a very particular option allowing the user to define values other than the plane number as abcisses of the curve. It is necessary to use the zone of edition at the left of the pixel value window to introduce the correspondence between the plane number and the new abcisse value: For ex: (plane-no wavelength).

1	443
2	490
3	565
5	670
6	763
7	765

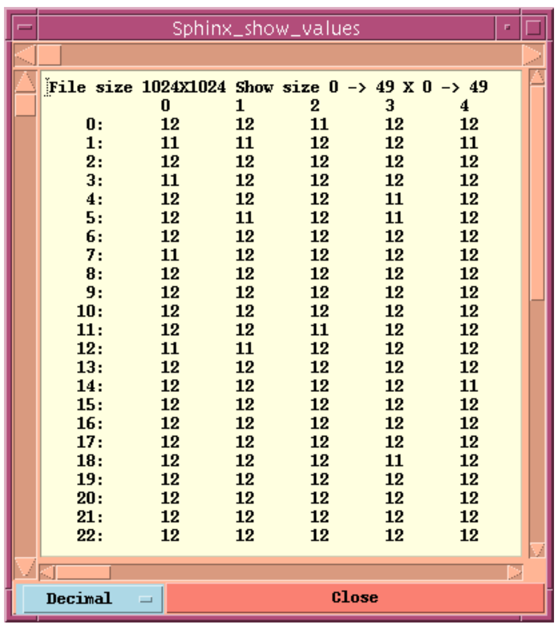
Activate the toggle option: the printed values become:

```
b= Red[ChU] :443 x=  938 y=  735 v=     136 mean 3X3 =   132.3
b= Gre[ChU] :490 x=  938 y=  735 v=     164 mean 3X3 =   159.4
b= Blu[ChU] :565 x=  938 y=  735 v=     197 mean 3X3 =   192.3
b=   5[ChU] :670 x=  938 y=  735 v=     197 mean 3X3 =   192.3
b=   6[ChU] :763 x=  938 y=  735 v=     164 mean 3X3 =   159.4
b=   7[ChU] :765 x=  938 y=  735 v=     136 mean 3X3 =   132.3
```

The curve is plotted with the new values of x.

Remark: you can save these values archived in Mgraph by using the menu *"Files→ Export Data...→ Data to file..."*.

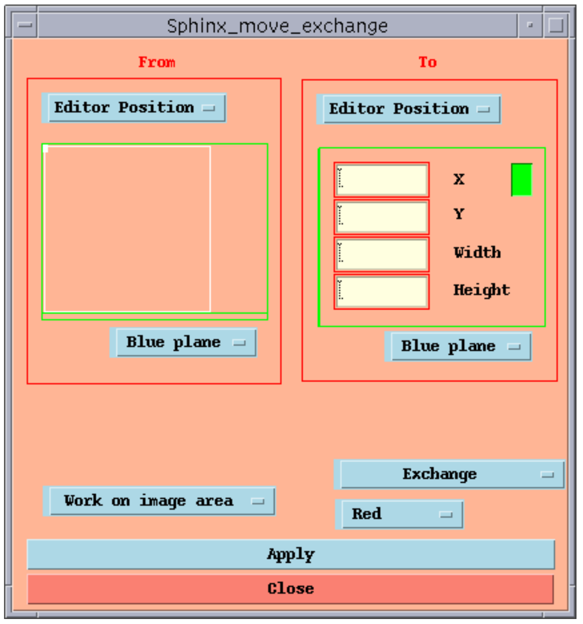
5.2 EDIT→ DUMP IMAGE VALUES



This option realizes a dump of the data plane displayed in the main window. You can enlarge the window *"Sphinx_show_values"* to make it easiest to see. Right and bottom scrollbars allow the user to move the display into a (50×50) sub-zone. Left and top scrollbars allow you to move the (50×50) sub-zone in the global image.

The data can be printed in several units: decimal, hexadecimal or binary.

5.3 EDIT→ MOVE EXCHANGE ROTATE



This menu allows the user to modify:

- the data planes
- the 3 visualization planes
- the graphic plane + plane masks
- the color look-up-tables (copy, exchange)

Several menu lists and editors are used to define the geometry of the "FROM" and "TO" area and the working planes.

Clear... Erases, by the value zero, a zone of the image

Copy... Copy of zone

Exchange... Exchanges two zones

Rotate & Cut... Rotates a square zone on itself (90 degrees at a time)

Rotate... Rotates a rectangular on the image (90 degrees at a time)

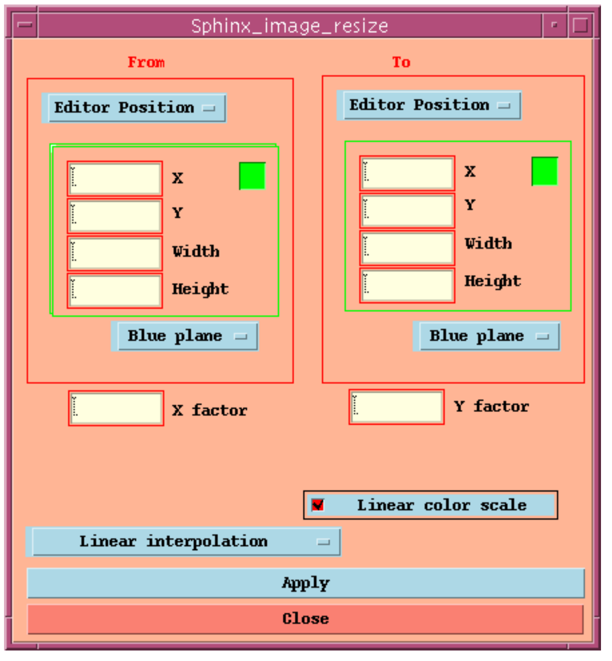
Up side down... Switches around lines

Left side right... Switches around columns

Complement... Realizes a complement to 255 of the displayed image values

Clear selected color... Only on the plane *"Work on mask area"*, it allows you to replace a particular colour of the plane with the color transparent.

5.4 EDIT→ IMAGE RESIZE



This menu allows you to modify the size of an image. A menu and editors are used to define the geometry of the "FROM" and "TO" area and the working planes.

Several methods of data sampling are available:

- Linear interpolation
- Nearest pixel
- Bicubic spline
- Nearest pixel (Build an icon)

To determine the zoom factor, two methods are available:

1. fill the geometry of the “From” and “To” areas. the *“Apply”* will compute automaticaly the X/Y scale factors.
2. fill the editors *“X factor” “Y factor”*; in this case the image result can be truncated to the reception area size.

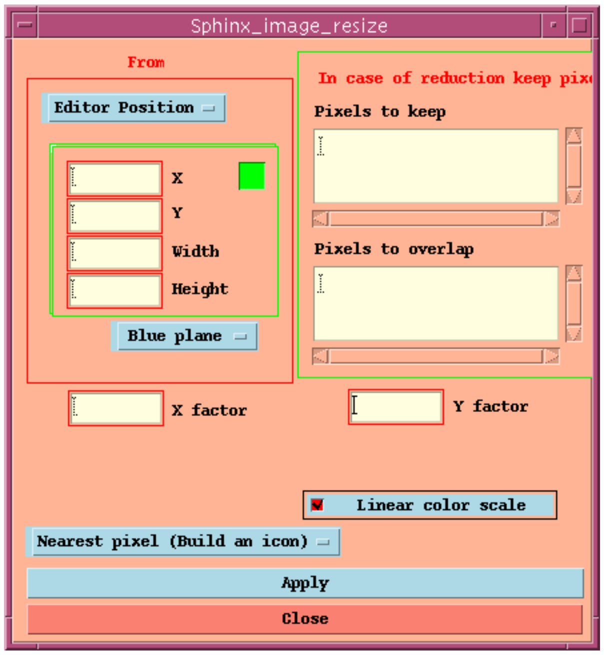
An important toggle *“Linear color scale”*:

In the majority of cases, data in memory are represented into the visualization display through a linear scale of predefined colors.
On the other hand, the digitalized photos or classification results have completely erratic color scales.
If you apply a method of pixel sampling other than *“Nearest pixel”*, the final

interpolated image will be disastrous.

For making the interpolations on this type of images, you have to deactivate the button *"Linear color scale"* and activate *"Apply"*.
Calculation will be carried out using the red, green and blue components of the pixel, and the final image recomposed using a completely different color scale with a display result close to the original image.
(Attention! If the two "FROM" "TO" areas are in the same data plane, the original image will be translated into the new color look-up-table)

Fonction *"Nearest pixel (Build an icon)"*



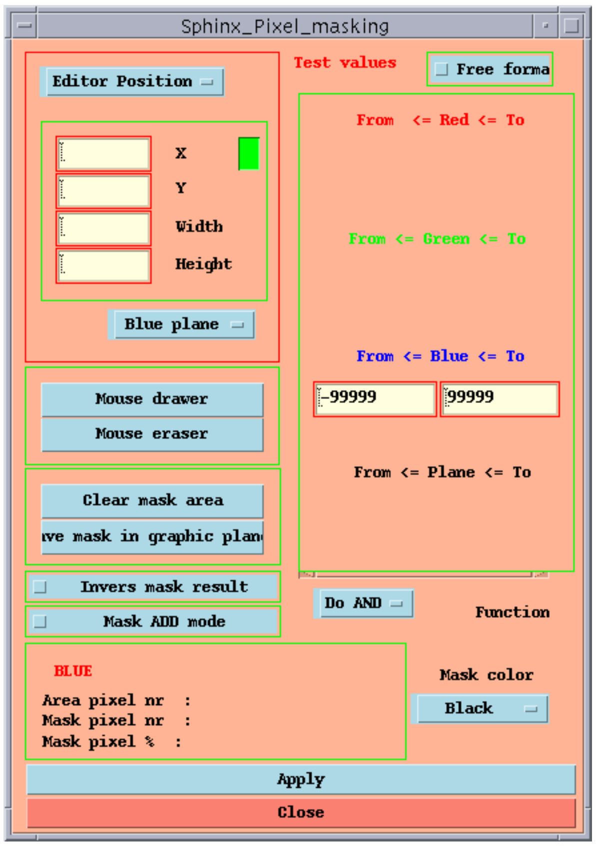
This function has been introduced to create small representative images from bigger images (typical use of WWW icons)
First, define the geometry of the "FROM" image and the geometry of the icon area.
Select *"Nearest pixel (Build an icon)"*.
Two editors appear:

- Pixels to keep: pixel value to keep always.
- Pixels to overlap: pixels value being able to be replaced.

ex: black text on a white background.
The white can be crushed, the black must be kept. The values of pixels can be determined by the function *"Edit->Pixel value..."*

5.5 EDIT→ PIXEL & MASK

5.5.1 Create Mask from Pixels



This menu allows you in the plane mask (4 bits) to generate colored zones (14 colours) corresponding to data pixels filtered by a series of tests.

To use it, define the geometry of the work area in the upper left side of the panel.

2 modes of filterings pixels:

1. direct
   Fill the editors
   eg: From $<=$ Blue $<=$ To
   with the interval values. In case of multi planes (R, G, B) you can choose the options *"Do AND"* or *"Do OR"* to perform between planes.

2. Free format
   An editor and a list appear. The top editor allows you to define tests on any data plane with a very simple syntax Eg:

```
100<Blue<200
230<Blue<240
100 < 4 < 300
```

```
100 < 100 < 400
# 1<Red<10  (# Allows the user to comment a line)
```

will be executed as

```
100<Blue<200   (plane blue, pixel between 100 and 200)
OR
230<Blue<240   (plane blue, pixel between 230 and 240)
AND
100 < 4 < 300 (plane no 4, pixel between 100 and 300)
AND
100 < 100 < 400 (plane no 100, pixel between 100 and 400)
```

- Choose between *"Do OR"* or *"Do AND"*, to replace the AND between planes by the OR.

- In direct mode or in free format, you can fill the editors with a value in hexadecimal format (for instance: 0x0F). It will perform a bit to bit test. In this example, all data with 4 bits set to 1 on the right will generate a mask pixel.

- Activating *"Apply"*, the tests really taken into account are displayed in the bottom widget list.

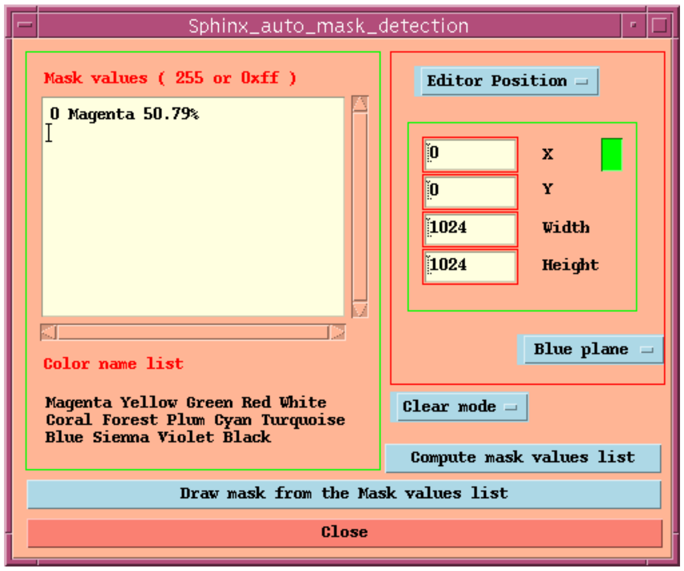
General Options:

"Clear mask area"	Erases the mask plane
"Save mask in graphic plane"	Transfers the mask plane in the graphic plane. This one can be erased by using *"Window→ Clear graph plane"*
"Invers mask result"	Inverts the mask
"Mask ADD mode"	Does not erase existing masks within the selected zone
"mask color"	Choice of the mask colour

- You can use an eraser *"Mouse eraser"* piloted by the mouse.
  Activate this option: Place the cursor in the image. The right button allows you to erase the pixels of the mask under the drawn rectangle. The left button allows you to quit the input loop.

- You can use a pencil *"Mouse drawer"* piloted by the mouse.
  Activate this option: Place the cursor on the image. The right button allows you to add pixels in the mask under the drawn rectangle. The left button allows you to quit the input loop.

5.5.2 Auto Mask Detection



This menu allows you to find the zones of constant pixels in the image and to create the corresponding zones of colour in the plane mask.

Define a geometry and a work plane in the menu at the upper right of the panel. Activate *"Compute mask value list"*. If an area of pixels exists, the constant values appear in the editor *"mask values"* with a format like: `0 Magenta 50.79%` (value zero represents 50% of the zone and will be drawn in magenta). You may add or detect value and modify the colors by using directly the editor zone; ex:

```
                 0 Magenta 50.79%
becomes
                 0 yellow
                 100 red
```

The function will look for the pixel 0 in yellow and for the pixel 100 in red.

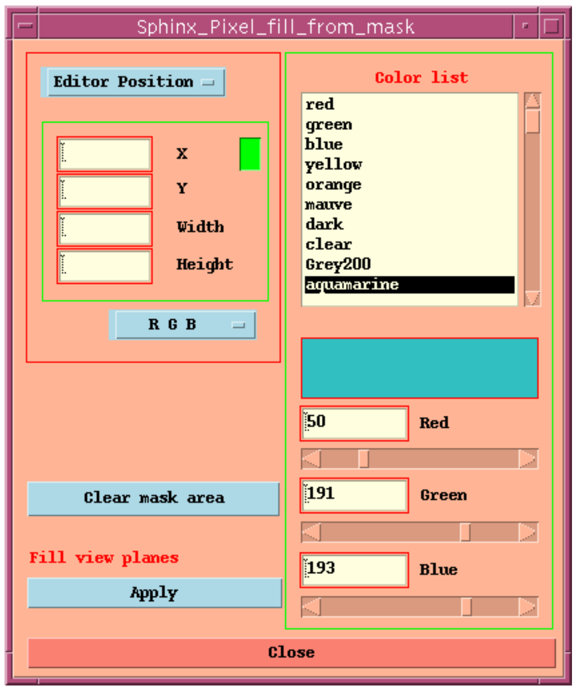
Activate *"Draw mask from the Mask values list"*

The red and yellow masks appear in the main window.

Options:

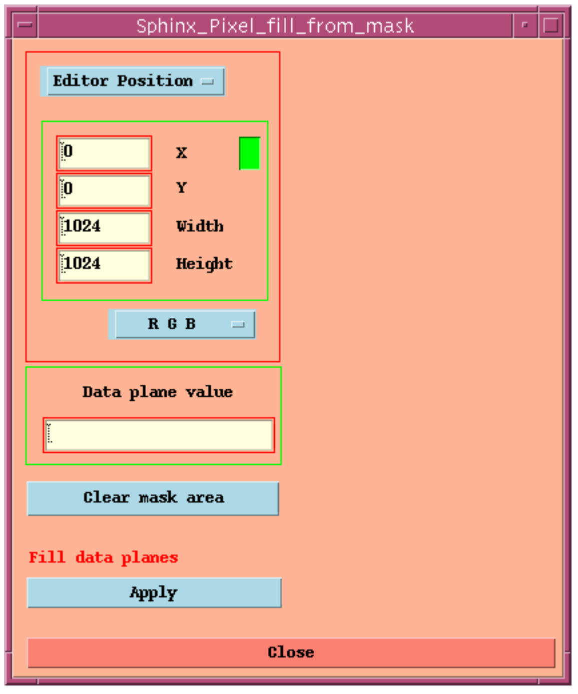
- *"Clear mode"* The previous mask area is cleared.
- *"Add mode"* Does not erase the existing mask pixels in the area.

5.5.3 Fill (RGB) Image planes



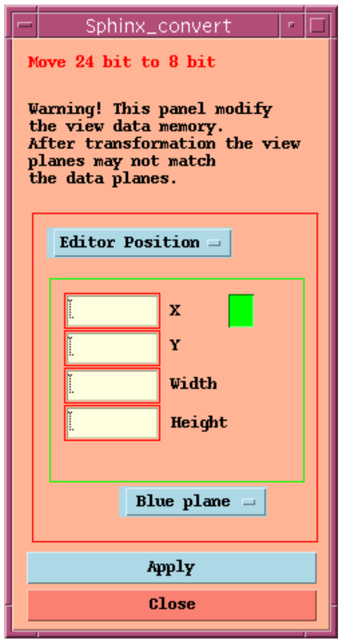
This menu allows the user to modify the display planes (8 bits) Red, Green, Blue independently of the data plane values, by affecting the pixels which have a mask (of any colour) with a constant color value selected from a list or defined by the user.
To use it:
Define the working zone, define the filling color.
Switch the display in true color mode *"RGB"*, activate *"Apply"*;
then activate *"Clear mask area"*: the masked zone appears with the defined color.
Now, there is a difference between the data planes and their visualization planes. To find the original visualization values Red, Green, Blue, it is necessary to use the menu *"Display→ Enhance display"* that will recompute the pixels of the 8 bits visualization planes.

5.5.4 Fill Data Planes



This menu allows the user to modify the data planes pixels, by affecting the pixels having a mask (of any colour) by a constant value defined by the user.
To use it:
Define the working zone.
Type a value in the editor *"Data plane value"*, activate *"Apply"*, activate *"Clear mask area"*.
The zone which was masked appears constant.
If you use *"Edit→ Pixel value..."* you will be able to see those initial data were replaced.

5.6 EDIT→ SCALE 24 BITS TO 8 BITS



This menu allows the user to transform, by using the algorithm of Heckbert's (Color Image Quantization for Frame Buffer), a 24 bit image (true color) defined by the 3 Msphinx's visualization planes (Red, Green, Blue) in an 8 bit image with a color look-up-table representing, as well as possible, the original image coded on 16 million colours.

This function works only on the visualization planes independently of the data planes values.

To use it:
Define the geometry of the "FROM" "TO" zones.
Choose the plane for the result (Red, Green, Blue or Plane no).
Activate *"Apply"*, then switch the visualization to the resulted plane and display the color scale *"Show plane.."*,*"Show scale"*.

Attention! In this function, the data planes are no longer representative of the visualization planes. To find the original pixels of the visualization planes (Red, Green, Blue.), it is necessary to use the menu *"Display→ Enhance display"* that recomputes the pixels of the visualization zones from the data stored in the data planes.

5.7 EDIT→ SCALE 8 BITS TO 24 BITS

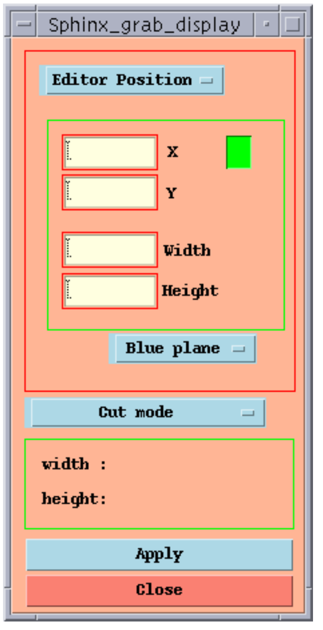
This is the inverse of the previous operation: a plane (8 bits) associated with a color look-up-table is decomposed into 3 planes Red, Green and Blue.

To use it:

Define the geometry of the "FROM" "TO" zones.
Select the image plane to decompose (Red, Green or Blue).
activate *"Apply"*.
The three visualization planes are filled with the red, green blue components of each image pixel.
Switch the visualization to *"True color"* to see the result.

Attention! In this function, the data planes are not any more representative to the visualization planes.
To find the original pixels of the visualization planes (Red, Green, Blue.), it is necessary to use the menu *"Display→ Enhance display"* which is going to recompute the pixels of the visualization zones from the data stored in the data planes.

5.8 EDIT→ GRAB DISPLAY



This menu allows the user to grab a part of your screen as an image, selecting the zone using the mouse and filling a defined data plane.
To use it:
Define the receiving area geometry, and the work data plane.
Attention! If the work plane is in 8 bit mode, the image will be loaded with a specific color look-up-table, If the work plane is in RGB mode, the image is loaded in 3 planes (Red, Green, Blue) with the color component of each pixel.

Options:

"Cut mode" the size of the image can exceed the size of the receiving zone.

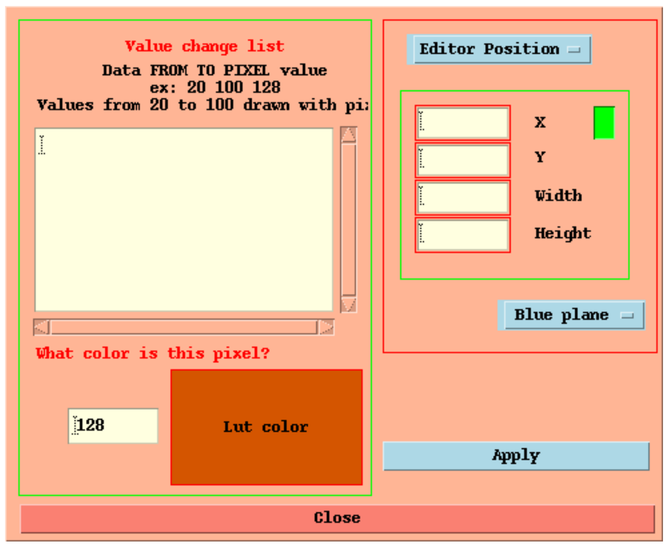
"Fit mode" the size of the image will be adapted by sampling (line, column) to the size of the receiving zone

"Fit mode (keep ratio)" the size of the image will be adapted by sampling (Line, column) to the size of the receiving zone but preserving the proportions height/width.

Activate *"Apply"*.

Use the left button of the mouse to select the area or click into a window (only the panel and its contents will be transferred) or click on the background of the screen (the full screen will be trapped)

5.9 EDIT→ VIEW PLANE PIXEL CHANGE



This function allows the user to modify the pixels of the visualization planes according to the range values of the corresponding data plane. Define the area geometry and the work plane. Fill the editing zone *"Value change list"*;
the command syntax is simple:
Name of the data plane (R, G, B), interval(minimum, maximum) , color component (red, green, blue)

```
G .1  .2  255 0 255
B .0  .1    0 255 0
```

The pixel values in the green plane between .1 and .2 will appear in magenta (red+blue). The pixel values in the blue plane between 0 and .1 are going to appear in green.

Remark: a color editor allows you to see in mode RGB, the colour done by these (R, G, B) components or in mode simple plane, a color pixel value (0-255) from the associated look-up-table.

In RGB mode, if your screen is 8 bit depth, it will be necessary to point with the mouse into the rectangle *"Lut color"* to see effectively the colour defined by the (R, G, B) editors.

Option: A button *"Undo"* allows you to retrieve the original image.

6 DISPLAY

6.1 DISPLAY→ SHOW TRUE COLOR

The visualization switches to 24 bit true color mode. The visualization planes (Red, Green and Blue) are used to define the intensity of red, green and blue of the final image.
This mode allows you to work in 16 million colours for every pixel. You are able to mix into the data planes any type of images without damaging the final visualization.
Remark: On an 8 bit screen, an algorithm (3-3-2) is used to display the image (Only 3 bits of red, 3 bits of green and 2 bits of blue constitute a pixel). That degrades considerably the visualization. On the other hand, the created files and printings of the images will be done correctly.

6.2 DISPLAY → SHOW (Red/Green/Blue) PLANE

The display switches in pseudo color mode. The image is displayed using a 256 color look-up-table with the red, green, blue components of the pixels.

