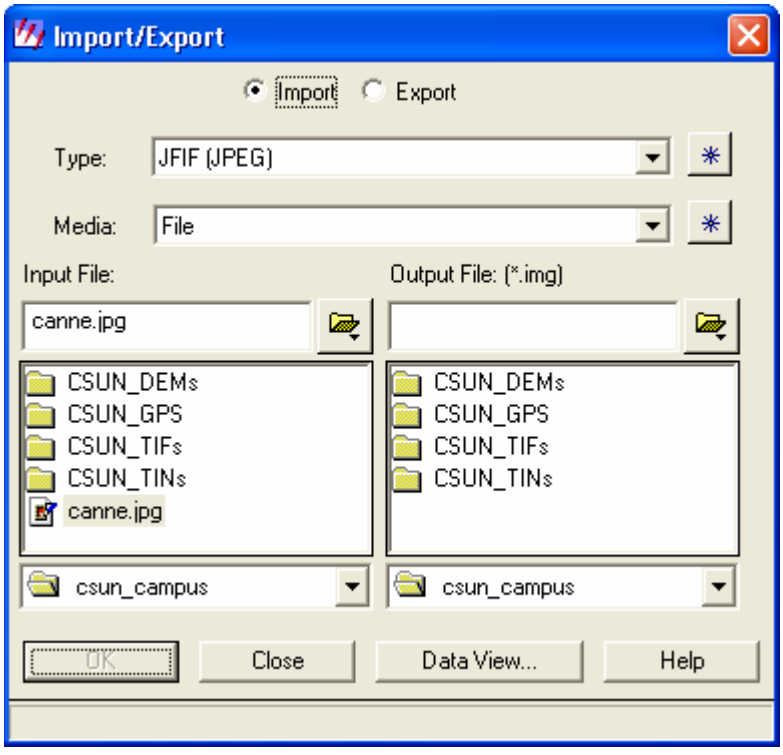
Georeference an image using another (georeferenced) image

Assignment

Your assignment is to georeference an image – for example an aerial photo (or JPEG file) with the aid of a georeferenced image of the same area. This is done by matching locations on the two images and instructing the software (*Imagine*) that the locations are coincident. *Imagine* will then scale and warp the un-referenced image in order to line up the locations and store the new referencing information in the unreferenced image file. Note that a vector file (such as a GIS *Streets* file can be used to achieve the same result.) This process seems to work faster if you first import the un-georeferenced image or aerial photo (JPEG, TIFF or other format) to Imagine (.img) format first (though this step is not essential).

Import an image

Click on the "Import" (button) in the Imagine banner. The Import/Export dialog should appear. Select the "Import" button, set Media to "File", and Type to "JFIF" (for JPEG), or whatever format your file is in. Navigate the folders to locate your aerial image under "Input File" (use the image of Canoga Park, NE, canne.jpg) and navigate through the "Output File" to make sure you place the .img file (canne.img) in the same location.



