Tutorial 1: Getting Started using Ilwis Open & GEONETCast Toolbox

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Objectives

In this first hands-on tutorial, you will get acquainted with the Ilwis Open software: the windows, the menu and file system and types, and how to perform operations. Also some important map and service objects in Ilwis are reviewed. The Ilwis Help Menu is the most useful source for rapid learning and understanding of the system, and one saying remains valid like in sports: "the more you train, the more you gain".

The Ilwis Main Window

The main window of ILWIS is made of the navigator and operation tree/list on the left side, one or more catalogues on the right, the command line, the menu and some quick access button bars. In this exercise we will explore the various options you have with these tools. For this Ilwis getting started training, we use the basic Ilwis demonstration dataset (Cochabamba, Bolivia) available on http://52north.org (Ilwis main open source download website) and GEONETCast MSG data *[pls. see workshop for data]*.
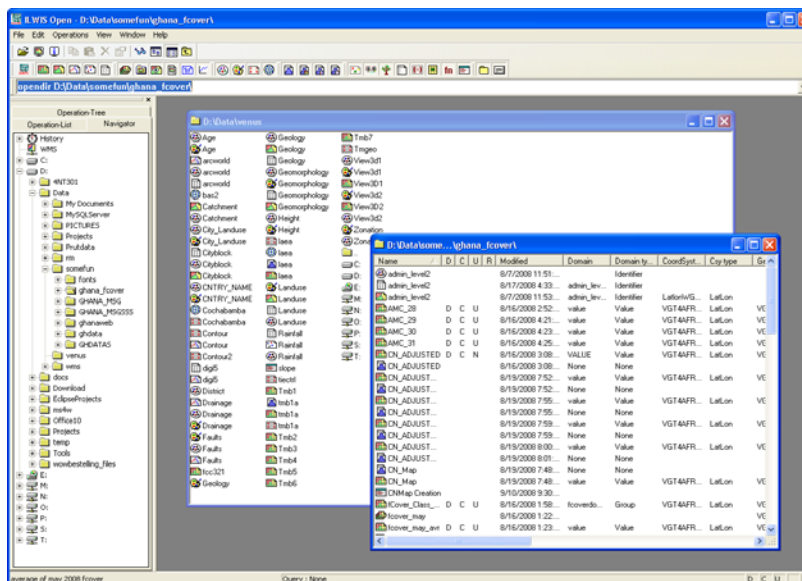

Navigation
Select in the left panel the tab labelled 'Navigator'
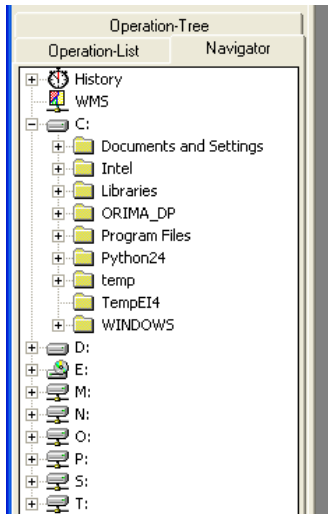
Use the navigator to go the correct location for the data. If you already have a catalogue open it will fill the catalogue with the folder you have current selected. If you don't have a catalogue open select the desired catalogue and use the right-button menu and select 'New Catalog'. A new catalogue will open and be filled with the data in that folder.

Views on the Catalog

The Catalog has several ways of filtering to limit the number or kind of objects you see. First of all there is the button bar.
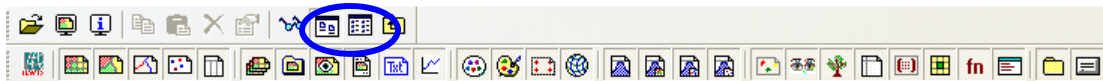
First of all there is the option to view everything in List (icons only) or Details view. Just toggle between the buttons to see the difference.

