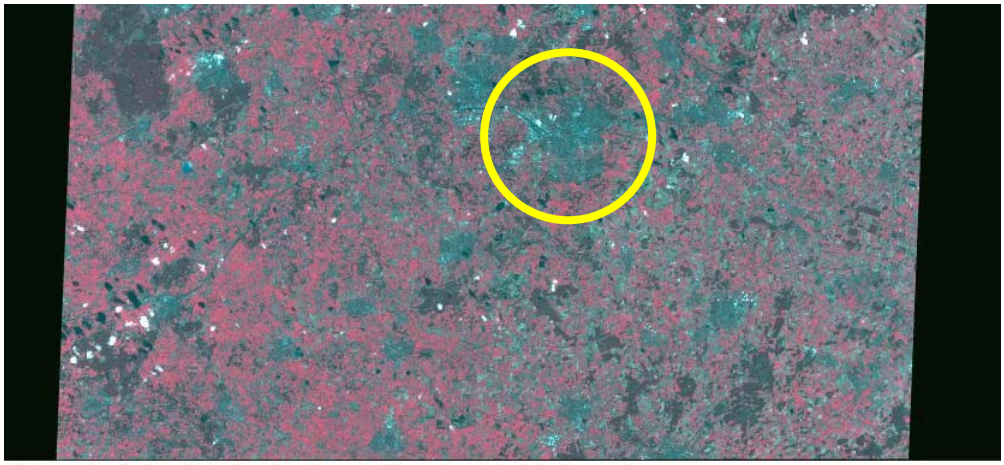
Chapter: Image Preparation

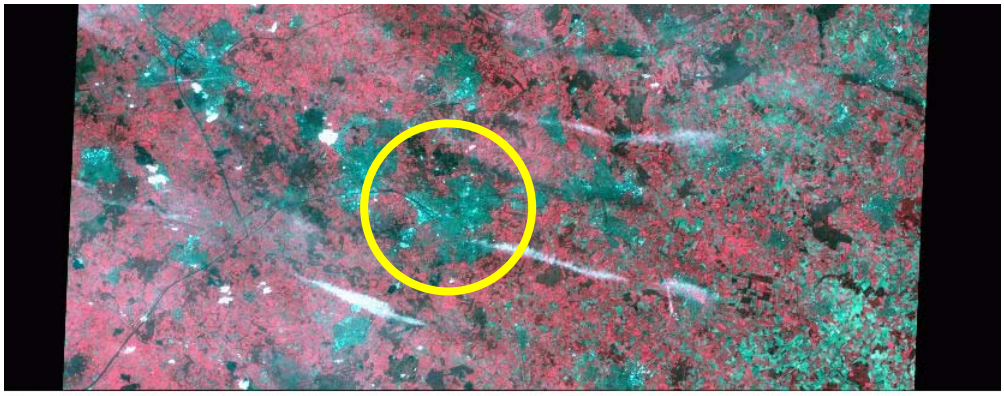
1. Data Description

Downloaded are 3 Aster 1b-images of different dates and quality. The 1b processing level means that radiometric correction and band-to-band co-registration are done. We require at present only the first 3 bands with a resolution of 15 m. The images are:

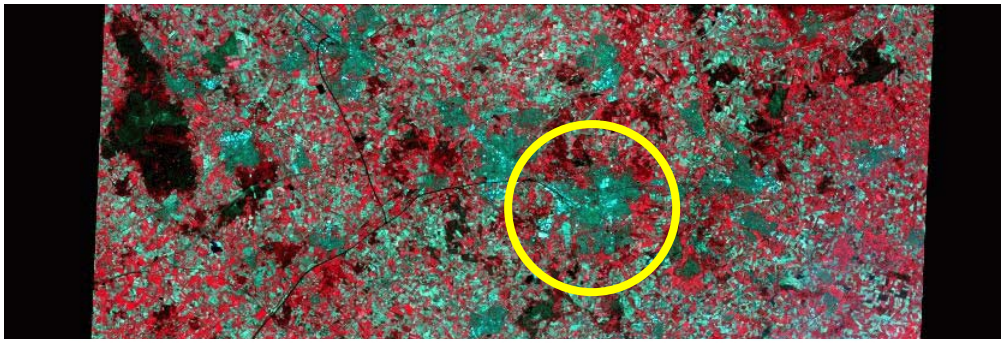
Date	Filename
14 Feb 2002	AST_L1B_003_02142002104020_03012002083518.hdf
8 Sep 2002	AST_L1B_003_09082002105227_10012002110040.hdf
31 May 2003	AST_L1B_00305312003104522_06212003111041.hdf



Data set: ASTER L1B REGISTERED RADIANCE AT THE SENSOR V003
Granule: SC:AST_L1B.003:2006040239
Acquired: on 2002-02-14 10:40:20Z
Center lat/lon: 52.29° Lat, 6.83° Lon



Data set: ASTER L1B REGISTERED RADIANCE AT THE SENSOR V003
Granule: SC:AST_L1B.003:2008260357
Acquired: on 2002-09-08 10:52:27Z
Center lat/lon: 52.37° Lat, 7.00° Lon