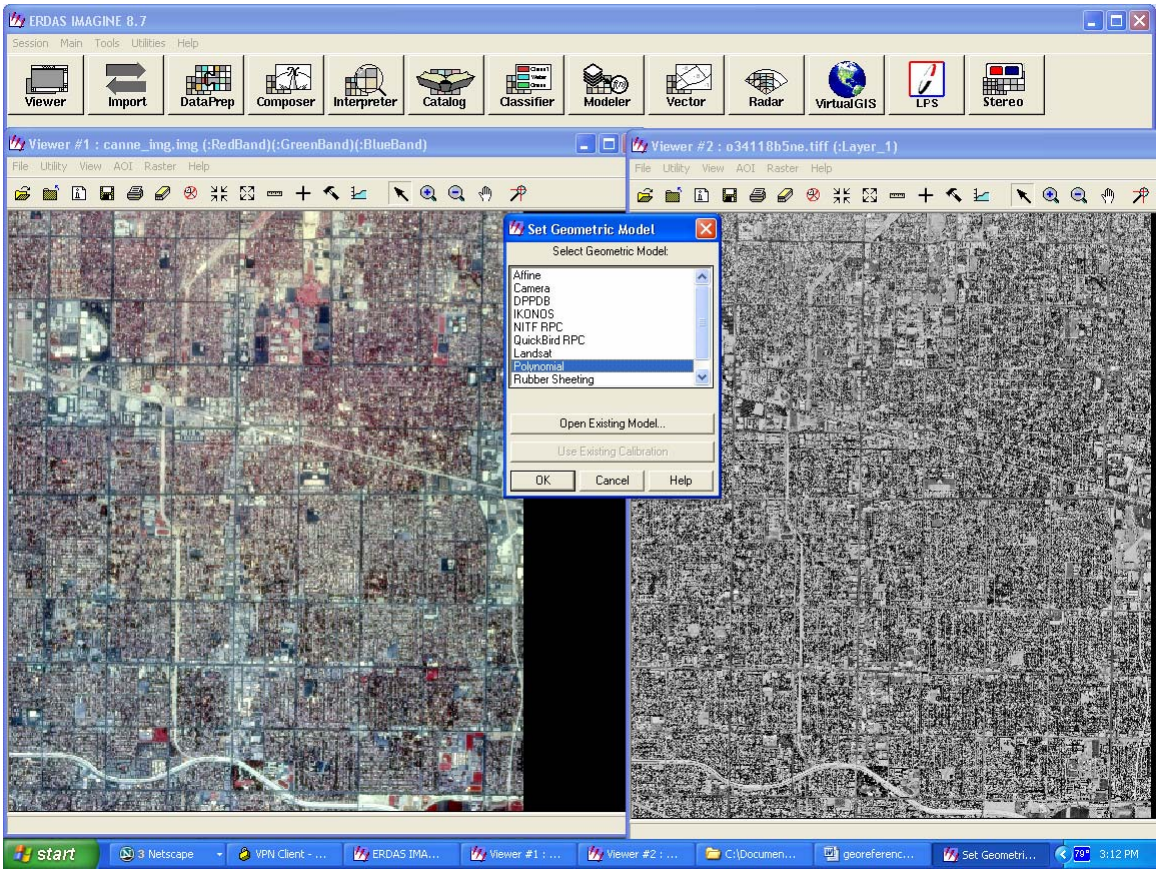
Then click on OK to run the import process.

Georeferencing

In the georeferencing process, Viewer #1 will be used to display the un-referenced image (canne.img) and Viewer #2 will be used for the georeferenced one (o34118b5ne.tiff). We will use the image in Viewer #2 to georeference the image/photo in Viewer #1.

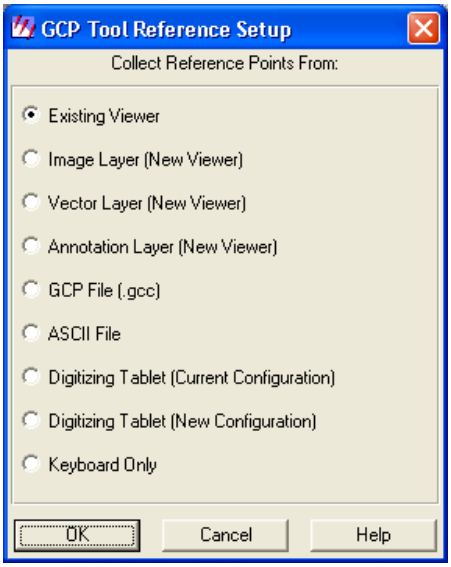
Open your .img file (canne.img) as a Raster Layer in Viewer #1. Set the bands to display true color (or to match the color in your original image/photo).
Open a second viewer (Viewer #2) and open your georeferenced image (o34118b5ne.tiff) as a Raster Layer here.

We are now going to establish some GCPs (Ground Control Points). These are locations which can be found in both the images. We will mark the same location in each image and by doing so, force the Imagine software to scale and align the first image to match the second. The first image will then take on the coordinate system of the second.
In Viewer #1, select Raster -> Geometric Correction -> Polynomial -> OK.

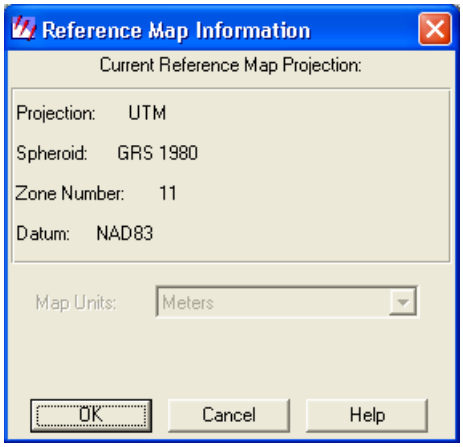


Click Close on the Polynomial Model Properties pop-up window.