Second there is the lower button bar. This simply filters on type of object. Is the button down then everything of that type is shown, is the button up than that type is not visible in the catalogue. The first button toggles all buttons on or off. Just press some of the buttons to see the difference.

Opening maps

Let's now open the raster map tmb1. Double click (or right click and use the right button menu) the icon

. When it opens you get a 'Display options' dialog. You can overrule the defaults but let's accept them for the moment and press 'OK'.

You should see a window that looks like
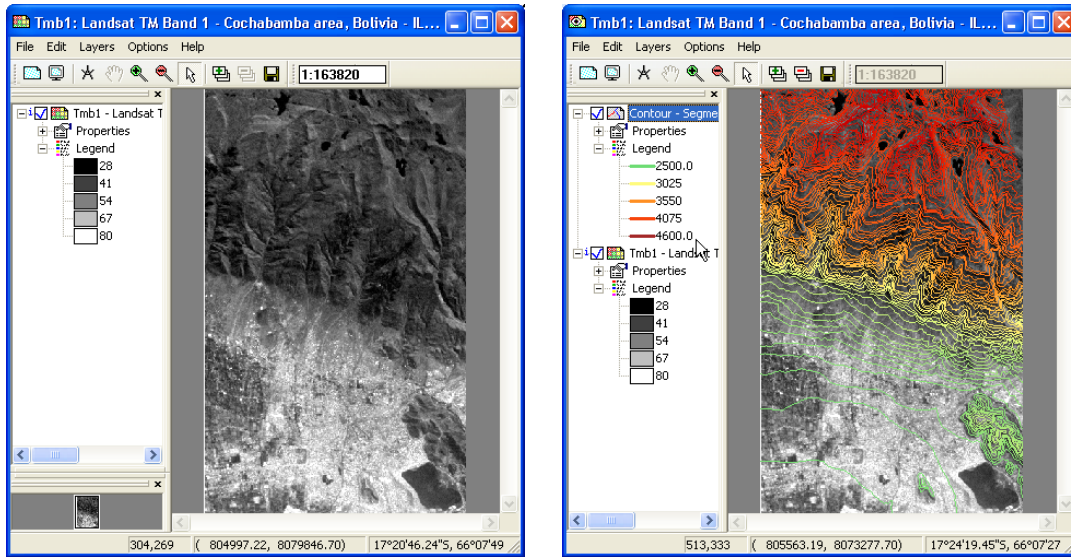
On the left we see the layer overview (one layer now), on the right the map pane. The top contains a button bar with some commonly used actions. When you move the mouse over the map and press the left button you can see the values of the map. Below you will see the world location and pixel location(s) of the mouse cursor. Ps. You look now at a Ilwis quick learning data set of Cochabamba, Bolivia.

You can add other maps in various ways but for the moment let's take the simplest and select contour segment map ( ) from the catalogue and drag this onto the map pane or layer pane (doesn't really matter). We again get a display options form and press 'OK'. The map window should then look like, the map on the right side (above). An unlimited number of layers can be added this way.

Select from the 'File' menu the entry 'Open Pixel information'. You get a small window looking like
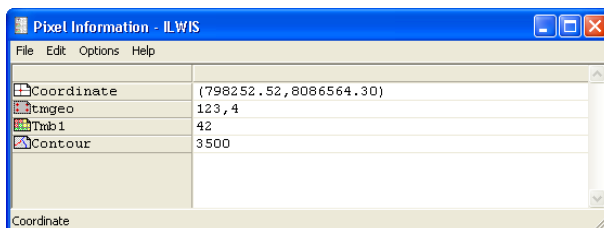
When you move the mouse over the map pane these values will constantly update to reflect the values of location of the mouse cursor for all layers.

Where are this data from or which location is this?

