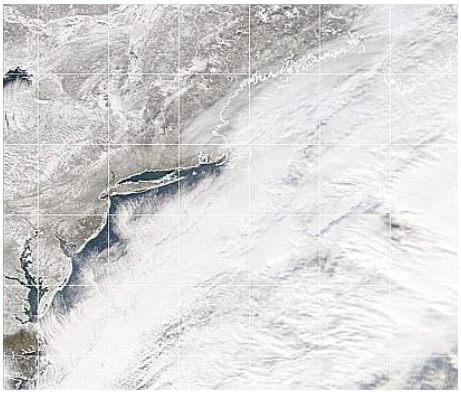
Exercise #3

Introduction to Imagine



Objective

- **To introduce basic ERDAS IMAGINE display and screen cursor control procedures.**
- **To examine pixel information in image**
- **To examine spectral information in image**

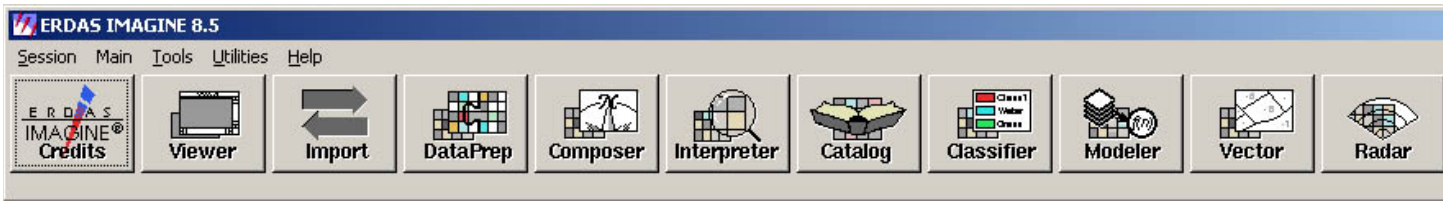
Part I - Introduction to ERDAS IMAGINE

During this semester, we will be using ERDAS IMAGINE image processing for Windows NT. ERDAS (Earth Resource Data Analysis System) is a mapping software company specializing in Geographic Imaging solutions. (They are actually now Leica Geosystems.) Software functions include importing, viewing, altering, and analyzing raster and vector data sets. For more information on ERDAS, you can browse their company web page.

We will be analyzing Landsat images in this exercise. Follow the directions given to you in class to login to the system. The imagery that you will work with is installed locally on each machine to reduce loading times. It is located under the data directory for this class. Each of you should create a folder on your local hard drive where you can store your own files. This will speed up access times. One of the first things to do is to set the Preferences in the program to point to your local storage area.

After you have successfully logged onto the system, launch IMAGINE by going to the Start Menu -> ERDAS -> Geospatial Imaging 9.3 -> ERDAS IMAGINE 9.3. Choose the Classic View. Examine the icon panel along the top of the screen. These icons represent the various components and add-on modules available with the University's current license. You have the option of displaying the icon panel horizontally across

the top of the screen or vertically down the left side of the screen using the [Session | Flip Icons] menu item.

