PRAPRO NUBES HELP FILE for Version 3.x

Processing Meteosat Second Generation data

Nubes is an executable file (nubes.exe) designed for Windows with support of the following files:

-(optional) coastline mask with any name in 8-bitmap format (size 13779008 bytes, 3712 x 3712 coast or land values)
-(optional) town.txt with geographical locations of interest
-MSG images in the so-called NATIVE format, typically with extension NAT.

The image files are generated by the **start.exe** application, which manages the EUMETCast reception of HRIT segment files. Alternatively, the EUMETSAT archive (archive@eumetsat.de) supplies free of charge such native files for any recorded situation older than six hours. Or see http://archive.eumetsat.org/en/index_center.htm for online orders from Eumetsat.

Both executables are contained in the NUBES.zip:

Start.exe generates the NATIVE format files describing the current weather out of the EUMETCast segments.
Nubes.exe is intended for the visualisation and analysis of the NATIVE formats generated by **Start.exe**
Both modules operate only on PC Windows platforms.

Index

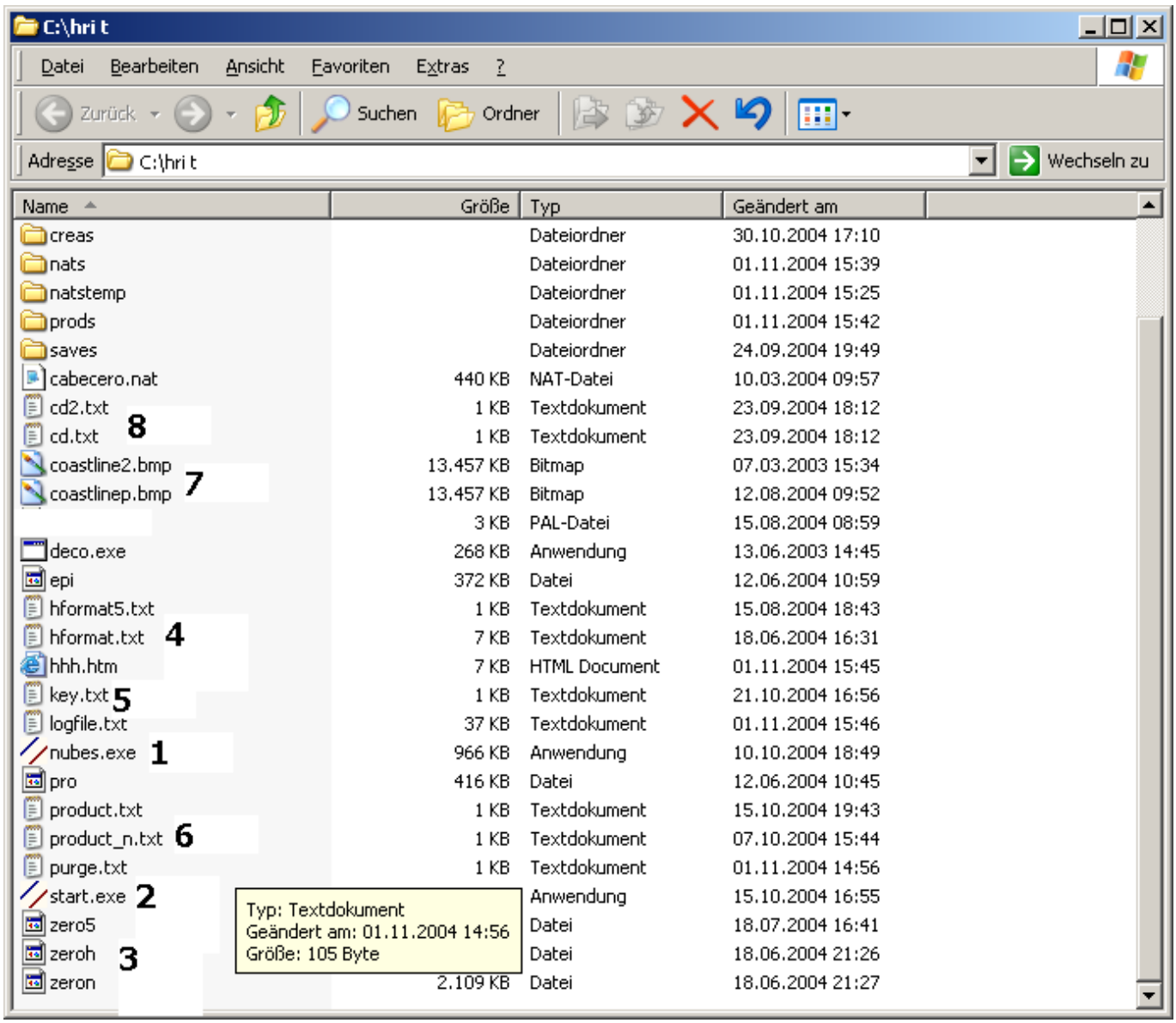
1. **The full kit: Nubes.zip**
2. **The START module**
3. **Options through the main controls (right hand side)**
4. **Options of the main menu**
5. **Special functions:**

5.1 Moving the mouse over the display
5.2 Programming slot products
5.3 Choosing an animation (CTRL+B)

1. The full kit: Nubes.zip

The downloaded software is packed as a zip file of about 2 Mbyte in size. Place it in any **empty** directory, for instance in a new directory called 'C:\hrit'. Then extract the contents of Nubes.zip into that directory. You will see a screen similar to the figure below. **Do not move or run any of the executables (.exe files) outside of the chosen directory**. Here is the explanation of the contents:

Creas: temporal directory for series of graphical formats (bitmaps or jpegs) displaying channel information or regional combinations.
Nats: directory for keeping the native files, each containing the information for a slot of 15 minutes. Its contents are subject to regular purging.
Natstemp: directory for keeping the last native file during its creation.
Prods: directory for the graphical formats regularly generated by Nubes according to the specifications in product.txt, which can be changed with the option CTRL+Alt+P (Product setup). Its contents are subject to the regular purging.
Saves: directory for collection of any information which the user wishes to preserve from purge. It is not accessed by the purging application. Of course, any other directory can be created for storing interesting weather situations.
Other directories (like **hdf5, gribs, bufrs, avhrr**,..) will appear depending on your reception licence with Eumetsat, and on your having decompressing programs like bunzip.exe or gunzip.exe. Please contact support@prapro.com for more information.



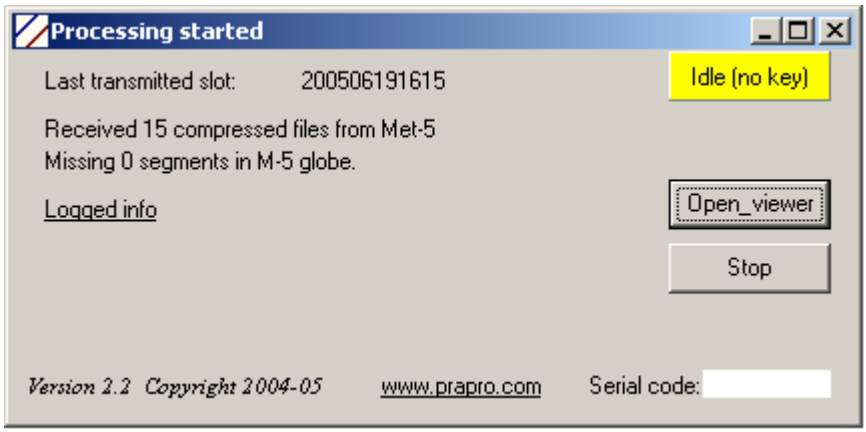
1: Nubes.exe is the main application, in charge of the visualisation of the native files, and of the generation of products as graphical formats (jpeg or bitmap).
2: Start.exe allows the start of Nubes, purging of files and generation of native files.
3: ZeroX are blank segments to replace those missing during regular file reception. Normal reception should not contain losses, but interference, obstacles in front of the antenna or power failures could be reasons for temporary losses.
4: HformatX include a list of expected segments for the slot.
5: key.txt is the key to enable grayed options in the downloaded version. You get this file via e-mail after registration and payment. You can get it for free during two weeks, for testing.
6: product.txt includes the centre location, channels and type of a particular product, generated on reception of a new slot.
7: Coast line maps
8: Location of your reception directory, as defined in the set-up of the Tellique application. Tellique is the software supplied on registration with Eumetsat, which generates the segments out of the antenna signal. The files cd.txt and cd2.txt are generated by Start.exe after its first run. If for any reason you change the location of the Tellique “received” directory, please delete these two files to re-establish correct operation.

Cabecero.nat provides some default parameters for the configuration of Nubes.exe during the initialization.

2.The START module

The executable start.exe provides the interface
-to identify the reception directory for the satellite segment files
-to define the purge sequence of incoming files
-to start the decompression and merging of the segments

Before getting a Prapro licence, the following interface appears when clicking on start.exe:



The user can open the viewer NUBES.exe by pressing the highlighted button 'Open_viewer'. A limited number of options is available, because of the missing Prapro licence. Clicking on the labels allows log file inspection and reference to our web pages. Still, if you already have the decryption unit from Eumetsat, you will get a couple of slots around midday and midnight even without the key. This is enabled for testing purposes, but it is recommended to get a full-right key from PRAPRO for free testing.

