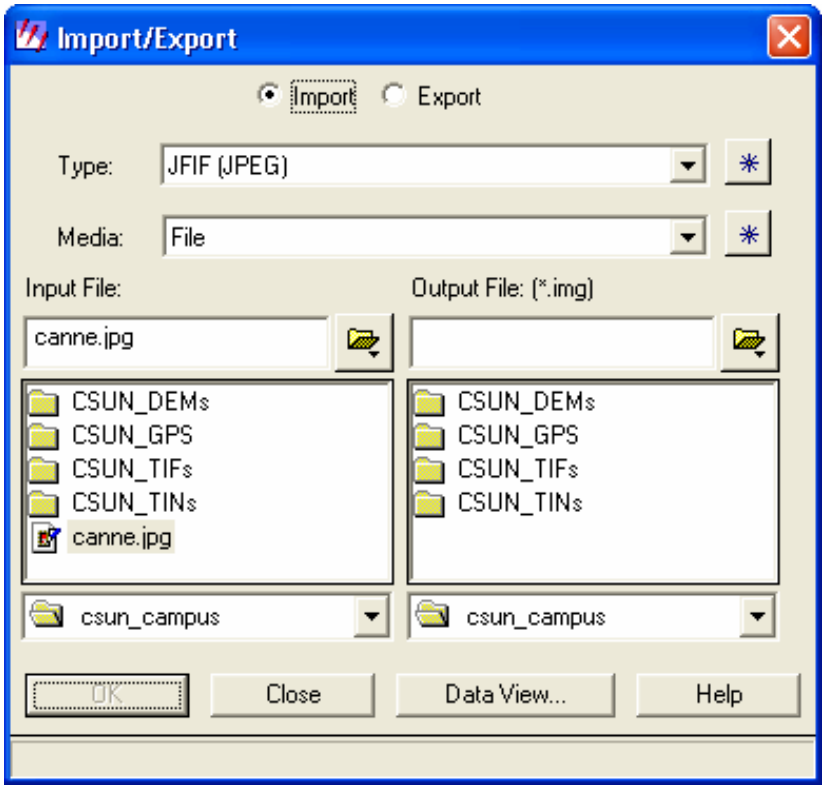
Georeference an image using known geographic coordinates of points

Assignment

Your assignment is to georeference an image – for example an aerial photo (or JPEG file) with the aid of set of ground control points (GCPs) with known locations (coordinates) which lie within the image. This is done by locating the points within the unreferenced image and manually typing in the geographical coordinates of those points. *Imagine* will then scale and warp the un-referenced image in order to line up the locations with those of the stated geographic coordinates, and store the referenced image as a new file.
This process seems to work faster if you 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.