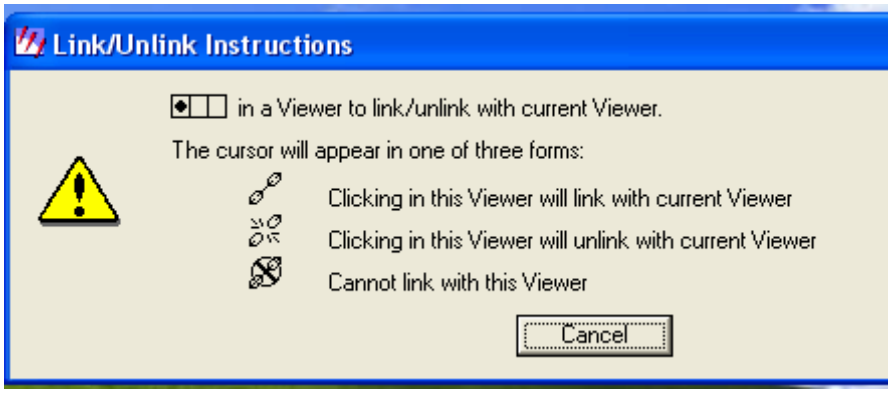


Familiarize yourself with the five menu items located along the top of the icon panel in the left corner: Session, Main, Tools, Utilities, & Help. The Session menu controls many of the session settings such as user preferences and configuration. The Main menu allows access to all the modules located along the icon panel. The Tools menu allows you to display and edit annotation, image, and vector information, access surface draping capabilities, manage post script and true type fonts, convert coordinates, and view ERDAS Macro Language (EML) script files. The Utilities menu allows access to a variety of compression and conversion algorithms including JPEG, ASCII, image to annotation, and annotation to raster. The Help menu brings up the On-Line Help documentation as well as icon panel and version information. An index of keywords helps you to quickly locate a help topic by title. A text search function also helps you find topics in which a word or phrase appears. **For help you might like to use the .pdf manuals which are available on your local drive**. They are located in the Program Files subdirectory for Imagine under the help folder (C:\Program Files\ERDAS\Geospatial Imaging 9.3\help\hardcopy). The ones that are most useful are the Essentials_TG (a tutorial) and the FieldGuide (a reference/user's manual). You can page through these using Adobe Acrobat, or you can copy them to your own CD or flashdrive and print out the relevant sections at home (not here – they are 670+ pages each!)

The menu you will probably use the most under the Session menu is the Preference Editor. The Preference Editor is accessed under [Session | Preferences]. It allows you to customize and control many individual or global IMAGINE parameters and default settings. Use the left mouse button (lmb) on the scroll arrows on the side of this menu to examine the available categories. Your first task will be to follow the tutorial in Chapter 1 of the Tour Guide thru' section "Profile Tools". Stop when you get to the section on Image Drape. Set up your preferences to fetch and store images from your local directory.

Important Note – At various times when you are using the Imagine software a pop-up window like the one below will appear. In the event that you are confused by the symbols, you should be aware that the little box at the top which is divided into three represents a mouse and its three buttons. In the case of the instructions below, you are

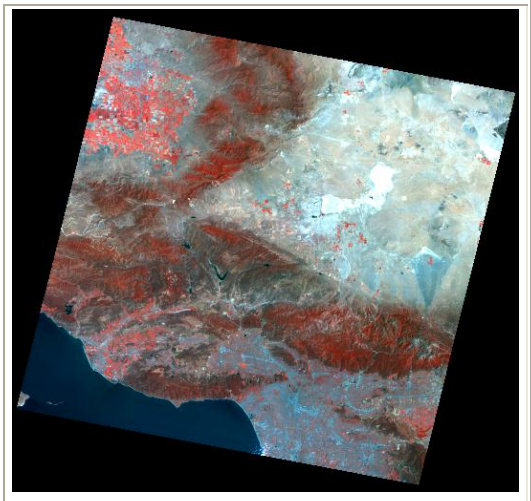
asked to click the left mouse button inside one of the Viewer windows, at which point you will be given a cursor looking like one of the three icons shown.



Another note – the acronym AOI – which appears quite often, stands for “Area Of Interest”.

After you have worked through this hands-on tutorial, apply your skills to carrying out the following analysis of the Landsat image of the Los Angeles area.