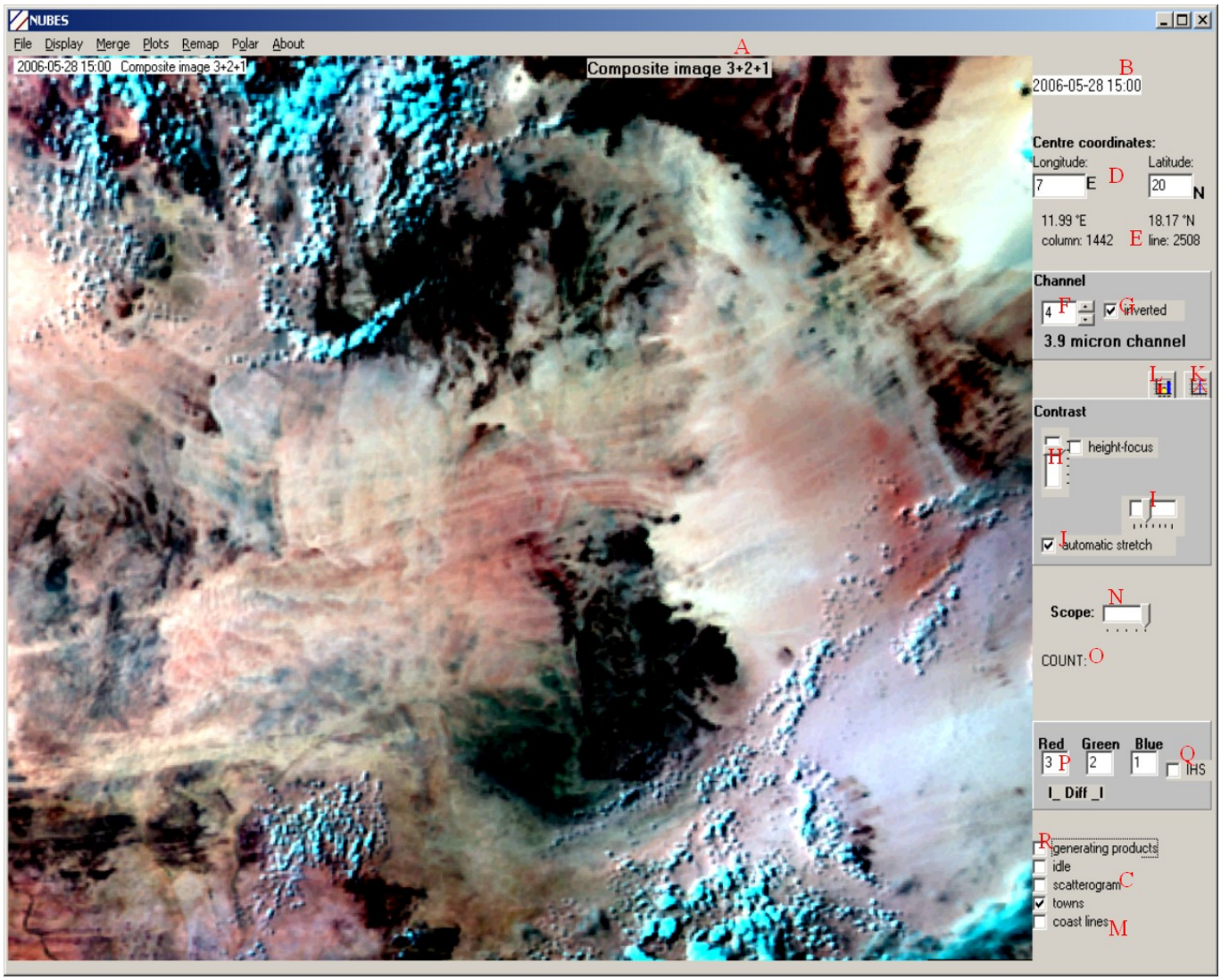
After getting a key file as a licence from Prapro, and clicking on Start.exe, some more possibilities open up:

Now, processing starts the automatic generation of native files. Then you should make sure that 'purging old files' is active (click on the box). You can change the number of files kept any time with the button Edit_purge. As before, 'Open_viewer' will start the NUBES interface with full functionality to operate on any opened native file.

Occassionally, during the decompression phase, which is calculation-intensive, the interface gets blanked by the operating system. The blanking does not affect other processes in the computer. Do not stop the application or try to reboot the computer for that reason. After some seconds, the decompression will

finish, and the user will recover control of this interface. The START interface is better kept in a minimized state.

3.Options through the main controls (right hand side)



View of the Nubes.exe module

The gray panels in the middle and close to the bottom part are shown with the key combinations Ctrl+F5 and Ctrl+F6. The bottom panel appears spontaneously after trying a composite image (Ctrl+C).

A: type of product on display, and channels used to generate it.
B: date and nominal time of the image, obtained from the native file header.
C: histogram over single channel images, or scatterogram over composites on the cursor click position
D: geographic location of the image centre, in degrees.
E: geographic location of the cursor, and corresponding column and line in the global native file.
F: channel chosen for the single channel display.
G: inversion checkbox. It is recommended to invert channels 4 through 11 to get white cloud
H: if the height-focus checkbox is ticked, the scale marks the height of maximum enhancement. The automatic stretch box J should be de-activated for the height focus to work.

I: strength of the stretching. For each colour component the values can be stretched to gain a better contrast
J: when ticked, the images are displayed with an enhancement with strength given by slider I.
K: equalizes the colour in the image.
L: applies the enhancement indicated by slider I. It only has an effect when J is not ticked.
M: when ticked, images are presented with a coast-lines or political boundaries. Before the first display after ticking it on, the program will ask you for the coastline file.
N: scope of the image from 1 (far right, small scale, as in the image, with maximum resolution) to 5 (far left, biggest scale, least detail, globe picture).
O: area for numerical readings from the image file. It shows count values from 0 to 255 when a single channel is shown, and the corresponding brightness temperatures (infrared) or reflectivities (percentages of solar constant).
P: three boxes for colour composites. The options "Temperature scatter" and "Temperature difference" use these boxes for a choice of channels to operate with (see those options below).
Q: transforms an RGB colour composite into an IHS composite, where the first box is the channel number for the intensity, the second for hue, and the third for saturation.
R: if ticked, a regular check of the last slot received in the computer will ensure that products are generated as requested in the file product.txt. This file can be modified with the 'CTRL+Alt+P Product Setup' option of the File menu. The option to generate products automatically works only when the reception file (start.exe) is in active mode (see chapter The START module, below). Alternatively, an option box 'idle' is offered as random display of existing loops of files from the 'prods' subdirectory. It is **recommended** to use each of the two options (generating products *and* idle) in different windows of Nubes.exe. Finally, the 'scattering' box enables additional scatter or histogram information when clicking on the image.

