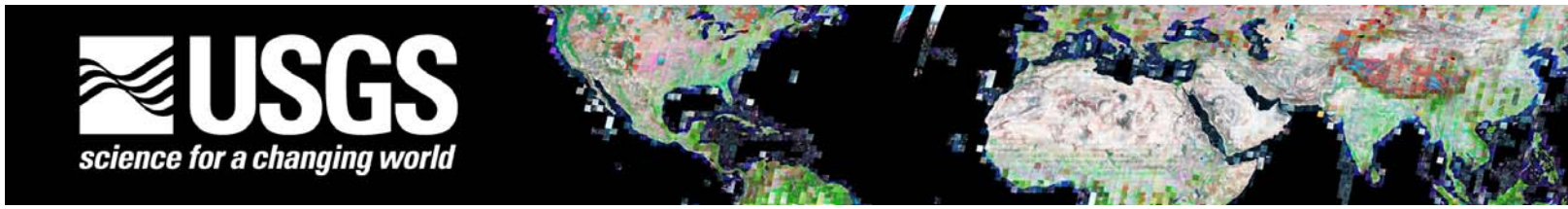

Landsat Update

Volume 4 Issue 3, 2010

Modification to Landsat 5 Acquisition Plan

During Landsat 5's first 25 years, the Thematic Mapper (TM) sensor acquired data over assigned ground stations regardless of cloud cover or season. This resulted in the collection of significant numbers of TM scenes unsuitable for analysis. In order to maximize the life of the components on the spacecraft, the U.S. Geological Survey's Flight Operations Team has begun creating a new scheduling tool, designed to avoid acquiring data over areas considered to be too cloudy or off-season. Other variables will also be analyzed, including the time period since the scene was last acquired, the location of calibration sites, the degree of land area overlap between scenes, and more.

Although this is a substantial change to Landsat 5 operations, the USGS believes the effect of the change will be to maximize quality data acquisitions, reduce the number of unusable scenes in the archive, and extend the life of the mission. The new acquisition plan will maintain the long-standing policy of prioritizing collection of the continental U.S., while continuing to provide direct downloads to our International Cooperators. Questions or concerns about the new Landsat 5 acquisition plan can be sent to custserv@usgs.gov.

Stewart Udall, Grandfather of the Landsat Mission

With Stewart Udall's recent passing there have been many powerful obituaries (e.g; Washington Post, March 21, 2010) noting the amazing heritage that Stewart Udall left, particularly in his service to the nation as Secretary of the Department of the Interior (DOI), under the Presidential administrations of John Kennedy and Lyndon Johnson. His contributions to our National Parks and protection of our natural resources were indeed remarkable.

However, one critical aspect of Secretary Udall's contributions to US society and technology appears to have been missed by many reporters. In the early 1960s, as the space race with the Soviet Union continued to heat up, many U.S. Geological Survey (USGS, a DOI Bureau) scientists – under Dr. William T. Pecora's direction – became increasingly involved with NASA and the US Department of Agriculture (USDA) in the application of newly evolving "remote sensing" methods to the monitoring of the Earth's resources. By the mid-1960s NASA's plans to develop a land satellite observatory were still slowly evolving, with most of NASA's attention focused on the Apollo missions. Dr. Pecora and his USGS team, recognizing the immediate value of satellite-acquired land observations, became increasingly anxious that a satellite land observation system be developed and deployed for agencies such as DOI and USDA.

By 1966 Dr. Pecora had convinced Secretary Udall that DOI should announce plans to develop their own satellite system, the Earth Resources Observation Satellite (EROS). This probably in part was done to get NASA to pay more attention to this mission. He prepared a memo for Secretary Udall that explained why USGS and DOI needed EROS to monitor land cover dynamics. Announcement of a USGS-led EROS program took place on September 21, 1966. Curiously, the Secretary was on a rafting trip down the Colorado River with his good friend Ladybird Johnson when this announcement was made.

The Udall announcement created a storm of political protest from NASA and Defense agencies, neither of which wanted another competitor in the Earth observations business. Rumor has it that President Johnson, furious with the resulting controversy, never spoke again with Secretary Udall. Nevertheless, the Udall EROS announcement did capture considerable Washington attention, which led NASA to begin development of the Earth Resources Technology Satellite (ERTS) in 1967. ERTS-1 was placed into orbit on July 23, 1972 and renamed Landsat 1 in 1975. The Landsat mission has been operating continuously since that time, documenting the Earth's land dynamics—through six individual observatories—for nearly 40 years now. Landsat data is archived at the USGS National Satellite Land Remote Sensing Data Archive (NSLRSDA) held at the Earth Resources Observations and Science (another EROS) Center in Sioux Falls, South Dakota. This observation record provides the only permanent, continuous basis for understanding the Earth's land dynamics over the last half century.

Not only did Stewart Udall raise our concerns about the Earth's environment and resources and take steps to preserve some of the most beautiful areas of our country, but he also took the politically brave steps needed to ensure that we used our new space technologies to monitor the Earth's land areas. We are only beginning today to appreciate the magnitude of this important contribution to understanding the recent history of our evolving uses of our critical land areas—a truly amazing contribution to our future generations.

Landsat Thermal Band Pixel Size Change

Commercial software has difficulty aligning the 30-meter multispectral bands of Landsats 4-7 with the 60-meter thermal band. This forces users of the Landsat thermal band to resample data. Effective February 25, 2010, the pixel size for all thermal data is processed at 30 meters. More details can be found at http://landsat.usgs.gov/about_LU_Vol_4_Issue_Special_Edition.php.