Remark: On an 8 bit screen, you have 256 colors for all your components of your screen. For using it without "Flash" (drastic changes when you move from a window to another), *Msphinx* needs at least 96 free colors (or cells). An internal algorithm shrinks the 256 colours associated to the images to the real number of free cells in the screen (That does not affect printouts or file creation, which will be done with the maximum of definition).
If the number of free cell is $<$ 96, a message appears:

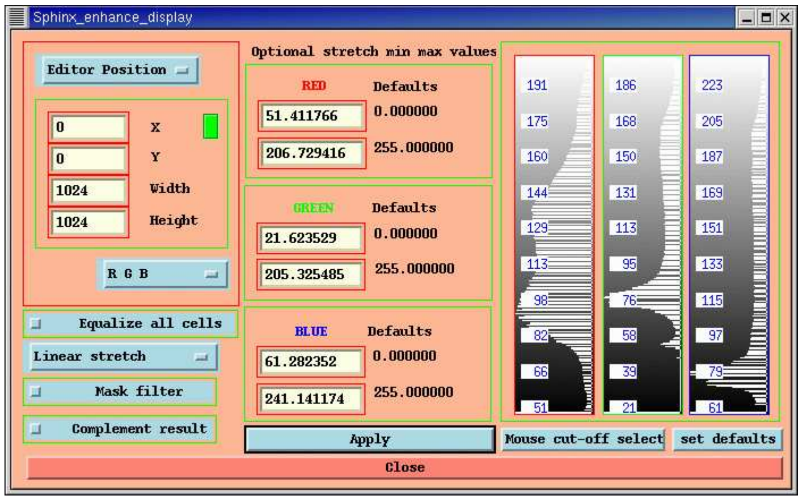
```
Sorry !!! Free Color Cells < 96 :: 7 I have to set My own lut
```

and *Msphinx* assigns a number of cells being enough to work with a side effect of "flash" when you pass from a Msphinx's window to an another software window.

6.3 DISPLAY→ SHOW COLOR SCALE

A widget is drawn showing the color scale associated to the plane.

6.4 DISPLAY→ ENHANCE DISPLAY



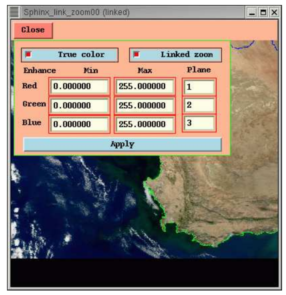
This menu allows one to contrast the automatic transformation realized by the software on the data pixels (of any scale), to convert the data pixel to a 256 level display pixel.
To use it:
Define the working geometry, and the concerned planes of data: necessarily red, green or blue planes or the 3 together.
Activate *"Apply"*;
the program is going to calculate the minima and maxima values for the stretch tansformation. If result does not agree, modify the editors *"Minimum"* and *"Maximum"* with your own values and activate *"Apply"* to show the image result.

Options:

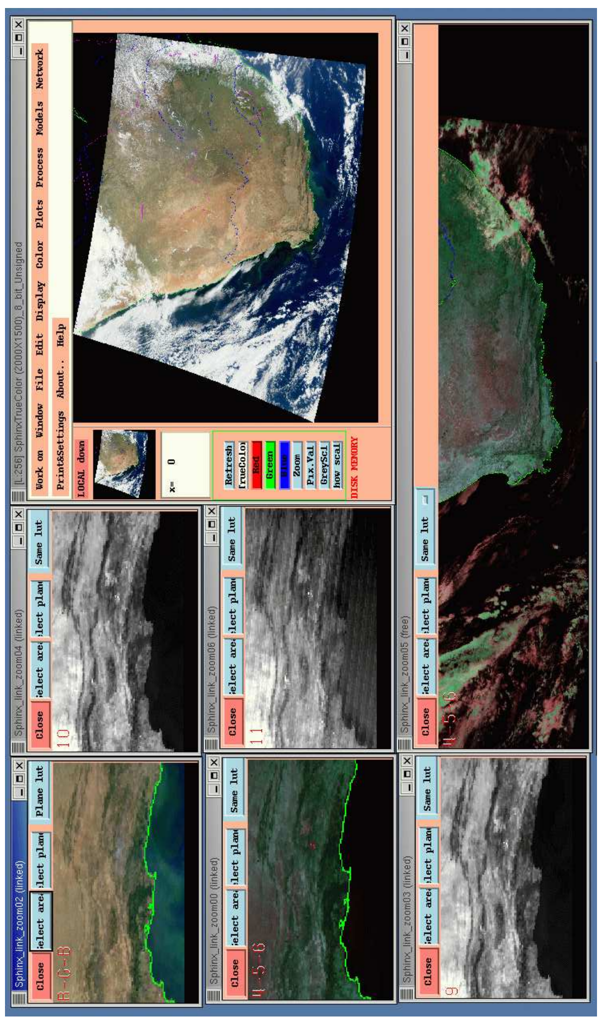
"Mask filter"	Allows you to apply the transformation only on the non-masked pixel of the image.
"Equalize all cells"	In this mode, the notion of global geometry disappears to leave place at the geometry of the cells.

If the two editors *"Minimum"* and *"Maximum"* are empty, every cell will be considered as independent with different stretch (automatically calculated).

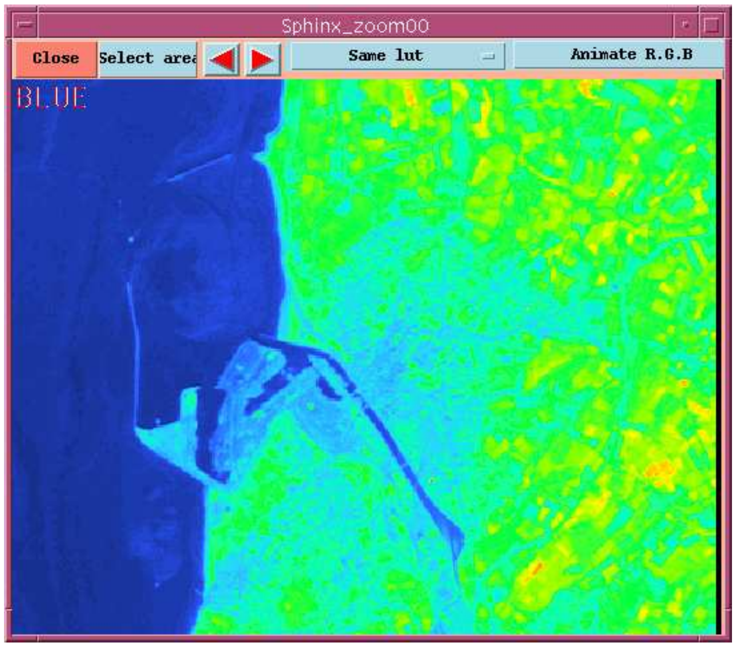
6.5 DISPLAY→ ZOOM (linked)



See the figure 6.5, for an example of a linked zoom.



6.6 DISPLAY→ ZOOM (simple) & ANIMATE



This menu allows one to realize a zoom of the main image (at least 10 different zoom windows can be used simultaneously). These windows are *"resizable"* and sensitive and they can be used as entry for all the selection menus of zone or pixel values etc...
Activate *"Select area"* and choose, using the mouse, a zone in the main window image or in another zoom window containing an image.

Options:

◁ ▷	In the case of several filled data planes, you can use the two arrows to switch the planes.
"Same lut"	Allows you to work with the color look-up-table displayed without stretching the data.
"Same lut (enhance)"	Allows you to work with the color look-up-table displayed with a new stretch at each image area selection.
"Plan lut"	Switch to the plane look-up-table.
"Plan lut (enhance)"	Switch to the plane look-up-table and performs a stretch.
"set enhance values"	Enter the min/max values for the stretch (available with options "Same lut (enhance)" and "Plan lut (enhance)".

Animations options:

"Animate RGB"	Realizes an animation on images contained in the RGB planes.
"Animate all banks"	Realizes an animation on images contained in all the planes.
"Create an mpeg animation"	See upper §4.8.
"Create a gif animation"	See upper §4.9.

Remark:

In the menus *"Animate"*:

the left button of the mouse allows you to slow down the animation,

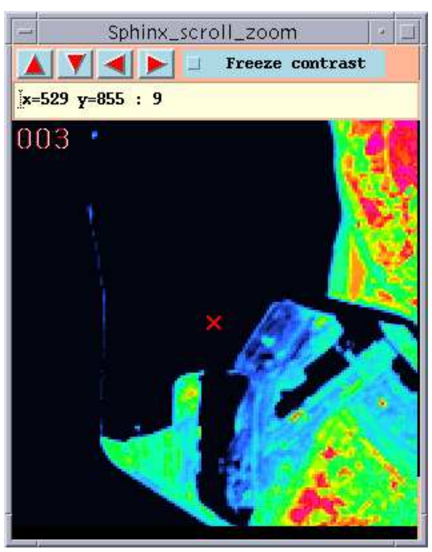
the middle button allows you to realize a fast animation on a small area around the mouse pointer in the zoom window,

the right button allows you to quit the animation loop.

To slow down or to accelerate animations, you may also enlarge or reduce the zoom window.

Graphic planes and masks are inlayed in the zoom, use option *"Window→ Mask/Umask overlay plane"* to mask them.

6.7 DISPLAY→ SCROLL ZOOM



This menu allows the user to create a small scroll window in the image.

The mouse buttons have a different uses, if the mouse is inside the main window display or if the mouse points on the image of the window *"Sphinx_scroll_zoom"*:

- In the main Window:
  - The middle button selects the zone
  - The left button increases the size of the zone displayed
  - The right button decreases the size of the zone displayed

- In the window *"Sphinx_scroll_zoom"*:
  - The middle button selects a pixel of which value should be printed
  - The left or right button switches to the various data planes
  - The left+middle buttons animate a small area around the mouse pointer.

If the toggle *"Freeze contrast"* is on, the zoom image is displayed with the same stretch, otherwise contrasts change at every new selection of zone.

The red cross in the zoom window shows the pixel of which value is printed in the top editor. You can click on pixels in the zoom window to display their values.

The arrows (top, bottom, right, left) allow you to move with great precision in the main image.

To stop the scroll display, the XWindow panel *"Close"* is used.

Remark:
Graphic planes and masks are inlayed in the zoom: use option *"Window→ Mask/Umask overlay plane"* to mask them.

7 COLOR

7.1 COLOR→ TRUE COLOR

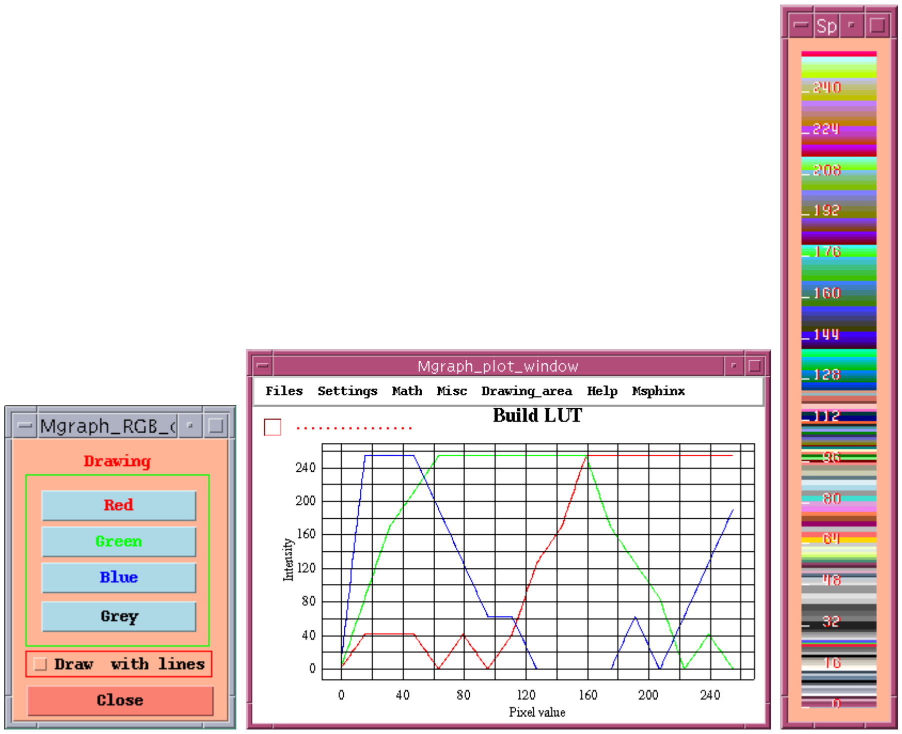
The visualization switches to 24 bit true color mode. The visualization planes (Red, Green and Blue) are used to define the intensity of red, green and blue of the final image.
This mode allows you to work in 16 million colours for every pixel. You are able to mix, into the data planes, any type of images without damaging the final visualization.

Remark: On an 8 bit screen, an algorithm (3-3-2) is used to display the image (Only 3 bits of red, 3 bits of green and 2 bits of blue constitute a pixel). That considerably degrades the visualization. On the other hand, the created files and printouts of the images will be done correctly.

7.2 COLOR→ MORE PALETTES

This menu allows the selection of a new predefined color look-up-table or introduced using the menu *"File→ LUT read.."* in user LUT directory (*"Color→ more palettes→ User LUT base"*).

7.3 COLOR→ BUILD COLOR SCALE



A Mgraph's particular option allows the user to build interactively a color LUT from the 3 (Red, Green, Blue) components and their graphic representations.

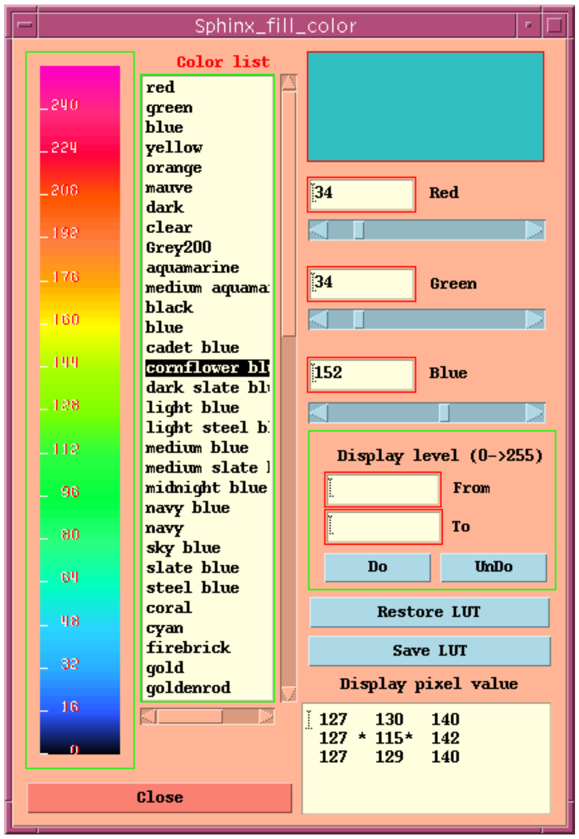
Activate *"Display→ Show color scale"* that is going to build an image showing all the levels of color look-up-table.
Move the Mgraph's graphic window to the first level of your screen.
In the menu *"Mgraph_RGB"* activate one of the color component for example the button *"Red"*.
The mouse is automatically placed in the Mgraph's window (in X, there is the pixels value (0-255). In Y, there is the intensity color (0-255)).
Use the right button as marker pen and draw continuously or by step lines to draw the red intensity curve.
Press on the left button to quit the input loop.
The new color LUT replaces the old one.
You can see the result on the main window image and in the image representing the color scale.

Do the other 2 components the same way (green and blue).

In the menu *"Mgraph_RGB"*, an option *"Draw lines"* allows you to draw the color curves by segments. Push the right hand button first on the first point of a segment then by moving the mouse (button depressed) draw the line. Free the button: the segment is introduced etc...

Press the left hand button to quit the input loop.

7.4 COLOR→ FILL LEVELS WITH COLORS



This menu can not be used in true color mode.
It concerns only the visualization of a plane associated with a color look-up-table. It allows you to modify the LUT using a predefined color table or with precise values (0-255) defined by the user.
A top right rectangle shows the selected colour. On the 8 bit screens, it is necessary to point the mouse to the *"Sphinx_fill_color"* window to be able to see the selected color.

Choose a colour in the main list; you can modify it by changing the values of the component editors or by moving the scroll bars or every color component.

Select the pixel levels to modify *"From"* and *"To"*, then apply *"Do"*.

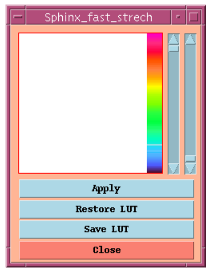
Options:

"Undo"	allows you to go back a step.
"Restore lut"	erases all the modifications.
"Save LUT"	replaces the main lut with the new one.
"Display pixel value"	Small 3×3 window showing the value of the visualization pixels on a zone pointed in the main window by the mouse (Click on a zone of interest).

Remark: To keep the new LUT, don't forget to active *"Save LUT"* before closing the panel *"Sphinx_fill_color"*.

7.5 COLOR→ COLOR STRETCH

7.5.1 FAST STRETCH



This menu allows you to dilate or to contract the color scale with a simple movement of the mouse. It doesn't work on 24 bit display (the visualisation method is to slow).

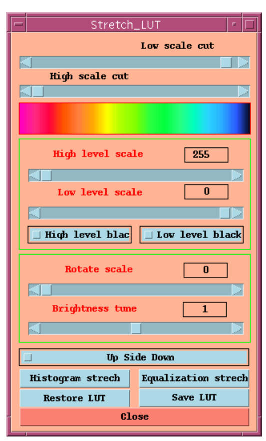
Activate *"Apply"*

Move the cursor in the small window: the visualization transformation is immediate. Click any button to quit the input loop.

Options:

"Restore lut"	Erases all the modifications.
"Save LUT"	Replaces the main LUT with the new one.

7.5.2 STRETCH THE 8 BITS Color Scale

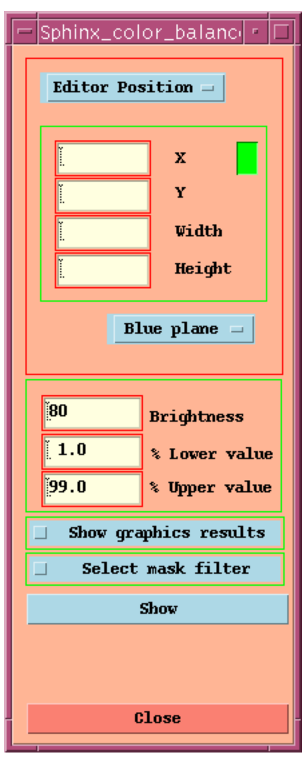


This menu allows you to dilate, to contract, to invert or to execute a color scale rotation. Use the scoll bars by observing the result on the main image window.

Options:

"High level black"	Allows you to replace the colors outside the upper bar with the black color.
"Low level black"	Allows you to replace colors outside the lower bar with the black color.
"Up side down"	realizes a swap of the scale high to low colors.
"Histogram stretch"	Allows you to associate the LUT to the shape of an histogram of a zone defined on the main image. On 8 bit screens, it is necessary to point the mouse cursor in the menu *"Stretch_lut"* to visualize the result.
"Equalization stretch"	Allows you to associate the LUT to the shape of an histogram of a zone defined on the main image by keeping the same number of pixels in every class. On 8 bit screens it is necessary to point the mouse cursor in the menu *"Stretch_lut"* to visualize the result.
"Restore LUT"	Erases all the modifications.
"Save LUT"	Replaces the main LUT with the new one.

7.5.3 COMPUTE IMAGE BALANCE



This useful menu works in true color mode. It allows you to adjust the amplitudes of the 3 images constituing the red, green, blue color components to improve the global contrast of an image. It allows you associated with a mask to contrast, for example, only the pixels constituting the water of an image without touching the ground pixels. Select a test zone and a work plane (generally RGB). Activate *"Show"*: the resultant image is displayed.

2 options are possibles:

"Undo" to return to the initial state

"Apply" to apply definitively the calculation to the selected area. (Or in a new area after to select all the image as new working geometry)

"Show graphic results"	A graph appears showing the histograms of the zone before (left part) and after (right part). (The general shape of the original histogram is preserved).
"Select mask filter"	Calculation will be done only on the non masked pixels of the image.

8 PLOTS

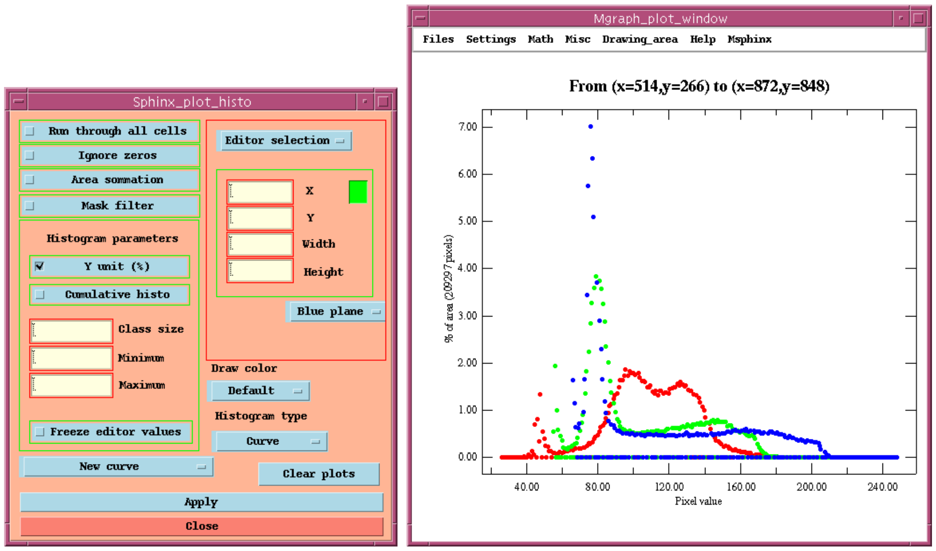
The menus below use the *Mgraph* software:
Mgraph is an "easy to use" graphic software application allowing a fast visualization of scientific data. The output files are in PostScript. Images in Tiff or Gif format can also be generated.

Mgraph main features

- Fast visualization without limitation of the quantity of data.
- Up to 10 simultaneous graphic windows.
- Management of the user's graphic database.
- Interactive formating of documents.
- Digitalization of curves, starting from images read in TIFF/GIF format (from scanner, for ex.) or starting from images grabbed directly on the screen.
- Various fits and equations on the curves.
- Contour drawing and many projections
- Automatic production starting from command files, themselves which can be created by *Mgraph* .
- Simple implementation into FORTRAN or C programs.
- Surface perspectives
- WWW Cgi implementation

See the Mgraph manual for more explanations.

8.1 PLOTS→ HISTOGRAM



This menu allows the user to draw histograms from the image data plane.

Select the geometry of a zone. Execute *"Apply"*.

Options description:

Run through all cells	Allows one to draw the same zone through all the defined cells.
Ignore zeros	The zero pixel number classes are skipped.
Area sommation	This mode allows you to draw a histogram which is going to evolve according to the number of zones that are going to select: Select a zone, then execute *"Apply"*. Again, select a zone, then execute *"Apply"*. and so on...
Mask filter	Only non masked pixels are taken into account.
Y units (%)	Switches Y values to the class percent pixel number. (% of the total pixel zone)
Cumulative histo	The classes are accumulated the last one is 100% pixels.
Freeze editor values	Allows one to introduce the maximum, minimum and step for the histogram in the above editors.

New curve drawing features:

- *"New curve"*

  Erases the previous curves

- *"Curve add Mode"*

  Adds a curve to the plot window

- *"Keep setting & new curve"*

  Erases the previous curves but keep the plot presentation done by the user in the Mgraph menus (Titles, axes etc...)

- *"Keep setting & add mode"*

  Adds a curve to the plot window but keep the plot presentation made by the user, etc...)

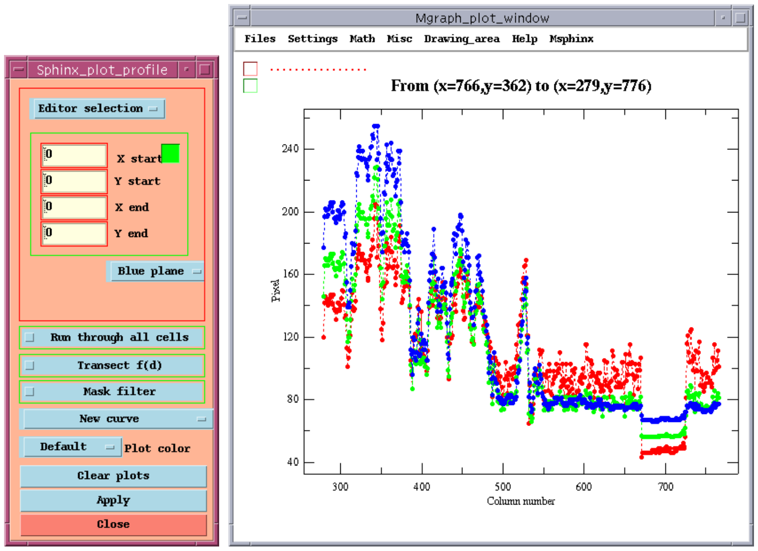
Clear plots Erases curves already drawn.

Histogram type Allows one to define the type of curve

- Curve
- Steps
- Bars
- Bars with gaps

Draw Color Allows one to define the color of the curve.

8.2 PLOTS→ TRANSECT



This menu allows the user to select a radial with the mouse in the image and to draw the curves of the corresponding pixels.

Options description:

Run through all cells Allows one to draw the same radial through all the defined cells.

Transect f(d) The values of x are the line number or the column number, according with the input line (more horizontal or more vertical). In this mode, X is a function of the distance in the input line.

Mask filter Only non masked pixels are taken into account.

New curve drawing features:

- *"New curve"*

  Erases the previous curves

- *"Curve add Mode"*

  Adds a curve to the plot window

- *"Keep setting & new curve"*

  Erases the previous curves but keep the plot presentation done by the user in the Mgraph menus (Titles, axes etc. . .)