Remarks to the main controls.

It is recommended to follow the box-filling sequence with the tabulator until some practice is acquired in using the program. The following options can be chosen by the user:

Location of the centre of the region to show: LATITUDE and LONGITUDE should be given in degrees, positive (north or east) or negative (south or west).

The maximum size of the image display is currently 920x740 pixels, still compatible with a prompt display (up to ten seconds wait) of the graphical format.

CHANNEL of the image is a number which runs from 1 to 11 for the channels from 0.6 micron to 13.4 micron, in wavelength increasing order. Channel 12 is the high resolution visible, with a horizontal resolution three times better. Some options are not available for this channel, like Resolution (skipping lines and columns according to the value assigned to the slider) or Projection (it is not useful to reproject the small geographical area in the image display window).

Clicking on the "inverted" check box reverses the greyscale, which is recommended for infrared channels, so that clouds appear white in all channels. Generally, negative channel numbers are accepted in the other boxes for channel numbers to indicate inverted grayscales.

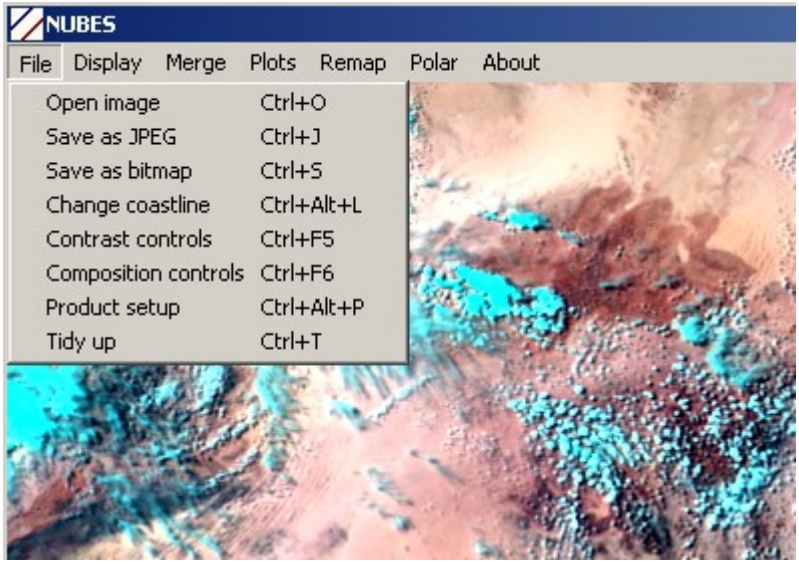
"Height-focus" provides different enhancements around intermediate values of the gray scale, using the 10-bit information. It concentrates on the brightness values corresponding to a particular height, to be chosen from the slider. It requires the option "height-focus" to be ticked. As a result, the cursor returns no value for COUNT and temperature/albedo. The slicing (Ctrl+A) gets inactive for black and white products.

RESOLUTION: This option degrades the horizontal resolution of the image by a factor between 1 (top right) to 5 (top left).

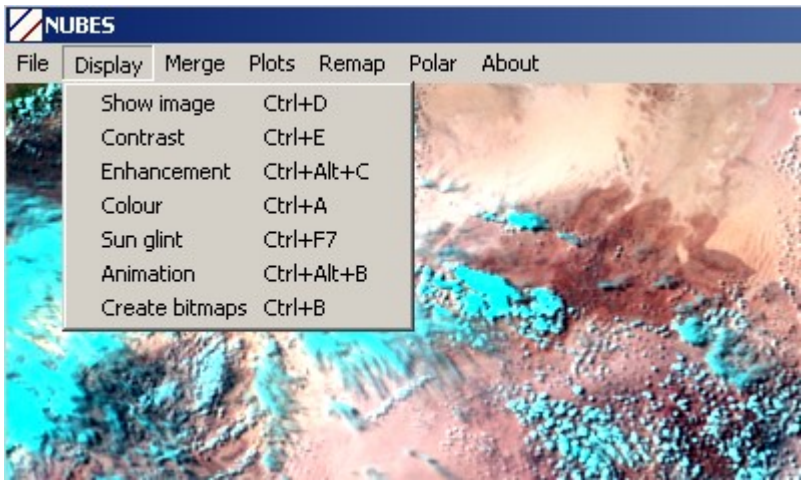
SUN button: displays the vertical sun location (yellow circle) and the sunglint location (aqua circle). The calculation of the latter is not exact but very approximate, since it does not consider the actual satellite inclination.

IMPORTANT NOTE: CHANGING THE CONTENTS OF A CONTROL BOX DOES **NOT** CHANGE AUTOMATICALLY THE DISPLAY. THE COMMAND OR ITS CORRESPONDING SHORTCUT HAVE TO BE ACTIONED TO GET A NEW DISPLAY.

