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**Geog 577 Advanced Remote Sensing**
**Jan 24, 2007**

# Lab 1: Import/Export Image into/out of Imagine

## Questions

(1) Use your own words describe the Objectives and the Steps.

The objectives were to import images into Imagine and set its coordinate system using data from the header file so that further spatial analysis could be done. The steps were to import each of the 6 bands as general binary files, export them as Imagine files, perform a layer merge to combine all the bands into one file, then edit the coordinate system to change it from Unknown to WGS84, based on the information provided in the header file (actually supplied in the lab instructions because the images were clipped to show just Chapel Hill).

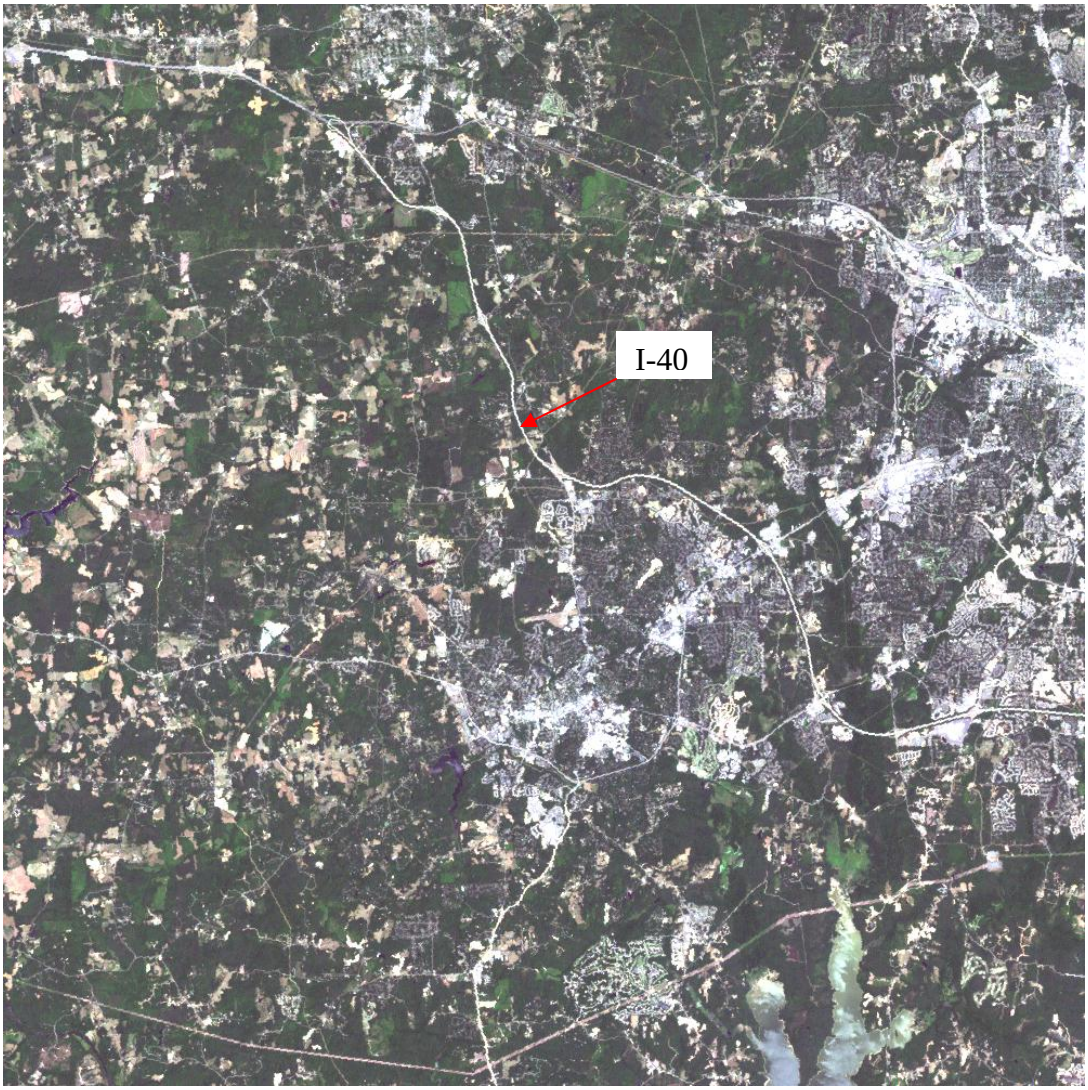
(2) In the ImageInfo window, click the Histogram tab, and examine the shape of the histogram for each band (layer), and describe the characteristics of the histogram for each band and its implications.