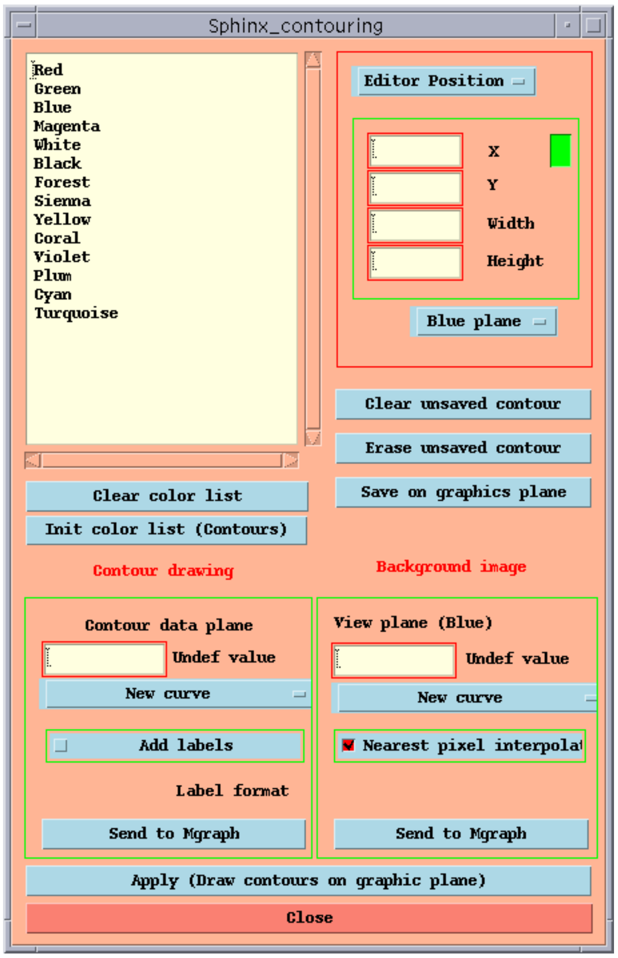
- *"Keep setting & add mode"*

  Adds a curve to the plot window but keep the plot presentation made by the user, etc. . .)

Plot Color Defines the colour of curves.

Clear plots Clears all curves.

8.3 PLOTS→ CONTOURING



This menu (may be complex) is used to draw values of pixels representing area borders directly in the overlay plane mask (as colored mask pixels) or using the *Mgraph* software to display an image and, if necessary, contours as curves.

8.3.1 Drawing in the plane mask

Define the working geometry:
In the list at the upper left, you must define the real contour values, for ex, type: `Red  128` then execute *"Apply (Draw contours on graphic plane)"*. The result appears in the main window.

Options description:

Clear color list	Erases all the present values in the list.
Init color list (contours)	The software computes the contour values according to the maximum and minimum values of the zone.
Clear unsaved contour	Erases the pixels of the zone overlay mask *"overlay"*.
Erase unsaved contour	You have the possibility to use an eraser *"Mouse eraser"* piloted by the mouse. Activate this option: place your mouse in the image, the right button allows you to erase the pixels of the mask under the drawed rectangle. The left button allows you to quit the input loop.
Save on graphics plane	Transfers the mask plane in the graphic plane. This one is able to be erased by using *"Window→ Clear graph plane"* or the *"Edit→ Move exchange...→ Clear..."* menu.

8.3.2 Mgraph use

Define the working geometry:

- We only want to show an image and to add a title, the axes etc...
  In the block *"Background image"*, execute *"Send to Mgraph"*: a window *Mgraph* appears with the image. Use the menus of *Mgraph* to realize the presentation.

  Options description:

Nearest pixel interpolation	In the Mgraph software, the image is defined with triangles; the method of interpolation can be linear if the correspondence pixel value look-up-table value is linear. Otherwise the most close pixel must be used to avoid noisy pixel generation in the interpolated image.
Undef value	the pixel value representing a lack of data.
New curve	drawing features: – *"New curve"* Erases the previous curves – *"Curve add Mode"* Adds a curve to the plot window – *"Keep setting & add mode"* Adds a curve to the plot window but keep the plot presentation done by the user, etc...)

- We want to draw contours with Mgraph

In the list of contours, introduce a value.
In the block *"contour drawing"*, Execute: *"Send to Mgraph"*.
A *Mgraph* window appears with the plot.

At this level you can select in the geometry another one plane of data.
In the list of contours: introduce a new value with another colour.
In the block *"Contour drawing"* activate the Menu *"Curve add Mode"*.
Execute: *"Send to Mgraph"*

Undef value the pixel value representing a lack of data.

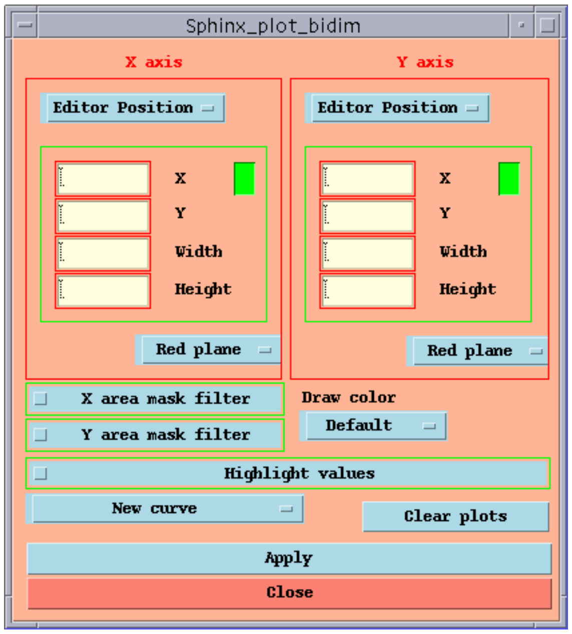
New curve drawing features:

- *"New curve"*
  Erases the previous curves
- *"Curve add Mode"*
  Adds a curve to the plot window
- *"Keep setting & add mode"*
  Adds a curve to the plot window but keep the plot presentation done by the user, etc...)

We can, with the two menus *"Contour drawing"* and *"Background image"*, NECESSARILY in this order:

1. calculate contours from various data planes.
2. add a background image (true color or 8 bit with look-up-table) to illustrate the contours drawing. (The pixel values of this last can be completely different from the plane of data having generated the contours).

8.4 PLOTS→ BIDIMENSIONAL PLOT



This menu allows you to draw scatter plots from one data plane versus another data plane. Measures being placed in the same geometrical space or in different cells.

How to start?

- Select a working geometry in the menu *"X axis"* at the top left of the panel. If the spaces are identical, it is enough. Otherwise, select geometry of work in the menu*"Y axis"* at the top right of the panel.
- Select the plane of X
- Select the plane of Y
- Activate *"Apply"*:
  The scatter plot appears in the Mgraph window. If points exist outside the boundaries the scatter plot will be crushed.
- Use the option *"Mgraph→ Drawing_ area→ Clear Area"* to erase the bad pixels.

Options:

X area mask filter use only non masked pixels in the X zone

Y area mask filter use only non masked pixels in the Y zone.

Draw Color allows you to define the colour of the scatter plot.

New curve drawing features:

- *"New curve"*

  Erases the previous curves

- *"Curve add Mode"*

  Adds a curve to the plot window

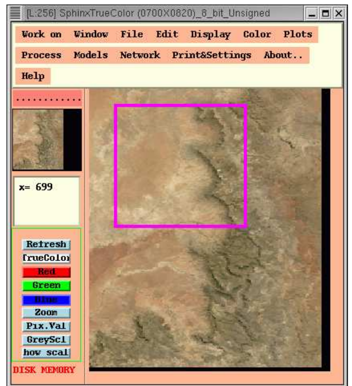
- *"Keep setting & new curve"*

  Erases the previous curves but keep the plot presentation done by the user in the Mgraph menus (Titles, axes etc. . .)

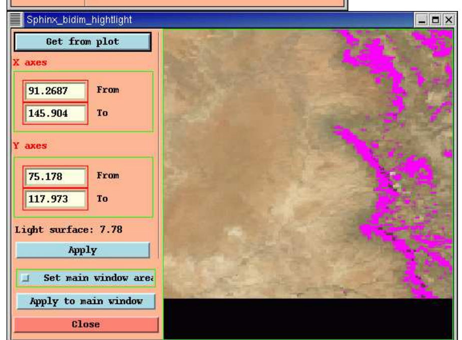
- *"Keep setting & add mode"*

  Adds a curve to the plot window but keep the plot presentation made by the user, etc. . .)

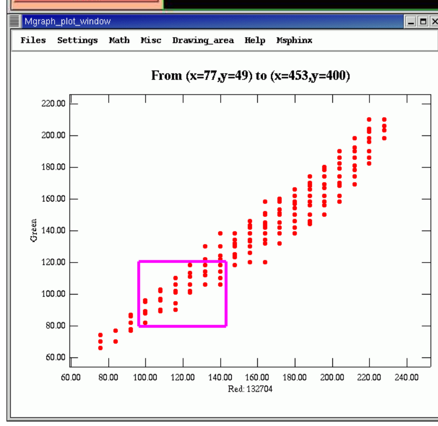
Bidimentionnal menu



Bidim highlight with selected range in the graphic window



Graphic window with user's selected pixels



"Highlight values"

This menu allows the user to associate zones of the histogram to pixels of the image. You can enlarge the panel for a better image definition.
Activate this option. Activate *"Apply"*.
A new window *"Sphinx_bidim_hightlight"* appears containing the zone used for the scatter plot calculation (zone corresponding to the image shown in the main window).
Select the Mgraph window and the *"Sphinx_bidim_hightlight"* window at the first level of your screen.
Activate the option *"Get from plot"*.

The cursor goes in the Mgraph's window; you have to surround the pixels group to show. The editors *"From" "To"* in *"X Y axes"* contain the boundaries in X and Y selected and the corresponding pixels are shown on the image of the zone.
You can also directly modify the editors and select *"Apply"*

Option:
This menu allows also the user to create masks corresponding to the zones of the histogram but in the main window of visualization.
Activate: *"Set main window area"* Select the geometry of the calculation zone.
Choose a mask colour for example *"Green"*
Activate *"Apply to main window"*
In green in the main window appear all the pixels having the same characteristics that in the selected zone.

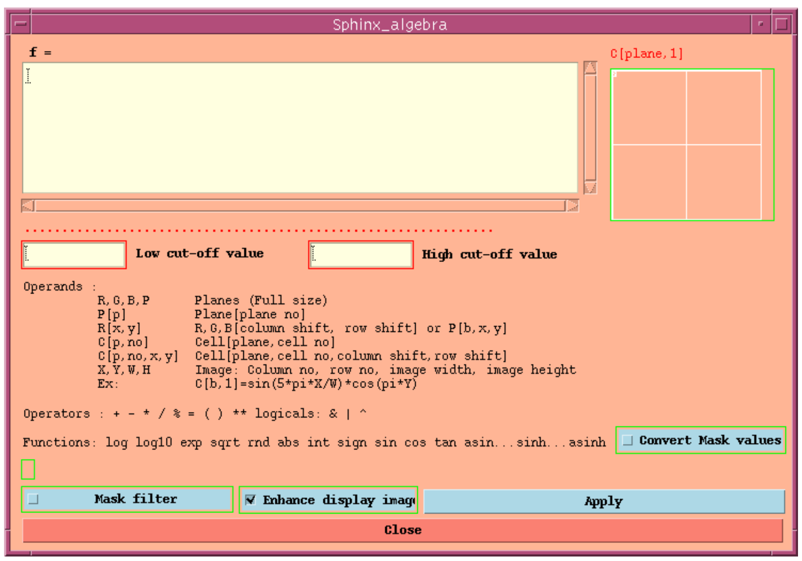
To return to the option *"Get from plot"*, Deactivate: *"Set main window area"*

8.5 PLOTS→ CALL GRAPHIC MENU

This option launches an empty *Mgraph* module.

9 PROCESS

9.1 PROCESS→ IMAGE ALGEBRA



This menu allows the user to apply one or several formulaes to images (A window shows the set of already used formulaes). Formulae are contained in editor *"f="*. Calculations are realized in float and then truncated to the data plane precision. For ex, on 3 lines:

```
r=r/100
g=g/100
b=b/100
```

divide the pixels of Red Green Blue planes by 100.
Formulate notation is in FORTRAN langage notation.

Operands at the plane level are:
R for the Red plane
G for the Green plane
B for the Blue plane
P[no] for any plane, the no is the plane number in the stack (1 to 511)
Particular notation:
`R[x,y] or P[3,x,y]`

X will be a shift in column, Y will be a shift in line from which the data will be computed or filled.

example:
`R[40,40]=B[100,50]+G[100,50]`
the Red plane filled from the column and line 40 will be equal to the sum of the blue and green plane shifted of 50 Lines and 100 columns.

Operands for a cell: C[plane no, cell no]

The calculation of the cell number is facilitated by the drawing at the top right side of the panel. It is enough to click a cell to see its number in the label place above.

Specific Operandes: **X** no of the column in the calculation

Y no of the line in the calculation

W width of the image

H height of the image

Functions: Exp, log10, log, sqrt, rnd()

sign, abs, int,

sin, cos, tan (in radian),sind, cosd, tand (in degrees)

asin, acos, atan, asind, acosd, atand,

sinh, cosh, tanh,

asinh, acosh, atanh,

cosec, sec, cotan, cosecd, secd, cotand

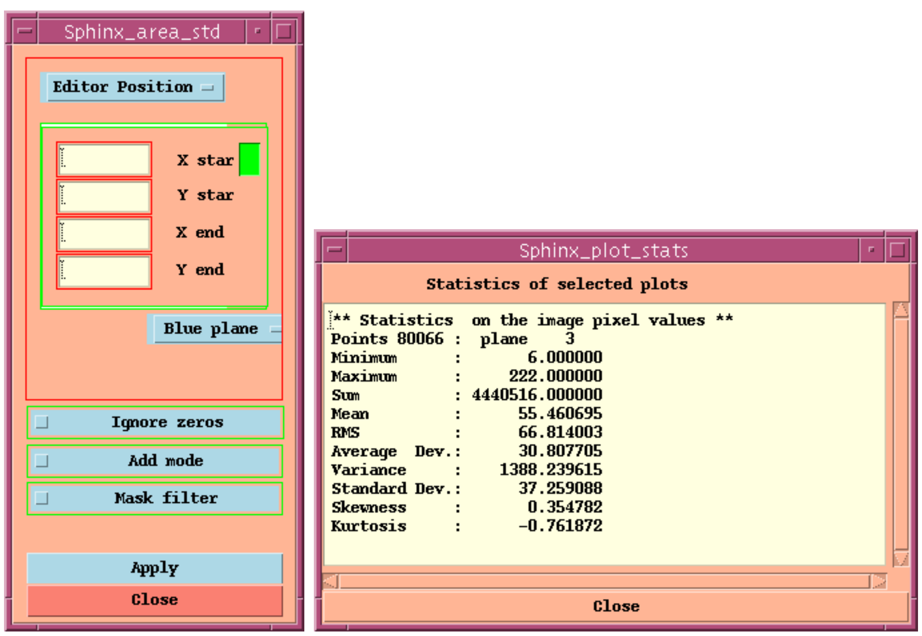
The operators: $+$, $-$, $\star$, / , % (integer division),

$**$ (power)

& (AND) , | (OR) , ^ (XOR), $\sim$ (complement)

Options	
Mask filter	Only non masked pixels will be calculated and so, modified in the resultant image.
Convert Mask values	Option allowing to save specific values of the image corresponding in zones of masks before and after the calculation. Selecting the option makes an editor appear: Type the value of the mask before the calculation followed by the value of the mask in the result image. example: mask_value | result_value 0 | 255 1 | 254 The value 0 of the image becomes 255 in the image result.
Enhance display image	The resultant image is shown by using the automatic algorithms of scale shift (data any scale→ visualization (0-255) range pixels).

9.2 PROCESS→ AREA STANDARD DEVIATION



This menu allows one to calculate simple statistics on a zone of the image:

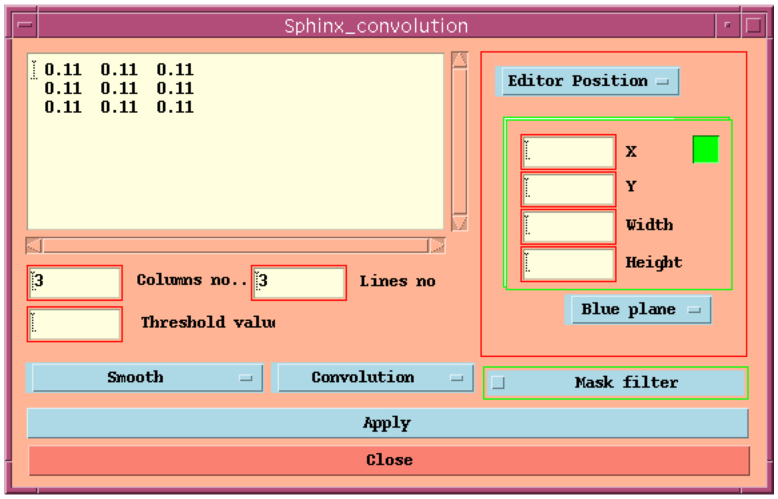
```
** Statistics  on the image pixel values **
Points 80066 :  plane    3
Minimum      :        6.000000
Maximum      :      222.000000
Sum          : 4440516.000000
Mean         :       55.460695
```

```
RMS          :     66.814003
Average  Dev.:     30.807705
Variance     :   1388.239615
Standard Dev.:     37.259088
Skewness     :      0.354782
Kurtosis     :     -0.761872
```

Description of options:

Ignore zeros	Zero pixels are skipped.
Add mode	The selected zones accumulate in the display results.
Mask filter	only non masked pixels are taken into account.

9.3 PROCESS→ CONVOLUTION PRODUCT



This menu allows one to realize smoothings or apply filters to an image by using a matrix of coefficients or a line or a column vector.

Type choice:	
type	Editors to fix
Convolution	Columns and Lines no
Filter on lines	Vector length
Filter on columns	Vector length

Implemented matrix filters:	
Owner	The user types the coefficients in the editor. Warning! You must adjust the line and column numbers in the editors with the coefficients to define.
Smooth	In this option, the user can change the matrix size. Type values in the editors *"Columns no"* and *"Lines no"*; select or re-select in the menu *"Smooth"*. The coefficient matrix appears in the editor.

The following filters are pre-defined matrix 3×3.	
Sobel operator	Front Detection.
Vertical E.	Front Detection.
Horizontal E.	
East diagonal E.	
West diagonal E.	
Vertical L.	Line Detection.
Horizontal L.	
East diagonal L.	
West diagonal L.	

Options:

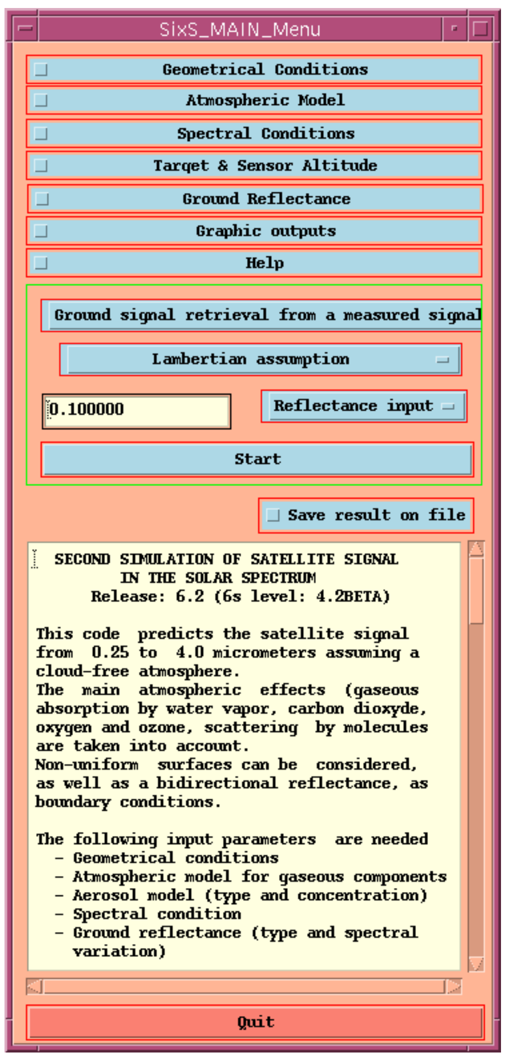
threshold value Value over which a pixel is not computed anymore.

Mask filter Only pixels non masked are computed and replaced in the image result.

10 MODELS

10.1 MODELS→ SATELLITE SIGNAL SIMULATION 6S

*

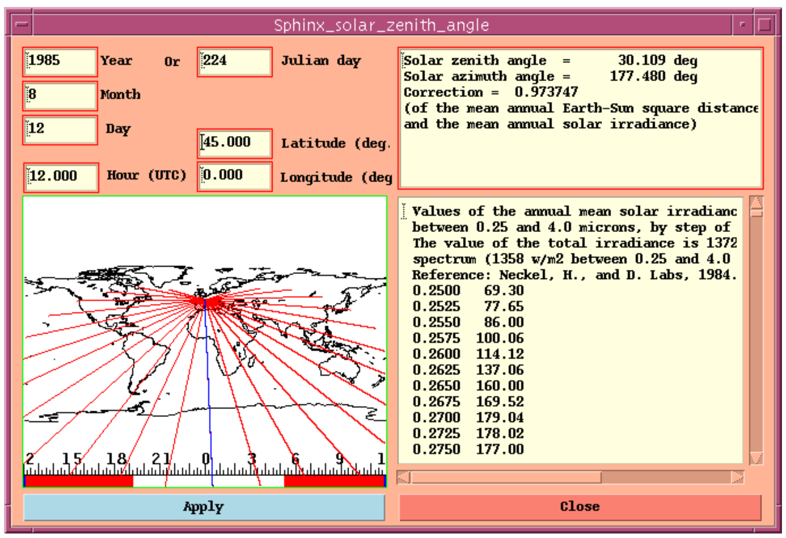


This menu launches the module of Simulation of the Satellite Signal Simulation in the Solar Spectral.

*The authors of this package are:
6S code: Vermote E. et al
From: Code 923 / GIMMS group - GSFC/NASA - Greenbelt, MD 20771 - USA
Motif code: Gonzalez L. et al
From: Laboratoire d'Optique Atmosphérique - Université des Sciences et Technologies de Lille - 59655 - Villeneuve d'Ascq Cedex - France

This code predicts the satellite signal from 0.25 to 4.0 micrometers assuming a cloud-free atmosphere. The main atmospheric effects (gaseous absorption by water vapor, carbon dioxyde, oxygen and ozone, scattering by molecules are taken into account. Non-uniform surfaces can be considered, as well as a bidirectional reflectance, as boundary conditions.

10.2 MODELS→ SOLAR ZENITH ANGLE CALCULATION



Calculate for a world place, a date, various sun parameters. For example:

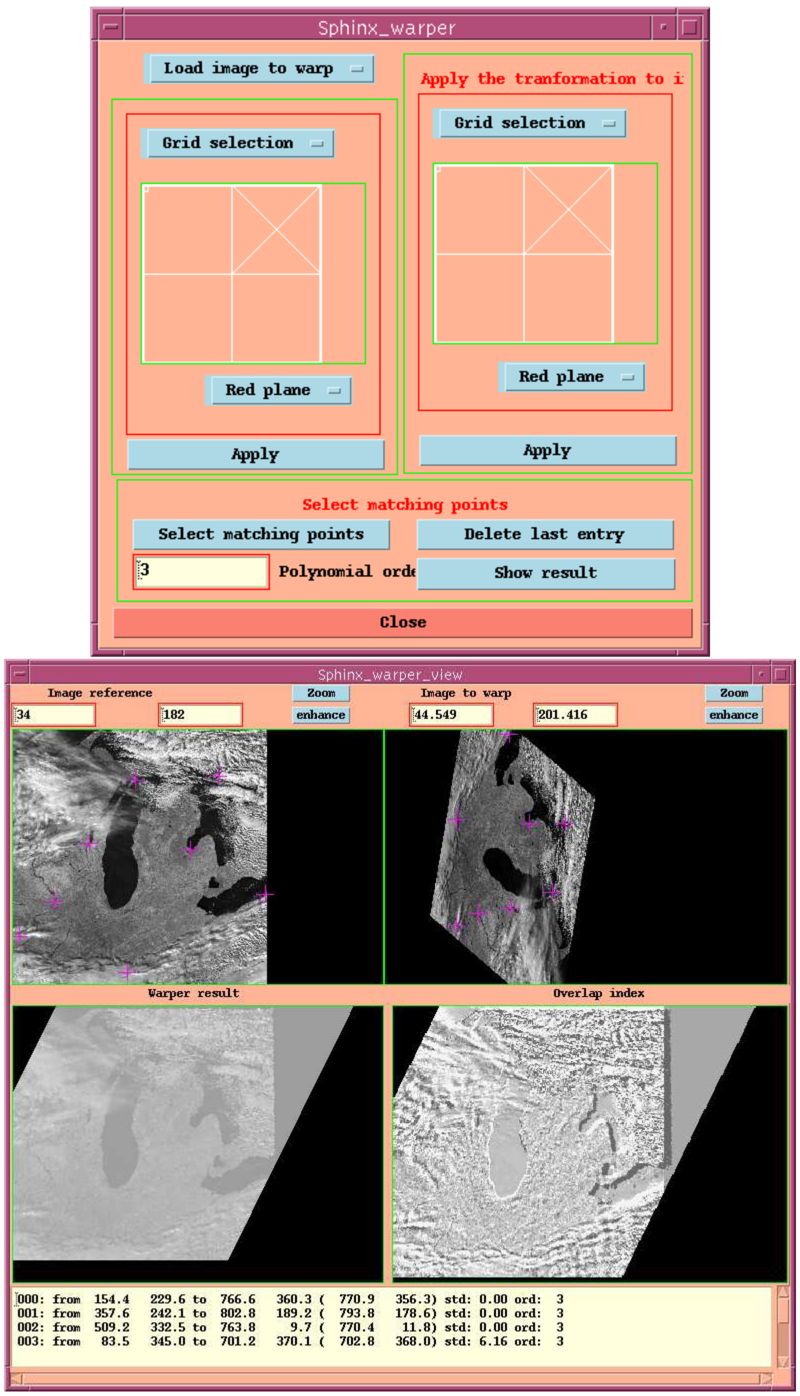
```
Julian day: 286
Latitude: 50.0 Longitude: 0.0
Hour: 12.0 (UTC)
```

the software shows:

```
Solar zenith angle  =      57.927 deg
Solar azimuth angle =     184.146 deg
Correction =  1.00464
(of the mean annual Earth-Sun square distance
and the mean annual solar irradiance)

Values of the annual mean solar irradiance (in w/m2/micron)
between 0.25 and 4.0 microns, by step of 0.0025 microns.
The value of the total irradiance is 1372 w/m2 on the whole
spectrum (1358 w/m2 between 0.25 and 4.0 microns).
Reference: Neckel, H., and D. Labs, 1984. Solar Physics, 90, 205- 258.
0.2500   69.30
0.2525   77.65
0.2550   86.00
```

```
      0.2575   100.06
......
```

10.3 MODELS→ WARPER



This menu allows the user to overlap two different geometry images by a method of Legendre polynomials. The polynomes of deformation being calculated from matching points introduces interactively by the user.
Operation is performed in two steps:

- determination of the matching points
- Application of the deformation on one or several images.

