USGS
science for a changing world

LANDSAT Newsletter

November, 2006

Interactive Spectral Characteristics Plotter

"What are the best spectral bands to use for my study?"

This is a common question asked by users of remotely sensed data, novice and expert alike.
Landsat Data Continuity Mission (LDCM) scientists have developed an interactive tool that helps visualize how bands of different satellite sensors measure the intensity of the wavelengths of light (the relative spectral response, or RSR). By overlaying the curves from different spectra, users can determine which bands of the selected sensor will work best for their application. It is also possible to overlay the atmospheric windows, as well as convolve the feature's spectrum with each sensor's RSR. Information and the link to the tool can be found at http://ldcm.usgs.gov/spectral_plotter.html.

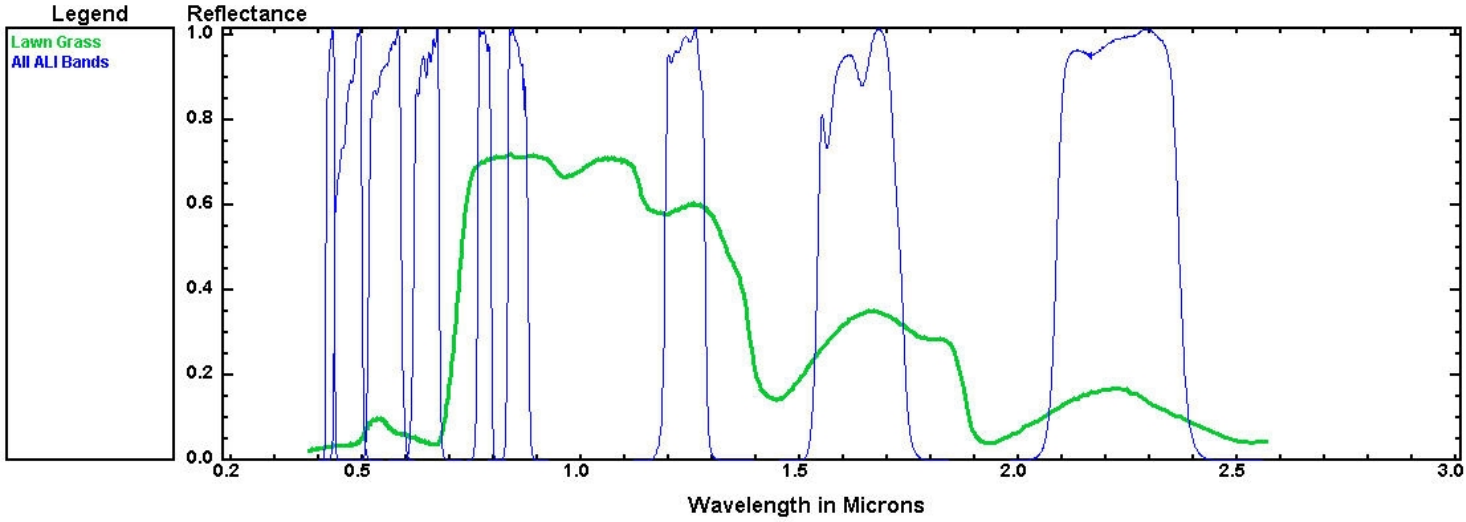

Figure 1. Spectral graph

Landsat Sales for the 2006 Fiscal Year

The Landsat Project distributed over 11,500 Landsat 1- 7 scenes. Customer requests for Landsat 7 SLC-off data continued to increase steadily over last year.

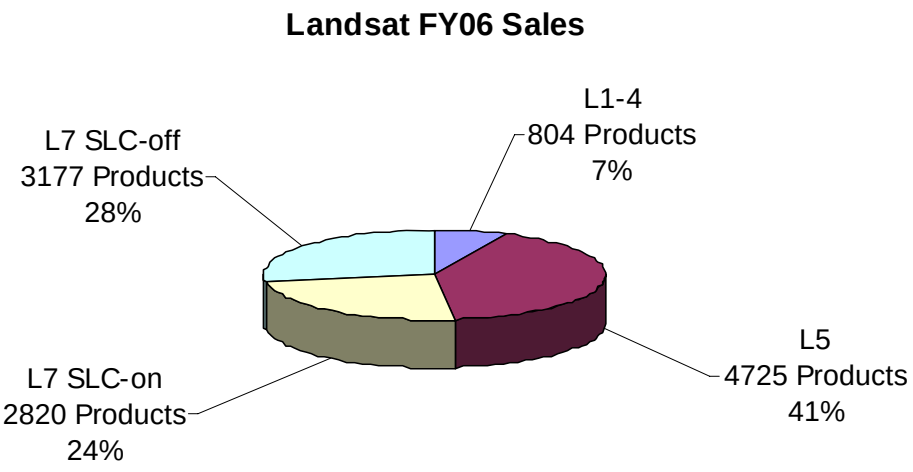

Figure 2. Landsat data sales for the 2006 fiscal year.