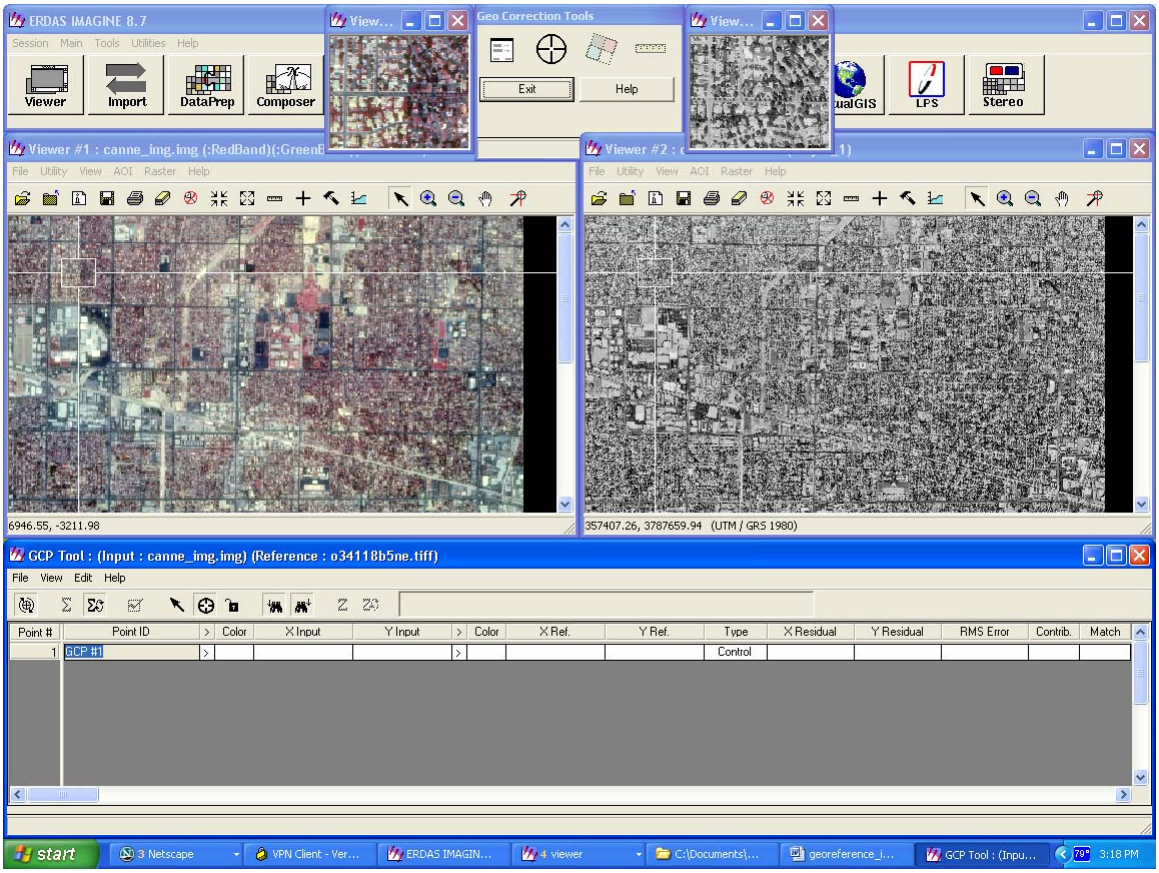
Since we will be getting our GCP locations from the image in the second viewer, we need to select the first button “Existing Viewer” in the next pop-up window:



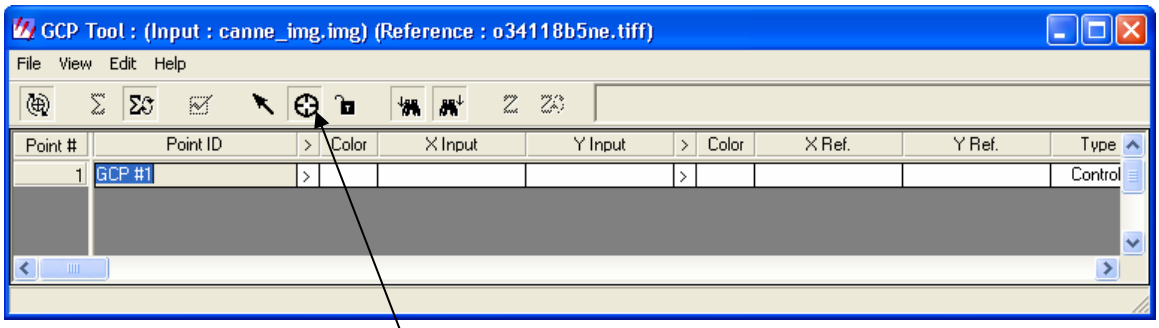
Then click on OK. Click in Viewer #2 to tell the software that this is where you will be getting the GCP locations from. A pop-up window appears to tell you the projection information for this image:



Click OK. A statistics window will pop-up. You can click OK to this also. Then your screen may become a little cluttered, and should look something like this:



Two new Viewers have appeared (Viewers #3 and #4). These contain close-ups of the areas in Viewers #1 and #2 which are enclosed by the white ("linked") boxes. In addition a "Geo Correction Tools" window has appeared at the top of the screen, and a "GCP Tool" at the bottom:



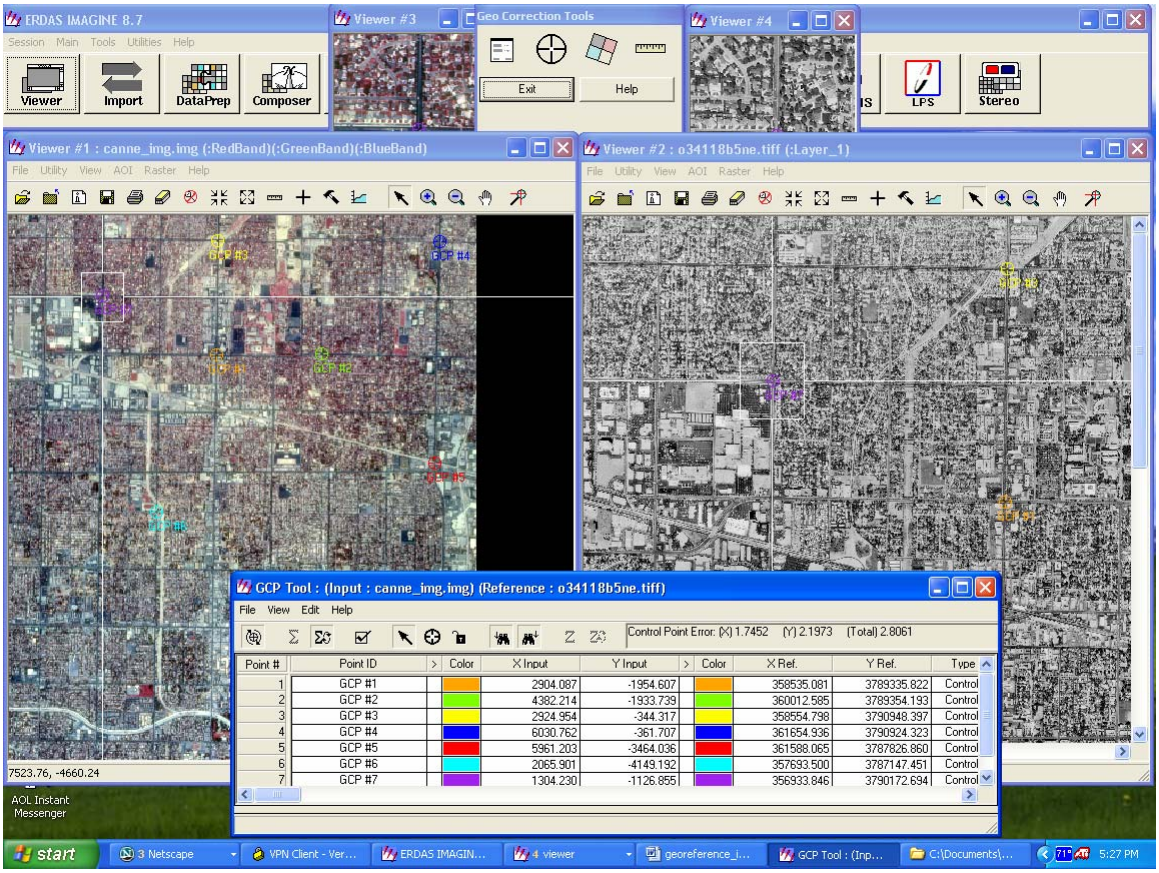
You are now ready to point to your GCP points on both images. You will start by pointing to a location in Viewer #1 (canne.img). You should have the crosshair cursor in Viewer #1. If not, select the "Create GCP" icon in the GCP Tool as shown above. (When creating GCPs, the location of them in Viewer #1 will be shown under the "X Input", "Y Input" columns of the table, and their georeferenced locations from Viewer #2 will be shown under the "X Ref", "Y Ref" columns. If you accidentally create one in the