The panel *"Sphinx_warper_view"* is divided into 2 parts:

1. The left side concerns the reference image so the geometry of arrival.
2. The right side concerns the image to deform.

You can enlarge the panel for a better image definition. The 2 images at the top represent the selected zones, the images at the bottom serve to show zooms during the sequence of matching point selection or to show intermediate results on warping.

How to start:
In the sample group *"Sphinx_warper"*, you may select the reference image and the distorted image, then you can launch the *"Warper"*:

10.3.1 Load reference image

Select the menu *"Load reference image"*, then a working geometry *"X, Y, Width, Height"* and a data plane. Activate *"Apply"*.
The image appears at the top left side of the panel *"Sphinx_warper_view"*.
If the image is too dark or too bright, you can activate the button *"enhance"* at the top left side of the panel. The editors show the minimum maximum values used in the conversion data to color LUT. Change interval then activate *"enhance"*: the new image contrast is diplayed.

10.3.2 Load image to warp

Select the menu *"Load image to warp"*, then a working geometry *"X, Y, Width, Height"* and a data plane. Activate *"Apply"*.
The image appears at the top as right side of the panel *"Sphinx_warper_view"*.
If image is too dark or bright, you can activate the button *"enhance"* (See higher).

10.3.3 Select matching points

Activate the button *"select matching points"* in the panel *"Sphinx_warper"*.

You enter in an input loop of introduction of matching points in the two image geometries.

You can directly click in the reference image or use the 2 options *"Zoom"* to enlarge a part of the image. The zoom is show at the bottom of the panel *"Sphinx_warper_view"*.
You can now select your points as well in the reference image as in the zoomed images.

Select a point in the reference image (or in its zoom).
Select its corresponding pixel in the image to deform.
Your first entry is introduced. If it is wrong, activate the button *"Delete last entry"* on the panel *"Sphinx_warper"*.

Select other points. For an optimal result you have to introduce at least 4 points well distributed over the whole surface. (The implemented algorithm is a good interpolater but extrapolates very badly).
After your 4th selection of a point in the reference image, a green cross is drawn on the image to deform; you are able to appreciate the accuracy of the projection and require (or not) to introduce more inputs.

10.3.4 Show result

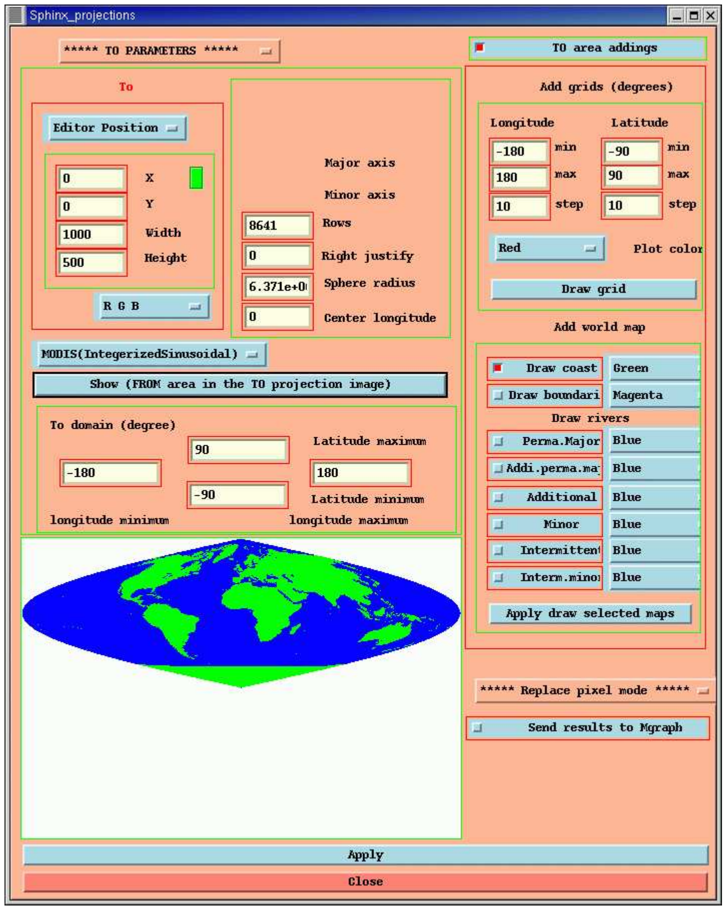
After 4 inputs you can at any time activate the button *"Show result"* on the panel *"Sphinx_warper"*.

The deformed image appears in the frame *"Warper result"* at the bottom left side of the display panel. An image substraction of the image of reference with the deformed image is shown in the part *"Overlap index"*. The zones of shadows allow you to appreciate the accuracy of the deformation.

If you activate the button *"Select matching points"* again you can add inputs to the list.

At the end of work, choose a geometry of application of the result in the menu *"Sphinx_warper"* at the top right side. Activate*"Apply"*.
Change data plane, if necessary. Activate *"Apply"* etc...

10.4 MODELS→ PROJECTIONS



This menu allows the reprojections of satellite images of which geometry is known.
It allows the user to add to the result a grid and a precise world map (about 1km) drawn in the graphic overlay plane.
It can be directly associated with the software *Mgraph* for fast plot setting and printing.

How to start:

10.4.1 Define the geometry and the data plane of the origin image

"FROM PARAMETERS" menu.
Define the projection of origin in the proposed list:

```
Linear, POLDER, Goode'S Homolosine, Mollweide Equal-Area, Hammer,
Azimuthal Equidistant, Lambert Azimuthal equal area,
Miller Cylindrical, Mollweide, Orthographic, Robinson,
Sinusoidal, Van Der Grinten, Wagner 7
```

Define the latitude and longitude of the domain that the image covers. (If nothing is defined, the image is assumed global (-90→ 90, -180→ 180 degrees).

Activate *"Show (From area in the TO projection image)"*.
This function allows one to simulate the projection result using a synthetic world map.
The projection and geometry are those defined in *"TO PARAMETERS"*; it is going to correspond to the final result. In green and blue, appears the overlap *"FROM"* towards *"TO"*; in black and white, the zone not covered in *"TO"*.

10.4.2 Define geometry and the data plane of the result image

"TO PARAMETERS" menu.
Define the new projection in the proposed list.
Define the latitude and longitude of the domain that the image covers. (If nothing is defined, the image is assumed global (-90→ 90, -180→ 180 degrés).

If you work with several input images, to build a *"patch work"*, select the option `***** Overlap pixel mode *****` instead of `***** Replace pixel mode *****`.

Activate *"Show (From area in the TO projection image)"* to visulalize the result. Activate *"Apply"*: the reprojection is computed.

10.4.3 Grids and map

If you activate *"To area addings"* new menus appear; These menus allow the user to draw in the graphic plane a grid or a world map.
The drawing projection geometry correspond to that defined in *"TO PARAMETERS"*.

- Add a grid
  Fill the grid editors.

Choose a color.
Activate *"Draw Grid"*.

- Add a map.
  Choose a color.
  Activate *"Draw map"*.

10.4.4 Send results to Mgraph

This menu allows the user to send the various results to the *Mgraph* software to realize a fast presentation.

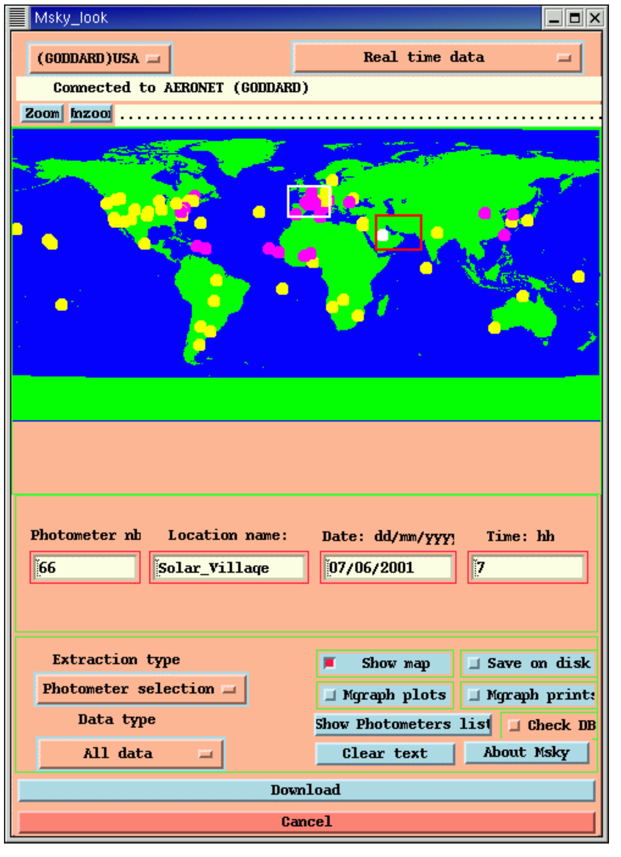
Activate the toggle *"Send results to Mgraph"*, after you have defined all the parameters of projections (see higher).

Activate *"Apply"*: the reprojection is computed. A Mgraph window appears. Then activate *"Draw Grid"*.

The grid is drawn in the graphic window. Activate *"Draw map"*.
The map is drawn in the graphic window.

10.5 MODELS→ AERONET Fast-link

[*] This software allows the user to download data from the Aeronet data base.



Two indentical databases are implemented:

- At LOA USTL France
- At GSFC USA

Use the upper left menu to select the data base that you want to use (You can switch from one to the other at any time).

10.5.1 Extraction type menu

- *"Photometer selection"*
  The extraction is carried out for the specific photometer at the date (filling the *"Date: dd/mm/yyyy"* editor) and time selected by the user (if the field *"time"* is empty the extraction will be done for the day).

- *"Area selection"*
  The extraction is carried out for a specific area and date (filling the

[*] http://aeronet.gsfc.nasa.gov/

"Date: dd/mm/yyyy" editor) and time selected. The user is able to fill the latitude or longitude editors or can use the *"show map"* option and directly select a zone with the mouse (if you do not see the sites of the photometers on the map, push the button *"Show Photometers list"*).

10.5.2 Data type menu

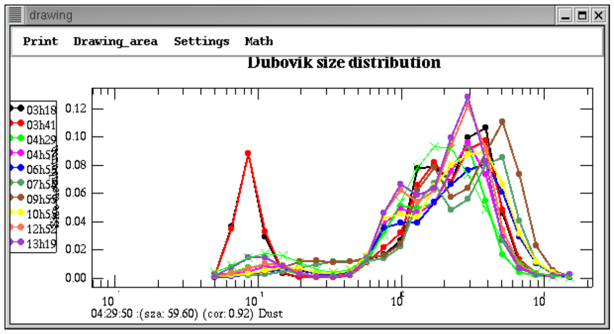
Select the data which you want to subset:

- Optical thickness
- Size distribution
- Refraction index
- Polarization
- All data

remark: The plot option just works with "All data" or "Optical thickness" selection.

10.5.3 Toggle and button options

- "Show map"
  This option draws a world map with the selected day operational photometers (Yellow Non polarized, Magenta with polarization data).
- "Save on disk"
  This option dumps the display area into a disk file "MskyResult". If the file exists, it will be appended.
- "Mgraph plots"
  This option draws the results using 4 windows:
  - Angström coefficients
  - Optical thickness
  - Dubovik size distribution
  - Polarization ratio



- "Mgraph prints"

  This option creates a command file for a plot software called *Mgraph* . If *Mgraph* is implemented on your system, the job is automatically launched and a second file (a PostScript file) is created with the plot page results. You have to send the PS file to your printer or use "Ghostview" to see the print.

- "Show Photometers list"

  Display the operational photometers for the input date. (Enlarge the "Photometers_list" panel.) The following things are printed:
  The number and the name of the photometer, its location and the number of measurements available. If you click on a specific line, the photometer characteristics are replaced in the "Msky_look" panel.

- "Clear text"

  Clear the display area.

- "About Msky"

  Print the advertisement and help file.

- ***"Check DB"***

  This is a very important option; after the first extraction, the software uses a memory cache to avoid multiple connections to the data base.
  If you change the data base type, you will retrieve the same data from the memory cache. The toggle "Check DB" forces download again from the data base and rebuilds the memory cache for this extraction.

11 NETWORK

11.1 NETWORK→ USERS DIALOG

This part concerns the communication between users. It is a first draft, showing the possibilities of the software packages. This part will be improved, if it is effectively use.
Communications allow:

- the exchange of messages and images among users.
- the visualization of a local image data base
- relaxation games among users.

11.1.1 Global Architecture

The exchanges are administered by two programs:

- A server of lists:
  This server is implemeted on one of the computers of the LOA. It lists the network locations where the local users servers are implemeted.
- A local users server:
  This server shows the *Msphinx* working users.

11.1.2 Local Implementation

Starts the "local users server":
This program administers a group of computers on the same network which are able to activate *Msphinx*

```
(PATH)/Mfiles/Msdiaser -P 8999  -T "GROUP NAME" -B
(PATH)/Mfiles/bin > /dev/null 1>&2 &
```

Options:

-P The UNIX port used for TCP/IP dialogs
-T Between " ": it is the name of the laboratory.
-B The PATH of the Mfiles/bin directory.

A file ((PATH)/Mfiles/compta/network) must be initialized to prevent *Msphinx* of the presence of a local users server.
ex: vi Mfiles/compta/network

```
# Msphinx local Image data base and local dialogs (Only one)
LOCALdatabase: loaser.univ-lille1.fr   8999
```

Options:

loaser.univ-lille1.fr	Localcomputer name where the local users server is running.
8999	communication UNIX port.

11.1.3 Users Dialogs

At the launch of the module *"Network->Users dialogs... "*, a panel appears.

In the list place at the top left *"LOCAL users list"*, the series of persons using the software is printed. You have the possibility to select one or more users. The selected lines are displayed in the right list.
You can manadge several lists:
Activate *"Create a new list"*
and select another user.
The arrows (◁ ▷) allow you to pass from a list to another one.

The option *"Refresh selectable list from server"* allows one to interrogate the server and to refresh the list *"LOCAL users list"*.

Options:
"Send a message "
A panel appears in the top part; the dialog will be printed. The bottom part allows one to type the text.
2 options
"Clear text" Clears all content.
"Save on file" To save the dialog on disk into a file name as Dialogs01, Dialogs02 etc. . .

The panel can be enlarged for a better definition.

Type your lines in the bottom editing window. To send your mail at any time type two consecutive carriage return [CR, Enter].
In the top window, the beginning of your message is printed as:

// text // your text // etc. . .

The answer appears always in the same window with a format: `<Sender login name>` then his text left adjusted.

Remarks:
If your *"Mailing list"* contains several names, your text will be sent to everybody.

You can create a new list and so change quickly of corresponding by using arrows to allow you a private conversation in your messages.

Options:
"Network status and Image position menu"

It allows one to show the progress of the communications. The right panel allows one to define an image geometry which will be used to load an incoming image into the Msphinx data planes or to send a Msphinx image, activating the button *"Send the selected image"*.

"Send a grabed image" allows one to send to your correspondent anything displayed in your screen.
Activate *"Send a grabed image"*; the button becomes red. If you click in a panel, the complete panel content will be sent.
For ex: click in the background of your screen (the image of your complete screen is sent). If you hold down your mouse button, you can define a zone; at the button release, the zone will be sent.

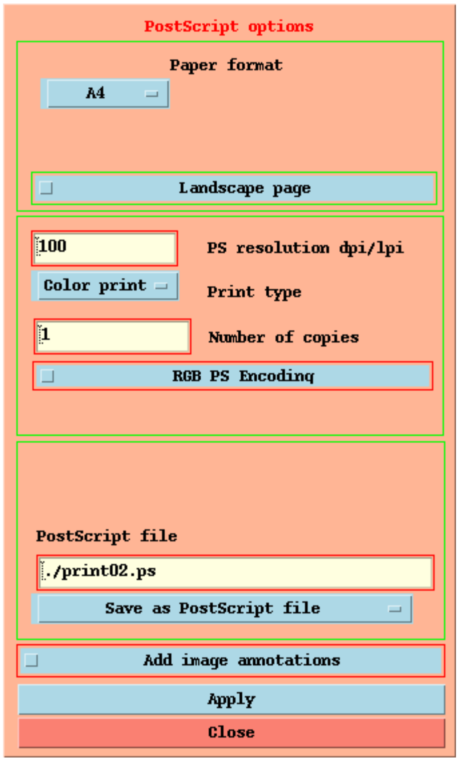
Your correspondent will receive a little panel *"Mdial_incoming_(your login name)"* with the image. He can enlarge it to see your image and load it in a data plane (see higher *"Network status and Image position menu"*)

11.2 NETWORK→ SERVER MAIN LIST

This menu allows the user to interrogate and to show the various active sites. If you select a site, you will be able to see the Msphinx's users of this site.

12 PRINT & SETTINGS

12.1 PRINT & SETTINGS→ QUICK PRINT



This menu allows the user to print quickly or to create a PostScript file from a 24 bit true color image or from a 8 bit image associated to a color LUT. The images are archived in the visualization planes (R, G, B) of Msphinx.

Options:

Paper format	A4, A3, B5, US letter, US legal, Custom.
Landscape page	Paper orientation: Portrait or Paysage.
PS resolution	The PostScript resolution in dots per inch (generally 100dpi are enough).
Color print	Choice: Black and White or Color print.
Number of copies	The number of copies.
RGB PS Encoding	The PS printing may not work on some printers with 8 bit images (see below).
Send to printer	Choice of the print type: • *"Send to printer"* send the selection to the command typed in the editor *"Spooler shell"*; for example: `lp -c -dPRINTER_NAME` • *"Save as PostScript file"* creation of a PS file. • *"Save as Encapsulated PostScript file"* creates an EPS file to insert the result into another document (Word, TeX etc...)
Add image annotations	Add image annotations, built in the menu *"Image annotation"* (detailed §12.4).

ATTENTION:

- If you use the print command: `lp -dPRINTER_NAME` in the editor *"Spooler shell"* and it does not work, try `lp -c -dPRINTER_NAME`.
- If you choose a custom format for the paper, you must fill the two editors (Width and Height) and click on *"Refresh show page panel"* (this option, with the size, is saved in your working context).
- The PS printing may not work on some printers with 8 bit images with a color LUT. The algorithm of postscript compression gives a blank page on some printers as Phaser340, for example.
  Activate the option *"RGB PS Encoding"* and print again (this option is saved in your working context).
- If you open the menu *"Add EPS icons"*, you can add your favorite icon (in Encapsulated PostScript) on the page.

12.1.1 Environnement Files

extract of the file $home/.Msphinx/YourProjectName.prj/Print_Options:

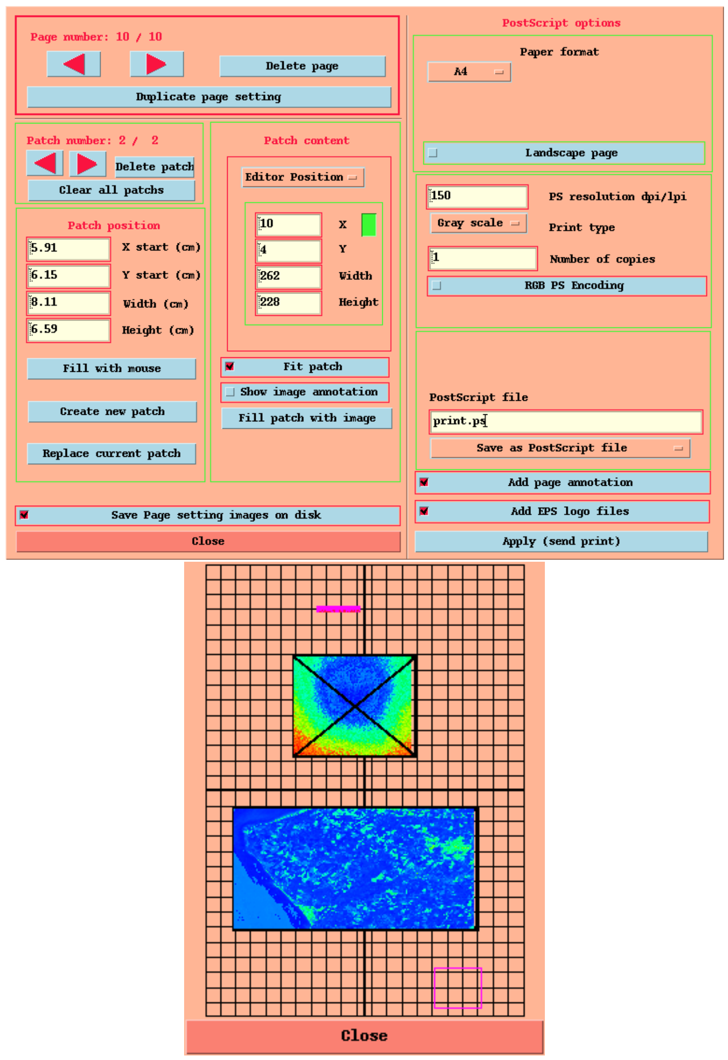
```
INCH              0
post_costr      /usr/LOA/bin/vidpsLEX
```

```
post_grstr      /usr/LOA/bin/vidpsMAN
PAPER_SIZE         0  100 -1 -1
```

The signature at the bottom of the page default is: `L.O.A. Computer Team`. To modify it, edit the file $home/.Msphinx/SIGNATURE, and change it with new informations:

type this:		to obtain:
SIGNATURE	"L.O.A. Computer Team"	Date + signature
SIGNATURE	" " (Spaces)	Date
SIGNATURE	"" (Empty)	Nothing

12.2 PRINT & SETTINGS→ PAGE SETTING AND PRINT



This menu allows the user to build a Page Setting with images stored in the visualization planes and :

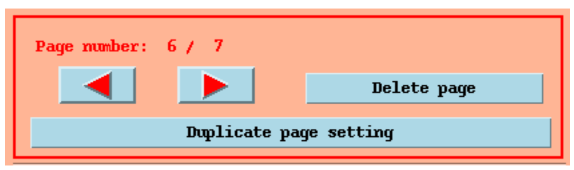
- to draw several cells on the page
- to add annotations
- to add external EPS icons on the page

Two panels are activated: *"Sphinx_page_setting"* and *"Sphinx_show_page"*. You can enlarge this last panel for a better image definition.

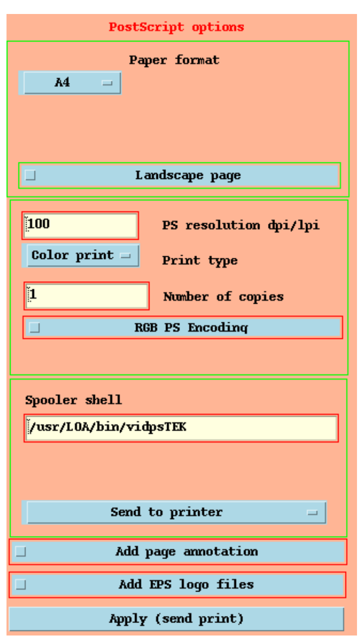
The option *"Save Page setting images on disk"* allows you to keep the page settings and the printed images on disk space and reprint afterward. (Attention! the print resolution (*"dot per inch"*) is fixed at the cell filling action and can't be change for the cell. If you have to change this resolution it will be necessary to reload the image into the cell).

This complex menu is divided into several zones:

12.2.1 Page definition



The arrows (◁ ▷) allow the user to show the various existing pages and their contents. The creation of a new page passes by the option *"Duplicate page setting"* that is going to create a new page with the **same empty** cells of the current page.



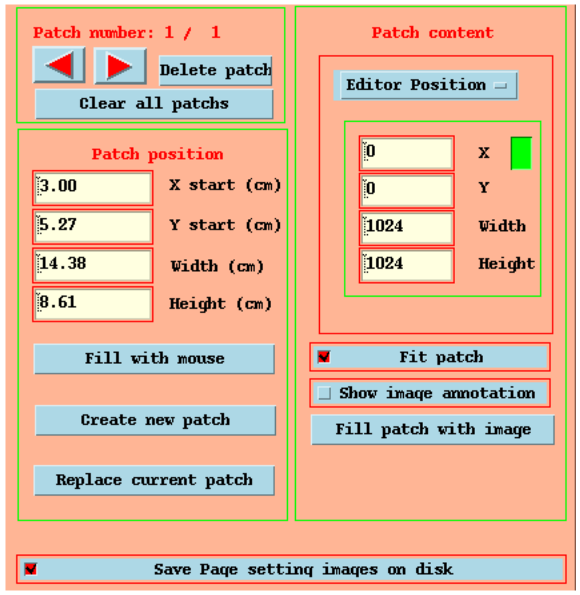
"Paper format"	A4, A3, B5, US letter, US legal, Custom.
"Landscape page"	page orientation: Portrait or Paysage.
"PS resolution"	The PostScript resolution in dots per inch (generally 100dpi are enough).
"Color print"	Choice: Black and White or Color print.
"Number of copies"	The number of copies.
"RGB PS Encoding"	in the case of 8 bit images, the PS coding is force to 24 bits as the true color mode.
"Send to printer"	Choice of the print type: • *"Send to printer"* send the selection to the command typed in the edito r *"Spooler shell"*; for example: `lp -c -dPRINTER_NAME` • *"Save as PostScript file"* creation of a PS file. • *"Save as Encapsulated PostScript file"* creation of an EPS file to insert the result into another document (Word, TeX etc...)
"Add page annotation"	launches the menu *"Sphinx_page_annotations"*. See lower §12.4.3.
"Add EPS logo files"	allows you to introduce one (or several) logo(s) (in EPS format) into the page. See the §12.6 for more explanations.