The Mid-Decadal Global Land Survey

The U.S. Geological Survey (USGS) and the National Aeronautics and Space Administration (NASA) have joined together to augment a series of decadal global land surveys with a new one based around the 2005-2006 time period. The Mid-Decadal Global Land Survey will be similar to surveys from the 1970's, 1990, and 2000, but will increase the total coverage and, for the first time, include Antarctica.

The Mid-Decadal survey has been organized into two phases: the USGS leads Phase 1, Data Acquisition, and NASA leads Phase 2, Product Generation. In Phase 1, primary consideration is given to the data acquisition specification for seasonality, based on geographic location, climate, and cloud cover.

Landsat 7 is a global survey mission, and much of the data for the entire Earth's surface is already in the Landsat archive. USGS holdings of Landsat 5 data, however, are restricted in geographic scope to scenes in the United States. To complete a global survey with Landsat 5, all scenes outside the United States will be acquired by our international cooperators around the world. The Landsat network of international cooperators is offering unprecedented support to complete the Mid-Decadal survey effort.

Landsat Data for International Polar Year Studies

The first International Polar Year (IPY) was in 1882 – 1883 and was the first of many opportunities to broaden our understanding of the Polar Regions through interdisciplinary research. The next IPY will run from March 2007 to March 2008 to allow research on both poles during the winter and summer seasons. Research relating to the IPY will cover a wide variety of topics, from social change in Polar Regions to shifting ice shelves in Antarctica. One IPY effort is the first Landsat mosaic of Antarctica. With over 1,000 scenes, it will be one of the largest mosaics of Landsat ever created. These data will be hosted free to the public through a user portal that is currently under development. Scene-based data, and three versions of the mosaic (panchromatic; 3,2,1 combination; 4,3,2 combination), will be web-enabled for download as they become available.

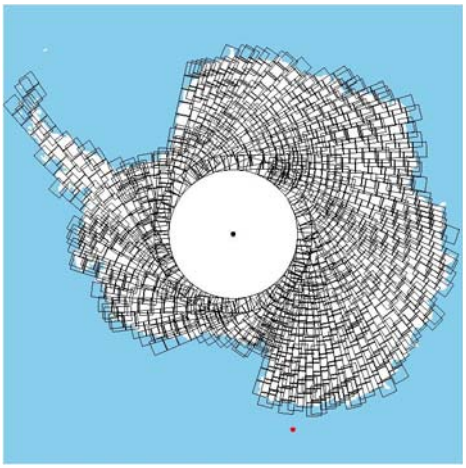

Figure 3. This map represents the extent of the Landsat mosaic. Because of Landsat 7's near-polar orbit there is a "hole" at the South Pole.

Figure 4. This scene is an example of the beautiful imagery that the ETM+ sensor has acquired of Antarctica. (Path 128 - Row 108; September 9, 2006)

EarthNow! Goes Live

The EarthNow! Landsat image viewer (http://earthnow.usgs.gov) went live on November 2 at the USGS Center for Earth Resources Observation and Science (EROS). EarthNow! displays data received from the Landsat 5 and Landsat 7 satellites as they pass over the United States. When a Landsat satellite passes within range of the ground station at USGS EROS, image data are downlinked and displayed in near-real time. When Landsat 5 and 7 are not in range, the most recent 10 passes are displayed. EarthNow! was created as an outreach tool by the Landsat project at USGS EROS, and a version was installed on November 11 at the National Air and Space Museum in Washington, D.C..

Landsat 5 for Alaska - Successful 2006 Season

The multi-agency collaboration to [capture] Landsat 5 data for Alaska for the 2006 season was a success, with 4,780 scenes acquired over Alaska, eastern Siberia, and western Canada. Landsat 5 depends on direct downlink capabilities to transmit images to the Earth. Starting in the spring of 2005, USGS EROS, the National Oceanic &

Atmospheric Administration / National Environmental Satellite, Data, and Information Service (NOAA/NESDIS), the Fairbanks Command and Data Acquisition Station (FCDAS), and the University of Alaska's Geographic Information

Network of Alaska (GINA) worked together to use the FCDAS's receiving station, GINA's network and user services, and USGS EROS processing, archive, and user services to capture data within the FCDAS Station Mask. Since the spring of 2005, the program has contributed 8,669 scenes to the National Satellite Land Remote Sensing Data Archive.