wrong place and want to remove it, right click on the GCP in the “Point#” column, “Select” it and then “Delete Selection”.)

Zoom into an area within your image in both Viewers. (Using the supplied images you should zoom into the area around the CSUN campus.) We will now mark GCPs on these choosing appropriate locations such as street intersections. For the CSUN area we will choose locations like the intersection of Reseda and Plummer, Nordhoff and Tampa, Nordhoff and Zelzah etc.

Making sure that you have the crosshair cursor in Viewer #1, mark the location of your first GCP (GCP 1). Then use the close-up of this in Viewer #3 to move the mark to its exact location. (If you want to zoom in closer you should make the zoom box in Viewer #1 smaller.) The location of this point should appear in the GCP table (X Input, Y Input). Now move your cursor to Viewer #2. If you have a crosshair you can mark the location of this same GCP in this (georeferenced) image. If you have the arrow and not the crosshair cursor, then click on the ‘Create GCP’ icon first and then mark the location of GCP 1 in this image. Correct it by using the close-up view shown in Viewer #4. This location should appear in the GCP table (X Ref, Y Ref).

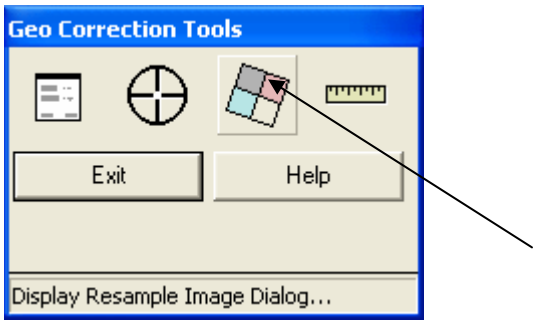
Now repeat this process for four to nine more GCPs (for a total of 5 – 10). Try to space the GCPs some distance apart. If you are georeferencing your own image you should spread the GCPs over its entirety. You can color-code your GCPs by right-clicking in the Color column in the table and choosing a color for each. For this exercise, we will just define 5 around the CSUN campus. Note that when you have entered three GCPs, the fourth and subsequent ones will automatically be placed in the second image. and your job will be to simply correct them to their exact location. This makes the process much faster.
(Note: In case you need to repeat the rectification process again you should save your GCPs use the “File” menu in your GCP Tool window. Choose, “Save Input” to save the points with your original (unrectified) image, and then use the “File” pull-down menu again to “Save Reference” points - your corresponding GCP locations in the reference image.)