You may ask yourself what images and data you are looking at? Ilwis is a global GIS system, so to find out, you can display the world country vector map (supplied), and then plot (using Add Layers from the Map Window Menu) some Cochabamba vector maps (e.g. *catchment.mps*). Then zoom-in to central Latin America, central Bolivia and find your location of the RS ad GIS data (approx. lat-lon: 17N – 66W). Ilwis permits any geographic data window to be displayed using an appropriate coordinate system and georeference window. Have also a look at the 3D-view of Cochabamba (see workshop).
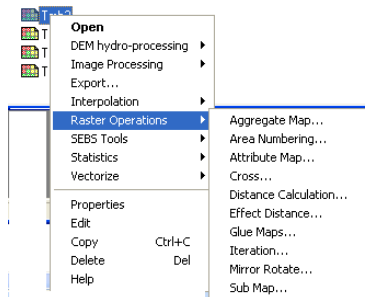
Operations

ILWIS contains many analytical operations. Most of them are in the raster and vector domain. Accessing the operations can be done through the main menu 'Operations', by right clicking a data object. You then get the operations appropriate to that type of object or by using the operation tree/list.
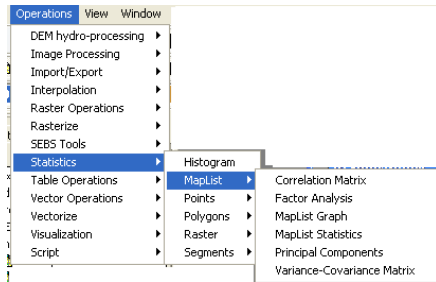
Menu   RMB Menu   Operation tree

Ilwis Objects

Ilwis also makes use of several objects of different types and functions > see Help Menu Basic concepts

Basic concepts
ILWIS objects and icons

There are several types of ILWIS objects: **data objects**, **container objects**, **service objects**, and **special objects**. Click the next link to get a list of all ILWIS objects and their icons in a secondary window.

Data objects are point, segment, polygon and raster maps, satellite images, tables and columns; that are the GIS/RS materials to work with. Maps can be displayed and edited in a map window, tables and columns in a table window. You can perform calculations and operations on data objects.

Data objects are:
raster maps   (containing pixels)
polygon   (containing area features)
maps
segment   (containing line features)
maps
point maps   (containing point features)
tables   (containing columns)

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raster maps   (containing pixels)
polygon   (containing area features)
maps
segment   (containing line features)
maps
point maps   (containing point features)
tables   (containing columns)
columns   (not listed in Catalog)

In the Ilwis Help Basic Concepts, you can find information what all the Ilwis icons mean.

Container objects are collections of data objects.
Container objects are:
map lists   (containing a set of raster maps)
object collections
map views
layouts
annotation text
graphs

Service objects are:
domains
representations
georeferences
coordinate systems

You will learn their use during the workshop tutorials.

In order to get some look and feel on Ilwis processing, let's create some colour composite images from the Landsat bands present in de demo Cochabamba (Bolivia) dataset. Go to the Operations Menu > Image Processing > Color Composite
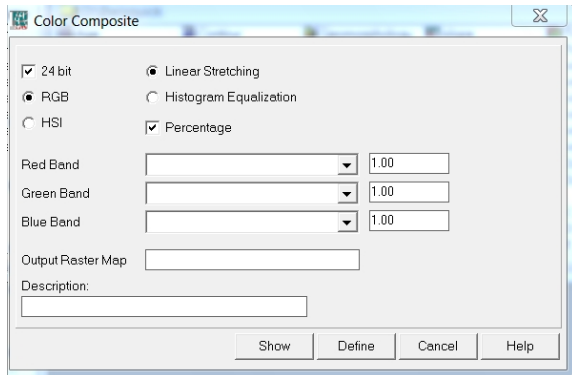
Detailed information about colour compositing can be found by pressing the 'Help' button. Let's select the appropriate parameters or bands. Select the input maps by pressing the ⊡. You get than the list of appropriate data objects for this operation (in this case raster maps) in the current top most (active) catalogue. You can navigate to other locations but let's just use this one. Select the raster maps tmb5, 4 en 1 (etc.). Let's call the output map FC541.