Part II - Image Display

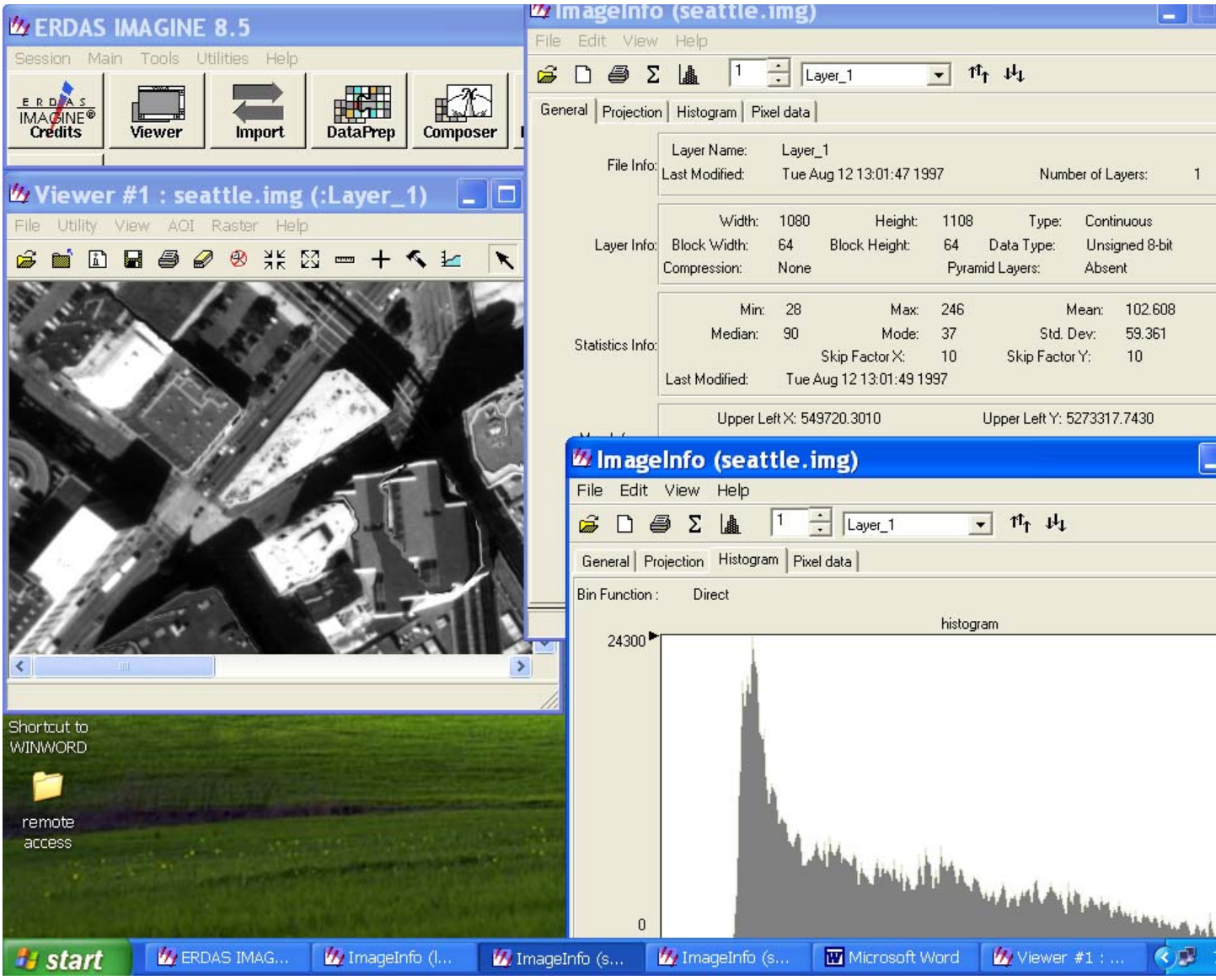
File Name	***LosAngeles_890628_7band.img***	Quick View
Location	Los Angeles, California	
Sensor	Landsat TM	
Spatial	30 x 30 meters	
Temporal	28 June, 1989	
Spectral	7 bands	

Move the cursor to the IMAGINE Viewer and select the File dropdown menu with the lmb. In the file menu select the [Open] option and then slide to the menu which opens to the right and select the Raster option to get the corresponding menu. You can also type [Ctrl R] to access the open raster layer menu if the cursor is over the Viewer or you can click on the Viewer icon that looks like a manila folder that is half open. Additional Viewers may be opened by clicking the Viewer icon on the IMAGINE icon panel.

Locate the ex3 folder within the class data area on the network drive or your local drive and open it. On the left side of the menu you should see a list of files in your account. Position the cursor over the file you want to display (*LosAngeles_890628_7band.img*) and click the lmb once (do not double-click). The file name should appear in the file name window in the Viewer. If you do not see the correct files in your account then you are either not looking in the correct directory or you do not have the [Files of type] specified as IMAGINE Image (*.img).

Before clicking [OK], you need to assign the spectral bands of the image to the colors red, green, blue (RGB). First we will create a color infrared composite image (or "False Color" image). Click on the [Raster Options] folder tab and assign band 4 (NIR) to red, band 3 (Red) to green, and band 2 (Green) to blue. Make sure that the Display option is set to [True Color] . You also have the option of making the image fit the Viewer frame by depressing the small box next to Fit to Frame. Now you are ready to click [OK]. If the Landsat image is requiring less space in the IMAGINE Viewer (there are large black borders on the sides) then you can resize the IMAGINE Viewer to use your screen desktop area more efficiently. This will become important in future exercises when many IMAGINE Viewers will need to be open at once. To remove an image displayed in the IMAGINE Viewer move to the File dropdown menu in that Viewer and select it with the lmb, then find the Clear option and select it. You can also click on the "close top layer" or "eraser" tool icons in the Viewer. (If you right click within the Viewer window you can also "Fit image to window", and various other options.)

To find out additional information about this image, go to the [Utilities] drop down menu in the open Viewer. Choose [Layer Info] and wait for the Image Info dialog box to appear. You can also access this same screen by clicking on the "info" ("i") icon in the Viewer icon menu (third one from the left).