* If you choose a custom format for the paper, you must fill the two editors (Width and Height) and click on *"Refresh show page panel"* (this option, with the size, is saved in your working context).

* If you don't have annotations, the menu *"Sphinx_page_annotations"* will be open, otherwise the annotation position will be drawn on the *"Sphinx_show_page"* panel.

* If you don't have EPS icons, the menu *"Sphinx_page_add_EPS_files"* will be open, otherwise the icon position will be drawn on the *"Sphinx_show_page"* panel.

12.2.2 Definition of cells or "patch"



Like for pages, the arrows (◁ ▷) allow you to jump from one cell to another.

Cell creation

2 methods exist to create a cell:

- Fill the editors *"X start, Y start, Width, Height"*. After that, activate *"Create new patch"* or *"Replace current patch"*.

- Activate the option *"Fill with mouse"* which allows you to draw a cell in the window *"Sphinx_show_page"*. Correct, if necessary, the values of the editors and activate *"Replace current patch"*.

Cell image filling

In the part *"Patch content"*, select the image geometry. The image which will be loaded is the image shown in the Msphinx's main window.
Activate *"Fill patch with image"*.
If your screen is 8 bit deep the mixture of different images with different color LUTs will give a bad visual result into the panel *"Sphinx_show_page"* but the printing result will be perfect.

Options

"Fit patch"	In case of different geometries (patch and image), the image is deformed to fit the size of the cell.
"Show image annotation"	Launches the annotation menu (detailed lower §12.4).
"Fill patch with image"	Fills the cell with the selected image; the result is show in the panel *"Sphinx_show_page"*.

Save context

"Save Page setting images on disk" saves the page and the images on disk.

Warning! If yours images are huge, be careful: deactivate this option or they will be duplicated.

12.2.3 Environnement Files

extract of the file $home/.Msphinx/YourProjectName.prj/Print_Options:

```
INCH                0
post_costr      /usr/LOA/bin/vidpsLEX
post_grstr      /usr/LOA/bin/vidpsMAN
PAPER_SIZE          0  100 -1 -1
```

The signature at the bottom of the page default is: `L.O.A. Computer Team`. To modify it, edit the file $home/.Msphinx/SIGNATURE, and change it with new informations:

multicolumn2ctype this:		to obtain:
SIGNATURE	"L.O.A. Computer Team"	Date + signature
SIGNATURE	" " (Spaces)	Date
SIGNATURE	"" (Empty)	Nothing

12.2.4 Remarks

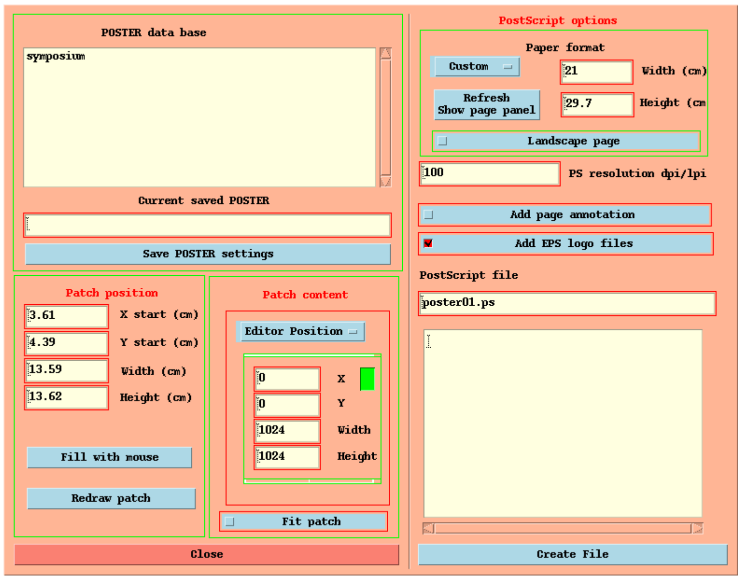
- two types of annotations are available:

  1. At the image level:
     Print&Settings->Draw Image annotations (§12.4)

  2. At the page level:
     Print&Settings->Draw Page annotations (§12.4.3)

- The mask and graphic planes are automatically overlayed in the images

12.3 PRINT & SETTINGS→ POSTER SETTING



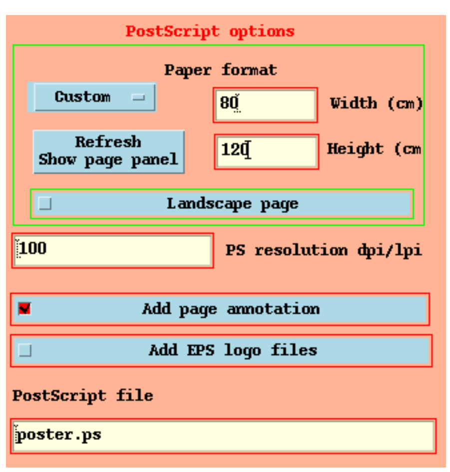
This menu allows you to realize Poster of free size with the images stored in the visualization planes of *Msphinx* . You can also add page annotations and put several icons (in Encapsulated PostScript language).
This menu creates a PostScript file.

Two panels are activated: *"Sphinx_poster_setting"* and *"Sphinx_show_page"*.
You can enlarge this last panel for a better image definition.

For simplicity, you can carry out the poster in small format (A4 for example), then, when the print is correct, you can just change the paper format to the final size. All the poster settings will be translated to the good scale.

This complex menu is divided into several zones:

12.3.1 Page definition



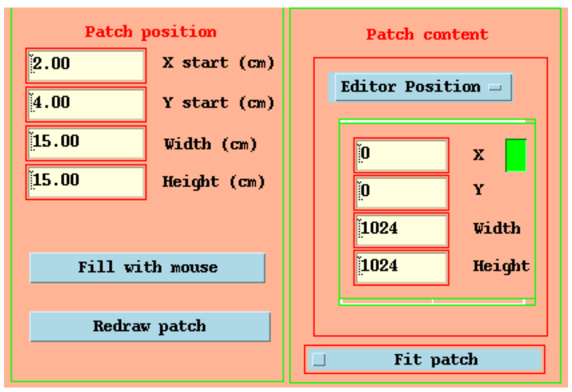
"Paper format"	A4, A3, B5, US letter, US legal, Custom.
"Landscape page"	page orientation: Portrait or Paysage.
"PS resolution"	The PostScript resolution in dots per inch (generally 100dpi are enou gh).
"Add page annotation"	launches the menu *"Sphinx_page_annotations"*. See lower §12.4.3.
"Add EPS logo files"	allows you to introduce one (or several) logo(s) (in EPS format) into the page. See the §12.6 for more explanations.

* If you choose a custom format for the paper, you must fill the two editors (Width and Height) and click on *"Refresh show page panel"* (this option, with the size, is saved in your working context).

* If you don't have annotations, the menu *"Sphinx_page_annotations"* will be open, otherwise the annotation position will be drawn on the *"Sphinx_show_page"* panel.

* If you don't have EPS icons, the menu *"Sphinx_page_add_EPS_files"* will be open, otherwise the icon position will be drawn on the *"Sphinx_show_page"* panel.

12.3.2 Definition of patch



Cell creation
You can create only one patch. 2 methods:

- Fill the editors *"X start, Y start, Width, Height"*. After that, activate *"Redraw patch"*.

- Activate the option *"Fill with mouse"* which allows you to draw a cell in the window *"Sphinx_show_page"*. Correct, if necessary, the values of the editors.

important point:
You can prepare a poster on "Letter format" , print it, and switch to custom

format paper without change (the patch's size will be automatically transformed).
You can not do this action with the page setting manu.

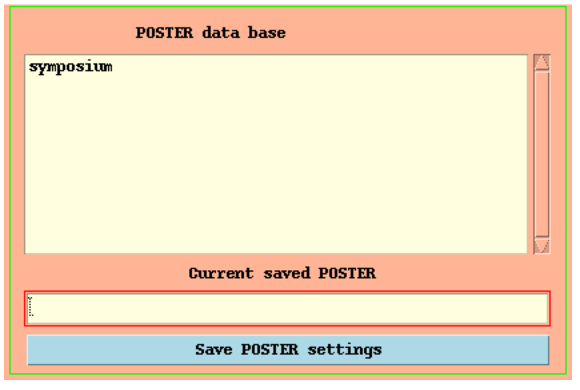
Cell image filling

In the part *"Patch content"*, select the image geometry. The image which will be loaded, is the image shown in the Msphinx's main window.

Option

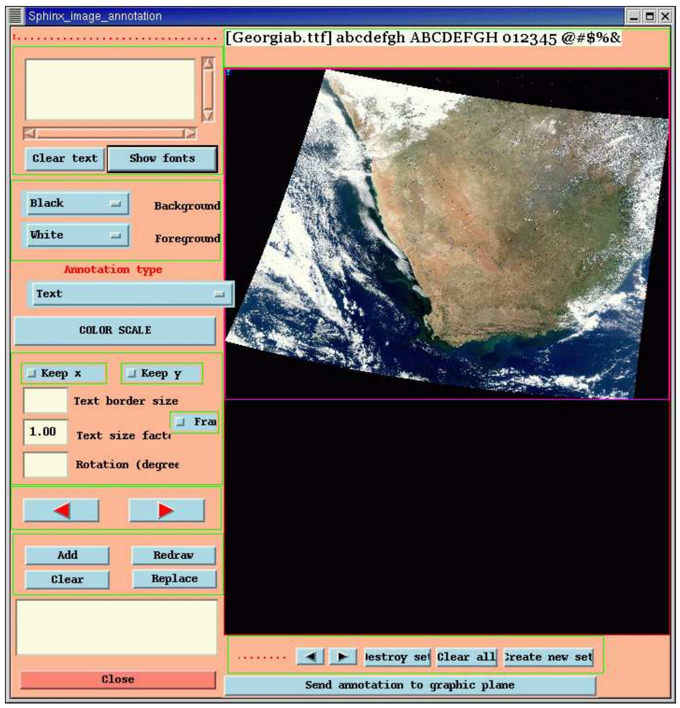
"Fit patch" In case of different geometries (patch and image), the image is deformed to fit the size of the cell.

Contrary to the *"Page_Setting"*, the result will not be shown on the *"Sphinx_show_page"* panel but your preferences will be kept for the next poster.



You can save the poster description in a base (*"Save POSTER Settings"*) and you can recall it when you click on its name.
They are saved in the $home/.Msphinx/YourProjectName.prj/POSTERS/ directory.

12.4 PRINT & SETTINGS→ DRAW IMAGE ANNOTATION



This menu allows one to define annotations which can be inlayed into an image as graphic plane to generate a (gif etc. . .) file or a print.
You can enlarge the window for a better image definition.

12.4.1 Operation

This menu works also with pages of presentations *"Set"*. You move from one to another using the $\triangleleft$ $\triangleright$ in the bottom of the panel.

"Destroy set"	kills the current set.
"Clear all"	clears the image annotations of the set.
"Create new set"	generates a new empty set.

Choose, in *"Annotation type"*, the type of annotation then activate *"Add"*. You can use the zone of image display to select the geometries or to draw the object using the mouse.

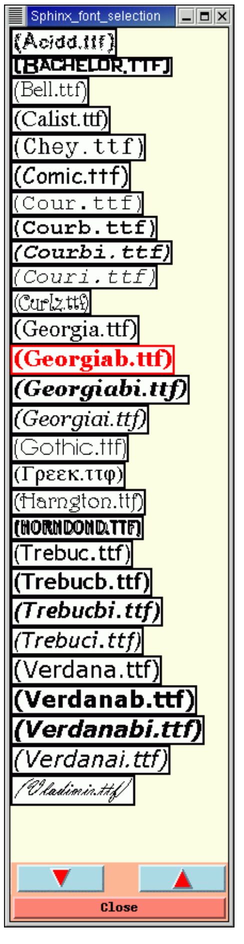
Arrows ($\triangleleft$ $\triangleright$) allow you to select the already introduced objects (magenta rectangle shows the current annotation).

Options:

"Add"	Adds an annotation
"Clear"	Erases the current annotation
"Redraw"	If you change a parameter, for example the color, this option redraws the object with its modification.
"Replace"	The same option than *"redraw "* but with a new mouse position selection.

At the end of the setting, you can insert the result to the graphic plane overlay. Activate the option *"Send annotations to graphic plane"*

"Show Fonts" Fonts format is TTF . The fonts are stored in the Mfiles/Fonts directory. The user is allowed to add any TTF file into this directory.



12.4.2 Color Scale

"COLOR SCALE" Annotation:
It is a specific object because it is going to replace pixels in the visualization (R,G,B) planes. It represents a group of drawing (Text,Scale,Icons..) that you can move globally.

Main window in mode *"True color"*:
You are able to define any colour for your objects. The annotation *"Draw rainbow"* which has no meaning in this mode, will draw the scale contained in the blue Msphinx's plane.

Main window in mode *"Red, Green, Blue"*:
You are able to define only colors contained in the associated LUT.

The action *"Send annotations to graphic plane"* will draw into one selected visualization plane *"Red, Green, Blue"* or into 3 visualization planes *"True color"*.

If you change the visulisation mode (8 bit to 24 bit or invers) having inlayed the *"COLOR SCALE"* objects, you have to reactivate the option *"Send annotations to graphic plane"* to retrieve the good colors.

The arrows ($\lhd$ $\rhd$) allow you to select the already introduced objects. A magenta rectangle shows the current annotation.

Options:

"Draw icon"	Icons are drawn.
"Draw rainbow"	Linear scale zone vertical or horizontal.
"Draw scale"	Allows you to draw a scale but with lines.
"Fill area"	Allows you to erase a zone before drawing icons or scale.
"Draw text"	Draw text on the scale area.

12.4.3 Example of a series of actions

Choose the option *"Fill area"*, choose a color *"White"* then activate *"Add"*.
Draw a rectangle in the annotation image where icons will be drawn.
Choose the option *"Draw icon"*.
Introduce a size factor (for example 2).
Select a type of icon (for example *"Triangle Icon"*).
Select a color:
By filling the (R,G,B) editors or more easily by activating the option *"Select color from image"* and by selecting a colour in the main window using the mouse. Press on a button and move on the image: a rectangle showing the color is drawn. Release the button to select the color.
Activate *"Add"*.
Select a position in the cleared area zone.
Activate one toggle *"Keep x or Keep y"* according to the orientation of your zone.
Restart at Select a color: etc...

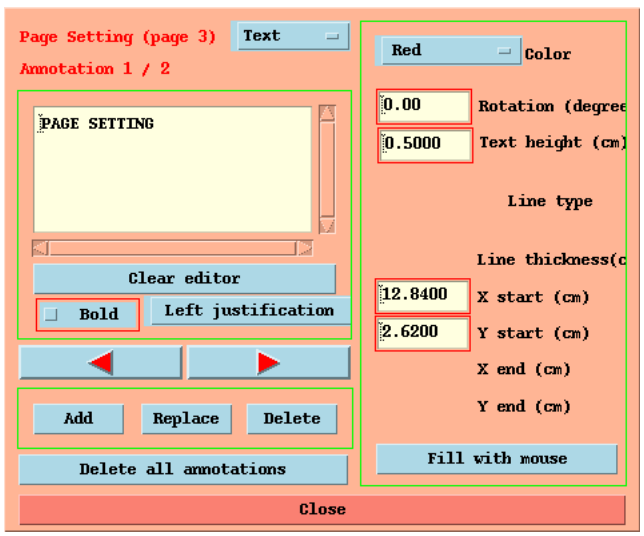
Select *"Draw text"*.
Type a text in the editor.
Select the color of the text and the font.
Activate *"Add"*.
Annotate the corresponding icon.
etc...

Activate *"Move all scale"*.
With the right button of the mouse, select another position in the annotation image. The group *"COLOR SCALE"* changes its position.

ATTENTION:
Having activated the command *"Send annotations to graphic plane"*, if there is a *"COLOR SCALE"* annotation, the visualization planes are filled and do not represent any more exactly the data planes. In the case of a mistake, it is necessary to regenerate the visualization planes.

Use the menu *"Display→ Enhance display"* to retreive the original pixels.

12.5 PRINT & SETTINGS→ DRAW PAGE ANNOTATION



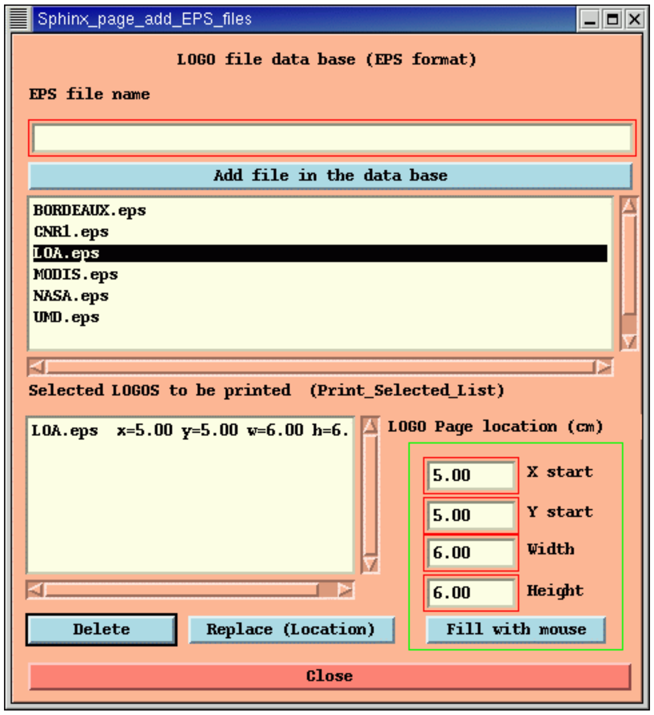
This menu allows one to add text and some figures (line, rectangle, arrow) on the page.
Choose the type of annotation.
Fill the editors of geometry or activate *"Fill with mouse"* that is going to allow you to define the object directly in the window *"Sphinx_show_page"*.
Then correct the geometry editors, if necessary, and activate the button *"Add"*.
The note is drawn in the page.

Options:

	Only in mode text:
"Bold"	for bold text (only 2 PostScript fonts are available).
"Left justification"	The annotations are centered or left justified.
	For all annotations:
◁ ▷	allow you to point the various notes of the page.
"Add"	adds the defined annotation.
"Replace"	replaces the current annotation.
"Delete"	kills the current annotation.
"Delete all annotations"	kill all the annotations.

12.6 PRINT & SETTINGS→ (ADD) EPS ICONS

This menu allows one to add icons on the page. These images must be in format EPS (Encapsulated PostScript language).



Two databases may be available: the office database and your personnal database.
The office database is set, in the Mfiles directory, at the installation of the software.
To constitute your personnal base, you must fill the editor *"EPS file name"* with the complete path of the EPS file, then click on *"Add file in the data base"*. The file will be copied in the directory $home/.Msphinx/USER_EPS_LOGOS.

To select an icon, click on its name in the database list (it appears in the second list: Selected LOGOS).

To position the icon, select it in the second list, then, else fill the 4 editors, else click on *"fill with mouse"* and draw a rectangle on the *"Sphinx_show_page"* window. Finally, click on the *"replace"* button.

12.7 PRINT & SETTINGS→ XFIG TOOLS

This option activates an intuitive and efficient tool of page presentations. Images can be directly exported from Msphinx to Xfig. Xfig possesses its own manual. The images are archived in different directory under $home/.Msphinx.

$home/.Msphinx/XFIG	Contains the created and saved presentations.
$home/.Msphinx/XFIG/CAPTURE	Image results from screen grab.
$home/.Msphinx/XFIG/IMAGES	Images transferred from Msphinx.

13 ABOUT

13.1 About→ Authors panel...

We, Msphinx's version, "Copyrights", etc...

13.2 About→ Memory...

The amount of memory used.

13.3 About→ LUT...

The color active look-up-table description. At the end, the RGB constituents of every pixel.

13.4 About→ Server...

Your local server state.

13.5 About→ Tests→ Send image test to display

Loads an image (1024×1024) in the data plane.

13.6 About→ Tests→ Send image test to cells

Load an image into every defined cell.

13.7 About→ Tests→ Kaleidoscope

Random image. To quit the loop, just click any button in the main window.

Part II

BACKGROUND CAPABILITIES

14 The command file

In this mode, the work on images can be generated in an automatic way without visualization.

The command is: Msphinx file.com

14.1 Options of the command file

#	This character comments a line of the file.
|	This character means choice of options.
[ ]	These characters mean optional argument.
\	This character means that the next line is a continuation line.

14.2 Glossary

ViewPlane	Refers to the Msphinx view memory. It is always linked with a color scale (Look Up Table) [a ViewPlane is a 8 bit image computed from one of the data planes[8/16/32 bits]] * Red(1) Green(2) Blue(3) TrueColor(0) * -1 for the current plane
Plane	Refers to the data planes from 1 to 511 * -1 for the current plane * 0 to the R/G/B corresponding data planes
Graph Plane	Refers to a 4 bit overlay view memory (15 colors) for drawing purpose
Mask Plane	Refers to a 4 bit overlay view memory (15 colors) for drawing mask area purpose
Cell	A cell is a subdivision of a plane: *ex: a plane 1024 by 1024 can be split into 4 cells (512 by 512)*

data_type	name or value (0→ 6)			
	UCHAR	0	unsigned character (8 bits)	
	USHORT	1	unsigned short (16 bits)	
	SHORT	2	signed short (16 bits)	
	INT	3	integer (32 bits)	
	FLOAT	4	float (32 bits)	
	CHAR	5	signed character (8 bits)	
	UINT	6	unsigned integer (32 bits)	
	DOUBLE	7	double (64 bits)	

Color Lut Name	GREY	RAINBOW0	RAINBOW1	RAINBOW2
	RAINBOW3	RAINBOW4	GEODESIC	SEISMIC
	TOPOGRAPHIC	ADDITIVE	CEE	X11
	GREY16	RAINBOW16	NONE	

Font name list	Some fonts are archived in the Mfiles/Fonts directory:			
	Bell.ttf	Couri.ttf	Greek.ttf	Trebuci.ttf
	Calist.ttf	Curlz.ttf	Harngton.ttf	Verdana.ttf
	Chey.ttf	Georgia.ttf	Horndond.ttf	Verdanab.ttf
	Comic.ttf	Georgiab.ttf	Rock.ttf	Verdanabi.ttf
	Cour.ttf	Georgiabi.ttf	Trebuc.ttf	Verdanai.ttf
	Courb.ttf	Georgiai.ttf	Trebucb.ttf	Vladimir.ttf
	Courbi.ttf	Gothic.ttf	Trebucbi.ttf	

Drawing Line Style	SOLID	DASH	MICRODASH
	SMALLDASH	LONGDASH	DASHDOT
	LINEDOT		
Drawing Color Name	RED	GREEN	BLUE
	BLACK	WHITE	MAGENTA
	FOREST	SIENNA	YELLOW
	CORAL	VIOLET	PLUM
	CYAN	TURQUOISE	TRANSPARENT
	CURRENT		
Drawing Icon Name	SQUARE	DIAMOND	CIRCLE
	TRIANGLEU	TRIANGLED	TRIANGLEL
	TRIANGLER		

Convolution Product Name	"OWNER"	"SMOOTH"
	"SOBEL"	"VERTICAL1"
	"HORIZONTAL1"	"EASTDIAGONAL1"
	"WESTDIAGONAL1"	"VERTICAL2"
	"HORIZONTAL2"	"EASTDIAGONAL2"
	"WESTDIAGONAL2"	

14.3 MISC

- Allows the user to execute a unix shell within a command file.

send_system "..."

Par exemple:

```
send_system "cc ../DEMO_DRAW/send_draw_com.c -o ../DEMO_DRAW/send_draw_com -lm;../DEMO_DRAW/send_draw_com MYIMAGE"
```

- set the input/output directory path for the files created in the command file (default ./). This output directory will overlap *"set_ output_ directory"* in the encapsulated commands (HDFLook Mgraph).

set_ output_ directory	/tmp
set_ input_ directory	./

- Refers to Msp program verbose mode

verbose

- Refers to Msphinx program verbose mode

send_ set_ verbose
send_ unset_ verbose

- A command file can be parameterized in a very simple way using a system of aliases (Free Word preceded by the character @). This allows you to replace whole or part of a command by a line introduced into the data file.

set_ alias	FileName

Ex: in the command file we have:

```
send_set_verbose
set_alias LABELS2_ALIASES
set_workspace_geometry @WORKSPACE
send_show_view @VIEWPLANE
set_projection_to_geometry XTo=0 YTo=0 WidthTo=@WIDTH HeightTo=@HEIGHT \
ProjectionTo=@PROJECTION
```

In the file "LABELS2_ALIASES" we have:

```
@WORKSPACE   PlaneWidth=1000 PlaneHeight=1000  DataType=0 CellWidth=1000 CellHeight=1000
@VIEWPLANE   ViewPlane=3
@PROJECTION  "ORTHOGRAPHIC"
@WIDTH       800
@HEIGHT      800
```

14.4 MSPHINX GEOMETRY AND VIEW PLANES

- Set a new home directory for the .Msphinx structure

set_Msphinx_HOME_directory HOME="/tmp"

- Set a new project directory. The user can store the Msphinx memory on disk space and the View Planes can overlap Data planes (only in 8 bit depth).

set_project PROJECTNAME="TESTCOM"
DATAPLANESONDISK=Yes|No
DATAPLANESLINKED=Yes|No
OVERLAPDATAPLANES=Yes|No

- Set a new plane geometry.

set_workspace_geometry PLANEWIDTH=1024 PLANEHEIGHT=1024
DATATYPE=CHAR
CELLWIDTH=512 CELLHEIGHT=512

- Show a view plane: the number of the view plane can be 0 for TRUE-COLOR, 1 for RED, 2 for GREEN, 3 for BLUE.

set_view_planes VIEWPLANE=3 [0→ 3] RED=2 GREEN=3 BLUE=4

- Destroy all data and view data file tructures

send_destroy_all_data

- Allows you to modify and stretch the data planes. The *"inputMin"* and *"inputMax"* value are the minimum/maximum data pixel values and they are optional.
  In this example, the input data from 10 to 30 were be stretched to output values 0 to 255.

set_plane_data_type PLANEFROM=1 PLANETO=1 DATATYPE=CHAR
INPUTMIN=10.0 INPUTMAX=30.0
OUTPUTMIN=0 OUTPUTMAX=255

14.5 READ WRITE FILES

For the read options, the *Plane* value is the data plane storage. The X and Y are the output position.