Much to the relief of Alaska residents, the 2006 fire season was mild compared to the record breaking 2004 and 2005 seasons. Nonetheless, Landsat 5 data for Alaska has proven invaluable to fire managers and ecologists for mapping and assessing the severity of 2006 fires, and studying the ongoing ecological recovery from fires in previous years. Fire scientists are not the only users of Landsat 5 data, and scientists and engineers will also benefit from the record of Alaska captured in 2006 through this unique cooperative effort.

ASPRS Moderate Resolution Remote Sensing Survey Results are in!

The American Society for Photogrammetry and Remote Sensing (ASPRS) recently undertook a survey of the Landsat user community on the future of U.S. land imaging at moderate resolution (5-120 meter pixels). The results were presented to the Future of Land Imaging Interagency Working Group (FLI IWG). This team was established in 2006 by the White House Office of Science and Technology Policy and directed to create a plan for an ongoing, operational U.S. land imaging program with technical, financial, and management stability. We've included a few of the survey's key findings here.

1,295 voluntary respondents participated.
- 71% of those participants use Landsat as the primary source of moderate resolution data.
- 72% stated that Landsat is a primary, critical dataset for their applications.

The top 5 reasons participants use Landsat data instead of other remote sensing data are (in order of importance):
1. Landsat data are more accessible.
2. There is a large Landsat archive containing over 30 years of consistent data.
3. Landsat data are relatively less expensive.
4. The extent of Landsat scenes is more appropriate for the respondent's project.
5. Landsat has better temporal resolution (repeat coverage).

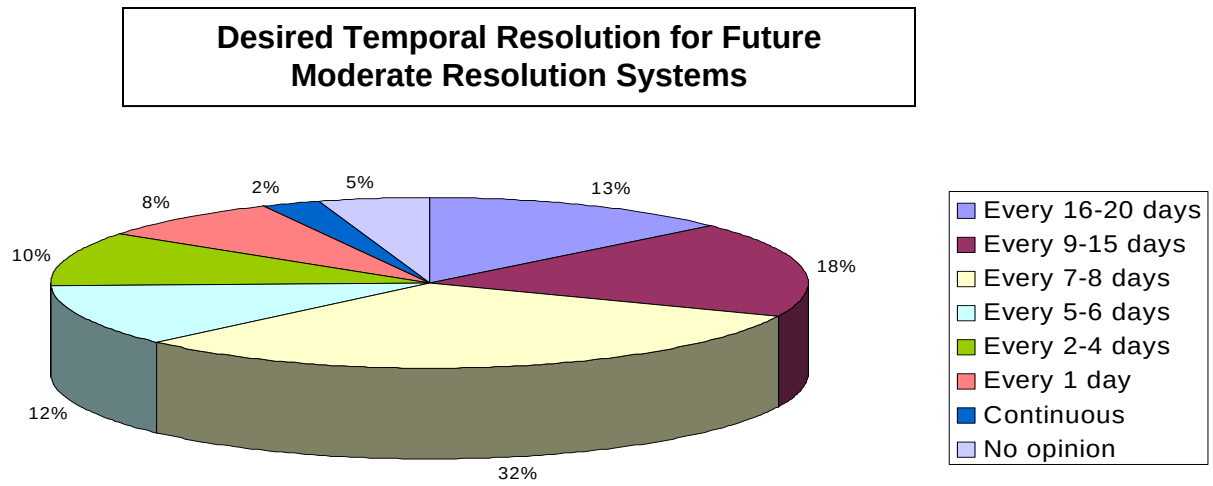

Figure 5. Desired temporal resolution graph

The top five ways to increase the utility of moderate resolution imagery are (in order of importance):
1. Lower cost data
2. More frequent temporal coverage
3. Finer spatial resolution
4. Better spectral resolution
5. Easier access to data

The survey states that the value attributable to the potential loss of Landsat imagery is estimated to be ***$935.8 million/year.*** Some 37% of the respondents believe that it would not be possible to provide the same level of service without Landsat, while 13% stated that they would have to discontinue their programs if Landsat data were not available.

For further information about the survey, visit http://www.asprs.org/news/fli/ or contact ASPRS at FLIsurvey@asprs.org.

To learn more about the FLI IWG effort, visit http://www.landimaging.gov/index.html.

Landsat Science Team Announced

The team has been chosen, the announcement is out, and plans are underway for the first Landsat science team meeting.