Resampling

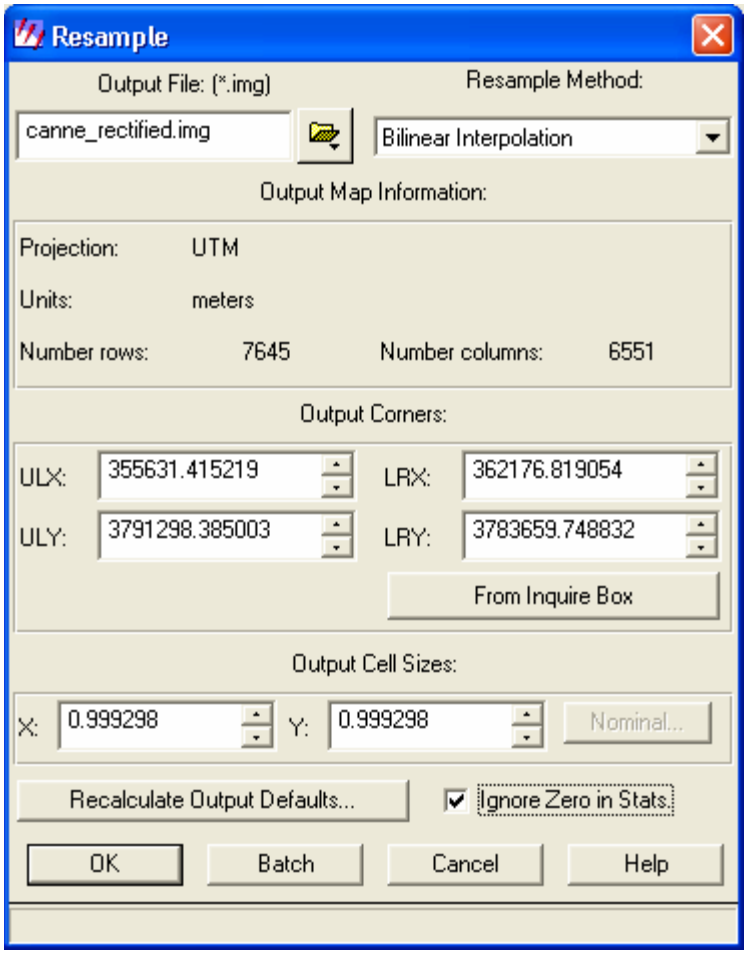
After you have finished locating the GCPs on both images you will resample the un-referenced file. This is the process of calculating pixel values for the new, rectified image and creating the new file.

Click the 'Resample' icon in the Geo Correction window:



A pop-up window will appear. Navigate to the folder where you will save the rectified image (let's call it canne_rectified in this example). Choose bilinear interpolation for the interpolation method. The corners of the image will correspond to the full extent of your original (un-referenced) image. If you wish to only keep a portion of this (say, the portion around campus) you can use an Inquire Box to mark out the area you wish to save

and then click the “From Inquire Box” option to save this subset of the image. Check the “Ignore Zero in Stats” box to make sure that any blank area does not contribute to your pixel brightness statistics values. (This is not essential.) Then click OK.