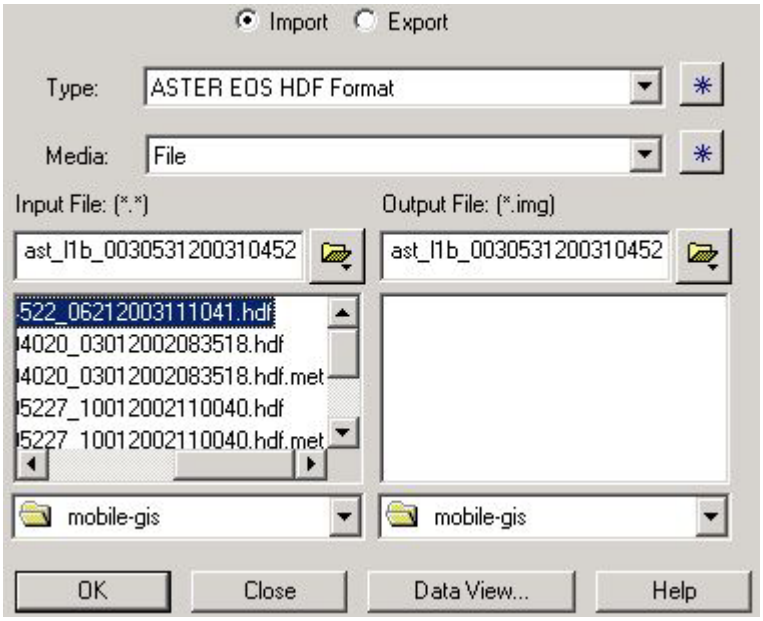


Data set: ASTER L1B REGISTERED RADIANCE AT THE SENSOR V003
Granule: SC:AST_L1B.003:2014368149
Acquired: on 2003-05-31 10:45:22Z
Center lat/lon: 52.09° Lat, 6.73° Lon

2. Data Import

Aster 1b-images can be imported using ILWIS, PCI, IDL/ENVI, and ERDAS. Considering that at a later stage we **must** export prepared images to the MrSID-format and that this can only be done in ERDAS and ArcGIS, this tutorial is fully based on the use of ERDAS for image processing. To import your images, follow after opening Erdas version 6.0, the following steps:

Step-1



Select the Erdas Import-Export routine.

Select Media and data type.

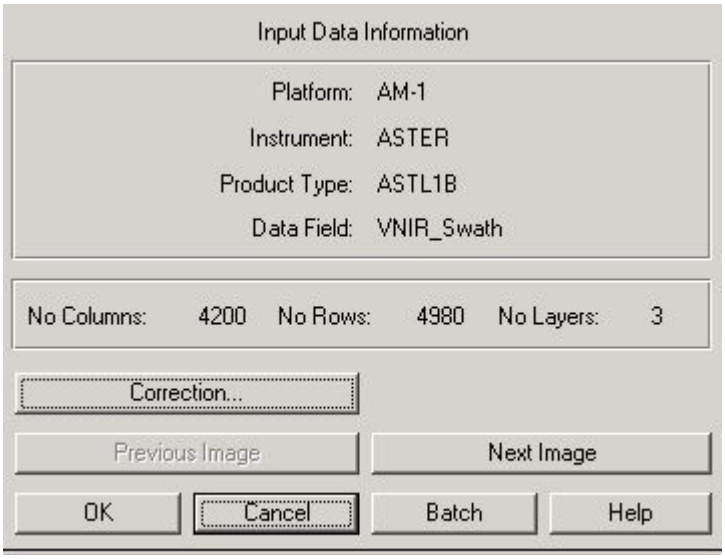
Select on the left **and** right the proper directories.

Select the required *.HDF files.

Press **ok**.

Note: the data import procedure will differ, not only for the sensor, but also for the processing level products and data providers……a full guidance is not possible!!

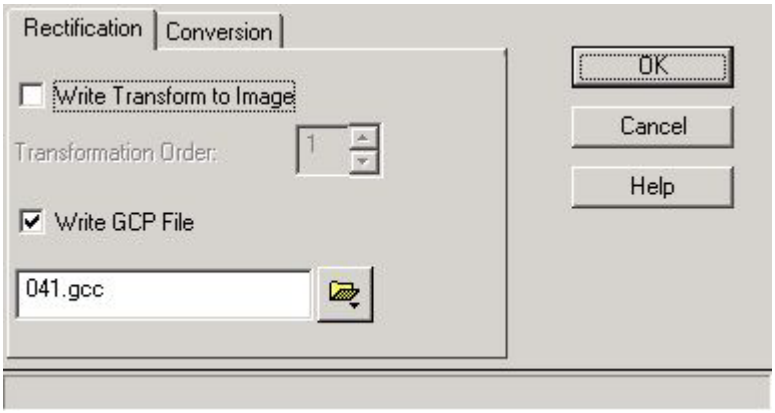
Step-2



Make sure the first 3 bands are selected; using "next image" othe bands (total of 14) can be selected.

Select **correction**.

Step-3



Select "write GCP file"; this file will contain 121 satellite position based ground control points.

Select **ok**, and select **ok**.

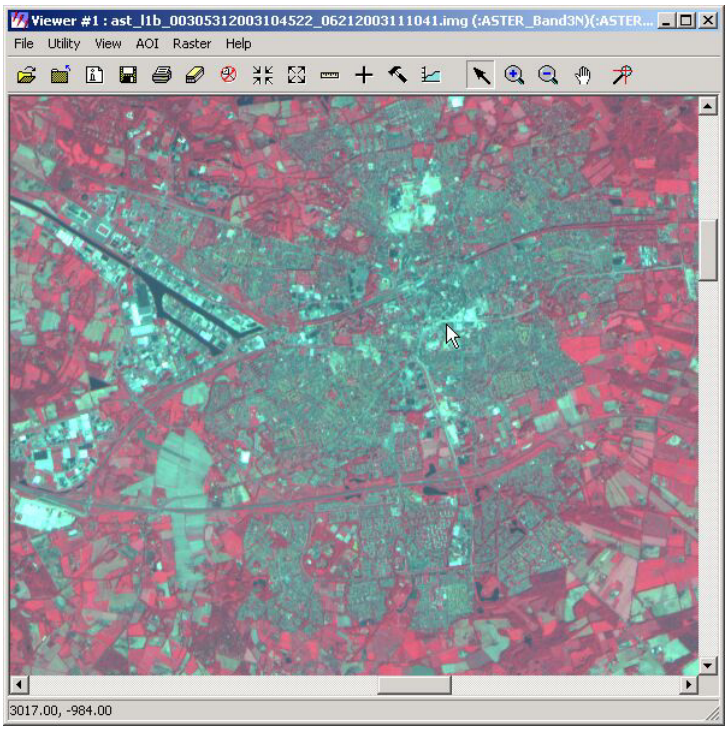
An *.img file and a *.gcp file are now prepared.

