

Orthorectification and Mosaicking of Spatial Data with ERDAS IMAGINE ®.

I. Orthorectification/Georeferencing

1. Open image to be rectified in an IMAGINE viewer.
2. Open reference image, i.e. a map, in a second viewer.
3. Click “DATAPREP” on the IMAGINE tool bar.
4. Select “Image Geometric Correction” from the DATAPREP menu.
5. ERDAS asks you to choose the image to geometrically correct. Choose “From Viewer” and click the “Select Viewer” button. Then click the mouse in the viewer with the image you wish to correct.

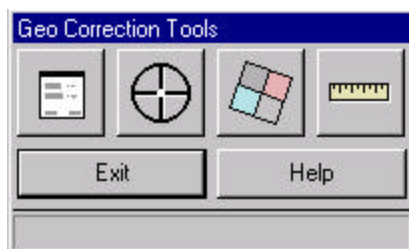


6. ERDAS asks you to choose a geometric model for the rectification. Choose “Polynomial”, click OK.
7. In the “Polynomial Model Properties” dialogue box, select “Close”.
8. ERDAS asks where to select reference points from for the rectification. Choose “Existing Viewer”, and click OK.
9. Now you are asked to choose the viewer, click the mouse in the viewer containing the reference image (DRQ).
10. ERDAS tells you the current projection information of the reference image. Check that it seems correct and click OK.
11. ERDAS will open the GCP Tool, the GCP Tools icon menu and two additional viewers containing zoomed in views of your larger viewers.

The GCP Tool provides you with information about your input and reference GCPs.

Point #	Point ID	Color	X Input	Y Input	X Ref	Y Ref	Type	X Residual	Y Residual	RMS Error	Control	Match
1	GCP #1		630.496	-1875.669	581004.217	4400678.190	Control	-0.000	0.000	0.000	1.237	
2	GCP #2		673.034	-1812.000	580997.734	4401172.061	Control	-0.000	-0.000	0.000	1.212	
3	GCP #3		845.062	-2049.306	581406.289	4400795.023	Control	0.000	-0.000	0.000	0.031	
4	GCP #4						Control					

The GCP Tools icon menu provides you with a quick link to the tools that you will need while doing geometric correction.



From left to right, these tools are: Display Model Properties (allows you to view and change the parameters of your geometric model), Start GCP Editor (GCP Tool), Display Resample Image Dialogue (used as final step in geometric correction, see below), and Calibrate Image (not to be used while performing geometric correction).

12. Once the GCP Tool is open and running you are ready to begin selecting input and reference GCPs in your images.

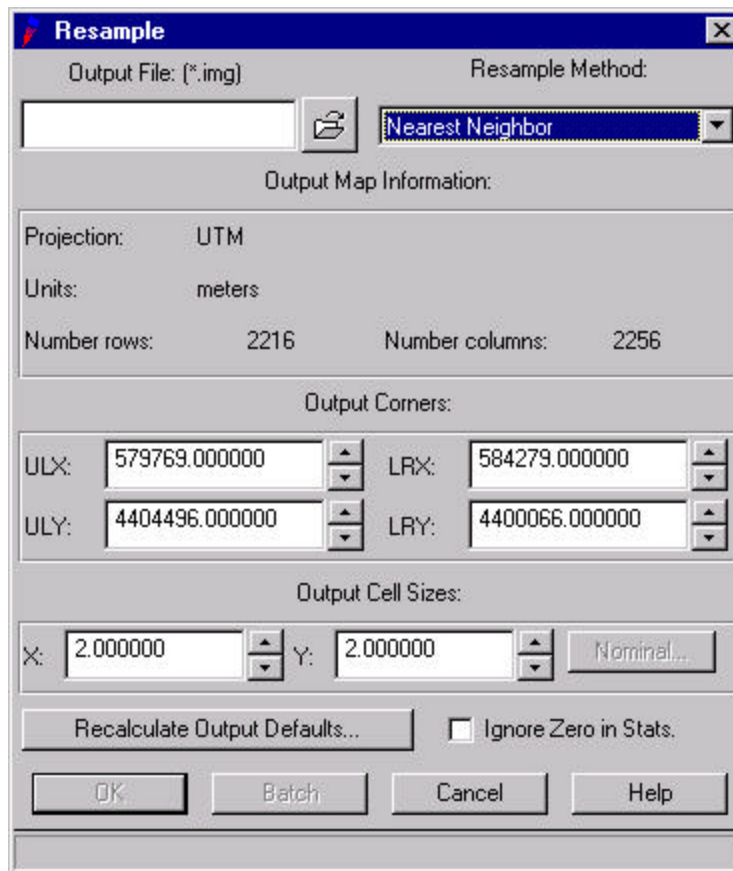
You will first want to find corresponding land marks on the images and zoom into these so that you can easily identify points on both images.