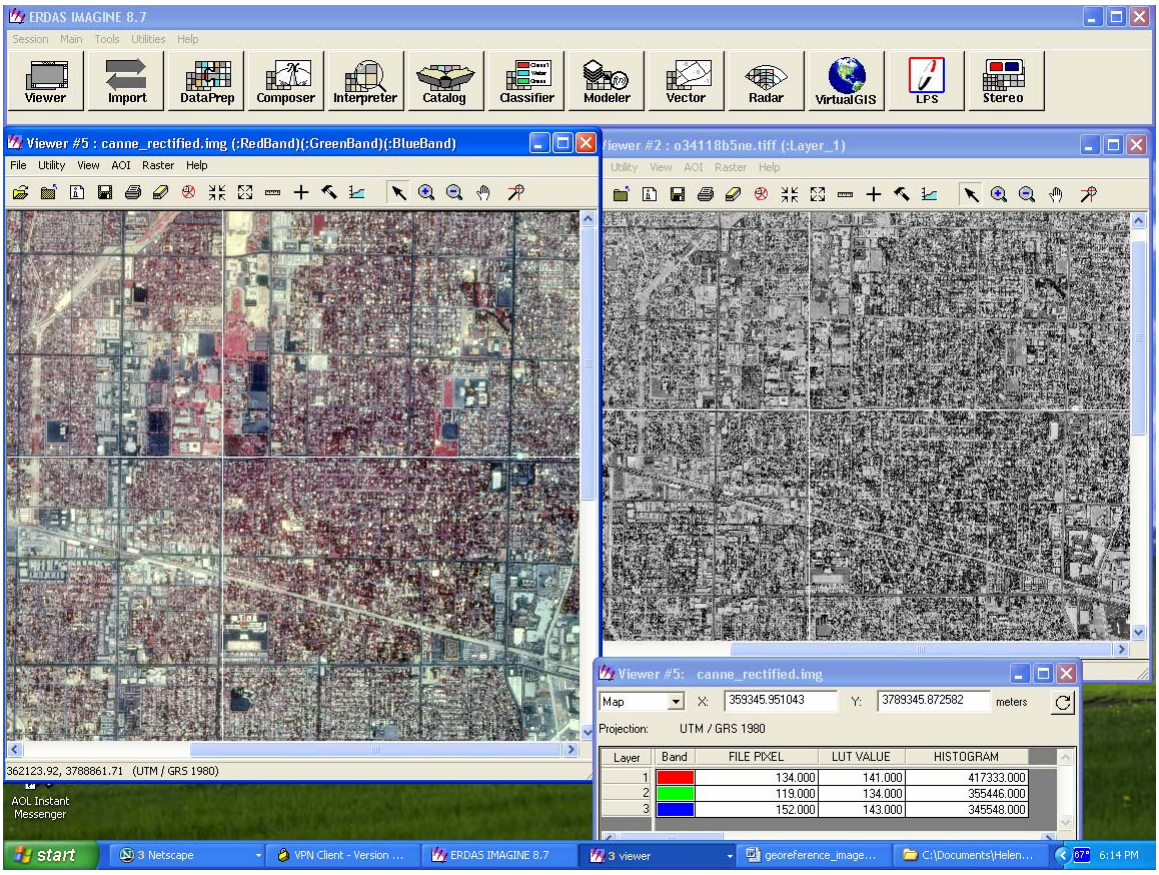


The georectification process will now begin. Click OK when necessary to acknowledge the steps that follow.

Checking your results

When the process has finished you can open the georectified image in a new Viewer (Viewer #5). You can close all other windows leaving just Viewers #5 (new image) and Viewer #2 (reference image, o34118b5ne.tiff) open. Note that your new file (canne_rectified) now has projection information which will be displayed underneath the image as you scroll around.

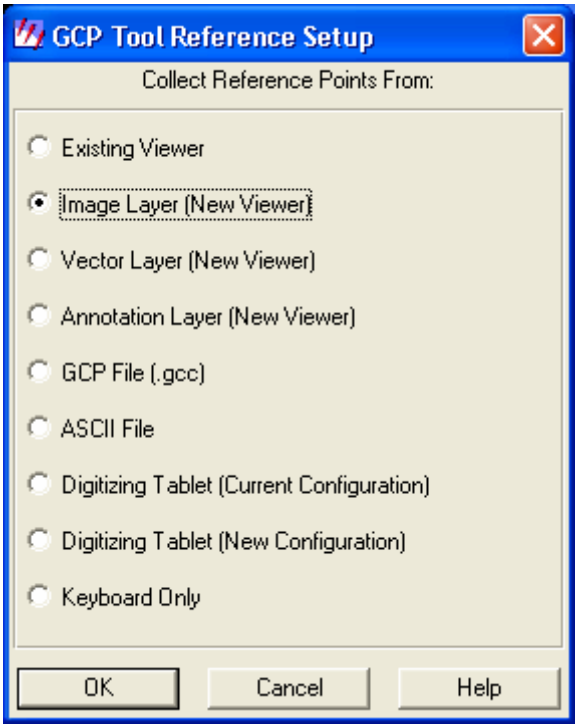
To check the referencing you should link the cursor in Viewers #2 and #5 by selecting View -> Link/Unlink Viewers -> Geographical from the menu bar in Viewer #5. Then click the left mouse button in Viewer #2 to link it to Viewer #5. If you now select the Inquire Cursor (+) in Viewer #5 and move it around, it should move a corresponding crosshair cursor in Viewer #2. Check that the locations in the two images are matched.



If so, you are done! If not, ... ☹ .....ugh oh! Go back to the GCP definition and try again ☺!!

Trying again!
(Note: You can retrieve your saved GCPs and edit/delete points, and/or run a different transformation model by following the instructions below:

Close all your windows, just leaving the main Imagine banner. Open your unreferenced image (canne_img.img) in Viewer #1. Select Raster -> Geometric Correction -> Polynomial (or some other model if your prefer) -> then OK. Then Click Close on the Polynomial Model Properties pop-up window. This time you will be getting your saved GCPs locations from your reference file (o34118b5ne.tiff) so when the next pop-up window appears, select the second button “Image Layer (New Viewer)”:



This will allow you to navigate to that file (o34118b5ne.tiff). When you click OK to open it, a couple of pop-up windows appear and then all the GCP windows containing your point locations appear. You can try editing/deleting/adding points and perform a new Resampling. Remember to save your new GCPs from the File menu in the "GCP Tool" window.)

Turn in your newly georeferenced image together with the file of your GCPs by copying the files canne_rectified and your GCP file to the directory cox407 on geogserver1. **Before you copy them over** please preface the file name with your own name. eg. cox_canne_rectified, otherwise I will not be able to tell whose is whose. (Once you have copied it over, you cannot rename it.)