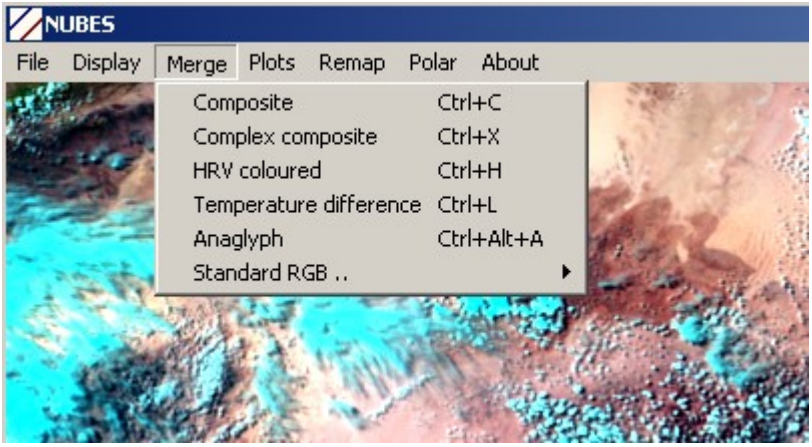
4. Options of the main menu



FILE:
-Open Image: prompts an open dialog to choose another native format image. The result is the reading of the header information of the new file. It has no visible result. The following display instructions will apply to the newly selected native file.
-Save as JPEG (CTRL+J): produces a jpeg file for the display, with a compression factor of 90. An info label is printed during the saving.
-Save as bitmap (CTRL+S): converts the display into a bitmap file, which can be processed by a graphics program later, to enhance it. A label is attached during the saving, with date and kind of product.
-Change coastline (CTRL+Alt+L): allows swapping to a different coast line map, for instance one including rivers.
-Contrast controls (CTRL+F5): toggles the panel on the right hand side of the main form with the contrast sliders.
-Composition controls (CTRL+F5): toggles the panel on the right hand side of the main form with the RGB composite channels.
-Product setup (CTRL+Alt+P): displays a dialog to create or delete new entries in the list of products to generate regularly. 'Anaglyph' means a 3D combination of Meteosat-8 and Meteosat-5 formats to create images with relief information when used with red-green glasses (Meteosat-5 reception requires an additional licence from Eumetsat).
-Tidy up (CTRL+T): closes all windows except the main one.

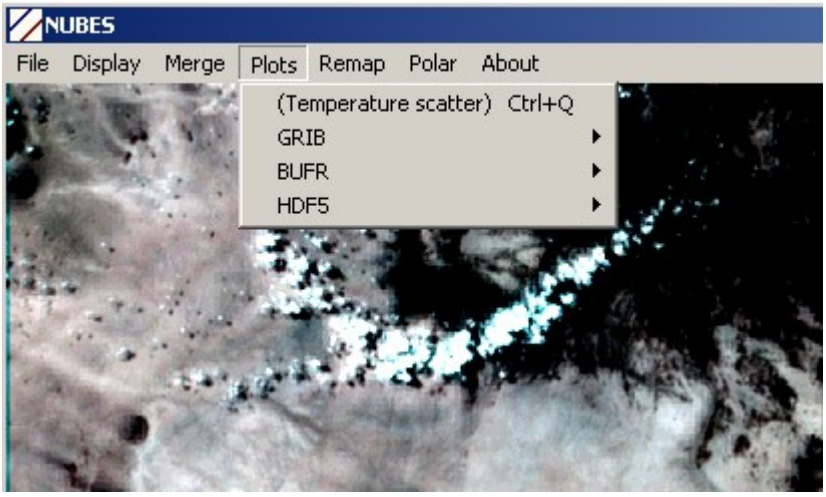


DISPLAY:
-Show image (Ctrl + D): Reads the control boxes on the right hand side and displays the requested segment.
-Contrast: (Ctrl+E): filters the histogram and produces and enhanced version of the display, according to the "contrast level" ruler indication.
-Enhancement (CRTL+Alt+C): tool to generate local enhancement in the neighbourhood of a pixel. The mouse indicates now the precise gray values in the red, green and blue scales. The user can locate the sliders close below those values to get a local enhancement.
-Colour (CTRL+A): provides slicing for single channel or difference products, so that a particular range of values is put in colour with limits sets by the user. Alternatively, for RGB composites, it provides for colour editing, reversal or rotation in the colour circle.
-Sun glint (CTRL+F7): marks the position of vertical sun (in yellow) and of sun glint (in cyan), a region of specular reflection in solar channels, which can be used to estimate wind on surface.
-Animation (CTRL+Alt+B): displays a list of selected graphical files, either in bitmap or in jpeg format.
-Create Bitmaps (CTRL+B): allows the creation of bitmaps or jpegs for a group of selected native files. These are all of the same region and size, and their settings are taken from the main controls. An intermediate menu form requests a choice of format, and the type of product format: bitmap or jpeg.



MERGE:

-Composite (Ctrl+C): Three colours: puts the three channels selected in the boxes into the red, green and blue components of a bitmap matrix, for colour display. Negative values accepted as reversed scales, e.g. the value –3 in the first box will put channel 1.6 micron in reversed values of RED.
-Complex composite (CTRL+X): Same as Composite, but combining channel differences at each colour. If zeros are used, no difference is taken. Negative channel values are recommended to combine VIS and IR information, so that differential information is obtained.
-HRV Coloured (CTRL+H): colouring of the HRV image with other channels supplies RGB composites in high spatial resolution, where the colour is introduced by one or more of the standard channels from 1 to 11.
-Temperature Difference (CTRL+L): Provides the brightness temperature difference between channels RED and GREEN. A note on the range of values in the sub-image appears on the low right corner ("Range: … Celsius").
-Anaglyph (CTRL+Alt+A): Generates on infrared images a 3-D like image, to be observed in depth with Red-Green or Red-Cyan glasses.
-Standard RGB (Night, Dust, Convection, Flow): Based on Eumetsat recommendations, these are some of the suggested products generated from combining different channels. See www.eumetsat.int/en/dps/msg/channel_interp/ for details on usage.