Once you have done this and found a suitable point for your first input GCP, select the GCP cursor from the GCP Tool and click the mouse on the point where you want the GCP on the image to be geometrically corrected.

Next, repeat this step on the reference image (map) carefully trying to put the reference GCP on the corresponding point to the input GCP.

Continue placing input and reference GCPs until you have a sufficient number around the edge and throughout the center of the image for an accurate geometric correction. Try to place as many input GCPs as close to the outside edge of the input image as possible, this will help increase the accuracy of the geometric correction around the edges of the image. (After you have placed the first three GCPs, ERDAS will begin placing the reference GCPs to correspond to your input GCPs based on the geometric model chosen, make sure to verify and correct the position of the automatically chosen reference GCPs).

13. Once you have placed your GCPs and have adjusted them to your satisfaction, click on the “Display Model Properties” icon on the GCP Tools icon menu. Change the polynomial order to 2 and click “close”.
14. Save the input and reference GCPs.
 - Click “File” on the GCP Tool menu bar.
 - Click “Save Input GCPs as”
 - Assign a directory and file name for your input GCP file.
 - Repeat these steps for the reference files.
15. Now click the “Display Resample Image Dialogue” icon. The dialogue box will open.
 - Give your output image a name and make sure that it will be saved in the appropriate directory.
 - Select “Nearest Neighbor” for the resample method.
 - Check “Ignore Zero in Stats”, and click OK.



A status bar will display the progress of the geometric correction process. Click OK when The display reads “done”.

16. Open the corrected output image in the viewer with the reference image (map) to verify the accuracy of the correction process.
 - To help with the accuracy inspection, use the “Blend” utility.
 - Open the corrected image in the viewer with the reference image.
 - In the viewer tool bar click on “Utility”, choose “Blend”.
 - A utility box with a slide bar will open in the viewer.
 - Click and hold the button on the slide bar and slide the button back and forth in the utility box. This will make the top image variably translucent. Adjust it so that you can see some elements of both images at the same time and see how they line up. Features in the top image should appear directly over the corresponding features in the bottom image.

If there are any areas that were not properly corrected, this is the best time to go back and try to get it properly lined up with your reference image. Make sure that the GCPs (input and reference) are on corresponding points and that the RMS error value is as low as possible. Points with a relatively high value in the “Contrib.” column are likely sources of error in the RMS error value and should be adjusted first.

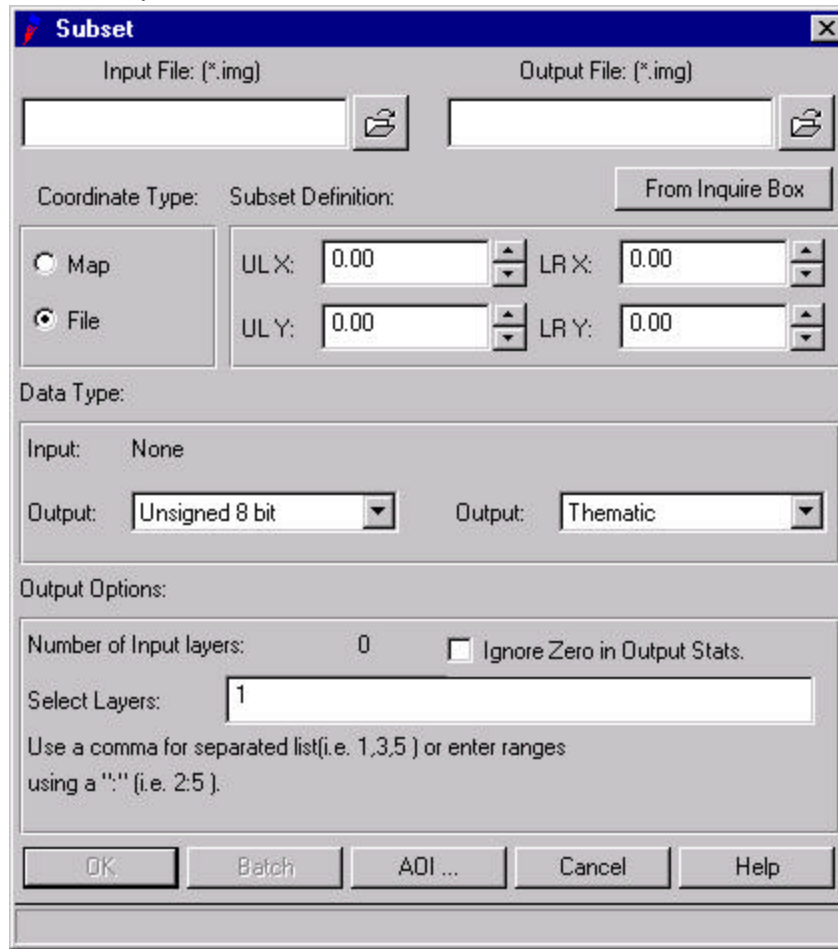
Once the GCPs have been re-adjusted, perform the resample process again and check the accuracy of the new output image.