3. Image Geo-referencing

We will use the satellite position based ground control points to geo-reference our image to the projection system required. We will perform pixel resampling using the UTM coordinate system with the WGS-84 spheroid and datum and a pixel size of 15m.

Step-1

Go to the Erdas Viewer and open the prepared *.img file. You should get something as shown below.



Notes:

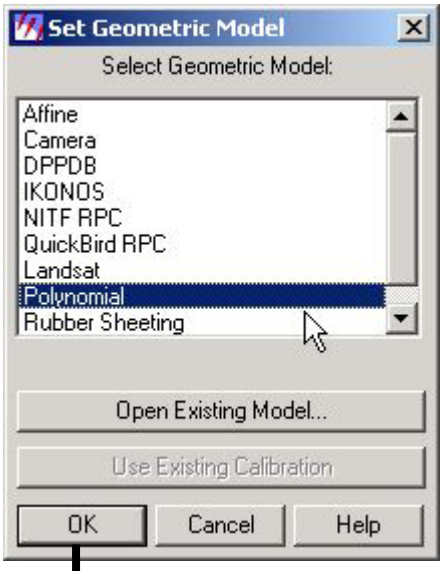
The pixels are imported using their original values; a conversion to "radiance" values was possible during the import routine for those who require such values.

The bottom left shows only column and row of the cursor location….not yet the actual geo-position.

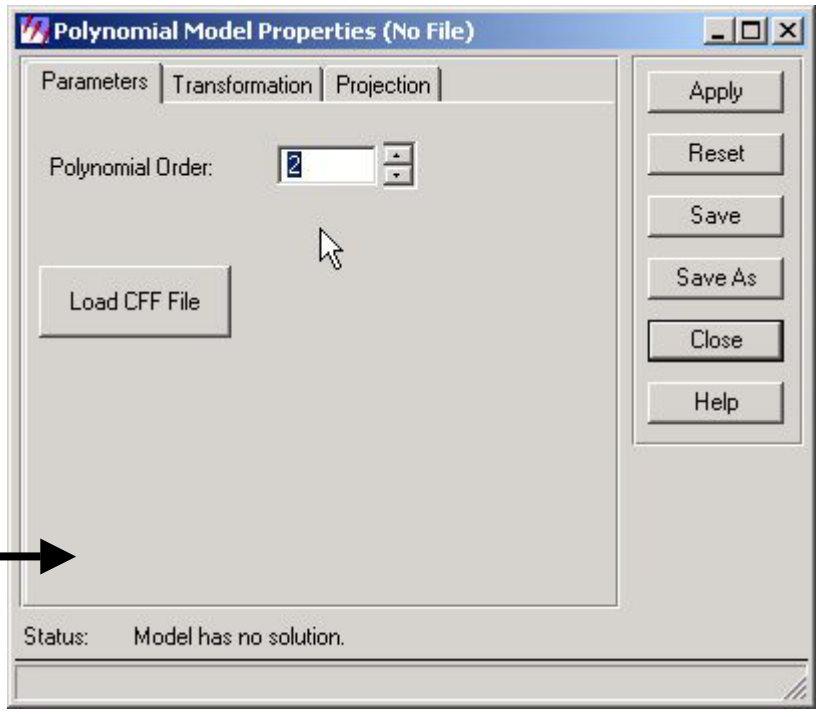
Optional: Press  to see the image meta-data.