Press Show (Define will only define the map without actually calculating it). A progress manager will show and after a short time a display options form (just press 'OK') will show and the calculated map will show.
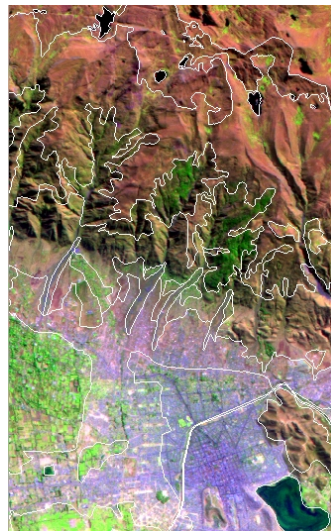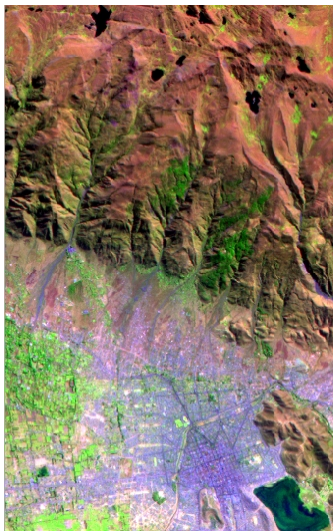
The object (fc541 colour composite image) will also be visible in the catalogue. Can you derive or explain the relation between land cover objects and colours?

Of course spectral reflection characteristics are needed to explain, but you can also open the land use polygon map in another window and compare visually. You can also overlay this vector map

on the image. Go to the Layer menu on the image window and use add overlay and select land use polygon map. Now, browse with the mouse and check the land use classes.

Pls. try some other colour composite band combinations (e.g. 3,2,1 or 4,5,2 etc.) and can you explain what the colours mean? For more practical training on this Ilwis demonstration data set, pls. see the Ilwis Quick Guide.pdf (also available from http://52north.org Ilwis download or the ITC webpage).

Importing data using the GEONETCast Toolbox

ILWIS contains many analytical operations and plug-ins. The GEONETCast toolbox is such a plug-in application, which permits to import and analyse several satellite and other data in near real time or delayed mode. Pls. see the main GEONETCast Toolbox manuals (Maathuis, Mannaerts et al, 2011) for more details.

You should have ILWIS Open 3.72 installed on your system in a directory with short directory name e.g. c:\ilwis37[1] or similar. If the GEONETCast Toolbox doesn't appear in the Navigation Menu, pls. download the Toolbox (from http://52north.org/download area) as a zip-file, and place the zip file (**as zip file**) in the Extension directory of Ilwis, and re-open Ilwis. The Toolbox will be loaded automatically! Pls. see the Toolbox Manuals for more details. Now, go to the Operation Tree panel and open the GEONETCast Toolbox (double-click).
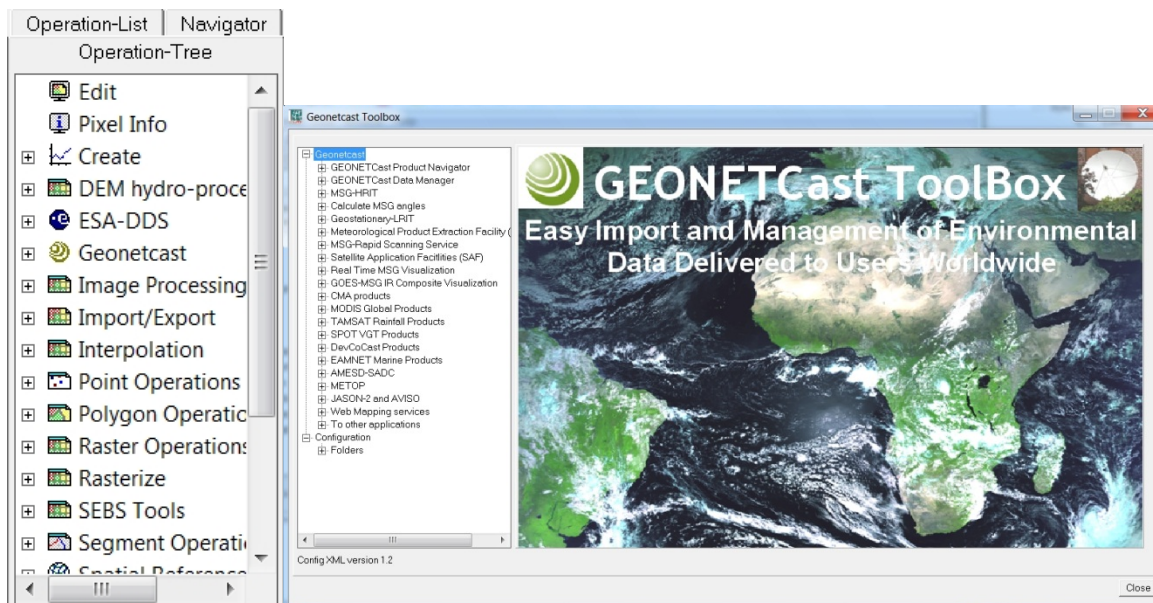