Repeat this process until the image has been corrected to your satisfaction. Always save your input and reference GCPs so that you can make changes later if necessary.

III. Clipping Rectified Images

Once all of the images in your data set have been geometrically corrected and referenced you should open several of them in a viewer and check them for the amount of overlap between the photos. Some of this overlap can be clipped from the images to save file space and to eliminate the portion of the images with the least accurate data.

1. Open some of the images to be clipped in a viewer and open one particular image to be clipped in another viewer. (The viewer with one image will be the image to be clipped while the other viewer will serve as a reference data set to make sure that you are leaving the appropriate amount of overlap.)
2. Activate the viewer with the image to be clipped and select "Utility" from the viewer menu bar, select "Inquire Box".
3. An inquire box will open in the viewer, drag and stretch the inquire box to the desired image coordinates to select the area that you want to clip out of the image. (Check the images in the other viewer to be sure that you are leaving sufficient overlap.)
4. Click on the DATAPREP button on the main IMAGINE tool bar, select "Subset".
5. The subset dialogue box will open.
 - Define the input file name (the image that you are clipping) and the output file name and directory.



- Click the "From Inquire Box" button.
- Check "Ignore Zero in Output".

- A status bar will be displayed. Click OK when done.
6. Open the new clipped image and make sure that it is the desired dimensions. Repeat this procedure for all of the images that you wish to clip.

III. Image to Image Rectification

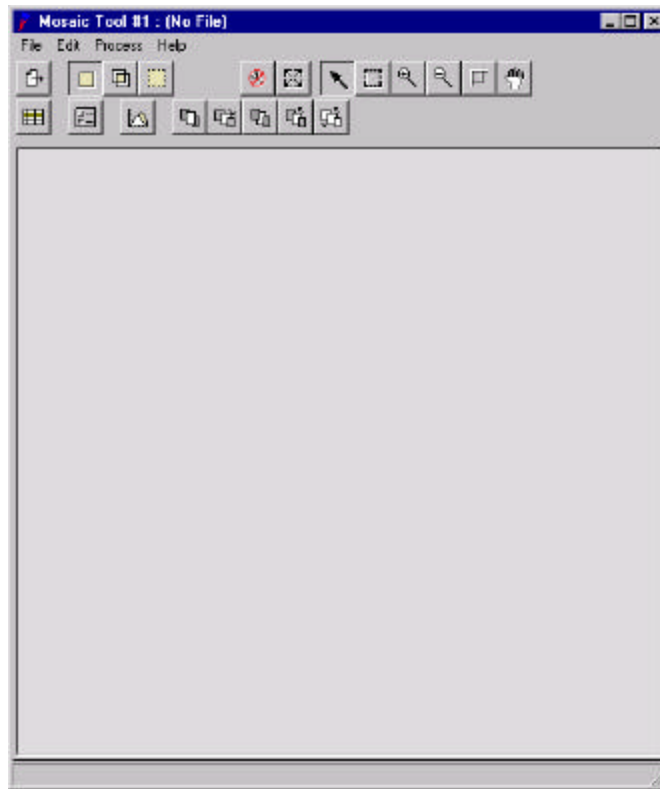
After the images have been rectified, referenced and clipped, you must open them in a viewer to inspect them for image to image accuracy. The goal is that they all line up perfectly along the edges. Areas that do not line up accurately will need to be further rectified.