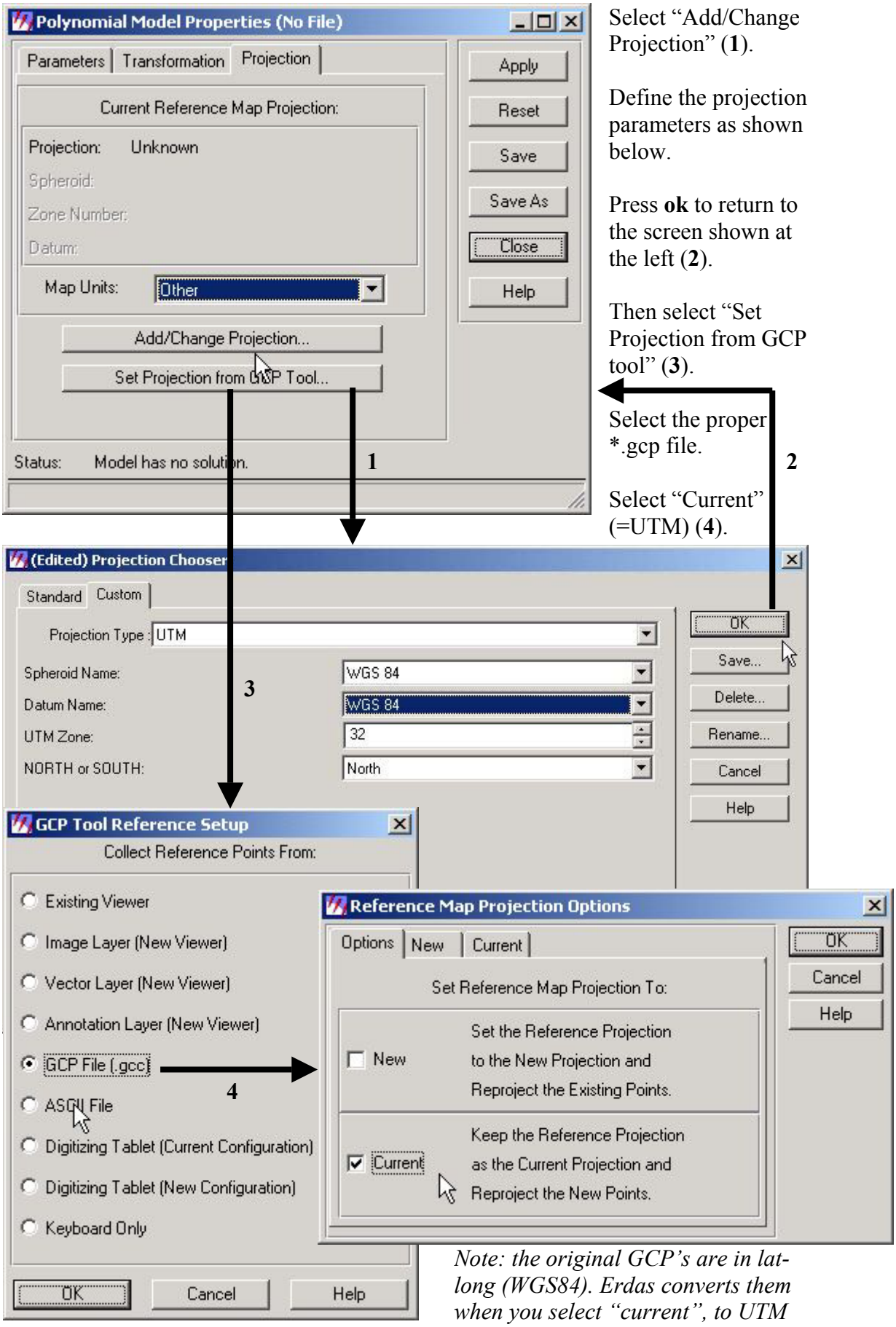
Select: Raster - Geometric Correction.

Step-2



We will use the 2nd polynomial as geometric model. Then select the tab "Projection".





Select "Add/Change Projection" (**1**).

Define the projection parameters as shown below.

Press **ok** to return to the screen shown at the left (**2**).

Then select "Set Projection from GCP tool" (**3**).

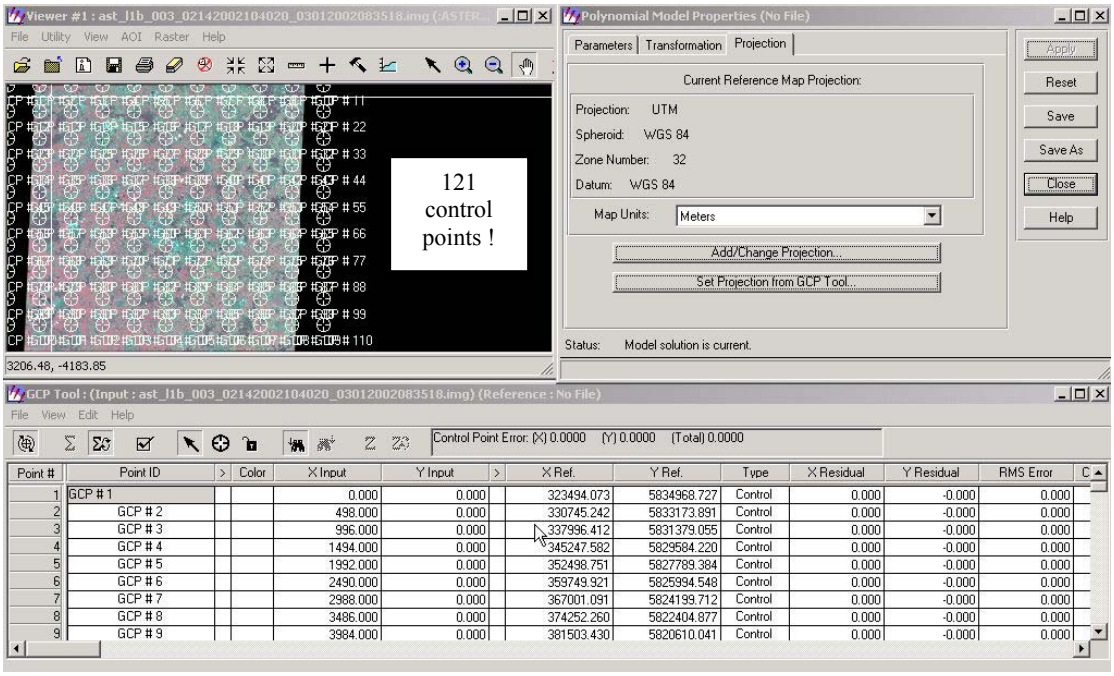
Select the proper *.gcp file.

Select "Current" (=UTM) (**4**).

Note: the original GCP's are in lat-long (WGS84). Erdas converts them when you select "current", to UTM or whatever you have specified in "Projection Chooser", e.g the local projection system!!