The Toolbox menu will appear as shown, illustrating the multiple import and analysis routines:

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[1] Pls. setup Ilwis Open on the root directory of d:\ ilwis37 or any other drive for proper functioning of all toolbox routines.

## Importing and analysis of MSG (Meteosat-9) image data (MSG2 HRIT L1.5).

The following routine allows you to analyse MSG2 raw image data as received by the EUMETCast satellite data receiving systems (e.g. Puma, GEONETCast), when in HRIT format (Level 1.5), the standard EUMETCast data transmission format for MSG2 (next to native format). In the Toolbox Menu, go to MSG - HRIT, and start the MSG Data Retriever. The next screen appears:
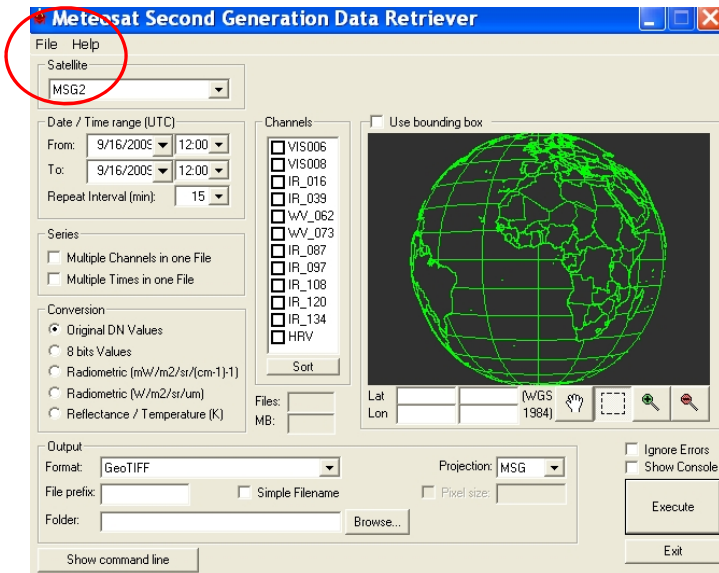
Go to the File Menu and open Data Sources. Check on the existing directories and create new source. You should access your own local source folder path e.g. [see workshop for tutorial data and location].
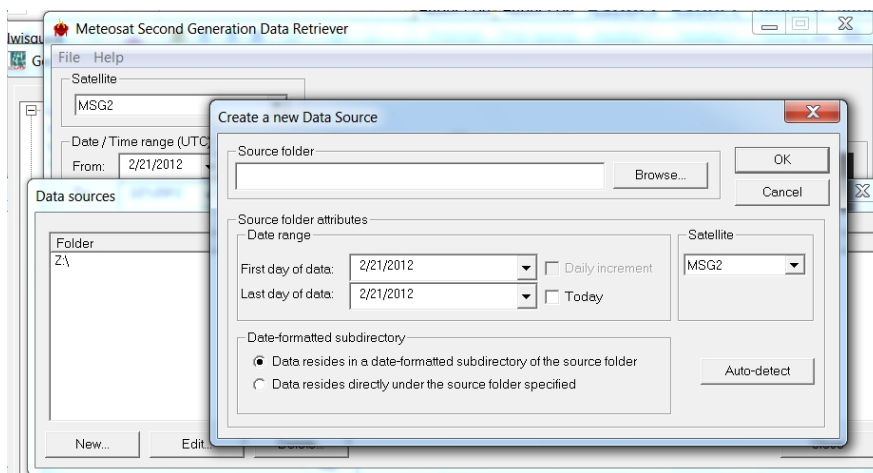
Use Satellite MSG-2 (Meteosat-9) and select Auto-detect, for Ilwis to check the available data[i]. One sample raw MSG dataset is provided in the tutorial dataset [see workshop for details]. By preference, link to your own GEONETCast LAN server and data drive, if available.
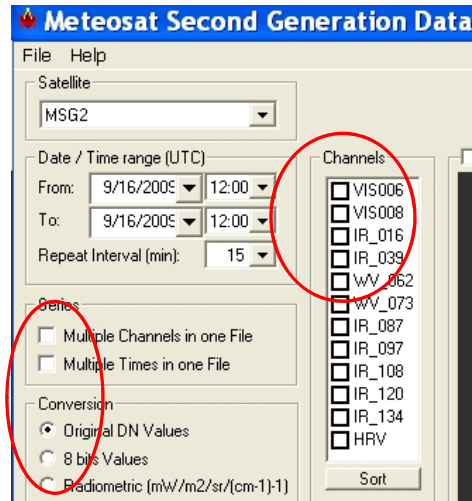