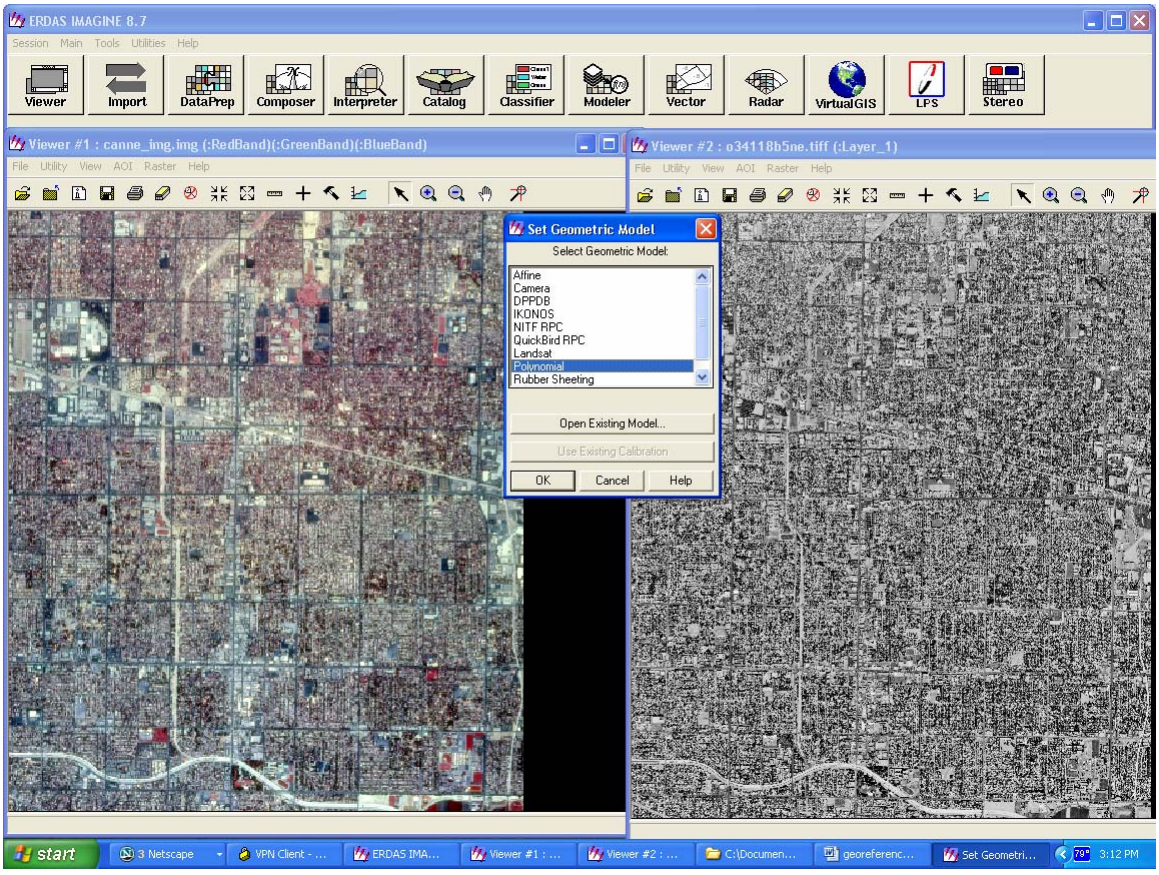
Then click on OK to run the import process.

Georeferencing
In the georeferencing process, Viewer #1 will be used to display the un-referenced image (canne.img). A new (georeferenced) image will be stored as canne_georef.img.

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).

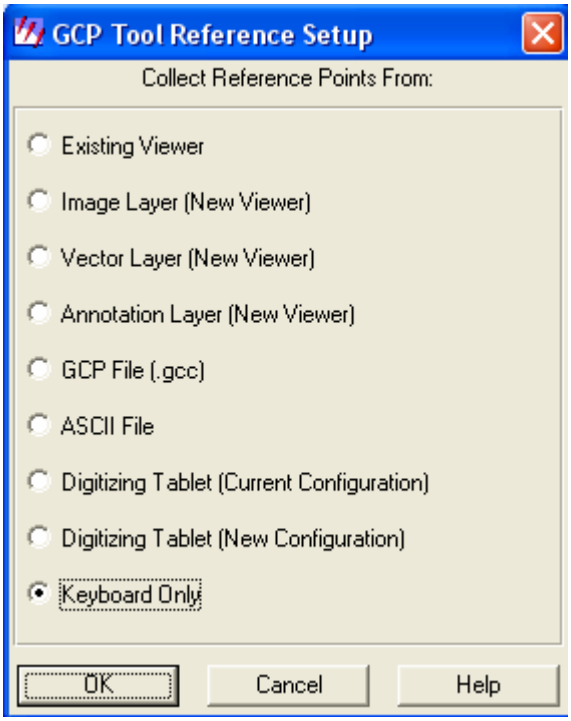
We are now going to establish some GCPs (Ground Control Points). These are the locations of the points for which you have geographic coordinates and which can be found in the image. We will mark these locations in the image and then enter the actual geographic coordinates of them.

In Viewer #1, select Raster -> Geometric Correction -> Polynomial -> OK.