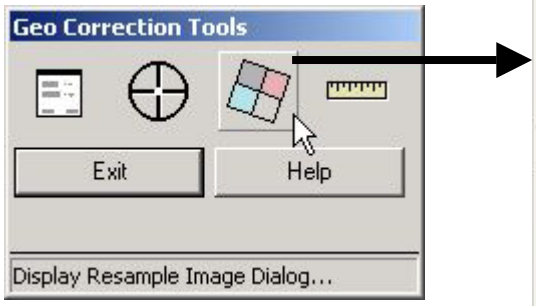
Part of your screen will then contain the following content; press the  button to (re-) calculate the model solution.

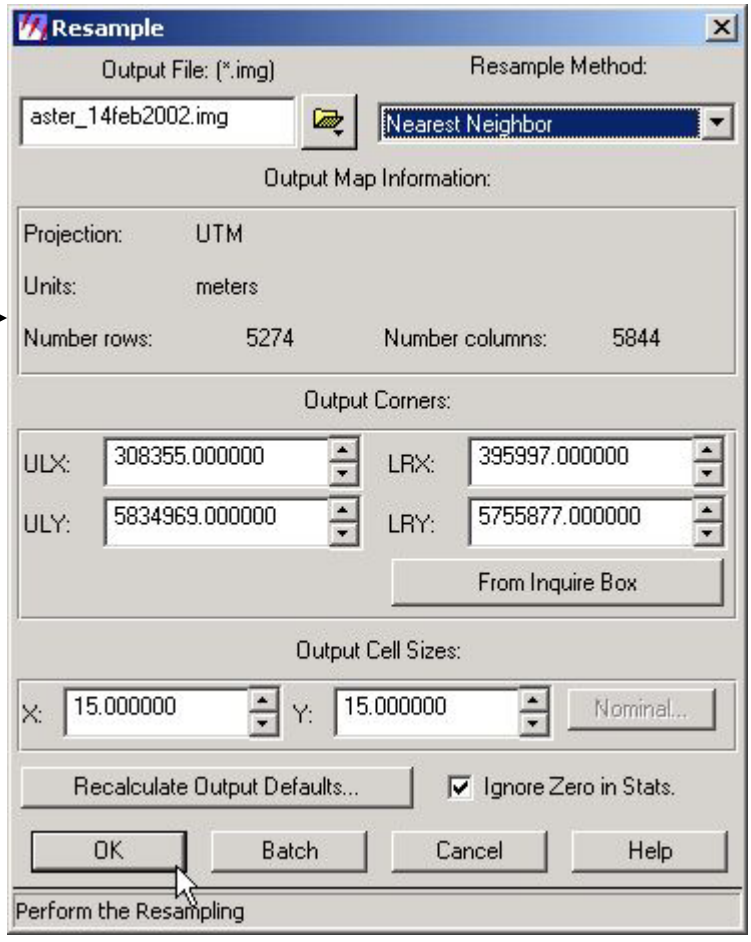
The resulting model error is: Control Point Error: (X) 0.0000 (Y) 0.0000 (Total) 0.0000.



Point #	Point ID	Color	X Input	Y Input	X Ref.	Y Ref.	Type	X Residual	Y Residual	RMS Error
1	GCP # 1		0.000	0.000	323494.073	5834968.727	Control	0.000	-0.000	0.000
2	GCP # 2		498.000	0.000	330745.242	5833173.891	Control	0.000	-0.000	0.000
3	GCP # 3		996.000	0.000	337996.412	5831379.055	Control	0.000	-0.000	0.000
4	GCP # 4		1494.000	0.000	345247.582	5829584.220	Control	0.000	-0.000	0.000
5	GCP # 5		1992.000	0.000	352498.751	5827789.384	Control	0.000	-0.000	0.000
6	GCP # 6		2490.000	0.000	359749.921	5825994.548	Control	0.000	-0.000	0.000
7	GCP # 7		2988.000	0.000	367001.091	5824199.712	Control	0.000	-0.000	0.000
8	GCP # 8		3486.000	0.000	374252.260	5822404.877	Control	0.000	-0.000	0.000
9	GCP # 9		3984.000	0.000	381503.430	5820610.041	Control	0.000	-0.000	0.000

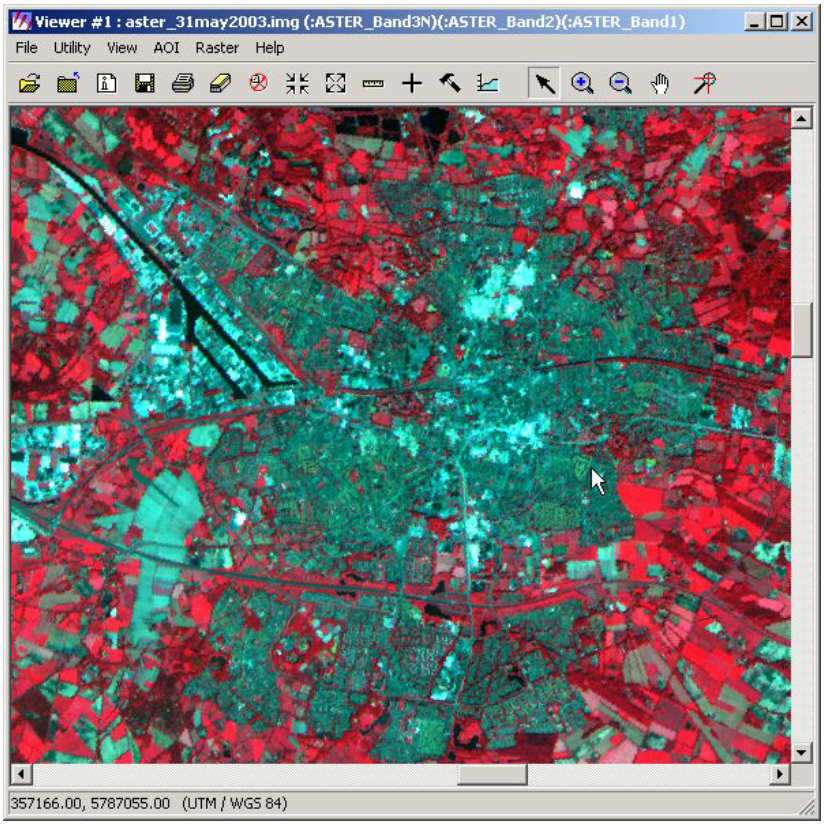
We are now ready to resample the image. To do so press the icon shown below and provide the required image details as shown. Close all windows that dealt with georeferencing; there is no need to save "the model".