If, at any time, you wish to change the bands which are displayed, click on "Raster" then "Band Combinations" within the Viewer window. Now answer the following questions:

1. (a) What is the pixel size in the X and Y direction?

(b) What are the units of measurement?

(c) What is the map projection of the image?

(d) What are the minimum, maximum and mean brightness values for band 2?

(e) What are the minimum, maximum and mean brightness values for band 3?

(f) What are the minimum, maximum and mean brightness values for band 4?

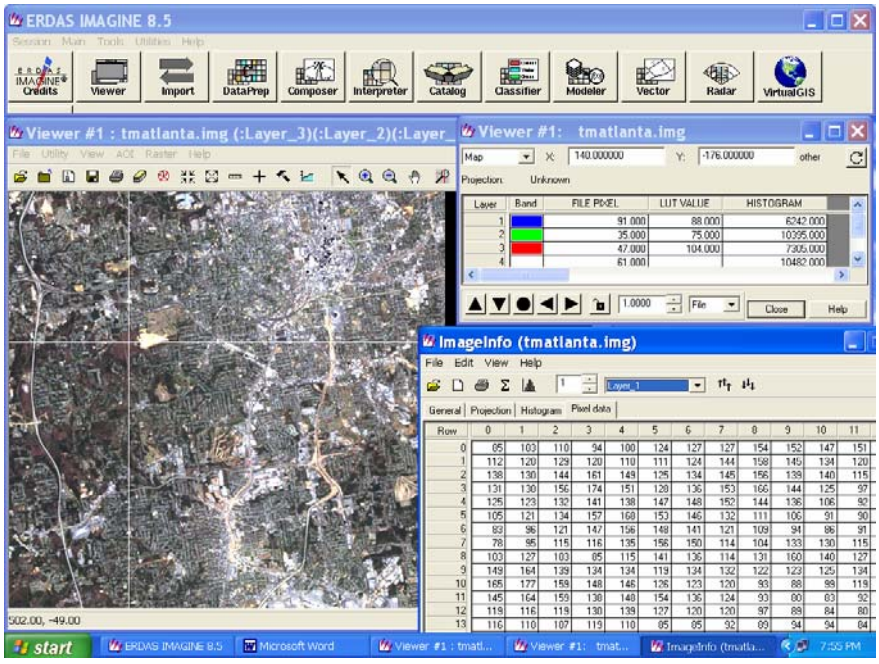
(g) Print out the histograms for the green, red and NIR bands (bands 2, 3 and 4).

(h) What does the x-axis of the histogram show? What does the y-axis show? Explain in a single sentence what the histogram shows.

(i) What do <u>you</u> think is the reason for the bi-modal distribution in the NIR band? (Think carefully about what a histogram shows.)

We will now determine the brightness values of specific pixels on the displayed image. The inquire cursor allows you to do this. Go into the Utility menu of the Viewer window and select [Inquire Cursor] (or select the + icon on the viewer tool bar). This will open a pixel information menu that allows you to move a crosshair cursor on the Viewer. The table shows the R,G,B pixel brightness values for both the image file (FILE PIXEL) and the color lookup table (LUT VALUE).

Move the Viewer Cursor and notice how the values change. To move the Inquire Cursor using the mouse you must initially place the arrow cursor at the center of the crosshairs and click on the lmb. Keep the lmb depressed to move the Inquire Cursor.



Now change the brightness/contrast by using the slider bar in the Brightness/Contrast box (accessed from Raster -> Contrast).

2. (a) When the brightness or contrast is changed what happens to the file pixel value?

(b) When the brightness or contrast is changed what happens to the LUT value?