"It was tough to decide," stated Dr. Thomas Loveland of the U.S. Geological Survey (USGS), "There were so many good proposals." The team was chosen through an intense panel-review process, and USGS announced the winners on October 16, 2006.

The team has already started work, but will come together for the first time in January 2007, at the USGS Center for Earth Resources Observation and Science (EROS) in Sioux Falls, South Dakota. Each member of the team is researching a specific topic, and the overall goal of the team is to enable more effective use of archived Landsat data and to help identify and address the needs of users of future land-imaging data.

Topics under investigation include:
- water and natural resource management
- radiometric calibration
- change detection and monitoring
- cloud detection and avoidance
- biophysical products
- extending the long term acquisition plan for the archive

Dr. Thomas Loveland, USGS, and John Dwyer, Science Applications International Corporation (SAIC), contractor to USGS, will lead the team and coordinate their efforts. While each member will conduct specific research, team members will also serve as representative users to advise the National Aeronautics and Space Administration (NASA) and USGS in their Landsat Data Continuity Mission (LDCM) development efforts.

For more information on the members, their research areas, and the mission of the LDCM Science team, see the official USGS press release at http://www.usgs.gov/newsroom/article.asp?ID=1571&from=rss and the Science section of the LDCM web site: http://ldcm.usgs.gov/intro.html.

L5 Solar Array Update

On August 16, 2006, Solar Array drive for Landsat 5 exhibited continued erratic behavior that had plagued the satellite since early 2005. As a result the Solar Array was placed in a fixed position, or spacecraft 'noon', to maximize the batteries' power charge. Quick action and innovative thinking from Mission Operations staff resulted in the implementation of a modified operations concept for pitching the spacecraft during the beginning and end of each orbit's daylight phase, which will allow for maximum power collection from the static solar array. This has resulted in a quick return to full operations, including downlinks to all international cooperator stations.

New L5 Mission Operations Center Contractor Selected

The USGS recently awarded a contract to Honeywell Technology Solutions, Inc., for daily Landsat 5 satellite flight operations. The USGS manages and operates Landsat 5, which has been in service for over 22 years.

L7 Solid State Recorders

The solid state recorder on Landsat 7 enables images to be acquired around the world for downlink to a Landsat ground station. There are 24 individual boards that make up the solid state recorder. One of the boards was turned off in August following a problem with transmitting image data. Three boards had been turned off previously for similar reasons. Fifty-five scenes were lost as a direct result of the failure and 19 subsequent scenes were lost that would have been acquired while the system was being reconfigured. The four boards that are no longer turned on represent 16.7% of the total solid state recorder capacity. Although the loss of four boards does not significantly affect the mission, the Flight Operations Team is investigating the possibility of recovering the boards.

Did you know?

GloVis (Global Visualization Viewer – glovis.usgs.gov) has a feature that allows users to upload their own shape files to display as a map layer. These files must be in geographic (latitude, longitude) coordinates and should be referenced to either the WGS84 or NAD83 datum.

1. Access GloVis at http://glovis.usgs.gov
2. In the viewer application window, go to Map Layers and select Read Shapefile.
3. Select the shapefile name from your directory and click Open.
4. Choose a color for the layer and click OK. The layer will automatically load over the images.
5. To turn the layer on and off, go back to Map Layers in the application window and select/deselect the checkbox next to the shapefile name.

For more tips on using the shapefile in GloVis, please access the help document at http://glovis.usgs.gov/ImgViewerHelp.html

Landsat History

The Landsat Project began in 1965. The first satellite was launched on July 23, 1972.

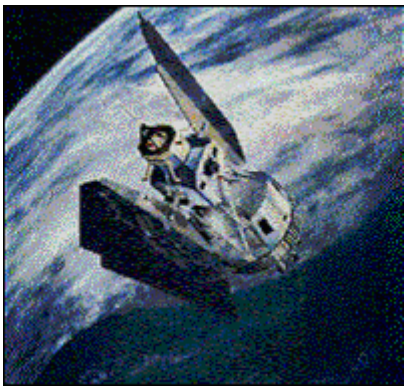

Figure 6. Landsat 1

The first two satellites launched were not called Landsat. Their original designations were: ERTS – A and ERTS – B (Earth Resources Technology Satellite). Prior to the launch of ERTS – B the name Landsat was adopted. ERTS – A was renamed as Landsat 1 and ERTS – B left the launch pad as Landsat 2.

The data download rate of Landsat 1 was 15 Mbps (megabits per second). A megabit is equal to one million bits. By comparison, the data download rate for Landsat 7 is 150 Mbps.