4. Prepare a sub-image

The results of the above produced (when loaded in a viewer) the following:

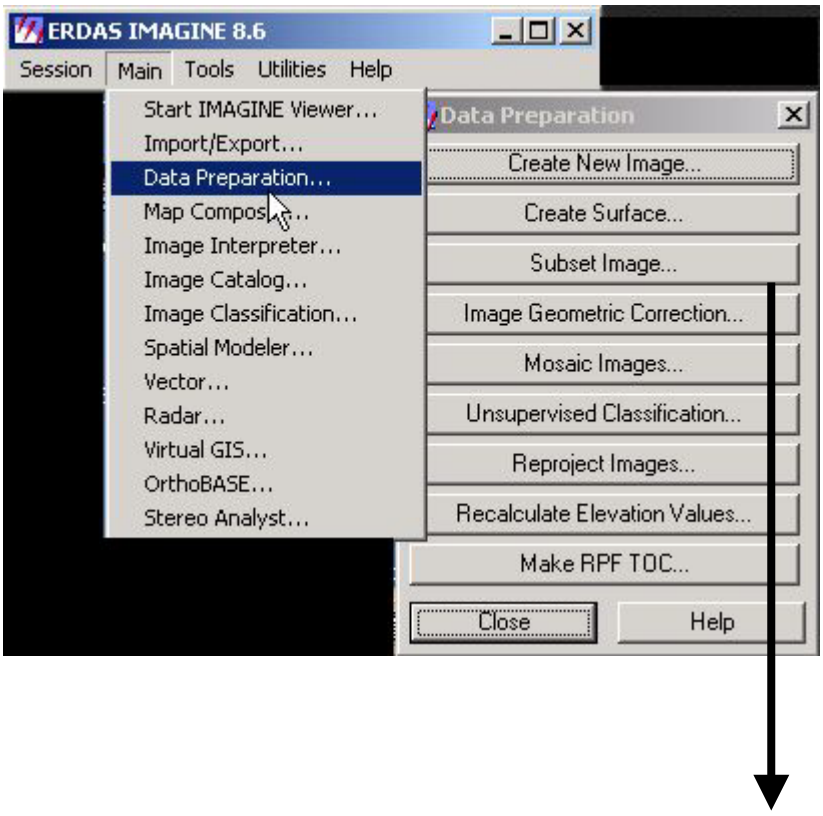


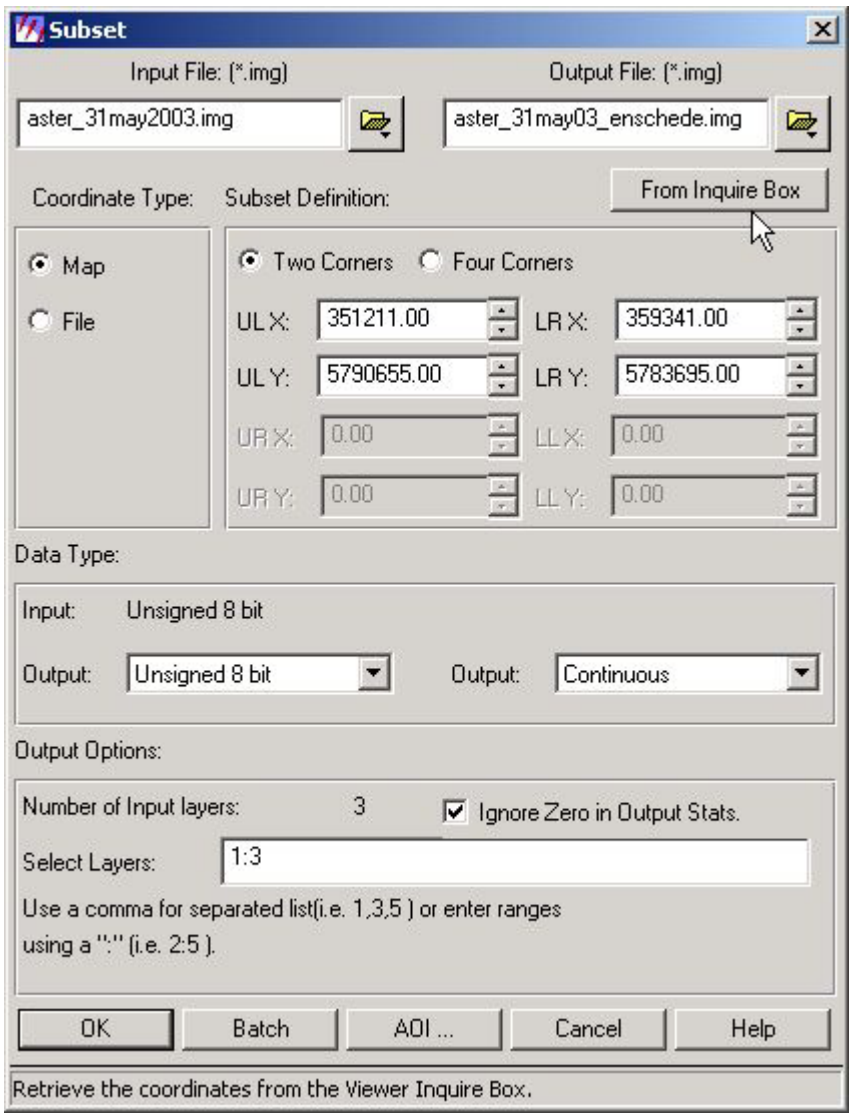
Note that in the left-bottom corner, the actual position of the cursor is now shown.