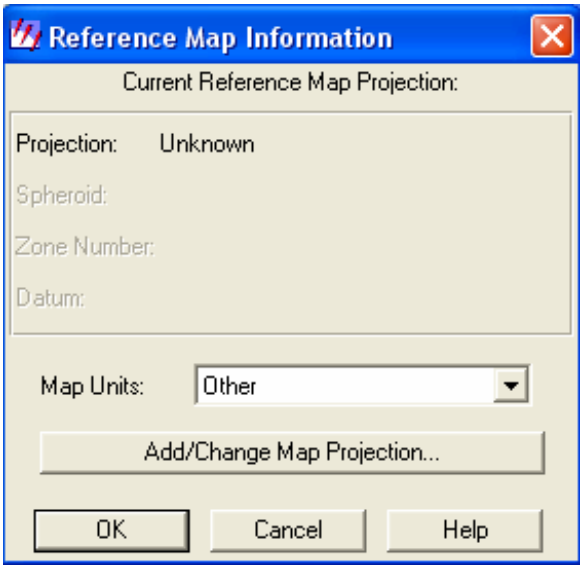


Click Close on the Polynomial Model Properties pop-up window.

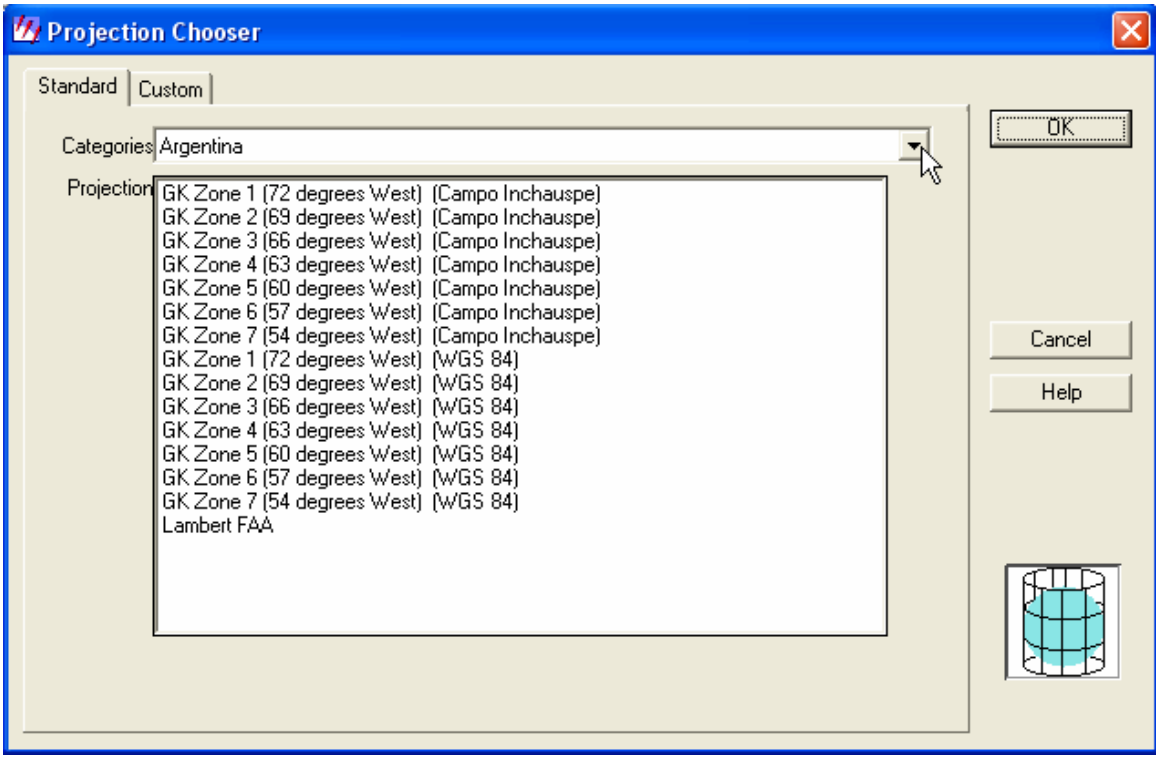
Since we will be getting our GCP locations by manually entering them, select the last button “Keyboard Only” in the next pop-up window:



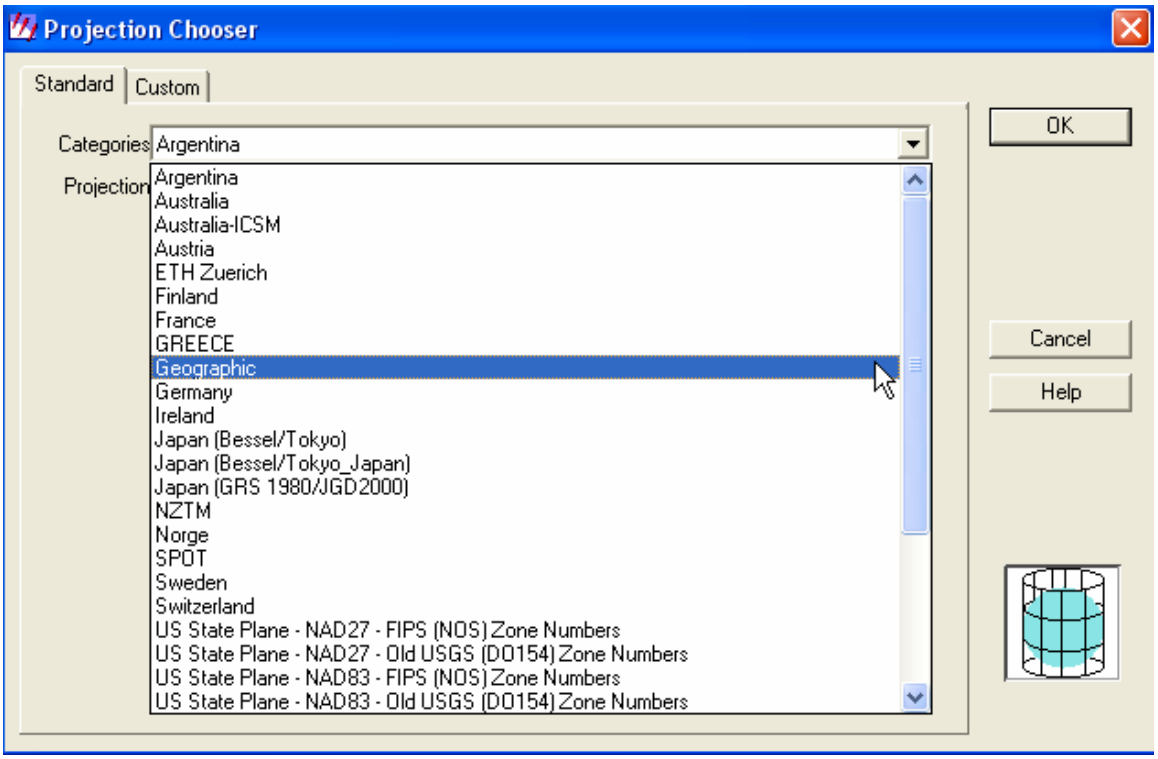
Then click on OK. A pop-up window appears to ask you about the projection information of the points you will be entering (This is the "Reference Map"):



Select "Add/Change Map Projection". Click on the "Categories" bar for a choice of map projections for the coordinates of the GCPs you will be entering.