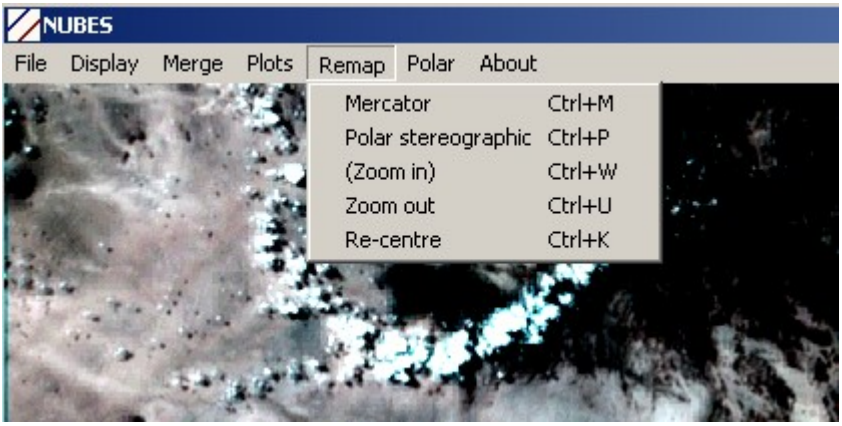
PLOTS:

-Temperature Scatter (CTRL + Q): When inspecting any display, for any location at the tip of the cursor and its sorroundings (radius ca. 50 Km, but depending on the number of pixels chosen by you in the box), it displays the pixel distribution in terms of brightness values in the channels in the RED, GREEN and BLUE boxes. Further, when clicking two corners of a square on the scatterogram, all points included will be tainted in alternating colours on the image. This function allows a classification according to values in two or three channels. For this function use the shortcut and do not select from the menu, since it is sensitive to the cursor location.

-GRIB: presents Sea surface temperature values as colour ellipses on the image. The user selects the decompressed EUMETCast file with that information, for instance: S-OSI_-FRA_-MULT-LMLSST_FIELD-200505021600Z.grb. Several display options are offered, with different labelling techniques. Fires can be displayed from the Eumetsat archive.

-BUFR: Decodes BUFR files of the types amsua, amsub and hirs from the EUMETCast flow, as well as winds and instability values.

-HDF5: Decodes products from the Land SAF from the EUMETCast flow.



REMAP:

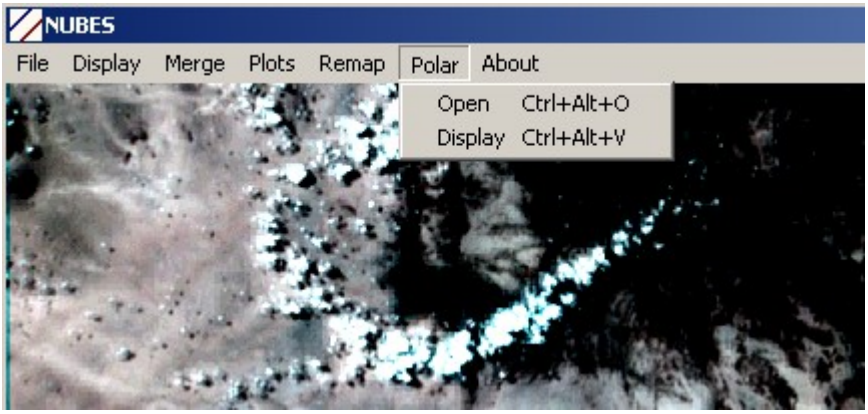
-Mercator (Ctrl + M): Projects the display region onto a Mercator map. A new form opens up, which allows saving the projected map as bitmap, enhancement according to the main control slider, or transfer of the bitmap to the main menu for further enhancement (zooming, high contrast among others).

-North-Polar Stereographic projection (Ctrl + P) is available too.

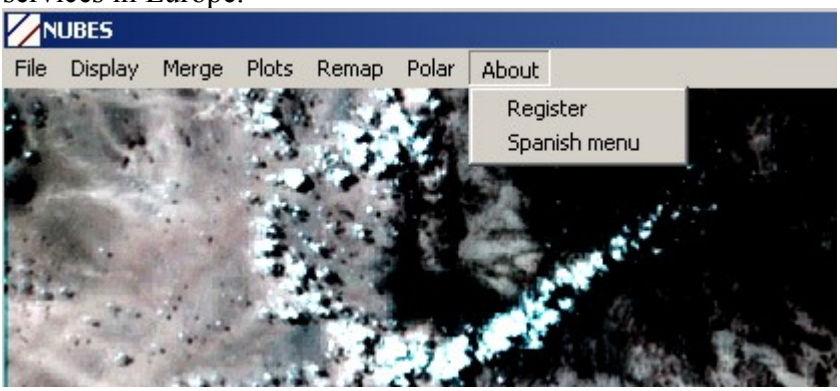
NOTE: After projection and "Take to main", the option for Temperature Scatter (Ctrl+Q) gets disabled in the main form. To re-establish it, just use Ctrl+J or Ctrl+X (complex composite).

