

Exercise #4A

Downloading and Stacking

Objective

- To download Landsat files from the Internet.
 - To import image files into *Imagine* and stack the bands as layers.
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Downloading Landsat Images

Landsat data used to be prohibitively expensive for extensive use in educational projects but ALL LANDSAT DATA IS NOW FREE!

A bulletin released by the USGS in April, 2008 made the following announcement:

“RESTON, VA The USGS Landsat archive is an unequalled 35-year record of the Earth’s surface that is valuable for a broad range of uses, ranging from climate change science to forest management to emergency response, plus countless other user applications. Under a transition toward a National Land Imaging Program sponsored by the Secretary of the Interior, the USGS is pursuing an aggressive schedule to provide users with electronic access to any Landsat scene held in the USGS-managed national archive of global scenes dating back to Landsat 1, launched in 1972. By February 2009, any archive scene selected by a user with no restriction on cloud cover will be processed automatically to a standard product recipe, using such parameters as the Universal Transverse Mercator projection, and staged for electronic retrieval. In addition, newly acquired scenes meeting a cloud cover threshold of 20% or below will be processed to the standard recipe and placed on line for at least six months, after which they will remain available for selection from the archive.

Newly acquired, minimally cloudy Landsat 7 Enhanced Thematic Mapper Plus (ETM+) data covering North America and Africa are already being distributed by the USGS over the Internet at no charge, with expansion to full global coverage of incoming Landsat 7 data to be completed by July 2008 (see timeline below). The full archive of historical Landsat

7 ETM+ data acquired by the USGS since launch in 1999 will become available for selection and downloading by the end of September 2008. At that time, all Landsat 7 data purchasing options from the USGS, wherein users pay for on-demand processing to various parameters will be discontinued.

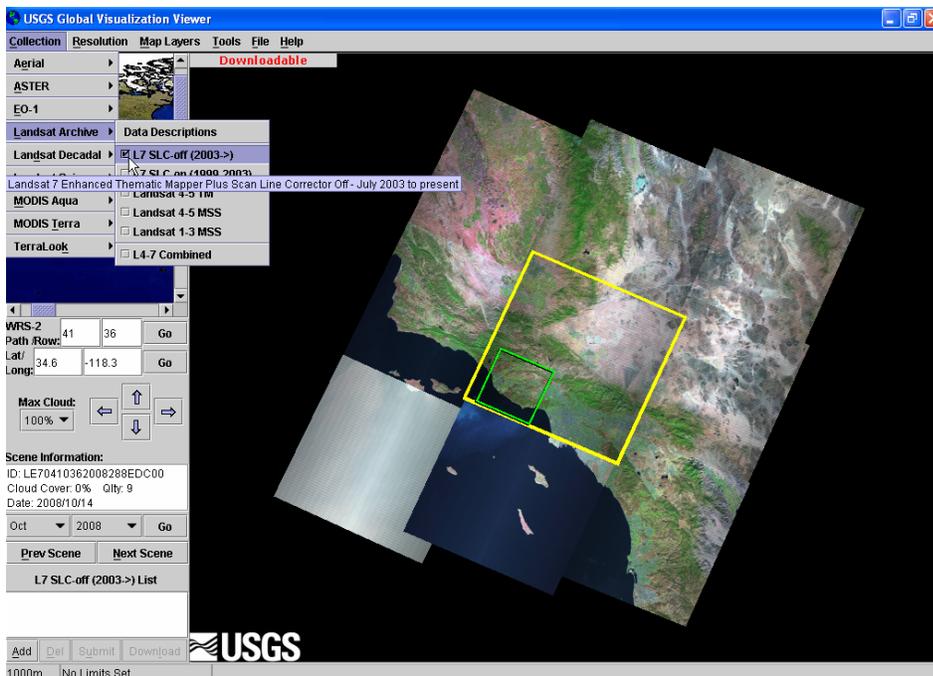
By the end of December of 2008, both incoming Landsat 5 Thematic Mapper (TM) data and all Landsat 5 TM data acquired by the USGS since launch (1984) will become available, with all Landsat 4 TM (1982-1985)

and Landsat 1-5 Multi-Spectral Scanner (MSS) (1972-1994) data becoming available by the end of January 2009. All Landsat data purchasing options from the USGS will be discontinued by February 2009, once the entire Landsat archive can be accessed at no charge.

Landsat scenes can be previewed and downloaded using the USGS Global Visualization Viewer at: <http://glovis.usgs.gov> [under Select Collection choose Landsat archive: L7 SLC-off (2003-present)]. Scenes can also be selected using the USGS Earth Explorer tool at <http://earthexplorer.usgs.gov> [under Select Your Dataset choose Landsat Archive: L7 SLC-off (2003-present)]. For further information on Landsat satellites and products, see <http://landsat.usgs.gov>"

Some Landsat data is directly downloadable. Other data requires that a request is submitted. Shortly thereafter, USGS will send out an email to let you know where they have posted the data for you to download.

I find the easiest access to the data is through <http://glovis.usgs.gov>. Don't bother with the map, simply click View Images. Under the Collection menu, select Landsat Archive, then select the Landsat instrument according to the data you wish to obtain. The quickest way to navigate to your area of interest is to type in a WRS-2 Path/Row. For the L.A. region this is path 41, row 36. Alternatively you can type in the latitude and longitude. Use the arrows to move to another scene. Choose your scene date by selecting the month and year below the scene information, or you can flip through the scenes by pressing "Prev Scene" or "Next Scene". If you find an image you want, press Add (bottom left). Every now and then red text "Downloadable" will appear in the top left corner of the image (as shown above). That means you can download the image immediately. To do this press the Download button (bottom left). If the "Downloadable" text does not appear, press Submit, and you will be notified of the download instructions by email.



Preparing the files for use

Use “My Computer” to select the folder containing the downloaded files. They should appear with the WinZip icon (meaning they are compressed). Click on the first one. The WinZip program loads. Choose “Extract”. The file will uncompress. Do this for each `_nn` file. You now have 6 (or 7) GeoTiff files. You must now import each of these into *Imagine* format. Load *Imagine*. Select “Import”. For Media type, select File. Then select GeoTiff from the range of available formats. Next, find your file (do one by one) in the Input File window. For the Output file, use the same folder and the same file name. (The file will be given the extension `.img` instead of `.tif`). Now you have 6 or 7 separate *Imagine* image files. Each one contains brightness values for one (wavelength) band. They can be opened individually as Raster files in the Viewer, and each will show a greyscale image of the same area taken at a different wavelength.

Stacking the layers

Stacking is the name of the process by which the different bands (or layers) of information are overlaid in one file. This allows you to display true and false color images by assigning Red, Green and Blue display colors to 3 different layers. Select Interpreter -> Utilities -> Layer Stack. Under Input File select the `_nn1` file. Press “Add”. Select the `_nn2` file. “Add” it. Repeat for all layers except 6, which is a different pixel size. When you have added layer 7, go to your folder in Output File and enter an appropriate file name. You do not need to enter the `.img` extension. Then press OK. The stacking will be carried out and a new *Imagine* file containing all the bands will be created. You can open this as a Raster file in the Viewer, and assign colors to the bands as you wish.