GEPL 4500/5500
Lab 1 Georectifying Imagery

Two of the hardest parts of remote sensing can be importing data as well as georectifying the image to a coordinate system that is accurate

Imagery to Use

To Start the Georectification
Open the image in one viewer. Select **Raster/Geometric Correction**…from the Viewer menu bar. → the Set Geometric Model dialog will open.

Select **Polynomial** and click **OK**.
→ the Geo Correction Tools dialog opens along with the Polynomial Model Properties dialog. Leave it alone for now. Click on the cross hairs in the Geo Correction Tools box that has appeared at the top of your screen.
GCP Tool Reference Setup dialog opens.
→ This dialog will allow you to enter Ground Control Points (GCP's) from an ASCII file or a digitizing tablet, things that you may want to do in the future… You will then need to choose "Text Only" because you will be typing your Ground Control Points in. (For other occasions you will be able to do image to image rectification which is a lot easier).
The Reference Map Information dialog opens. You will need to choose the projection. Click on Add/Change Map Projection. Make it Universal Transform Mercator (UTM) WGS North, zone 17. Click OK here also. The GCP tool will open.

You will be using Topozone.com to get your latitude and longitude of GCP's. Once you get a Toledo map on the screen, you can choose at the bottom the format of the lat/lon. You will want to use decimal degrees. Also, use it at 1:25,000 scale.
GCP Tool – This is where you will create your GCP's.
→ to create a GCP, click on the bulls-eye button on the GCP Tool. Then, click on the image where you would like a GCP to be. The GCP will be numbered starting with one. You can zoom in on the image or use the chip extraction viewer that appeared when you opened the GCP Tool. The X input and Y input values from the point you selected will appear in the GCP Tool. Now, get the latitude and longitude for the same location from topozone.com and enter it into the X Ref and Y Ref. Use intersections because they are the easiest to identify.

→ After you make your third control point, the computer will make guesses as to the lat/lon of your new GCP's and put a bull's eye on

the reference image for you. More likely than not, the point will not match up. You will then need to click on the bull's eye and move it to the correct location.

→ Save the GCP's often. Erdas appears to have a bug that will delete all of your hard work if some actions are performed. Make sure that you save **both the Input, the X and Y input, and the References, X and Y Ref**. This is a two step process.

→ Create at least 30 GCP's They get faster to create as you get more experience.

→ To delete a GCP, right-hold on the GCP number in the Point # column and select the Delete Selection choice.

→ Check the error on the GCP's by looking at the RMS Error. You will need to scroll to the right to see it in the GCP Tool.

→ The RMS errors are small only zeros will appear in the X Residual, Y Residual and RMS Error in the GCP Tool. You will need to reformat these columns so that the values are in scientific notation. Highlight the three columns and right-click on the X Residual column head. Choose Format. The Number Format dialog will open. Scroll down and choose 0.00E+00, scientific notation and click Apply. Values should now be visible. If the error is still too small for the total values to show anything but 0, make a quick average from the pixel column.

Throughout these steps, go back to the Polynomial Model Properties dialog to check the polynomial order and the coefficients that have been produced. Try different orders of polynomials to get the smallest RMS error. Write down the coefficients from your polynomial from the Polynomial Model Properties dialog. Click the Transformation tab to see them. You will have to click on apply when you change the polynomial. The higher order polynomial you use, the more coefficients you will have. In addition, write down the x, y and total RMS error from the top line of the GCP Tool. These are things you will need to hand in.

Once you have chosen your GCP's and applied the polynomial of the correct order, you will need to resample the image to remap the values.

→ Open the Resample dialog box by clicking on the colored tilted square in the Geo Correction Tools dialog. If the box is not highlighted so you can use it, click on the GCP Tool box and it should come up.

→ Under the Output File:)*.img), choose the directory that you will save your georectified image in and enter an output file name.

→ Under the Resample Methods; choose Nearest Neighbor.
→ Click on the Ignore Zero in Stats.
→ click OK. The Resample dialog box will close and the job status dialog box will open. It will show how much of the image has been resampled.
→ When the job status dialog box says that the process is done, click OK.

To verify the rectification, open the new image in the Viewer and use the Inquire Cursor to check the latitude and longitude.

Please hand in on Monday, February 17:

1. What is the accuracy of the Landsat 7 image rectification in meters for Aug. 8, 2002? You will need to get this image from the RAID if Adam has not put in on your computer. What points did you use to determine this? Find the latitude and longitude of an identifiable object such as an intersection in the image and compare it to the lat/lon that the image shows. Use two points. (in a real study, you would want to use many pixels scattered throughout the image to get a more accurate answer.

	Location	Lat	Lon	Error (m)
1.				
2.				

2. Printouts of your rectified images. To print the images, use the print screen option to convert the files to jpeg's. Then, insert the images into a Power Point file and print.
3. The coefficients from the polynomial that you used, its order and the X, Y and total RMS error associated with it.
4. A list of your ground control points.
5. The resampling scheme that you used.

Grading: Most of the grade for this lab will be determined by your ability to finish the georectification. The last few points of the lab will be determined by comparing the RMS error for your rectification for the RMS error for a rectification that I performed. This is just a fun part of the grading since it will not amount to much of your final grade.