-Zoom in (CTRL + W): Centred on the cursor when this is not close to the boundaries, this function magnifies by two the previous display. Then it enhances automatically the result. Use CTRL + E to control brightness, before zooming. To ensure inspection around the cursor, use the shortcut and do not select from the menu. That is the reason for the parenthesis.

-Zoom out (CTRL+U): Reverts to the previous zoom snapshot.
-Re-centre (CTRL+K): sets the centre coordinates to the current location of the mouse over the image.



POLAR:
-Open (CTRL+Alt+O): Allows the selection of several files (.hrp) corresponding to the same pass of polar satellites. This files are retransmitted by stations in the Eumetsat network, as Mas Palomas in the Canary Islands.
-Display (CTRL+K): shows menu to display the information in the hrp files, according to the colour combinations specified in the main form.
This menu entries are under development, in preparation for Metop and the expansion of Eumetcast services in Europe.

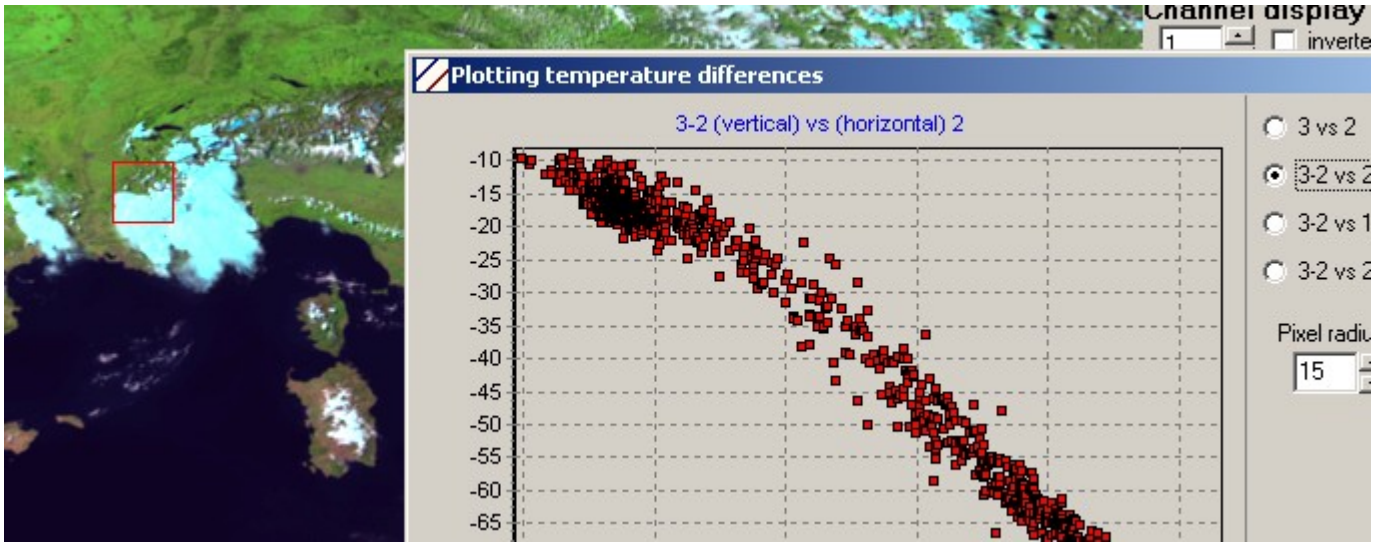


ABOUT:
-Registration: indicates the duration of the current licence and offers contact information and the renewal form.
-Spanish menu: at the request of users, we are starting to offer translation for main options and dialog boxes into other languages. For the time being, to return to English you have to restart NUBES.exe

5. Special functions:

5.1 Moving the mouse over the display

The display is sensitive to mouse movements, and shows the coordinates of the point. You will see the count value (0.. 1023) divided by 4, since the program often disregards the last two bits of a pixel, in order to speed up calculations. Additionally, you get the brightness temperature corresponding to the channel displayed. High values indicate a hot emitter, or reflectance of sun radiation.