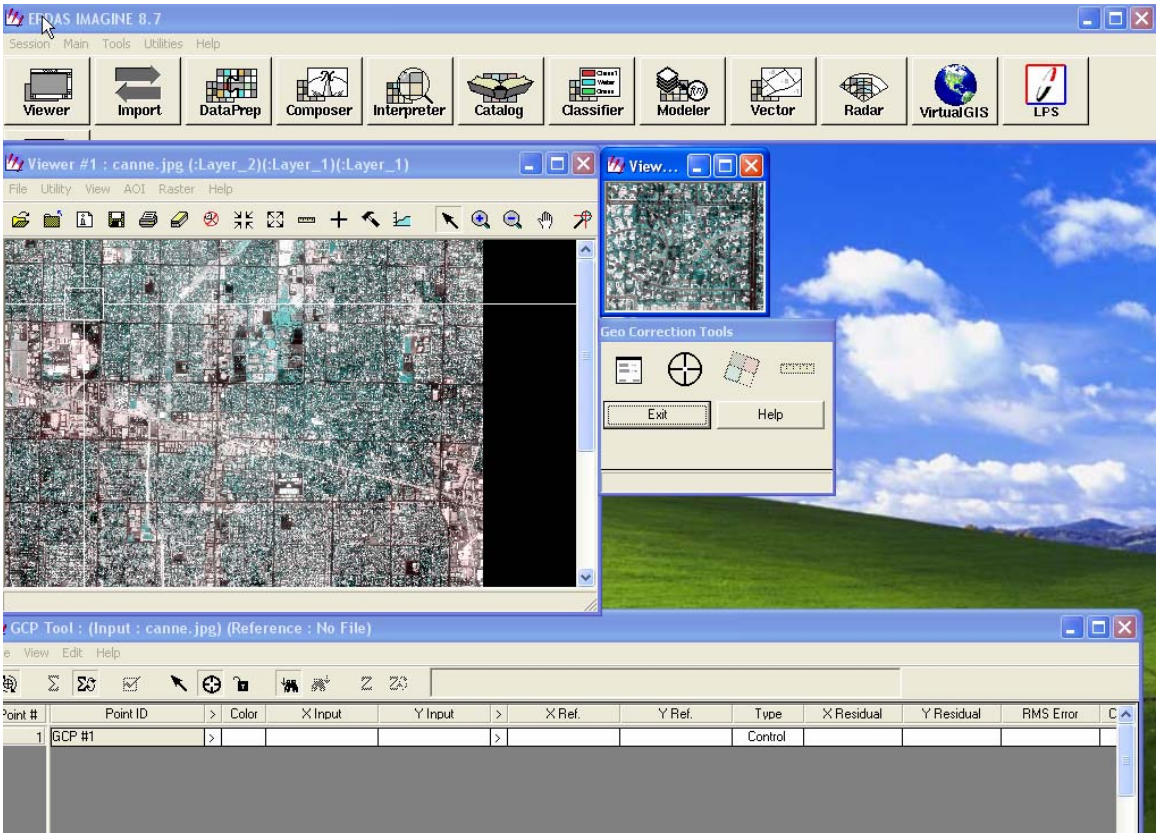


Choose “Geographic” for Lat/Long coordinates. Then choose the spheroid and click “OK”.

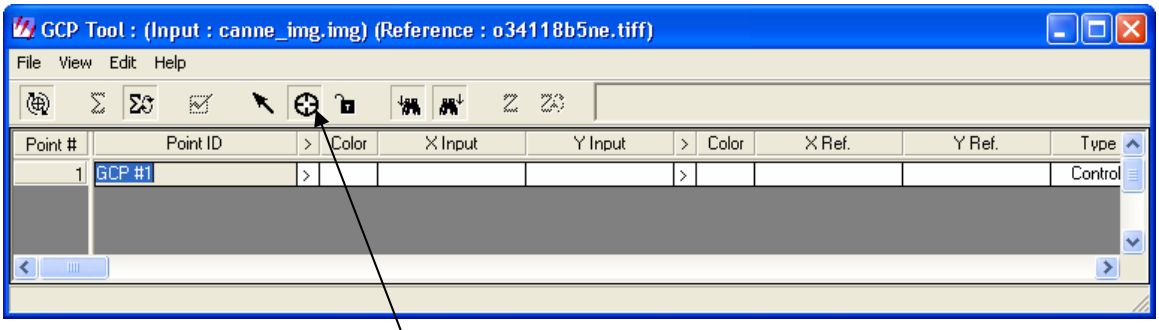


Click OK again to close the Reference Map Information box. A statistics window will pop-up. Click OK to this also.

Your screen should look something like this:



A new Viewer has appeared (Viewer #2). This contains a close-up of the areas in Viewer #1 which is enclosed by the white ("linked") box. 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 in the image. 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 that you provide for the GCPs will be entered 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 where your reference points are located. You will now mark GCPs on the map one at a time.