- Read gif,tif,jpeg etc.. files.
Here, *Width* and *Height* are the geometry of the input image. *Expand* allows you to expand or to reduce the input image size to the output geometry.

send_read_other	**PLANE**=1 **X**=0 **Y**=0 **WIDTH**=0 **HEIGHT**=0 **EXPAND**=No **FILENAME**="../IMAGES/LINEAR_MAYFEB256.tif"

- Read standard binary files.
Here, *Width* and *Height* are the geometry of the cell size. *DataWidth* is the width of the input image and *Data type* is the type of the input image.

send_read_simple	**PLANE**=3 **X**=0 **Y**=0 **WIDTH**=512 **HEIGHT**=512 **DATAWIDTH**=512 **DATATYPE**=UCHAR **EXPAND**=No **FILENAME**="MYIMAGE"

- Read an ASCII file on a regular or irregular grid.
Here, *Width* and *Height* are the geometry of the output image. *ColumsNumber* and *LinesNumber* are the number of lines and columns in the file. The *LinesToSkip* is the number of lines to skip at the top of file.

send_read_ascii	**REGULARGRID** **PLANE**=1 **X**=0 **Y**=0 **WIDTH**=0 **HEIGHT**=0 **COLUMSNUMBER**=0 **LINESNUMBER**=0 **LINESTOSKIP**=0 **UNDEFVALUE**=0 **DISTANCEFACTOR**=0 **NEARESTPIXELINTERPOLATION**=Yes|No **FILENAME**="MYASCIIFILE"
send_read_ascii	**IRREGULARGRID** **PLANE**=1 **X**=0 **Y**=0 **WIDTH**=0 **HEIGHT**=0 **COLUMSNUMBER**=0 **LINESNUMBER**=0 **XCOLUMN**=0 **YCOLUMN**=0 **ZCOLUMN**=0 **LINESTOSKIP**=0 **UNDEFVALUE**=0 **DISTANCEFACTOR**=0 **NEARESTPIXELINTERPOLATION**=Yes|No **FILENAME**="MYASCIIFILE"

- Read an ASCII file and draw it on the graphic plane.
The *Xmini, Xmaxi, Ymini, Ymaxi* are the geometry characteristics in the file (x,y) units. the input geometry will match the output geometry.

send_read_ascii	**PLOT** **X**=0 **Y**=0 **WIDTH**=0 **HEIGHT**=0 **XMINI**=0 **XMAXI**=0 **YMINI**=0 **YMAXI**=0 **COLOR**="Red" **THICKNESS**=0 **FILENAME**="MYASCIIFILE"
send_read_ascii	**ARROWFIELD** **X**=0 **Y**=0 **WIDTH**=0 **HEIGHT**=0 **XMINI**=0 **XMAXI**=0 **YMINI**=0 **YMAXI**=0 **COLOR**="Red" **THICKNESS**=0 **STYLE**="SOLID" **ARROWFACTOR**=0 **FILENAME**="MYASCIIFILE"

- Add a frame switch to the send_create_file command.
  The *Size* variable is the border size (if = 0 no frame), The *SizeFactor* variable is the size factor of the Title.

send_create_frame **SIZE**=1 **RED**=100 **GREEN**=100 **BLUE**=100
FRAMECOLOR="Red"
TOPTITLE="My file" **BOTTOMTITLE**="My file"
TITLE="My file" **FONTNAME**=""Bell.ttf"
TITLECOLOR="Red" **SIZEFACTOR**=2.0

- Create a gif, tiff or jpeg output file.

send_create_file **VIEWPLANE**=-1 **X**=0 **Y**=0
WIDTH=700 **HEIGHT**=700 **WIDTHTO**=128 **HEIGHTTO**=128
FILEFORMAT="GIF"|"TIF"|"JPG"
FILENAME="MYFILE_COM.gif"

- Add a frame border to the image for the creation of an output image.

send_create_frame Size=20 red=100 green=100 blue=100
FontName="Bell.ttf" TitleColor="White" SizeFactor=2.0
Title="LABELS AND FRAME Msphinx TEST" FrameColor="Blue"

- Create a raw binary file.
  The *DataType* value is the Data type of the output image. The *swap* allows you to swap output data for integers 16 or 32 bits. if the min and max are equals, the values are computed (1%-99% of the pixels of the area). The *range* value allows you to convert the output data (for ex: convert real values -1 to 1 to integer 0 to 1023).

send_write_simple **PLANE**=3 **X**=0 **Y**=0
WIDTH=512 **HEIGHT**=512
DATATYPE=UCHAR **SWAP**=Yes|No **CONVERT**=Yes|No
MIN=0 **MAX**=0 **RANGE**=1024.0
FILENAME="MYIMAGE"

- Create a hdf image 8 bit or 24 bit.

send_create_hdf_image **VIEWPLANE**=-1 **X**=0 **Y**=0
WIDTH=700 **HEIGHT**=700
TITLE="hdf image title"
FILENAME="MYFILE_COM.hdf"
send_create_hdf_sds **PLANE**=3 **X**=0 **Y**=0
WIDTH=512 **HEIGHT**=512
TITLE="hdf sds title"
FILENAME="MYFILE_COM.hdf"

14.6 CLEAR PLANES

- Clear data memory, view memory, graphic and mask planes

send_clear_area PLANE=0 X=0 Y=0 WIDTH=1000 HEIGHT=1000

- Clear the graphic plane

send_clear_graph X=0 Y=0 WIDTH=512 HEIGHT=512

- Clear the mask plane

send_clear_mask X=0 Y=0 WIDTH=512 HEIGHT=512

14.7 COLOR SCALES

- Load a Msphinx color scale (each *"set_view_planes"* will set the default color scale). See §14.2 for the color scale name. If the Color Lut Name is not in the list, a user's filename will be read.
  The format of this file must be:
  Pixel number (0− >255) Red Blue Green (Intensity between 0− >255).
  The empty string "" clears the default color scale.

send_default_color_scale "GREY"

- Load a Msphinx color scale. See §14.2 for the color scale name. If the Color Lut Name is not in the list, a user's filename will be read.
  The format of this file must be:
  Pixel number (0− >255) Red Blue Green (Intensity between 0− >255).

send_color_scale_name "GREY"

- Copy a lut from a plane to another one.

send_copy_lut PLANEFROM=1 PLANETO=3

- Choose a color for a pixel value (0→ 255)

send_color_level LEVEL=1 RED=255 GREEN=255 BLUE=255

14.8 DRAW ON GRAPHIC PLANES

These functions add some objects on the graphic planes.
The *X1, Y1, X2, Y2* values are the location (start and end) of each object. For the color, line style and font definitions, see the glossary (§14.2).

- Draw a text on the graphic plane.
  You can border the text with the *Border* value. If the *Frame* value is set, the background of the text will be transparent.

send_draw_text **X1**=50 **Y1**=10 **Border**=0
ForegroundColor="RED"
BackgroundColor="TRANSPARENT"
FontName="Bell.ttf" **SizeFactor**=1.0 **Rotation**=0.0
Frame=Yes|No **Text**="THIS IS A SIMPLE TEST"

- Draw a line on the graphic plane. The *Thickness* value gives the thickness of the line.

send_draw_line **X1**=50 **Y1**=50 **X2**=300 **Y2**=300
Thickness=8 **Style**="SOLID" **Color**="BLUE"

- Draw an arrow on the graphic plane. The *Thickness* value gives the thickness of the line. The *ArrowFactor* value gives the size factor of the arrow.

send_draw_arrow **X1**=0 **Y1**=100 **X2**=200 **Y2**=350
Thickness=4 **ArrowFactor**=20
Style="SOLID" **Color**="GREEN"

- Draw a box on the graphic plane. The *Thickness* value gives the thickness of the line.

send_draw_box **X1**=0 **Y1**=0 **X2**=512 **Y2**=512
Thickness=4 **Style**="SOLID" **Color**="CYAN"

- Draw an icon on the graphic plane. See the glossary (§14.2) for the different names of icon.

send_draw_icon **X**=250 **Y**=150 **IconName**="CIRCLE"
IconSize=1.000000 **IconColor**="YELLOW"

- Draw an icon and a text on the graphic plane.

send_draw_icon_text **X**=250 **Y**=250 **IconName**="CIRCLE"
IconSize=1.000000 **IconColor**="RED"
Border=2 **ForegroundColor**="MAGENTA"
BackgroundColor="WHITE"
FontName="Bell.ttf" **SizeFactor**=1.0
Rotation=0.0 **Frame**=Yes|No **Text**="CIRCLE"

- Draw a color scale on the view plane (linear or boxes).
  Draw labels and ticks on the graphic plane.

The C language formulation is used for the *TextFormat* value.
The *UpLeftSide* value is the label position (the default is bottom or right).
The *Labels* list is a z value (from 0 to 255) followed by text between quotes or an independant value written with the given format.

send_draw_scale	**ViewPlane**= 3 **X**=0 **Y**=600 **Width**=512 **Height**=100 **LutFrom**=0 **LutTo**=255
send_draw_scale_label	**X**=0 **Y**=0 **Width**=300 **Height**=500 **TickColor**="Red" **ForegroundColor**="Red" **BackgroundColor**="Tranparent" **TextFormat**="**FontName**="Courb.ttf" **SizeFactor**=1.0 **UpLeftSide**=No **NoTicks**=Yes|No **Labels**=" 25 1.00 30 Clouds ... "
send_draw_box_label	**X**=0 **Y**=0 **Width**=300 **Height**=500 **TickColor**="Red" **ForegroundColor**="Red" **BackgroundColor**="Tranparent" **TextFormat**="**FontName**="Courb.ttf" **SizeFactor**=1.0 **UpLeftSide**=No **Labels**=" 25 1.00 30 Clouds ... "

14.9 FUNCTIONS

- Redraw the view plane from the data plane with a linear funtion from A minimum to B maximum data value.

If the *Mask* value is set, the transformation will be not apply if the pixel is masked. The *Log* values allows you to choose a logarithmic or linear function.

send_enhance	**ViewPlane**=1 **X**=0 **Y**=0 **Width**=1000 **Height**=1000 **Mask**=Yes|No **A**=10.0 **B**=30.0 **Log**=Yes|No

- Set direct pixel conversion (No direct action).

In the example below, the original pixel value 100, before applying the algebra equation, will be directly translated to pixel result 200, and the pixel value 300 to pixel result 201. This will be performed with the send_algebra command.

send_algebra_conv	" 100 → 200 300 → 201"

- Compute an algebra equation.

The user can use the mask plane as filter (Masked pixels are not computed). The user can use the *send_algebra_conv* settings by setting the *SetVal* value. The *Expand* allows the user to expand the color of the image result to the viewplane.
The values under *CutMin* are equal to CutMin. The values over *CutMax* are set to CutMax.

send_algebra	**MASK**=Yes|No **SETVAL**=Yes|No **EXPAND**=Yes|No **CUTMIN**=0.000000 **CUTMAX**=255.000000 **FORMULA**="C[3,1]=rnd()*255"

For example:

`C[3,1]=rnd()*255`	Cell nb 1, from data plane 3
`R=rnd()*255`	Red plane, full size
`P[100]=rnd()*255`	Plane nb 100, full size

(See the Sphinx algebra widget for operator definitions).

- Compute a SOBEL convolution product.

The *Name* value can be the Filter name or "OWNER". The *Style* value defines the filter: it is applied on LINES or COLUMNS or as a MATRIX. The user can use the mask plane as filter (Masked pixels are not computed). The use can add its own filter values.

send_convolution	**PLANE**=3 **X**=0 **Y**=0 **WIDTH**=512 **HEIGHT**=512 **NAME**="SOBEL" **LINES**=3 **COLUMNS**=3 **THRESHOLD**=8421.000000 **STYLE**="MATRIX" **MASK**=Yes|No **MATRIX**=""
send_convolution	**PLANE**=3 **X**=0 **Y**=0 **WIDTH**=512 **HEIGHT**=512 **NAME**="OWNER" **LINES**=1 **COLUMNS**=9 **THRESHOLD**=8421.000000 **STYLE**="COLUMNS" **MASK**=Yes|No **MATRIX**=0,0,0,1,1,1,0,0,0"

- Fill the mask plane from data pixel intervals.

The value *Do* allows you to do an AND or an OR operation between intervals. If the value *AddMode* is set, the existing mask pixels will be kept. You can also define a mask color and filter as data_value < Plane < data_value etc.. (" 0x55 < 3 0x77 <5 " bit tests).

send_create_mask	**X**=0 **Y**=0 **WIDTH**=512 **HEIGHT**=512 **DO**="AND" **ADDMODE**=Yes|No **INVERSMASK**=Yes|No **COLOR**="CYAN" **FILTER**=" 48 <3 <64 110 <5 < 333"

- Compute basic statistics on a zone.

The user can use the mask plane as filter (Masked pixels are not computed).

send_area_statistics	**PLANEFROM**=3 **PLANETO**=3 **X**=0 **Y**=0 **WIDTH**=512 **HEIGHT**=512 **MASK**=Yes|No **IGNOREZEROS**=Yes|No **ADDMODE**=Yes|No

- Resize an image plane.

If the *XFactor, YFactor* are set to zero, it will be computed from From To geometry. The user can use the mask plane as filter (Masked pixels are not computed). The *LinearColorScale* value : RGB image with a non linear color scale. The *RescaleValues* value: From plane image deep → To Image deep

send_image_resize **PlaneFrom**=3 **XFrom**=0 **YFrom**=0
WidthFrom=512 **HeightFrom**=512
PlaneTo=3 **XTo**=0 **YTo**=0
WidthTo=512 **HeightTo**=512
XFactor=0.0 **YFactor**=0.0
Mask=Yes|No **LinearColorScale**=Yes|No
RescaleValues=Yes|No
Method="LinearInterpolation"|"NearestPixel"|"BicubicSpline"|"MeanValue"

14.10 PROJECTIONS

projection name [extra parameter nb]:

`LINEAR[..],POLDER[..],GOODE[..],MOLLWEIDEEA[3],`
`HAMMER[3],AZIMUTHAL[2,3],LAMBERT[2,3],MILLER[3],`
`MOLLWEIDE[3],ORTHOGRAPHIC[2,3],ROBINSON[3],SINUSOIDAL[3],`
`VANDERGRINTEN[3],WAGNER7[3],MODIS[0,3,8,9]`

extra parameter list name:

[0] MajorAxisFrom	or	MajorAxisTo	major axis
[1] MinorAxisFrom	or	MinorAxisTo	minor axis
[2] CenterLatitudeFrom	or	CenterLatitudeTo	center latitude
[3] CenterLongitudeFrom	or	CenterLongitudeTo	center longitude
[4] FirstStandardParallelFrom	or	FirstStandardParallelTo	first standard parallel
[5] SecondStandardParallelFrom	or	SecondStandardParallelTo	second standard parallel
[6] XOffsetInMetersFrom	or	XOffsetInMetersTo	x offset in meters
[7] YOffsetInMetersFrom	or	YOffsetInMetersTo	y offset in meters
[8] RowsFrom	or	RowsTo	
[9] RightJustifyFrom	or	RightJustifyTo	

Generalities:

`...To=`	output (geometry, data plane, location...)
`...From=`	input (geometry, data plane, location...)
`X...= Y...o=`	location on TO or FROM image (row,coluns)
`Latitude...= Longitude...=`	projection geometry
`EXTRA PARAMETERS= value`	Projection style dependent

- set the TO projection geometry:

set_projection_to_geometry XTo=0 YTo=0 WidthTo=1000 HeightTo=500
ProjectionTo="LINEAR|POLDER|..."
LatitudeMinTo=-90.0000 LatitudeMaxTo=90.0000
LongitudeMinTo=-180.0000 LongitudeMaxTo=180.0000
[EXTRA PARAMETERS= value]

- Compute a projection:

send_projection PixelOverlap=Yes|No PlaneTo=3 PlaneFrom=1
XFrom=0 YFrom=0
WidthFrom=100 HeightFrom=500
ProjectionFrom="LINEAR"
LatitudeMinFrom=-90.0000 LatitudeMaxFrom=90.0000
LongitudeMinFrom=-180.0000 LongitudeMaxFrom=180.0000
[EXTRA PARAMETERS= value]

- Add the projected grids on the graphic plane (TO space):
The latitude and longitude reference are the reference of the area on the "TO" space.

send_grids LatitudeMin=-90.0 LatitudeMax=90.0 LatitudeStep=5.0
LongitudeMin=-180.0 LongitudeMax=180.0 LongitudeStep=10.0
Color="RED" lineWidth=1 SendToMgraph=Yes|No

- Add a projected world map on the graphic plane (TO space)

send_world_map **COASTLINES**=Yes|No **RIVERS**=Yes|No **BOUNDARIES**=Yes|No
COASTLINECOLOR="GREEN" **RIVERCOLOR**=Blue
BOUNDARYCOLOR=Magenta **LINEWIDTH**=1 **SENDTOMGRAPH**=Yes|No

Below, the list of other key words:

RIVERS=yes	means All rivers
RIVERSRANK1=yes	Permanent major rivers
RIVERSRANK2=yes	Additional major rivers
RIVERSRANK3=yes	Additional rivers
RIVERSRANK4=yes	Minor rivers
RIVERSRANK5=yes	Intermittent major rivers
RIVERSRANK6=yes	Intermittent minor rivers
RIVERCOLOR=	All rivers
COLORRANK1=	
COLORRANK2=	
COLORRANK3=	
COLORRANK4=	
COLORRANK5=	
COLORRANK6=	

- Add an icon on the graphic plane (TO space)

send_draw_projected_icon **XTO**= 2.337 **YTO**= 48.837
ICONNAME="Circle" **ICONSIZE**=.20 **ICONCOLOR**="RED"

- Add a text on the graphic plane (TO space).
  the font name is any file from Mfiles/Fonts.
  "Frame" means Add background transparent pixels.

send_draw_projected_text **XTO**= 2.337 **YTO**= 48.837 **BORDER**=0
FOREGROUNDCOLOR="WHITE"
BACKGROUNDCOLOR="TRANSPARENT"
FONTNAME="Bell.ttf" **SIZEFACTOR**=1.0
ROTATION=0.0 **FRAME**=Yes|No
TEXT="Paris"

- Add an icon and a text on the graphic plane (TO space).

send_draw_projected_icon_text **XTO**= 2.337 **YTO**= 48.837 **ICONNAME**="Circle"
ICONSIZE=.20 **ICONCOLOR**="RED" **BORDER**=0
FOREGROUNDCOLOR="WHITE"
BACKGROUNDCOLOR="TRANSPARENT"
FONTNAME="Bell.ttf" **SIZEFACTOR**=1.0
ROTATION=0.0 **FRAME**=Yes
TEXT="Paris"

- Add latitude/longitude label names on the graphic plane

send_ draw_ latitude_ labels	**ForegroundColor**="Red" **BackgroundColor**="TRANSPARENT" **Border**=0 **FontName**="Bell.ttf" **SizeFactor**=1.0 **Rotation**=0.0 **TextFormat**="%.2f" **Longitude**=10.0 **LatitudeMin**=100.0 **LatitudeMax**=200.0 **LatitudeStep**=10.0
send_ draw_ longitude_ labels	**ForegroundColor**="Red" **BackgroundColor**="TRANSPARENT" **Border**=0 **FontName**="Bell.ttf" **SizeFactor**=1.0 **Rotation**=0.0 **TextFormat**="%.2f" **Latitude**=20.0 **LongitudeMin**=10.0 **LongitudeMax**=80.0 **LongitudeStep**=10.0

- Add a color scale with labels on the graphic plane The *X, Y, Width and Height* values are in pixels.

send_ draw_ scale	**ViewPlane**= 3 **x**=48 **y**=650 **Width**=300 **Height**=100 **LutFrom**=0 **LutTo**=255
send_ draw_ scale_ label	**x**=48 **y**=650 **Width**=300 **Height**=100 **TickColor**="White" **ForegroundColor**="White" **BackgroundColor**="Transparent" **TextFormat**="**FontName**="Courb.ttf" **SizeFactor**=1.0 **UpLeftSide**=No **NoTicks**=No **Labels**=" 10 -1.00 100 -10.0 200 Clouds"

14.11 PLOT

If the *Mask* value is set, the transformation will not be applied if the pixel is masked.

- Plot an histogram.

The *Xmin, Xmax, ClassSize* values define the class minimum, maximum and width. If these values are set to zero, they will be computed automatically. If the *Cumulative* value is set, the Y value will go from 0 to 100 %. With the *YPercent*, the user can choose the Y definition: count or percent. If the *ZeroClassFilter* value is set, the class zero will not be plotted.

send_ plot_ histogram	**PlaneFrom**=3 **PlaneTo**=3 **X**=0 **Y**=100 **Width**=200 **Height**=350 **Xmin**=0.0 **Xmax**=1000.0 **ClassSize**=10.0 **Cumulative**=Yes|No **YPercent**=Yes|No **ZeroClassFilter**=Yes|No **RunOverAllCells**=Yes|No **Mask**=Yes|No **HistoType**="CURVE"|"STEPS"|"BARS"|"BARSWITHGAP" **Color**="CURRENT" **MgraphPlotMode**="NEWCURVE"|"CURVEADDMODE"

- Plot a transect.

With the *DistanceXUnit*, the user can choose the X definition: pixel or distance.

send_plot_transect	**PlaneFrom**=3 **PlaneTo**=3 **X1**=0 **Y1**=100 **X2**=200 **Y2**=350 **DistanceXUnit**=Yes|No **RunOverAllCells**=Yes|No **Mask**=Yes|No **Color**="CURRENT" **MgraphPlotMode**="NEWCURVE"|"CURVEADDMODE"

- Draw a bidimentional scatter plot.

send_plot_bidimentional	**XPlane**=3 **XPlaneX**=100 **XPlaneY**=100 **XWidth**=100 **XHeight**=100 **YPlane**=1 **YPlaneX**=100 **YPlaneY**=100 **YWidth**=100 **YHeight**=100 **XMask**=Yes|No **YMask**=Yes|No **Color**="CURRENT" **MgraphPlotMode**="NEWCURVE"|"CURVEADDMODE"

- Draw a contour on the graphic overlay.

For each contour value, you can associate the colour.

send_contour	**Plane**=3 **X**=0 **Y**=0 **Width**=512 **Height**=512 **Red**= "8 16" **Green**= "30 32" **Blue**= "64" **Magenta**= "80" **White**= "" **Black**= "112" **Forest**= "116" **Sienna**= "120" **Yellow**= "130" **Coral**= "150" **Violet**= "160" **Plum**= "170" **Cyan**= "180" **Turquoise**= "200"

- Draw a contour with Mgraph.

The *ToXmin, ToXmax, ToYmin, ToYmax* define the contour geometry for Mgraph .

send_plot_contour	**Plane**=3 **X**=0 **Y**=0 **Width**=512 **Height**=512 **ToXmin**=-180 **ToXmax**=180 **ToYmin**=-90 **ToYmax**=90 **Undef**=8421 **DrawLabel**=Yes|No **LabelCFormat**="%.0f" **MgraphPlotMode**="NEWCURVE"|"CURVEADDMODE" **Red**= "8 16" **Green**= "30 32" **Blue**= "64" **Magenta**= "80" **White**= "" **Black**= "112" **Forest**= "116" **Sienna**= "120" **Yellow**= "130" **Coral**= "150" **Violet**= "160" **Plum**= "170" **Cyan**= "180" **Turquoise**= "200"

- Send a view plane as background image.

send_plot_contour_background_image	**ViewPlane**=3 **X**=0 **Y**=0 **Width**=512 **Height**=512 **ToXmin**=-180 **ToXmax**=180 **ToYmin**=-90 **ToYmax**=90 **Undef**=8421 **NearestPixelInterpolation**=Yes|No **AddGraphPlane**=Yes|No **MgraphPlotMode**="NEWCURVE"|"CURVEADDMODE"

14.12 PRINT

- Clean the previous page settings.

This command must be used in a command file to clean the previous Msphinx page addings and between two print page settings.

send_clear_page

For all functions, the *X1, Y1, X2, Y2* values define the page location (in cm.) of the adding (start and end position for line and box). All the units are in centimeters. See the §14.2 for the *Style* definition.

- Draw a text, a line or a box on the page.

send_draw_page_text	**X1**=5. **Y1**=1. **ForegroundColor**="RED" **BoldFont**=Yes|No **TextHeight**=1.0 **Rotation**=0.0 **Justification**="Left"|"Center"|"Right" **Text**="THIS IS A SIMPLE TEST"
send_draw_page_line	**X1**=5. **Y1**=2. **X2**=10. **Y2**=2. **Color**="red" **Thickness**=0.1 **Style**="Solid"
send_draw_page_box	**X1**=5. **Y1**=2. **X2**=10. **Y2**=2. **Color**="red" **Thickness**=0.1 **Style**="Solid"

- Draw a patch on the page.