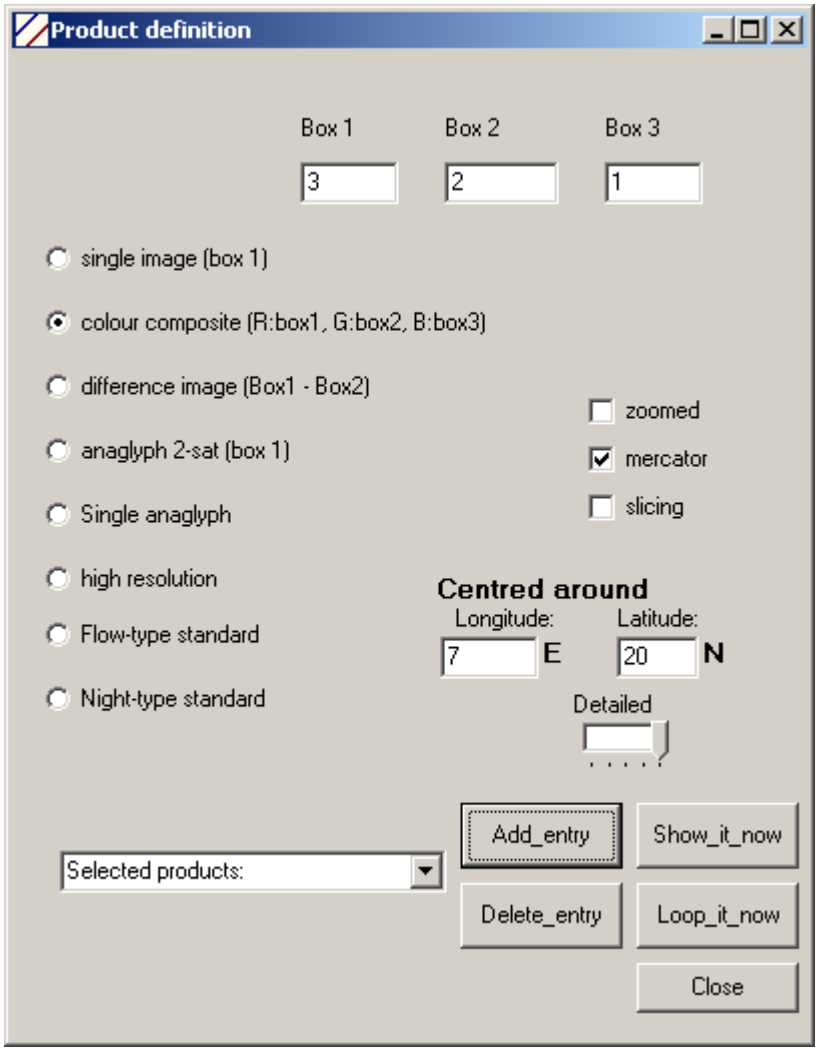
Example of use of the mouse over the display. CTRL+Q will generate data plots for an area around the mouse.

5.2 Programming slot products

NUBES generates every 15 minutes as many products as requested by the user. A reasonable upper limit compatible with the fluent performance of the system is 10 or 15. Any time, the user can modify or create product specifications by means of CTRL +Alt + P (Product Setup), an option of the file menu, which looks like the graphic below. There you choose a name for the new entry (any string) first. Then you choose a type of product: single image (for the channel in box 1), colour composite (with channels for colours as in boxes 1,2,3), difference image (box1 – box2), anaglyph (this is a 3-D composition if you receive Meteosat-5 segments), or high resolution (based on channel 12).

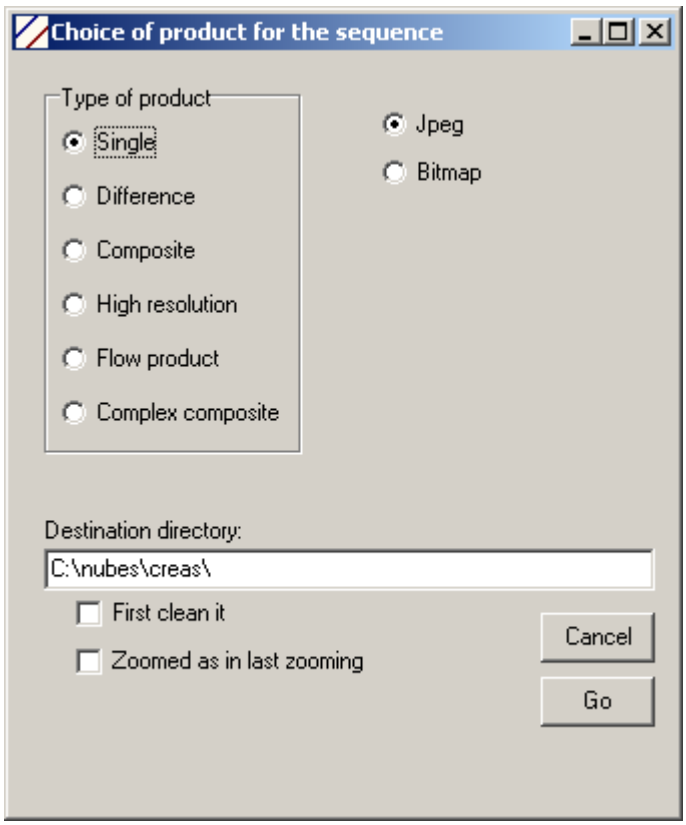
You can choose the centre and the degree of detail (one to one resolution for the maximum detail to the right hand end). Finally, you add_entry with the button.

Before deleting an entry, you choose one element of the list in the 'Selected Products' box.



5.3 Choosing an animation (CTRL+B)

To create an animation or sequence of images for display, you invoke from the File menu the option ‘Create bitmaps’. You see the following choice box:



There you click the radio buttons for your choice. Alternatively to bitmaps, you can create jpeg formats, smaller in size and showing with a similar degree of detail. The destination directory is normally ‘creas’ but you can use any other. After pressing Go, and waiting (the screen normally blanks) till the graphical formats are created, you are presented a dialog box to select those graphics you wish to display. You can create more graphics than you then display, or use completely different graphics for the display. This last part is equivalent to the File/Animation option, where you should know where your graphics were created (‘prods’ and ‘creas’ are the common choices).

Final note

PRAPRO S.L. offers its program NUBES as is, including the possibility of small performance deficiencies, which is rented out with that understanding. PRAPRO offers three weeks for free testing of its products. Should you wish to make suggestions, we will welcome them in the address support@prapro.com