Select "Utility" and "Inquire Box". Enlarge the box so that it covers the area you want to use for preparation of the sub-image.

Do **not** close the "Inquire Box"!!

Now, using the main ERDAS menubar, select "data preparation" and then "subset image".





Select the input and define the output files.

Press “from Inquire Box” to copy the area-of interest from the viewer. Note that the data in the “two corners” change.

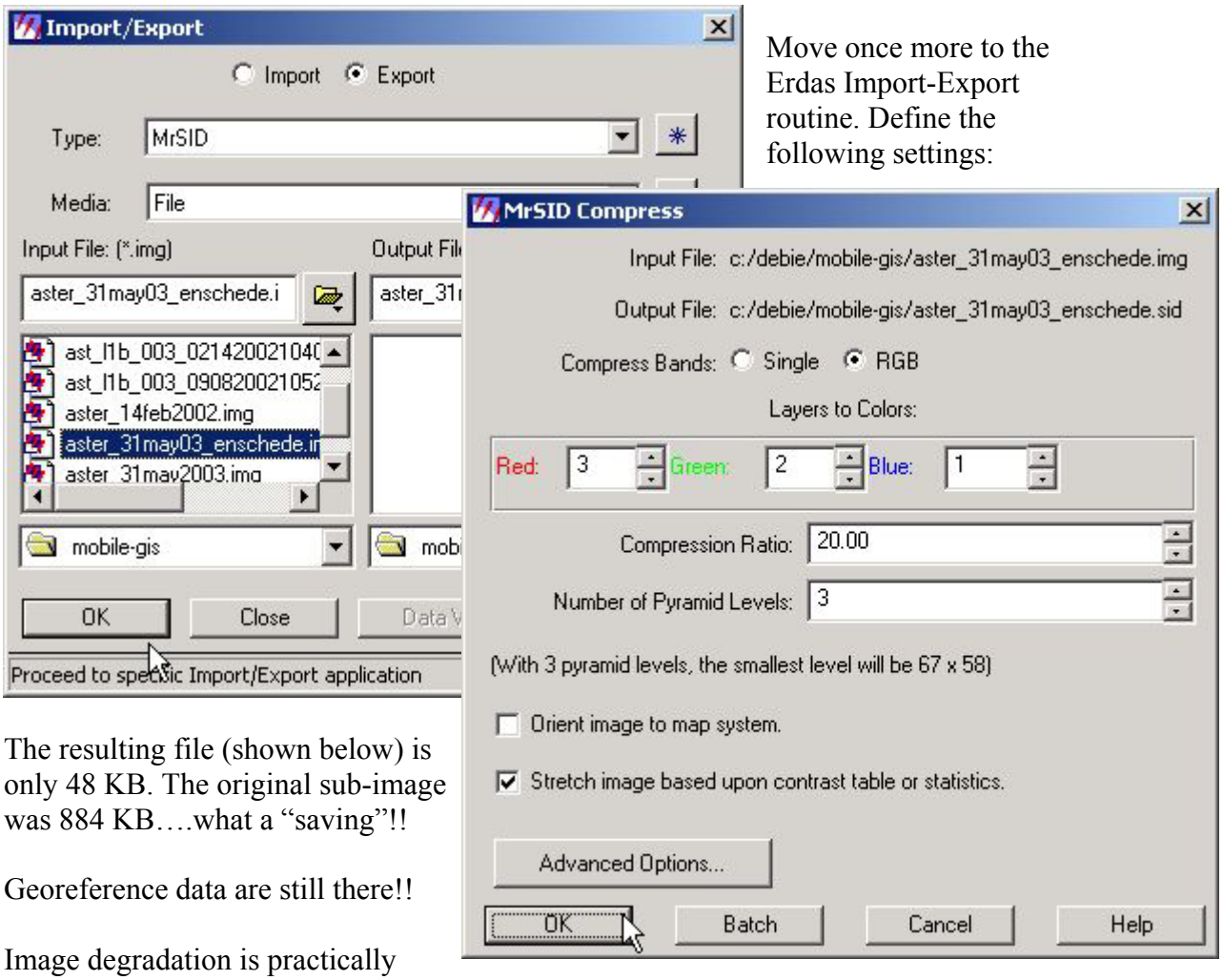
Select “Ignore zero in Output Stats.”

Press **ok**.

Verify the results in your viewer!!

Note: for the following export routine, your sub-image must be smaller thaan 50 MB!!