Calibration Update to ETM+ Thermal Band

Effective January 1, 2010, the calibration of the ETM+ thermal band was modified to correct for a lifetime gain error detected by the various calibration teams. Changes were made to the Calibration Parameter File (CPF) to correct a gain error that has been present since the launch of the instrument. This gain error causes the thermal band to predict too hot at cold temperatures and too cold at hot temperatures. http://landsat.usgs.gov/science_calibration.php.

Meetings & Conferences – Landsat Science Team Meeting Held

The Landsat Science Team Meeting was held January 19–21, 2010 at the Computer History Museum in Mountain View, California. Landsat 5 and 7 status updates, proposed Landsat processing changes, MSS calibration, LDCM progress and more was discussed. More details are available on the Landsat Science Team Meetings webpage: http://landsat.usgs.gov/science_LST_Team_Meetings.php.

Figure 1 Landsat Science Team January 2010

Meetings & Conferences – Upcoming

AAG Annual Meeting

April 14-18, 2010
Washington, DC
http://aag.org/annualmeetings/2010/index.htm

ASPRS Annual Conference
April 26 – 30, 2010
San Diego, California
http://www.asprs.org/SanDiego2010/index.html

Tips & Tricks – How Do I Determine the Processing Level of the Landsat Scene I have Downloaded?

The processing level of a downloaded scene can be found in either the metadata (MTL.txt) or processing history (WO.txt) files. These files are delivered with the data band files and other ancillary data. The MTL.txt file is included when a scene is processed through the Level 1 Product Generation System (LPGS). All Landsat 7 ETM+ (1999–present) and most Landsat 4-5 TM (1982–present) scenes are processed through LPGS. The WO.txt file is included when a scene is processed through the National Land Archive Production System (NLAPS). All Landsat 1–5 MSS (1972–83) and some Landsat 4-5 TM (1982–1990) scenes are processed through NLAPS.

After downloading the scene, locate and open the MTL.txt file or the WO.txt file.

Within the MTL.txt file, the processing level is listed as **PRODUCT TYPE**. L1T designates terrain corrected processing. L1Gt designates systematic terrain corrected processing. L1G designates systematic corrected processing.

Within the WO.txt file, the processing level is listed as **Processing Level**, as seen in the example below. Precision Geocorrection designates terrain corrected processing, similar to L1T processing listed in the MTL.txt example listed above. Systematic Geocorrection designates systematic corrected processing.

These details, along with graphics showing the files can be found at
http://landsat.usgs.gov/processing_level_of_the_Landsat_scene_I_have_downloaded.php

LDCM News – FY 2011 Budget for USGS Includes LDCM Funding

In a fiscally responsible budget that emphasizes cost containment, management efficiencies and program savings, the President's proposed $1.1 billion budget for the U.S. Geological Survey (USGS) in fiscal year 2011 reflects his commitment to use science as the basis for natural resource management decisions.

"Science is a cornerstone for sound decision making," said Marcia McNutt, USGS director. "Today's complex, interrelated natural resource issues—such as climate change, energy conservation and development, and water quality and availability—demand that policy makers and managers start with timely, unbiased science. The President's budget supports that vital perspective."

The FY 2011 USGS budget includes $13.4M towards Landsat Data Continuity. Scientists, educators and the general public around the globe use USGS Landsat data for a wide array of activities ranging from supporting disaster relief efforts to making agricultural crop assessments to identifying sites for cell phone towers. The USGS will accommodate ground-system requirement changes for the Landsat Data Continuity Mission associated with moving the Operational Land Imager to a free-flying satellite and the addition of a Thermal Infrared Sensor on board the spacecraft. These activities are required to meet the mission launch in December 2012.

EROS Authors in Recent Publications

Chander, G., Xiong, X., Choi, T., and Angal, A., in press, Monitoring on-orbit calibration stability of the Terra MODIS and Landsat 7 ETM+ sensors using pseudo-invariant test sites: Remote Sensing of Environment
http://dx.doi.org/10.1016/j.rse.2009.12.003

Gu, Y., Brown, J.F., Miura, T., van Leeuwen, W.J., and Reed, B., 2010, Phenological classification of the United States—a geographic framework for extending multi-sensor time-series data: Remote Sensing, v. 2, no. 2, p. 526-544.
http:dx.doi.org/10.3390/rs2020526

Roy, D.P., Ju, J., Mbow, C., Frost, P., and Loveland, T.R., 2010, Accessing free Landsat data via the Internet—Africa's Challenge: Remote Sensing Letters, v. 1, no. 2, p. 111-117.
http://www.informaworld.com/smpp/content~db=all?content=10.1080/01431160903486693

Napton, D.E., Auch, R.F., Headley, R.M., and Taylor, J.L., 2010, Land changes and their driving forces in the southeastern United States: Regional Environmental Change, v. 10, no. 1, p. 37-53.

http://dx.doi.org/10.1007/s10113-009-0084-x (abstract only)

Rover, J.A., Wylie, B.K., and Ji, L., in press, A self-trained classification technique for producing 30-m percent-water maps from Landsat data: International Journal of Remote Sensing.
(Not yet available online)

USGS
science for a changing world

NASA

Landsat 1
May 29, 1973

Landsat 5
October 18, 2009

Aral Sea

The Aral Sea, once the 4th largest lake in the world, continues to shrink and is now 10% of its original size. U.N. Secretary General Ban Ki-moon recently called the drying up of the Aral Sea one of the planet's most shocking disasters.

Feeder streams to the sea have been diverted by irrigation and by the completion of upstream dam projects. The result has been the ruin of the local fishing and shipping economy, and wind-carried salty sands have created regional health problems.

Landsat satellite imagery acquired May 29, 1973, and October 18, 2009, show the dramatic change in the region.

U.S. Department of the Interior
U.S. Geological Survey