Now, select the image date/time e.g. 09/16/2009 1200 UTC, and load the Channels VIS006, VIS008 and IR016. Put the multiple channels also in one File.

Output format:

- Use 8-bits as data format.

- Use ILWIS raster as format. A file prefix is not needed.

- Select an output directory on your pc system.

If no zoom window is selected in the disk window (using the mouse cursor), the full Meteosat disk window will be processed. Use MSG as projection system (geostationary). Run Execute to start the import. As Ilwis is open source, you can look at the import algorithm using the open source GDAL library. Then go to your output file directory to open the images. Pls. use the Navigator Panel to change directories.
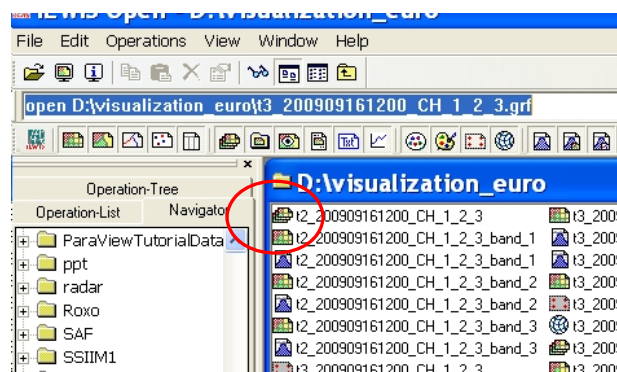