Band 1: There is a sharp peak in the number of pixels at around 71, with little to no pixel counts anywhere else between 0 and 255. The implications are that this is a low-contrast image because of the sharp peak, and its centering around 71 means the image is relatively dark. Since Band 1 picks up reflected light in the blue portion of the spectrum and there are many pixel counts around 71, much of the ground must be reflecting roughly uniformly at these wavelengths.
Band 2: The same shape peak occurs as in Band 1's histogram, but it is centered at 54 instead of 71. Thus, Band 2 is darker than Band 1 (there must not be as much green reflectance as blue-green reflectance).
Band 3: The same shape peak occurs, but this time centered at 38, and it trails off farther to the right than in either Band 1 or 2. This means Band 3 must be darker than Band 2 (there must not be as much red reflectance as green or blue-green reflectance), and the trailing off to the right means the image has more contrast.
Band 4: This is the first IR band, and its histogram looks much different from those of Bands 1-3. There is a broad number of pixel counts in the middle (from about 70 to 140), centered around 103. However, the pixel counts are lower than in Bands 1-3. There is also a negligible peak at 26. The broader histogram indicates a higher-contrast image than was the case for the visible bands, indicating the ground has a wider range of reflectances in IR.
Band 5: This histogram looks similar in shape to those in Bands 1-3, but is much broader, trails off to the right farther, and is centered around 77. This means the image is generally dark, but still has a good amount of contrast in the mid-IR range.
Band 7: There is a sharp peak at 33, and the histogram trails off broadly to the right until about 120. This indicates that Band 7 is low-contrast in the longer-

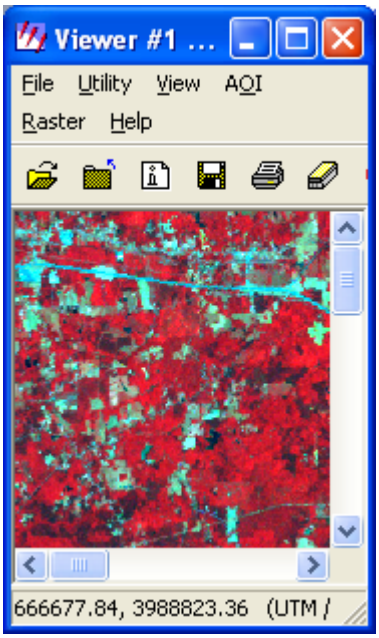
wavelength mid-IR range.

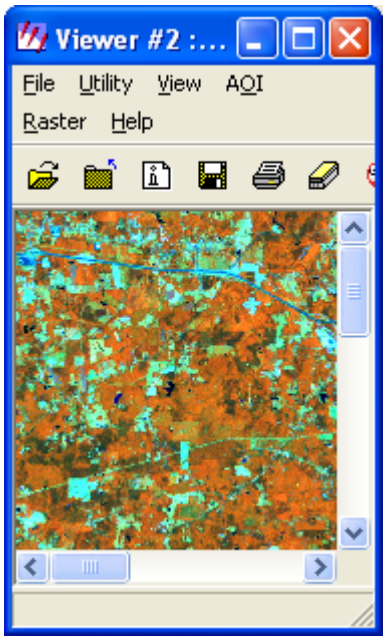
(3) Please manipulate the images with all the skills you have and identify the following features: I-40, Kenan Stadium, Friday Center, Saunders Hall, Old Well. Describe how you identified them. If not, why? Export the image into Tiff or JPG image and included them into your lab report. Please mark the features on the image in your report.