1. Open the image that needs further rectification (input image) in one viewer and open the images that this image will be rectified to (reference image) in another viewer.
2. Follow the procedure for image rectification described above for all images that need image to image rectification until they line up along the edges satisfactorily. The only difference between these two steps is that you are using rectified images for your reference coordinates rather than a DRQ.

IV. Mosaicking the Clipped and Rectified Images

After you have rectified the images and clipped them to the desired size, you are ready to use IMAGINE's Mosaic tool to compile your images into one composite image.

1. Click the "DATAPREP" button on the main IMAGINE tool bar. Select "Mosaic Images", the Mosaic Tool viewer will open.
Under the menu bar are the buttons that you will use most often while mosaicking. In the top row, from left to right are: the Add Images icon, the three mode buttons are next, they are, Input Images Mode, Set Intersections Mode, and Output Images Mode. In the second row, the first button is the Display Image List button, this provides you with information about the images in the Mosaic Tool viewer.



2. Click the “Add Images” icon. (Looks like a sheet of paper with an arrow over it)
3. The “Add Images for Mosaic” dialogue opens. Navigate to the directory containing the images that you want in the mosaicked image and add all of the images to the mosaic viewer.
4. Now click the “Set Intersection” mode button.
5. The display changes to show the areas where the images overlap. While holding down the “Shift” key click the mouse in the areas of overlap between the photos in your mosaic until you have selected all of them. The selected areas are highlighted in yellow.
6. When you changed modes from “Input” to “Intersections” the second row of buttons changed as well. The Fifth button in the second row is the “Set Default Cutlines for Intersections” button. After you have selected all of the intersections to be joined, click this button. A red line is drawn through each highlighted intersection.
7. Now click the “Output Images Mode” button. The display changes and the images are shown “cut” to the new dimensions where they will be joined.
8. Click “Edit” on the menu bar. Choose “Image Matching” in the “Edit” menu. Choose “For All Images” in the “Matching Options” dialogue box and click OK.
9. Again choose the “Edit” menu. This time choose “Set Overlap Function”. Choose “Cutline Exists” in the “Set Overlap Function” dialogue box. Select “Cut Only” and then click “Apply”.
10. Now click “Process” in the menu bar and choose “Run Mosaic”. Choose a directory and file name for your new image. Check “Stats Ignore Value” and make sure that it is set to zero. Leave other settings as the defaults. Click OK. A progress bar will open that shows the status of the mosaic process. When it is done click OK.
11. Save your mosaic layout as a *.mos file, also save the layout as an annotation layer by choosing “Annotation” under “File” on the menu Bar.
12. Open your new image in a viewer and make sure that it was constructed properly.

V. Subsetting an Image in IMAGINE

Now that you have created a mosaic image you can subset the mosaic into smaller manageable images that can be viewed separately.

1. Create a spatially referenced vector grid that corresponds to the size and shape of the images you wish to subset from the mosaic.
2. Open the vector file in a viewer. Make sure that the vector layer has a clean topology. (You can use the "Clean Topology" utility under the "Vector" button on the main IMAGINE tool bar.)
3. Click "File" on the viewer tool bar and choose "New" → "AOI Layer". (You will not see any change in the viewer.)
4. Select all features in the vector layer and choose "Copy to AOI" under "AOI" on the viewer tool bar. You can now close the vector layer – leave the new AOI layer open.
5. Open the image that you wish to subset and arrange the layers so that the AOI layer is the top layer. (You are now ready to begin subsetting the image.)
6. Click "Utility" on the viewer tool bar and choose "Inquire Box".
7. Move the inquire box to inside one of the polygons on your AOI layer. Choose "Fit to AOI" on the inquire box dialogue box.
8. Click the "DATAPREP" button on the main IMAGINE tool bar. Choose "Subset Image".
9. Fill in the options in the "Subset Image" dialogue box and click the "From Inquire Box" button as described above with the exception that this time click the "AOI" button on the bottom of the dialogue box as a last step.
10. Open the new image to check that it was properly clipped.
11. Repeat this as necessary.