Open the Map list. This file this corresponds to a file stack, containing the three processed MSG2 channels. The individual files (bands) can also be opened. The 3 files will be combined and shown as a Colour Composite (MSG Daytime Natural Colour). See workshop for explanation colour scheme.
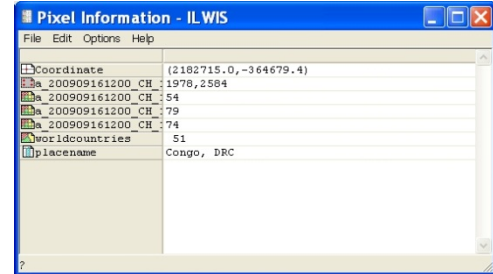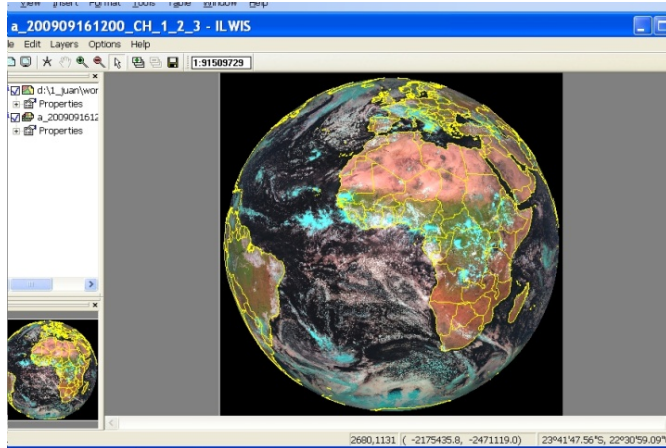
Pls. browse the image with the cursor, and enlarge eventually. You can add the world country borders and coastline, using the Add Layer option in the Menu bar. You can find this "world countries" vector dataset in the tutorial 1 data set and directory [see workshop for data and file locations]. Pls. use a colour e.g. yellow to visualize (e.g. not black = invisible,). Pls. note that when borders are added, the cursor does NOT display anymore the pixel information (data values) on screen! This can be done using Pixel Info eventually from the File Menu on top of the image. All geo-information on the data layers will be given for the selected pixel. Pls. Retrieve some other band combinations and view as colour composites: e.g. VIS006, VIS008, and IR108 (see classroom for more tips & tricks).

Create an Ethiopia window view (of an MSG image)

Import using the GEONETCast Toolbox > MSG-HRIT > MSG Data retriever > an East Africa window or select your own country i.e. Ethiopia window, of a MSG Daytime Natural Colour (using the solar channels VIS006, VIS008, IR016), also using the Lat-Lon coordinate system, Pixel size 0.01 degrees (approx. 1000 m in Ethiopia; ps. 1 degree is approx. 100 km near the equator). Also overlay the image with the world country vector data (e.g. in yellow). Your resulting image should look like below:
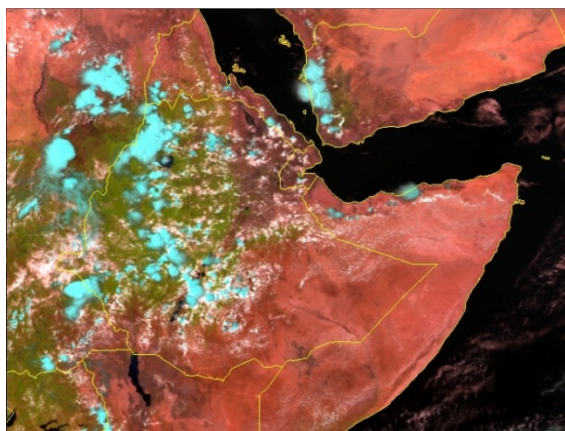
Pls. note the other cartographic map view compared to the MSG projected full disk image above, and the other coordinate system (Lat-Lon) and georeference made and used by Ilwis. Open (right hand

mouse click) and inspect and compare these objects and in your directory. What can you derive from this image (explain colour development)?

Pls. read the Main GEONETCast Toolbox Manual (Maathuis, Mannaerts et al, 2011) for more details. The source location settings depend on the network or drive/directory location of the raw HRIT (MSG) files, incl. available date/time.