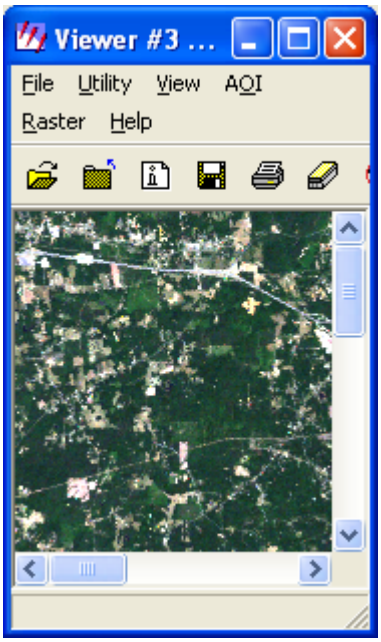
I-40: I looked for a line thicker than any other line (due to I-40 having more lanes than other highways), running in a general northwest to southeast direction, and being highly reflective in the visible bands.
Kenan Stadium: could not identify because the 30x30 meter pixel resolution of the Landsat image was too coarse to identify the stadium. If we could use the Ikonos image, its 1x1 meter resolution would have made the stadium visible.
Friday Center, Saunders Hall, Old Well: also could not identify due to the coarse pixel resolution of the Landsat image.



(4) Open another Viewer, and open chapelhill-etm-24may2002.img, click Raster/Band Combination, Set Red to band 4, Green to band 5 and Blue to band 3. Put this viewer side by side with the Viewer already open with Band Combination set to RGB=432. Open a third Viewer, and set the band combination to RGB=321.Describe how the image looks like in the three viewers, and explain. Which band combination provide the most detailed information for land surface features, and why?




| RGB = 432 | RGB = 453 | RGB = 321 |
|---|---|---|
| Vegetation appears red because of high IR reflectance | Vegetation appears orange because of high IR reflectance | Vegetation appears green |
| Cropland is blue-green | Cropland is cyan | Cropland is light brown |
| Developed areas are light blue because these places reflect shorter wavelengths | Developed areas are darker blue | Developed areas are white |

I think that RGB = 453 is the best of these three choices because there is greater contrast between cropland and developed areas, and water (University Lake) clearly stands out as being dark. The more densely vegetated areas are brighter orange in color. RGB = 453 has the best contrast between land features.

(5) Click File/Open/Raster Layer, a new window will appear. Click the Raster Options tab first and uncheck Clear Display. Click the File tab on the top, and select Ikons_chapelhill-BGRN.img. click OK. You will see an Ikonos image for Chapel Hill is superimposed on the Landsat 7 ETM+ image.

i) Guess what season this Ikonos image was taken and why?
The season was winter because after setting RGB = 321, I could see the pine trees stand out in green while the hardwoods were in brown, indicating they had lost their leaves.

ii) How well the Ikonos image and the Landsat image are matched geographically. How did you find out?
To find out, I looked at their header files. They both used the WGS84 datum and UTM projection, so based on that, they should be perfectly matched geographically. However, when I used the Swipe tool from the next question, it appeared that the Ikonos image was shifted a bit to the northwest by several meters compared to the Landsat image.

iii) Zoom in the image so that you can see the ground features more clearly on the Ikonos image. Click Utilities/Swipe…, slide the bar on the top to see how the image change from one spatial resolution to the other spatial resolution. You can swipe the images vertically or horizontally. What did you learn about the Landsat image through this swiping exercise?
The Landsat image is of much coarser resolution than the Ikonos image (30 m compared to 1 m), and there is a bit of a northwest shift in the Ikonos image compared to the Landsat image.