5. Export to MrSid format

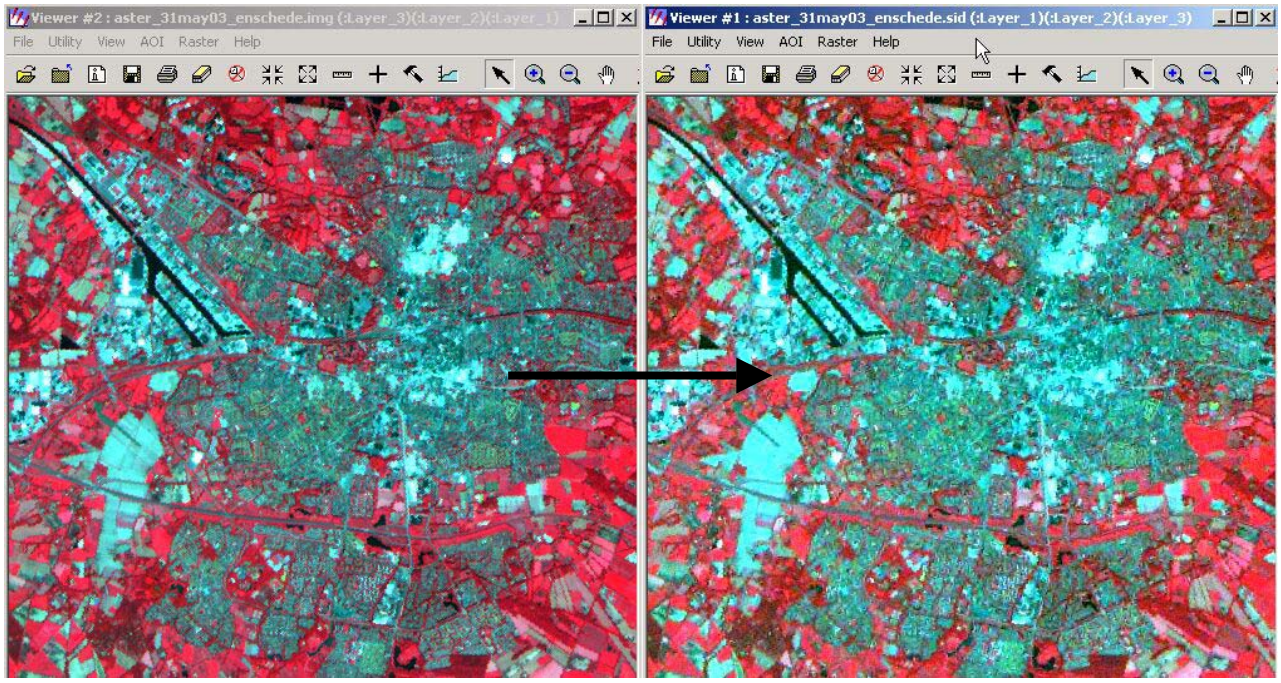


Move once more to the Erdas Import-Export routine. Define the following settings:

The resulting file (shown below) is only 48 KB. The original sub-image was 884 KB….what a "saving"!!

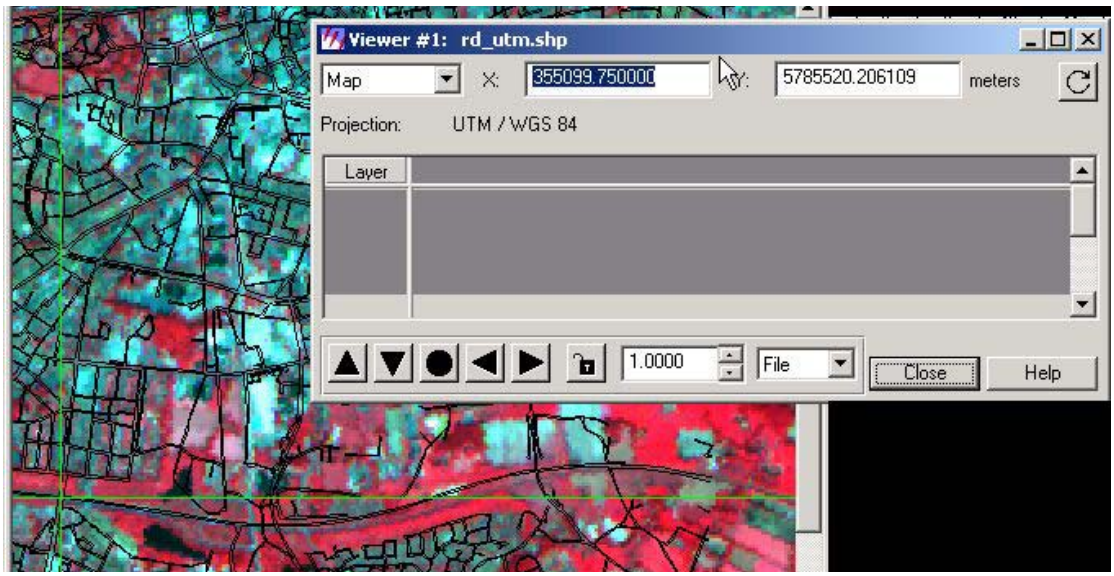
Georeference data are still there!!

Image degradation is practically "nil"!!



6. Image Shift Correction

Once GPS data are collected or if proper topographic information is available, prepared image files must be checked on their geographic correctness. Especially the above Aster-import routine is known to produce images that are sometimes 100m off the actual coordinates. As example, the imported image is shown below with the topographic road map on top….a clear shift can be observed. Using the utility "Pixel Info", a series of wrong versus proper coordinates can be explored (copied to MS-Excel), to calculate the X-Y shift that must be applied to move the image.



Use "Image Info" and then "Edit – Change Map Info" to modify the upper left image coordinate as calculated in Ms-Excel. Close the image and open it again to see results.