If the *FitPatch* value is set, the image will fit the cell. The values *X, Y, Width, Height* define the position and the size of the image to print. The values *XTo, YTo, WidthTo, HeightTo* define the position and the size on the page in centimeters.

send_draw_page_cell	**X**=0 **Y**=0 **Width**=512 **Height**=512 **XTo**=2 **YTo**=2 **WidthTo**=10 **HeightTo**=10 **FitPatch**=Yes|No

- Create the output: Postcript, Encapsulated PostScript or to the printer with a shell command.

The resolution is in dpi (dot per inch).

send_to_PS_File	**File**="./print.ps" **Type**=Color | Black&White **PaperFormat**=A4 | A3 | B5 | USLETTER | USLEGAL **Resolution**=100 **Copies**=1 **Orientation**=Portrait | Landscape **RGBEncoding**=Yes|No
send_to_EPS_File	**File**="./print.eps" **Type**=Color | Black&White **Orientation**=Portrait | Landscape **Resolution**=100 **RGBEncoding**=Yes|No
send_to_printer	**Command**="/usr/LOA/bin/vidpsINF" **Type**=Color | Black&White **RGBEncoding**=Yes|No **PaperFormat**=A4 | A3 | B5 | USLETTER | USLEGAL **Copies**=1 **Orientation**=Portrait | Landscape **Resolution**=100

14.13 Encapsulate commands

The user is able to include a command block to other softwares as Mgraph or HDFlook.

```
 send_Mgraph
<<              ... start block ...
        ....   Mgraph style commands ...
>>              ... end of block ...


send_HDFLook
<<              ... start block ...
        ....   HDFLook style commands ...
>>              ... end of block ...
```

A Examples of command files

The command files below have been interpreted by *Msphinx* .

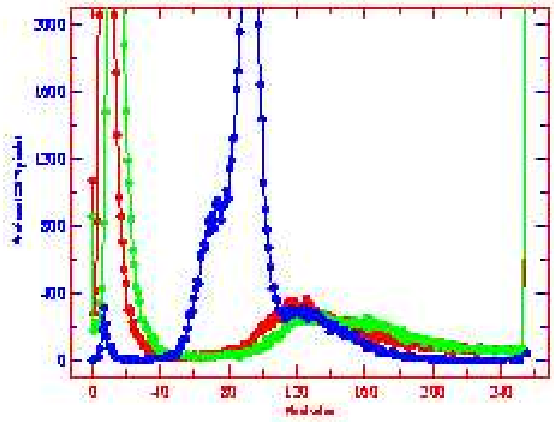
A.1 Create a Mgraph output

```
#verbose

send_set_verbose

set_workpace_geometry PlaneWidth=1000 PlaneHeight=500  DataType=0 CellWidth=1000 CellHeight=500

send_show_view ViewPlane=0

send_read_other  Plane=0 X=0 Y=0 Width=0 Height=0 Expand=No    \
            Filename="../IMAGES/LINEAR_MAYFEB.tif"

send_plot_histogram PlaneFrom=1 PlaneTo=3 X=420 Y=110 \
Width=284 Height=270 Xmin=1 Xmax=1 ClassSize=1 \
Cumulative=No     YPercent=No    \
ZeroClassFilter=Yes  \
RunOverAllCells=No     Mask=No    \
HistoType="CURVE" \
Color="CURRENT" MgraphPlotMode="NEWCURVE"



send_Mgraph
<<
#verbose
PlotTitle     Title="Histogram (Curve style)" Height=1.50
Grid          Frame=Yes   Xgrid=No       Ygrid=No  [Yes | Light | No]
#ScaleToFrame
LineStyle     Curve=1   Style=Solid          Color=Red          Thickness=3
MarkStyle     Curve=1   Style=Fcircle         Size=5
LineStyle     Curve=2   Style=Solid          Color=Green        Thickness=3
MarkStyle     Curve=2   Style=Fcircle         Size=5
LineStyle     Curve=3   Style=Solid          Color=Blue         Thickness=3
MarkStyle     Curve=3   Style=Fcircle         Size=5

XTitle        Title="Pixel value" Height=0.00
XAxis Show=Yes     Scale=Linear    Min=-1    Max=-1  Delta=-1  Color=Red  Thickness=4
XLabel        LabelStep=-1   Reference=-1   LabelHeight=1.50   CFormat="%.0f"  Angle=0.0
YTitle        Title=" % of area (22879 pixels)" Height=0.00
YAxis Show=Yes     Scale=Linear    Min=0    Max=2000    Delta=-1  Color=Blue  Thickness=1
YLabel        LabelStep=-1    Reference=-1   LabelHeight=1.50   CFormat="%.0f"  Angle=0.0

DrawCell     XStart=2.0   YStart=2.0   Width=8.00   Height=7.0\
Type=Color   Orientation=Portrait  Mode=Margin[|ScaleToFrame]

>>



send_area_statistics PlaneFrom=1 PlaneTo=3 X=420 Y=110 Width=284 Height=270 \
Mask=No    IgnoreZeros=No    AddMode=Yes


send_plot_transect PlaneFrom=1 PlaneTo=3 X1=370 Y1=230 \
                X2=710 Y2=230  DistanceXUnit=No    \
                RunOverAllCells=No     Mask=No    \
                Color="CURRENT" MgraphPlotMode="NEWCURVE"
```

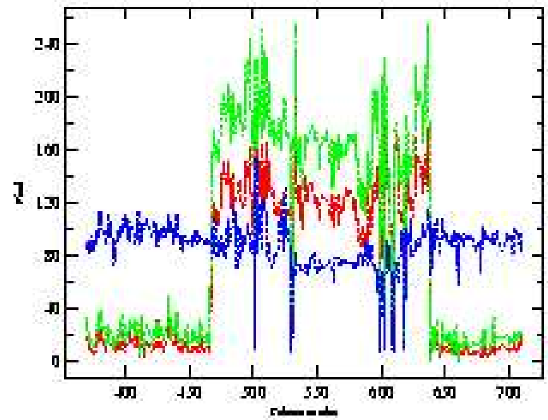
```
send_Mgraph
<<
PlotTitle     Title="Transect" Height=1.50
XLabel        LabelStep=-1   Reference=-1   LabelHeight=1.50   CFormat="%.0f"  Angle=0.0
YLabel        LabelStep=-1    Reference=-1   LabelHeight=1.50   CFormat="%.0f"  Angle=0.0

DrawCell     XStart=11.00   YStart=2.0      Width=8.00   Height=7.0\
Type=Color   Orientation=Portrait  Mode=Margin[|ScaleToFrame]
>>



send_plot_bidimentional XPlane=1 XPlaneX=420 XPlaneY=110 XWidth=284 XHeight=270 \
                YPlane=2 YPlaneX=420 YPlaneY=110 YWidth=284 YHeight=270 \
                XMask=No    YMask=No    \
                Color="Green" MgraphPlotMode="NEWCURVE"



send_Mgraph
<<
PlotTitle     Title="(POLDER) Red / Green" Height=1.50
XLabel        LabelStep=-1   Reference=-1   LabelHeight=1.50   CFormat="%.0f"  Angle=0.0
YLabel        LabelStep=-1    Reference=-1   LabelHeight=1.50   CFormat="%.0f"  Angle=0.0

FitResultFormat "Correlation: %.f  Y = %.6f X + %.3f",cor,c1,c0
Fit     Function=Polynomial Curve=-1  Min=-1 Max=-1 Npoints=100 Step=-1 Order=1   [Mode=Add|Replace|Merge] Variable=X \
FIT_RESULT_AS_ANNOTATION=Yes XStart=0.25%  YStart=10.00% Color=Black Style=Plain Height=1.50


DrawCell     XStart=2.0000   YStart=10.000   Width=8.00   Height=7.0\
Type=Color   Orientation=Portrait  Mode=Margin[|ScaleToFrame]
>>



send_plot_bidimentional XPlane=1 XPlaneX=420 XPlaneY=110 XWidth=284 XHeight=270 \
                YPlane=3 YPlaneX=420 YPlaneY=110 YWidth=284 YHeight=270 \
                XMask=No    YMask=No    \
                Color="Blue" MgraphPlotMode="NEWCURVE"


send_Mgraph
<<
PlotTitle     Title="(POLDER) Red / Blue" Height=1.50
XLabel        LabelStep=-1   Reference=-1   LabelHeight=1.50   CFormat="%.0f"  Angle=0.0
YLabel        LabelStep=-1    Reference=-1   LabelHeight=1.50   CFormat="%.0f"  Angle=0.0

FitResultFormat "Correlation: %.f  Y = %.6f X + %.3f",cor,c1,c0
Fit     Function=Polynomial Curve=-1  Min=-1 Max=-1 Npoints=100 Step=-1 Order=1   [Mode=Add|Replace|Merge] Variable=X \
FIT_RESULT_AS_ANNOTATION=Yes XStart=0.25%  YStart=10.00% Color=Black Style=Plain Height=1.50

DrawCell     XStart=11.0000   YStart=10.000   Width=8.00   Height=7.0\
Type=Color   Orientation=Portrait  Mode=Margin[|ScaleToFrame]
>>


send_create_mask   X=240 Y=140 Width=310 Height=110 \
    Do="AND" AddMode=No    InversMask=Yes   Color="RED" " 0 <red <50  0 <green <50 "

send_convolution   Plane=0 X=240 Y=140 Width=310 Height=110 \
            Name="SMOOTH"  Lines=7 Columns=7 \
          Threshold=8421.000000 Style="MATRIX"  Mask=Yes    ""

send_enhance ViewPlane=1 X=240 Y=140 Width=310 Height=110 Mask=Yes  A=10.0 B=30.0
send_enhance ViewPlane=2 X=240 Y=140 Width=310 Height=110 Mask=Yes  A=10.0 B=30.0
send_enhance ViewPlane=3 X=240 Y=140 Width=310 Height=110 Mask=Yes  A=2.0 B=180.0

send_clear_mask X=240 Y=140 Width=310 Height=110


#send_plot_contour Plane=3 X=0 Y=0 Width=1000 Height=500 \
#  ToXmin=-180 ToXmax=180 ToYmin=-90 ToYmax=90 \
#                        Undef=8421 DrawLabel=No LabelCFormat="%.0f" \
#                        MgraphPlotMode="NewCurve"     \
#                       Cyan=      "180"
```

```
#send_plot_contour Plane=1 X=0 Y=0 Width=1000 Height=500 \
#  ToXmin=-180 ToXmax=180 ToYmin=-90 ToYmax=90 \
#                          Undef=8421 DrawLabel=No LabelCFormat="" \
#                          MgraphPlotMode="CurveAddMode"     \
#                         Magenta=      "50"

send_plot_contour_background_image ViewPlane=0 X=0 Y=0 Width=1000 Height=500 \
ToXmin=-180 ToXmax=180 ToYmin=-90 ToYmax=90 \
                         Undef=8421  NearestPixelInterpolation=Yes \
                         MgraphPlotMode="NewCurve"


send_Mgraph
<<
#AddLogo    XStart=2.000 YStart=5.000 XScale=-1.000 YScale=0.000
PlotTitle     Title="POLDER  Surface reflectance  (May 97)" Height=1.00
SurfaceGeometry [Xmin=-180 Xmax=180 Ymin=-90 Ymax=90]    DistanceFactor=1 XYRatio=1 NearestPixelInterpolation=Yes

XTitle        Title=" " Height=1.00
XAxis Show=Yes     Scale=Linear    Min=-180    Max=180  Delta=30  Color=Black  Thickness=1
XLabel        LabelStep=-1   Reference=-1   LabelHeight=1.00   CFormat="%.0f"  Angle=0.0
YTitle        Title=" " Height=1.00
YAxis Show=Yes     Scale=Linear    Min=-90    Max=90    Delta=30  Color=Black  Thickness=1
YLabel        LabelStep=-1    Reference=-1   LabelHeight=1.00   CFormat="%.0f"  Angle=0.0

PlotBox      XStart=44.33%  YStart=19.33%  XEnd=65.65% YEnd=71.85% \
Color=Red   Style=Solid  Thickness=6
PlotLine     XStart=43.15%  YStart=44.12%  XEnd=68.19% YEnd=45.80%  \
Color=Magenta   Style=Solid  Thickness=6

DrawCell     XStart=1.0000   YStart=18.0   Width=18.00   Height=11.00\
Type=Color   Orientation=Portrait  Mode=Margin[|ScaleToFrame]

SendTo[EPS]File   File="./printMGRAPH.ps"  Type=Color    [Copies=1]   Orientation=Portrait
#SendToPrinter  Command="/usr/LOA/bin/vidpsINF"  Type=Color   [Copies=1]   Orientation=Portrait

>>
```

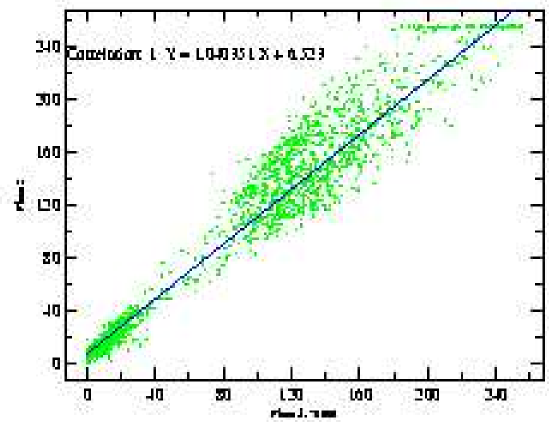
Histogram (Curve style)



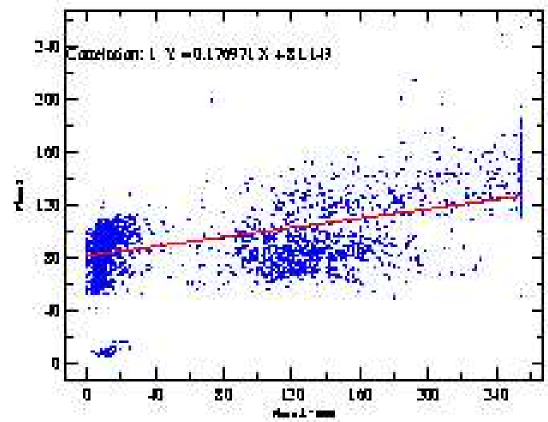
Transect



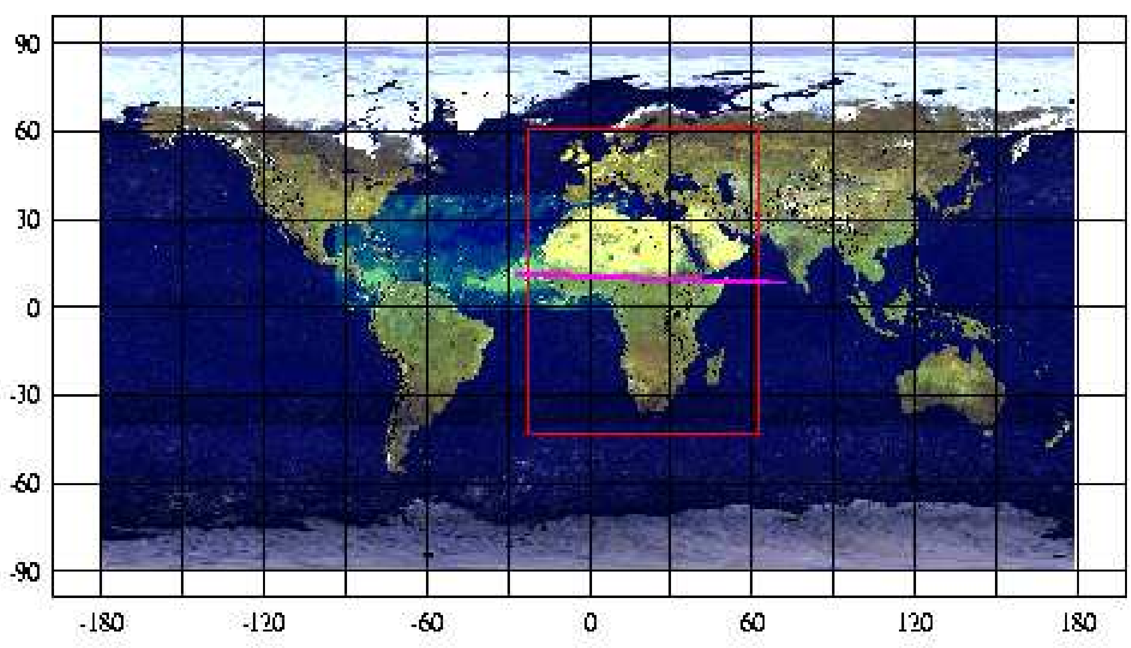
(POLDER) Red / Green



(POLDER) Red / Blue



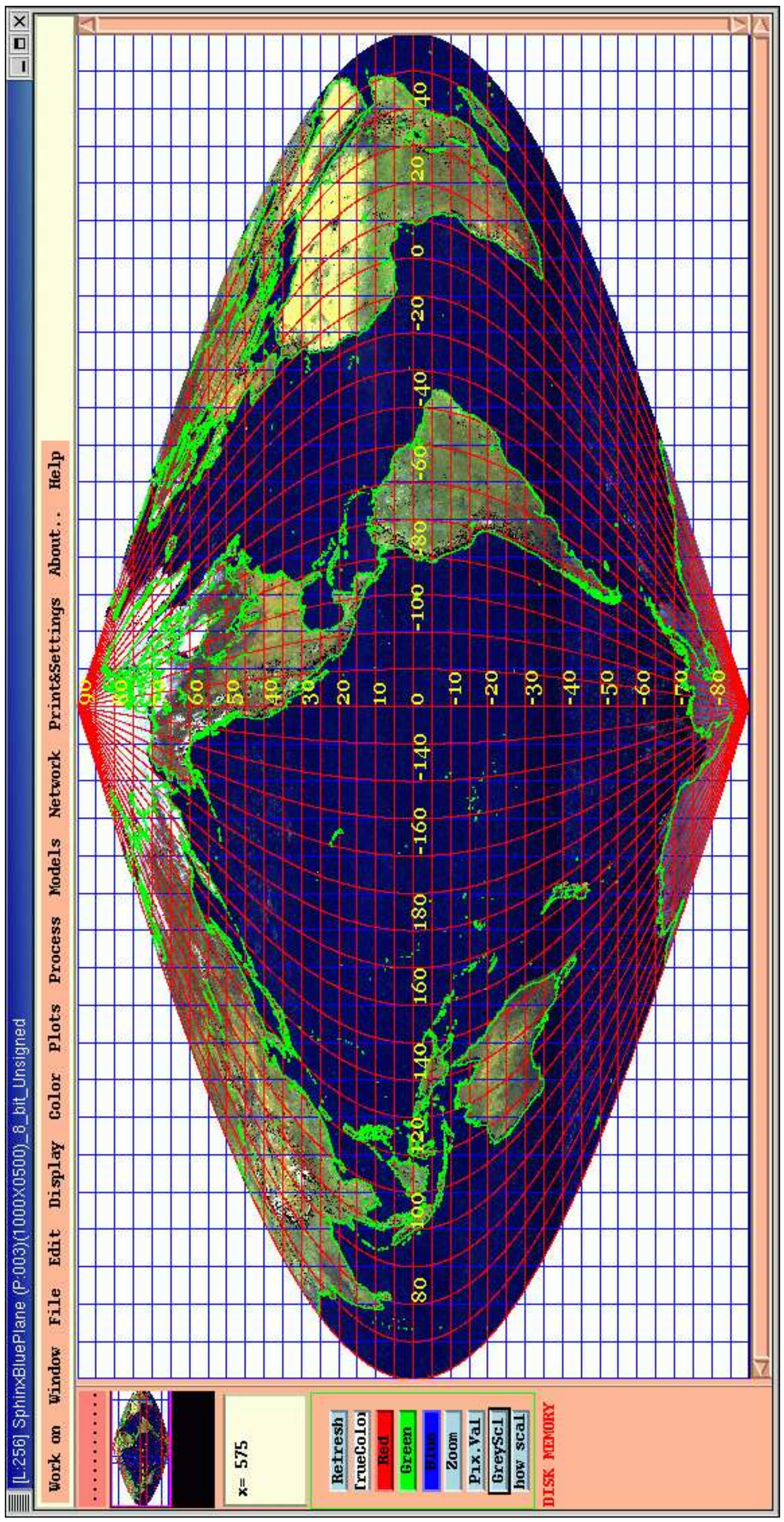
POLDER Surface reflectance (May 97)



A.2 Create a projected sinusoidal image

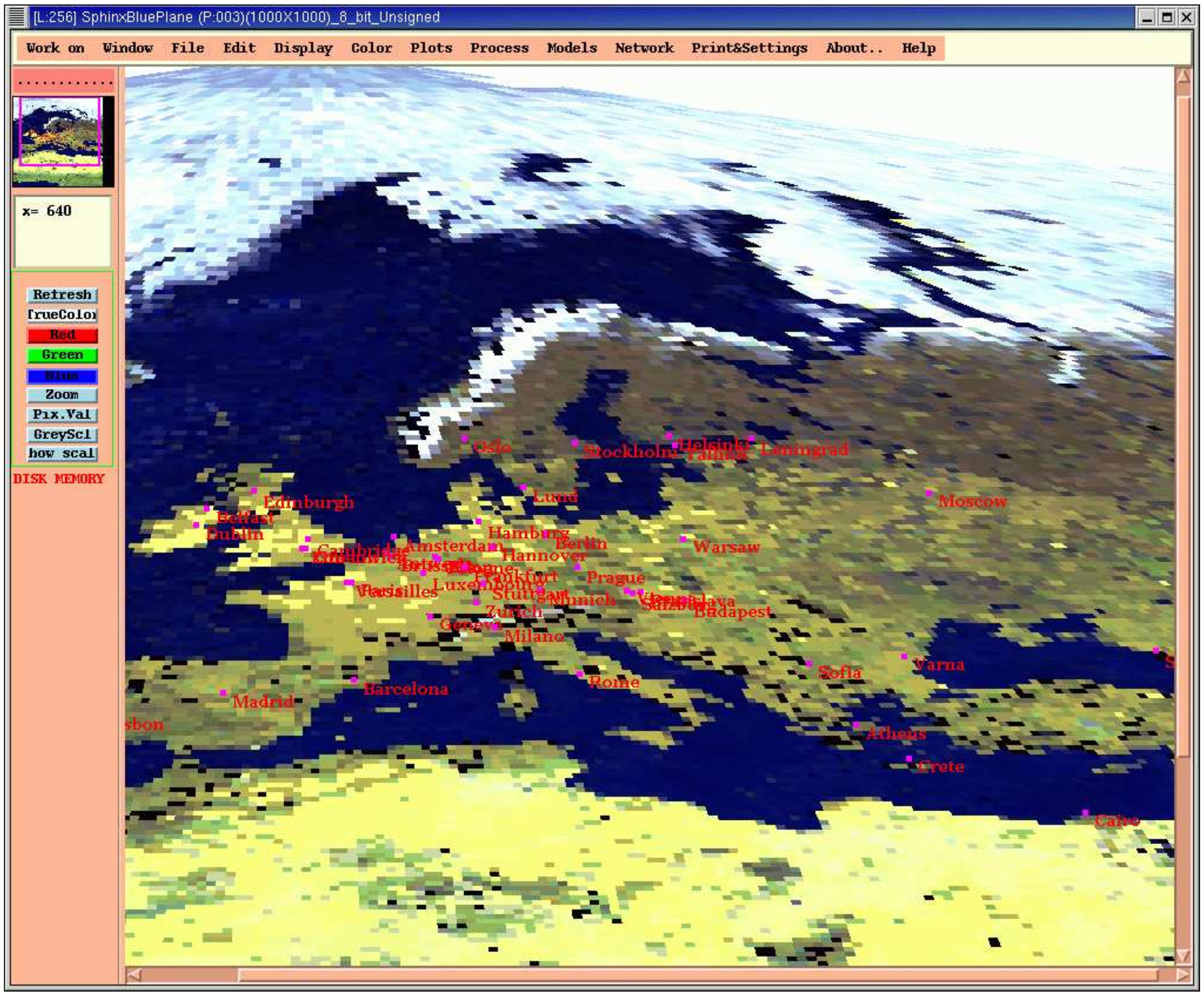
```
# CREATE A SINUSOIDAL IMAGE FROM A LINEAR IMAGE FILE WITH GRIDS AND WORLD MAP
#=========================================================================
verbose

send_set_verbose

set_project ProjectName="TESTCOM" DataPlanesOnDisk=Yes

set_workpace_geometry PlaneWidth=1000 PlaneHeight=500  DataType=0 CellWidth=1000 CellHeight=500

send_destroy_all_data

send_show_view ViewPlane=1

send_read_other  Plane=1 X=0 Y=0 Width=0 Height=0 Expand=No    \
            FileName="../IMAGES/LINEAR_MAYFEB256.tif"

send_copy_lut  PlaneFrom=1 PlaneTo=3

send_show_view ViewPlane=3

send_clear_area Plane=3 X=0 Y=0 Width=1000 Height=500

set_projection_to_geometry XTo=0 YTo=0 WidthTo=1000 HeightTo=500 ProjectionTo="LINEAR"\
   LatitudeMinTo=-90.0000 LatitudeMaxTo=90.0000 \
   LongitudeMinTo=-180.0000 LongitudeMaxTo=180.0000

send_grids LatitudeMin=-90.0000 LatitudeMax=90.0000 LatitudeStep=5.0000 \
                   LongitudeMin=-180.0000 LongitudeMax=180.0000 LongitudeStep=10.0000 \
                   Color="BLUE"

set_projection_to_geometry XTo=0 YTo=0 WidthTo=1000 HeightTo=500 ProjectionTo="SINUSOIDAL"\
   LatitudeMinTo=-90.0000 LatitudeMaxTo=90.0000 \
   LongitudeMinTo=-180.0000 LongitudeMaxTo=180.0000   \
   CenterLongitudeTO=-120.0000

send_projection PixelOverlap=No    PlaneTo=3 PlaneFrom=1 \
               XFrom=0 YFrom=0 WidthFrom=1000 HeightFrom=500 ProjectionFrom="LINEAR" \
               LatitudeMinFrom=-90.0000 LatitudeMaxFrom=90.0000 \
               LongitudeMinFrom=-180.0000 LongitudeMaxFrom=180.0000


send_grids LatitudeMin=-90.0000 LatitudeMax=90.0000 LatitudeStep=5.0000 \
                   LongitudeMin=-180.0000 LongitudeMax=180.0000 LongitudeStep=10.0000 \
                   Color="RED"

send_world_map Color="GREEN"

send_unset_verbose
verbose

send_draw_projected_text XTo=-120.0 YTo= -90  \
Border=0 ForegroundColor="YELLOW" BackgroundColor="TRANSPARENT" \
 FontName="Georgiab.ttf" SizeFactor=1.0 Rotation=0.0 Frame=No       Text=" -90"
send_draw_projected_text XTo=-120.0 YTo= -80  " -80"
send_draw_projected_text XTo=-120.0 YTo= -70  " -70"
send_draw_projected_text XTo=-120.0 YTo= -60  " -60"
send_draw_projected_text XTo=-120.0 YTo= -50  " -50"
send_draw_projected_text XTo=-120.0 YTo= -40  " -40"
send_draw_projected_text XTo=-120.0 YTo= -30  " -30"
send_draw_projected_text XTo=-120.0 YTo= -20  " -20"
send_draw_projected_text XTo=-120.0 YTo= -10  " -10"
send_draw_projected_text XTo=-120.0 YTo=   0  "   0"
send_draw_projected_text XTo=-120.0 YTo=  10  "  10"
send_draw_projected_text XTo=-120.0 YTo=  20  "  20"
send_draw_projected_text XTo=-120.0 YTo=  30  "  30"
send_draw_projected_text XTo=-120.0 YTo=  40  "  40"
send_draw_projected_text XTo=-120.0 YTo=  50  "  50"
send_draw_projected_text XTo=-120.0 YTo=  60  "  60"
send_draw_projected_text XTo=-120.0 YTo=  70  "  70"
send_draw_projected_text XTo=-120.0 YTo=  80  "  80"
send_draw_projected_text XTo=-120.0 YTo=  90  "  90"
send_draw_projected_text XTo=-160 YTo=0.0  "-160"
send_draw_projected_text XTo=-140 YTo=0.0  "-140"
send_draw_projected_text XTo=-100 YTo=0.0  "-100"
send_draw_projected_text XTo= -80 YTo=0.0  " -80"
send_draw_projected_text XTo= -60 YTo=0.0  " -60"
send_draw_projected_text XTo= -40 YTo=0.0  " -40"
send_draw_projected_text XTo= -20 YTo=0.0  " -20"
send_draw_projected_text XTo=   0 YTo=0.0  "   0"
send_draw_projected_text XTo=  20 YTo=0.0  "  20"
send_draw_projected_text XTo=  40 YTo=0.0  "  40"
send_draw_projected_text XTo=  60 YTo=0.0  "  60"
send_draw_projected_text XTo=  80 YTo=0.0  "  80"
send_draw_projected_text XTo= 100 YTo=0.0  " 100"
```

```
send_draw_projected_text XTo= 120 YTo=0.0  " 120"
send_draw_projected_text XTo= 140 YTo=0.0  " 140"
send_draw_projected_text XTo= 160 YTo=0.0  " 160"
send_draw_projected_text XTo= 180 YTo=0.0  " 180"

verbose
send_create_file ViewPlane=3 X=0 Y=0 Width=1000 Height=500 FileFormat="GIF" \
 Filename="PROJECTION_COH.gif"
```