Making sure that you have the crosshair cursor in Viewer #1, mark the location of your first GCP (GCP 1). The location of this point should appear in the GCP table (X Input, Y Input). Now move your cursor to the X Ref column for this point and enter its longitude value (or X coordinate of the point in the map projection scheme in which it was recorded). Note: Longitude and latitude values can be entered as degrees, minutes, and seconds or as decimal degrees (eg. -118 23 5.4 or -118.385). Then move your cursor to the Y Ref column and enter the Y coordinate or latitude value.

Repeat for all your GCPs (at least five). If the arrow and not the crosshair cursor appears, then click on the 'Create GCP' icon first and then mark the location of the next GCP in your image.

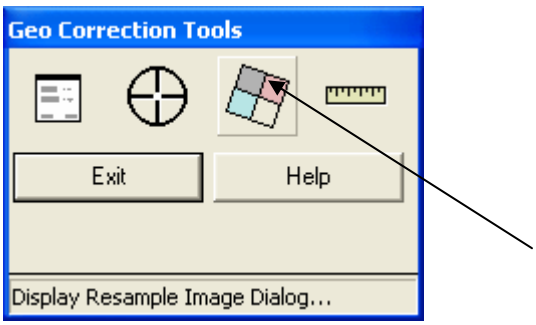
Note that when you have entered three GCPs, the fourth and subsequent ones will automatically appear in the table and your job will be to simply correct them to their exact location.

(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.)

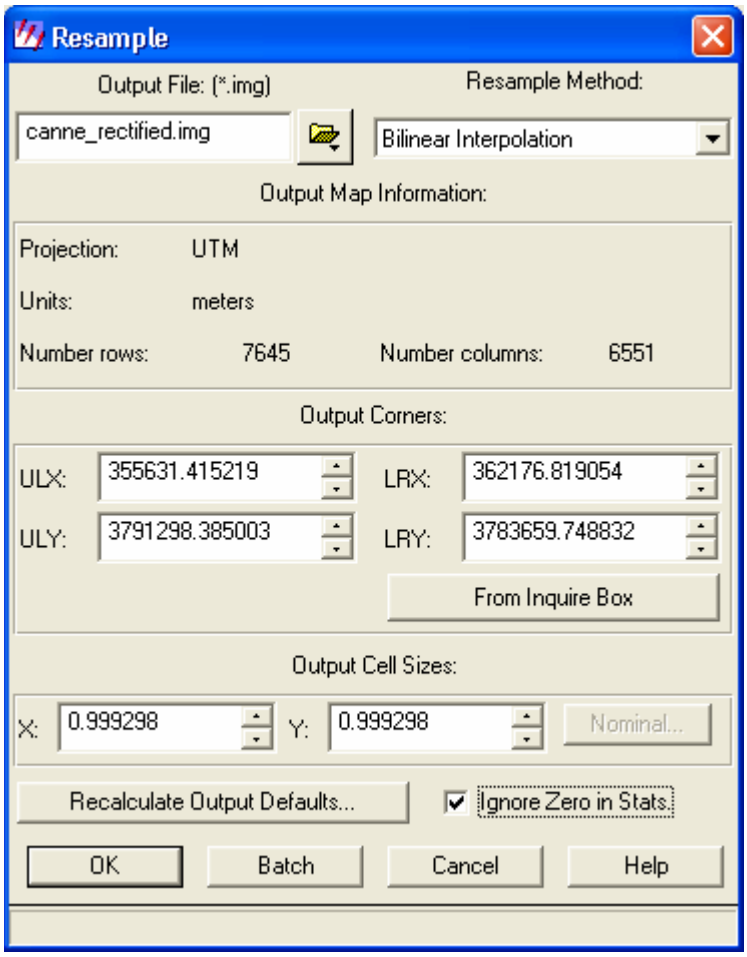
Resampling

After you have finished locating the GCPs on your image 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 georeferenced image (let's call it canne_georef 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 georeferencing 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 georeferenced image in a new Viewer. Note that your new file (canne_georef) now has projection information which will be displayed underneath the image as you scroll around.

To check the referencing you use the Inquire cursor and move it to the locations of your GCPs. Check that the location information which appears matches your known points.

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 from within the reference point table.)

Turn in your newly georeferenced image together with a list of your points and their coordinates.