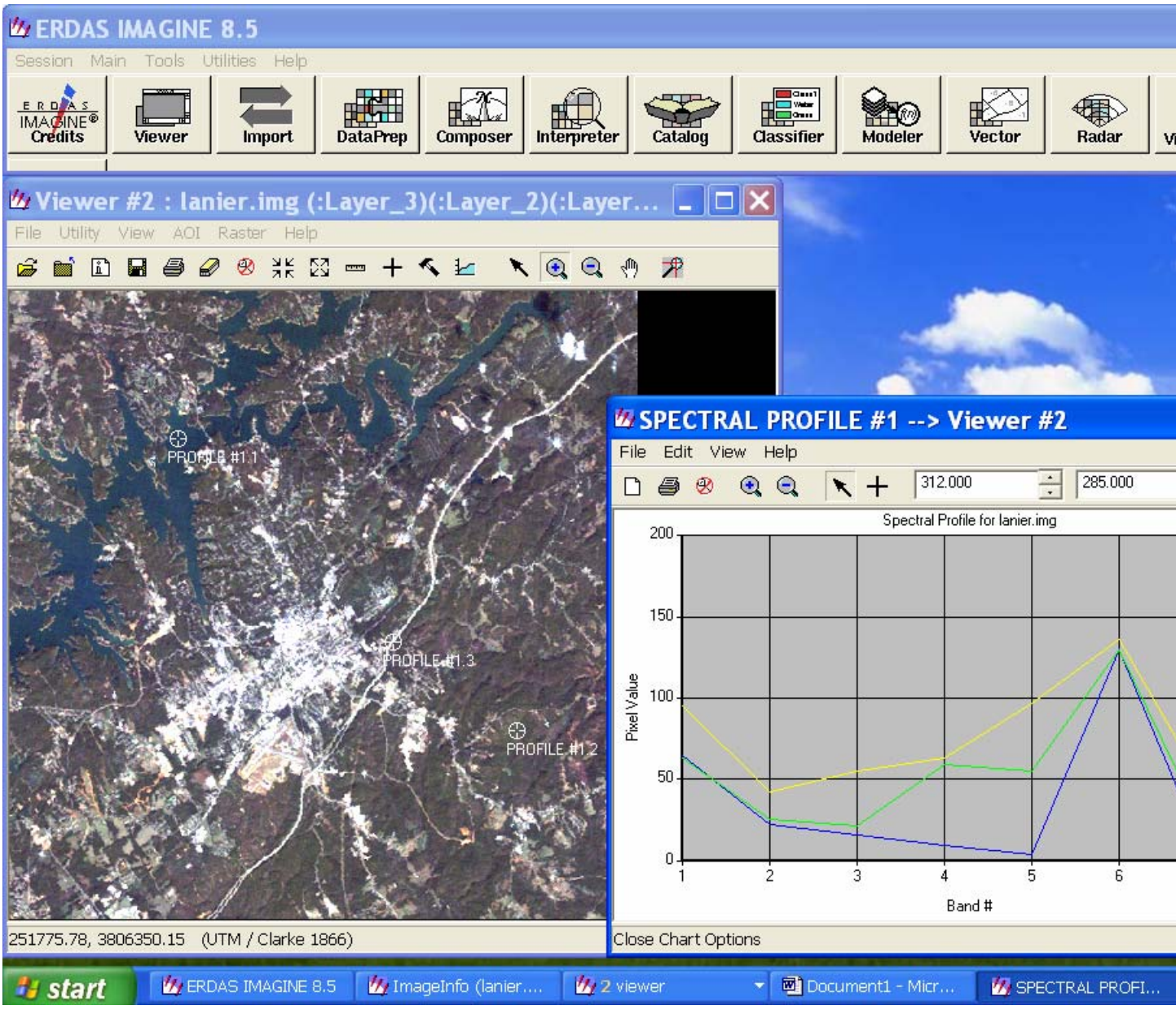
(c) What is the difference between a file pixel value and an LUT value?

Move the crosshairs around the image and note the pixel values for water, vegetation, and roads. Zoom in on pixels in the image representative of the following land cover – water, concrete/urban, beach, grass. Select a representative area for each of these land covers. Close the Inquire Cursor box.

You will now use Imagine to plot the Landsat spectral signatures of the four types of land cover identified above. It may help you to identify these if you have both "normal" and "false" color images on display together. Open a second Viewer and display bands 3, 2 and 1 as R, G and B. Zoom in to the appropriate areas to select individual pixels of water, concrete/urban, beach and grass. You can display (and print) the spectral profiles of these pixels as follows. Select [Raster | Profile Tools] in the Viewer menu bar. Select [Spectral] and click [OK]. Use the + icon in the Spectral window to select pixels on the image. For each pixel you select the spectral profile will be plotted. You can change the axes, the legend, the colors of the lines and the labels in the [Edit] menu.

3. Using the Spectral Profile, plot bands 1 thru' 5 (not bands 6 or 7). Color and label your lines appropriately and print out the four spectra. Select a background color and line colors/patterns so that the curves are distinguishable in your printout. Hand in your printout.

4. How do the <u>shapes</u> of the curves compare with the spectral signatures of grass, concrete and water that you plotted in exercise 1? Why can you only compare shapes and not reflectance values?



Last Modified: 8 Jan, 2009.
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