[L:256] SphinxBluePlane (P:003)(1000X0500)_8_bit_Unsigned
Work on Window File Edit Display Color Plots Process Models Network Print&Settings About.. Help
x= 575
Refresh
TrueColor
Red
Green
Blue
Zoom
Pix.Val
GreySc1
DISK MEMORY

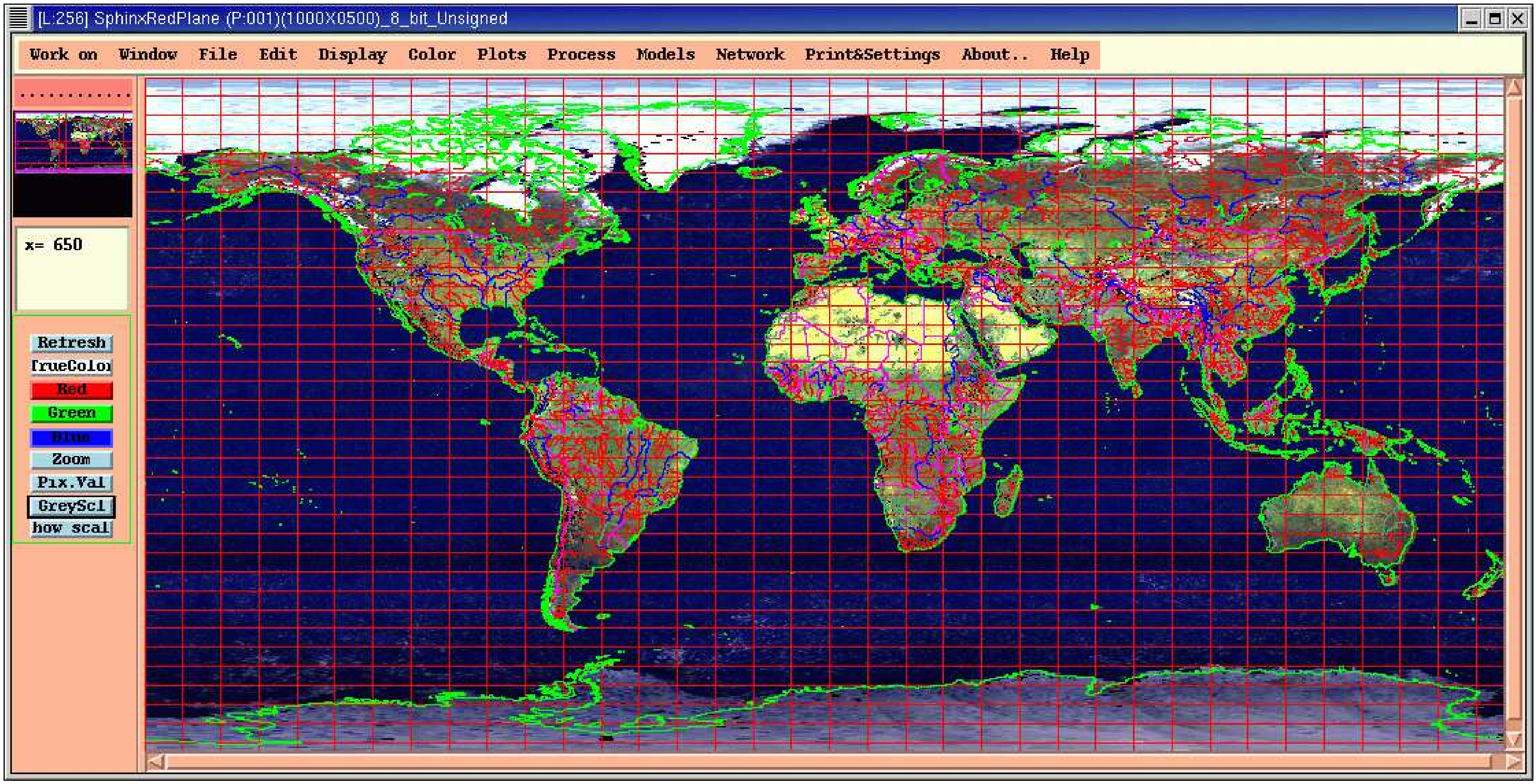
A.3 Draw a linear projection map and add cities location

```
#   (ZOOM 0->90,-10->30)
# CREATE A LINEAR PROJECTION MAP  DRAW CITIES LOCATION AND NAME
#=====================================================================================
#verbose

send_unset_verbose

set_workpace_geometry PlaneWidth=1000 PlaneHeight=1000  DataType=0 CellWidth=1000 CellHeight=1000

send_show_view ViewPlane=1

send_read_other  Plane=1 X=0 Y=0 Width=0 Height=0 Expand=No    \
            "../IMAGES/LINEAR_MAYFEB256.tif"

send_copy_lut  PlaneFrom=1 PlaneTo=3

send_show_view ViewPlane=3

send_clear_area Plane=3 X=0 Y=0 Width=1000 Height=1000

set_projection_to_geometry XTo=0 YTo=0 WidthTo=1000 HeightTo=1000 ProjectionTo="SINUSOIDAL"\
   LatitudeMinTo=-0.0000 LatitudeMaxTo=90.0000 \
   LongitudeMinTo=-10.0000 LongitudeMaxTo=30.0000  \
   CenterLongitudeTO=0.0000

send_projection PixelOverlap=No    PlaneTo=3 PlaneFrom=1 \
                XFrom=0 YFrom=0 WidthFrom=1000 HeightFrom=500 ProjectionFrom="LINEAR" \
                LatitudeMinFrom=-90.0000 LatitudeMaxFrom=90.0000 \
                LongitudeMinFrom=-180.0000 LongitudeMaxFrom=180.0000


send_draw_projected_icon_text XTo= -99.731 YTo= 32.451 \
                         IconName="Circle" IconSize=.20 IconColor="MAGENTA" \
                         Border=0 ForegroundColor="RED"  \
                         BackgroundColor="TRANSPARENT" FontName="Georgiab.ttf" \
 SizeFactor=0.9 Rotation=0.0 Frame=No  \
                         Text="Abilene"

send_draw_projected_icon_text XTo= 4.900 YTo= 52.367     Text="Amsterdam"
send_draw_projected_icon_text XTo= 2.150 YTo= 41.383     Text="Barcelona"
send_draw_projected_icon_text XTo= -5.833 YTo= 54.583    Text="Belfast"
send_draw_projected_icon_text XTo= 13.417 YTo= 52.533    Text="Berlin"
send_draw_projected_icon_text XTo= -86.810 YTo= 33.517   Text="Birmingham"
send_draw_projected_icon_text XTo= 7.100 YTo= 50.667     Text="Bonn"
send_draw_projected_icon_text XTo= 4.637 YTo= 50.839     Text="Brussels"
send_draw_projected_icon_text XTo= 19.083 YTo= 47.500    Text="Budapest"
send_draw_projected_icon_text XTo= 0.100 YTo= 52.167     Text="Cambridge"
send_draw_projected_icon_text XTo= 6.967 YTo= 50.883     Text="Cologne"
send_draw_projected_icon_text XTo= -6.239 YTo= 53.316    Text="Dublin"
send_draw_projected_icon_text XTo= 8.400 YTo= 50.050     Text="Frankfurt"
send_draw_projected_icon_text XTo= 6.100 YTo= 46.233     Text="Geneva"
send_draw_projected_icon_text XTo= 0.000 YTo= 51.500     Text="Greenwich"
send_draw_projected_icon_text XTo= 9.933 YTo= 53.600     Text="Hamburg"
send_draw_projected_icon_text XTo= 10.250 YTo= 51.583    Text="Hannover"
send_draw_projected_icon_text XTo= 24.833 YTo= 60.167    Text="Helsinki"
send_draw_projected_icon_text XTo= 30.250 YTo= 59.917    Text="Leningrad"
send_draw_projected_icon_text XTo= -9.133 YTo= 38.717    Text="Lisbon"
send_draw_projected_icon_text XTo= -0.183 YTo= 51.508    Text="London"
send_draw_projected_icon_text XTo= 6.150 YTo= 49.617     Text="Luxembourg"
send_draw_projected_icon_text XTo= -3.700 YTo= 40.417    Text="Madrid"
send_draw_projected_icon_text XTo= 37.700 YTo= 55.750    Text="Moscow"
send_draw_projected_icon_text XTo= 11.950 YTo= 48.233    Text="Munich"
send_draw_projected_icon_text XTo= 2.337 YTo= 48.837     Text="Paris"
send_draw_projected_icon_text XTo= 14.400 YTo= 50.083    Text="Prague"
send_draw_projected_icon_text XTo= -21.937 YTo= 64.130   Text="Reykjavik"
send_draw_projected_icon_text XTo= 12.500 YTo= 41.883    Text="Rome"
send_draw_projected_icon_text XTo= 18.100 YTo= 59.583    Text="Stockholm"
send_draw_projected_icon_text XTo= 9.183 YTo= 48.767     Text="Stuttgart"
send_draw_projected_icon_text XTo= 2.117 YTo= 48.833     Text="Versailles"
send_draw_projected_icon_text XTo= 8.551 YTo= 47.378     Text="Zurich"
```


[L:256] SphinxBluePlane (P:003)(1000X1000)_8_bit_Unsigned
Work on
Window
File
Edit
Display
Color
Plots
Process
Models
Network
Print&Settings
About..
Help
x= 640
Refresh
Red
Green
Zoom
GreySci
DISK MEMORY
Oslo
Stockholm
Leningrad
Moscow
Edinburgh
Belfast
Dublin
Lund
Hamburg
Amsterdam
Berlin
Hannover
Warsaw
Prague
Munich
Stuttgart
Budapest
Zurich
Geneva
Milano
Rome
Sofia
Varna
Madrid
Barcelona
Athens
Crete

A.4 Create a linear projected image with grids, world map and rivers

```
# CREATE A LINEAR PROJECTED IMAGE  WITH GRIDS, WORLD MAP AND RIVERS
#==================================================================
verbose

send_set_verbose

set_project ProjectName="TESTCOM" DataPlanesOnDisk=No

set_workpace_geometry PlaneWidth=1000 PlaneHeight=500  DataType=0 CellWidth=1000 CellHeight=500

send_show_view ViewPlane=1

send_read_other  Plane=1 X=0 Y=0 Width=0 Height=0 Expand=No    \
           Filename="../IMAGES/LINEAR_MAYFEB256.tif"

set_projection_to_geometry XTo=0 YTo=0 WidthTo=1000 HeightTo=500 ProjectionTo="LINEAR"\
                           LatitudeMinTo=-90.0000 LatitudeMaxTo=90.0000 \
                           LongitudeMinTo=-180.0000 LongitudeMaxTo=180.0000

send_grids LatitudeMin=-90.0000 LatitudeMax=90.0000 LatitudeStep=5.0000 \
                  LongitudeMin=-180.0000 LongitudeMax=180.0000 LongitudeStep=10.0000 \
                  Color="RED"

#send_world_map Coastlines=yes Rivers=yes Boundaries=yes  SendToMgraph=No\
# CoastlineColor="green"  rivercolor=blue BoundaryColor="magenta"

send_world_map Coastlines=yes  Boundaries=yes  SendToMgraph=No\
CoastlineColor="green"   BoundaryColor="magenta" \
  RiversRank1=yes RiversRank2=no RiversRank3=yes RiversRank4=no RiversRank5=yes RiversRank6=no \
  ColorRank1= "Blue" ColorRank2= "Yellow" ColorRank3="Red" \
  ColorRank4= "Magenta" ColorRank5= "Forest" ColorRank6= "White"

send_unset_verbose
```


[L:256] SphinxRedPlane (P:001)(1000X0500)_8_bit_Unsigned
Work on
Window
File
Edit
Display
Color
Plots
Process
Models
Network
Print&Settings
About..
Help
x= 650
Refresh
TrueColor
Red
Green
Blue
Zoom
Pix.Val
GreyScl
how scal

B Mpeg encode

NAME

mpeg_encode - mpeg-1 video stream encoder

SYNOPSIS

mpeg_encode [-stat stat_file] [-quiet num_seconds] [-no_frame_summary] [-gop gop_num] [-combine_gops] [-frames first_frame last_frame] [-combine_frames] [-nice] [-max_machines num_machines] [-snr] [-bit_rate_info rate_file] [-mv_histogram] param_file

DESCRIPTION

mpeg_encode produces an MPEG-1 video stream. param_file is a parameter file which includes a list of input files and other parameters. The file is described in detail below. The -gop, -combine_gops, -frames, and -combine_frames options are all exclusive. This man page is probably incomplete. For complete usage, see the User's Guide.

OPTIONS

-stat stat_file: causes the encoder to append the statistics to the file stat_file. In any case, the statistics are output to stdout. The statistics use the following abbreviations: bits per block (bpb), bits per frame (bpf), seconds per frame (spf), and bits per second (bps).

-quiet num_seconds: causes the program to not report remaining time for at least num_seconds seconds. A negative values tells the program not to report at all. 0 is the default (reports once after each frame). Note that the time remaining is an estimate and does not take into account time to read in frames.

-no_frame_summary: prevents the program from printing a summary line for each frame

-gop gop_num: causes the encoder to only encode the numbered GOP (first GOP is 0). The parameter file is the same as for normal usage. The output file will be the normal output file with the suffix ".gop.<gop_num>" No sequence info is output.

-combine_gops: causes the encoder to simply combine some GOP files into a single MPEG stream. A sequence header/ender are inserted. In this case, the parameter file need only contain the YUV_SIZE value, an output file, and perhaps a list of input GOP files (see below).

-frames first_frame last_frame: causes the encoder to only encode the frames from first_frame to last_frame, inclusive. The parameter file is the same as for normal usage. The output will be placed in separate files, one per frame, with the file names being the normal output file with the suffix ".frame.<frame num>" No GOP header information is output. (Thus, the parameter file need not include the GOP_SIZE value)

-combine_frames: causes the encoder to simply combine some frames into a single MPEG stream. Sequence and GOP headers are inserted appropriately. In this case, the parameter file need only contain the YUV_SIZE value, the GOP_SIZE value, an output file, and perhaps a list of frame files (see below).

-nice: causes the program to run any remote processes 'nicely.' This is only relevant if the program is using parallel encoding. (see 'man nice.')

-max_machines num_machines: causes the program to use no more than num_machines machines as slaves for use in parallel encoding.

-snr: print the signal-to-noise ratio. Prints SNR (Y U V) and peak SNR (Y U V) for each frame. In summary, prints averages of luminance only (Y). SNR is defined as 10*log(variance of original/variance of error). Peak SNR is defined as 20*log(255/RMSE). Note that the encoder will run a little slower if you want it to print the SNR.

-bit_rate_info rate_file: prints bit rate information into the file rate_file. Bit rate info is bits per frame, and also bits per I-frame-to-I-frame.

-mv-histogram: prints histogram of motion vectors as part of statistics. There are three histograms – one for P, forward B, and backward B vectors. Each histogram is a 2-dimensional array, and there is one entry for each vector in the search window.

PARAMETER FILE

The parameter file MUST contain the following lines (except when using the -combine_gops or -combine_frames options):

PATTERN <pattern>

OUTPUT <output file>

INPUT_DIR <directory>
all input files must reside in this directory. If you want to refer to the current directory, use '.' (an empty INPUT_DIR value would refer to the root directory).

INPUT
This line must be followed by a list of the input files (in display order) and then the line
END_INPUT
There are three types of lines between INPUT and END_INPUT. First, a line may simply be the name of an input file.

Secondly, the line may be of the form
<single_star_expr> [x-y]
single_star_expr can have a single '*' in it. It is replaced by all the numbers between x and y inclusive. So, for example, the line
tennis*.ppm [12-15]
is replaced by tennis12.ppm, tennis13.ppm, tennis14.ppm, tennis15.ppm. Uniform zero-padding occurs, as well. For example, the line
football.*.ppm [001-130]
is replaced by football.001.ppm, football.002.ppm, ..., football.009.ppm, football.010.ppm, ..., football.130.ppm. The third type of line is:
<single_star_expr> [x-y+s]
Where the line is treated exactly as above, except that we skip by s. Thus, the line
football.*.ppm [001-130+4]
is replaced by football.001.ppm, football.005.ppm, football.009.ppm, football.013.ppm, etc.

BASE_FILE_FORMAT <YUV or PPM or PNM>
All the input files must be converted to YUV, PNM, or PPM format. This line specifies which of the three formats (actually PPM is a subset of PNM). In the YUV format, the U and V components are subsampled 4:1. The reason for having a separate PPM option is for simplicity. If your files are RAWBITS ppm files, then use the PPM option rather than the PNM. Also, depending on the system, file reads will go much faster with the PPM option (as opposed to PNM).

INPUT_CONVERT <conversion command>
You must specify how to convert a file to the base file format. In the conversion command, each '*' is replaced by the filename (the items listed between INPUT and END_INPUT). If no conversion is necessary, then you would just say:
INPUT_CONVERT *
If you had a bunch of gif files, you might say:
INPUT_CONVERT giftoppm *
If you have a bunch of separate a.Y, a.U, and a.V files, then you might say:
INPUT_CONVERT cat *.Y *.U *.V

GOP_SIZE <n>
n is roughly the number of frames in a Group of Pictures (roughly because a GOP must begin with an I-frame)

SLICES_PER_FRAME <n>
n is roughly the number of slices per frame. Note, at least one MPEG player may complain if slices do not start at the left side of an image. To ensure this does not happen, make sure the number of rows is divisible by SLICES_PER_FRAME.

PIXEL <FULL or HALF>
use half-pixel motion vectors, or only full-pixel ones

RANGE <n>
use a search range of +/- n pixels

PSEARCH_ALG <algorithm>
algorithm must be one of EXHAUSTIVE, TWOLEVEL, SUBSAMPLE, LOGARITHMIC. Tells what kind of search procedure should be used for P-frames. Exhaustive gives the best compression, but logarithmic is the fastest. You select the desired combination of speed and compression. TWOLEVEL is an exhaustive full-pixel search, followed by a local half- pixel search around the best full-pixel vector (the PIXEL option is ignored for this search algorithm).

BSEARCH_ALG <algorithm>
algorithm must be one of SIMPLE, CROSS2, EXHAUSTIVE. Tells what kind of search procedure should be used for B- frames. Simple means find best forward and backward vectors, then interpolate. Cross2 means find those two vectors, then see what backward vector best matches the best forward vector, and vice versa. Exhaustive does an n- squared search and is EXTREMELY slow in relation to the others (Cross2 is about twice as slow as Simple).

IQSCALE <n>
use n as the qscale for I-frames

PQSCALE <n>
use n as the qscale for P-frames

BQSCALE <n>
use n as the qscale for B-frames

REFERENCE_FRAME <ORIGINAL or DECODED>
If ORIGINAL is specified, then the original images are used when computing motion vectors. To be more accurate, use DECODED, in which the decoded images are used. This should increase the quality of the image, but will take a bit longer to encode.
The following lines are optional:

FORCE_I_ALIGN
This option is only relevant for parallel execution (see below). It forces each

processor to encode a block of N frames, where N must be a multiple of the pattern length. Since the first frame in any pattern is an I-frame, this forces each block encoded by a processor to begin with an I-frame.
foo

If the BASE_FILE_FORMAT is YUV, then the parameter file must contain:
YUV_SIZE <w>x<h>
where w = width, h = height (in pixels) of image If the -combine-gops option is used, then only the YUV_SIZE and OUTPUT values need be specified in the parameter file. In addition, the parameter file may specify input GOP files in the same manner as normal input files – except instead of using INPUT_DIR, INPUT, and END_INPUT, use GOP_INPUT_DIR, GOP_INPUT, and GOP_END_INPUT. If no input GOP files are specified, then the default is to use the output file name with suffix ".gop.<gop_num>" starting from 0 as the input files. If the -combine-frames option is used, then only the YUV_SIZE, GOP_SIZE, and OUTPUT values need be specified in the parameter file. In addition, the parameter file may specify input frame files in the same manner as normal input files – except instead of using INPUT_DIR, INPUT, and END_INPUT, use FRAME_INPUT_DIR, FRAME_INPUT, and FRAME_END_INPUT. If no input frame files are specified, then the default is to use the output file name with suffix ".frame.<frame_num>" starting from 0 as the input files. Any number of spaces and tabs may come between each option and value. Lines beginning with '#' are ignored. Any other lines are ignored except for those between INPUT and END_INPUT. This allows you to use the same parameter file for normal usage and for -combine_gops and -combine_frames. The encoder is case-sensitive so, except for file names and directories, everything should be in upper case. The lines may appear in any order, except the following exceptions. INPUT must appear before END_INPUT (also, GOP_INPUT before GOP_END_INPUT and FRAME_INPUT before FRAME_END_INPUT). All lines between INPUT and END_INPUT must be the frames in play order.

PARALLEL OPERATION

The encoder may be run on multiple machines at once. To do so, add a line "PARALLEL" in the parameter file, followed by a listing, one machine per line, then "END_PARALLEL". Each of the lines should be in one of two forms. If the machine has access to the file server, then the line should be: <machine> <user> <executable> The executable is normally mpeg_encode (you may need to give the complete path if you've built for different architectures). If the machine is a remote machine, then the line should be: REMOTE <machine> <user> <executable> <parameter file> Full paths should generally be used when describing executables and parameter files. This INCLUDES the parameter file given as an argument to the original call to mpeg_encode. Also, .rhosts files on the appropriate machines should have the appropriate information. The encoder will use the original machine for the master and I/O server processes, and uses the listed machines as slaves to do the computation.

Optional lines are

RSH <remote shell command>
The encoder uses the remote shell command to start processes on other machines. The default command is 'rsh.' If your machine supports a different command, specify it here.

PARALLEL_TEST_FRAMES <n>
n is the number of frames to encode initially on each processor

PARALLEL_TIME_CHUNKS <t>
subsequently, each slave processor will be asked to encode for approximately t seconds. Smaller values of <t> increase communication, but improve load balancing.

The default values for these two options are n = 3 frames and t = 30 seconds.

PARALLEL_PERFECT
If this line is present, then scheduling is done on the assumption that work distribution will be perfectly even – meaning that each machine is about the same speed. The frames will simply be divided up evenly between the processors. This has the advantage of very minimal scheduling overhead, but is obviously wrong if machines have varying speeds, or if the network load makes performance uneven.

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BUGS

No known bugs.

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