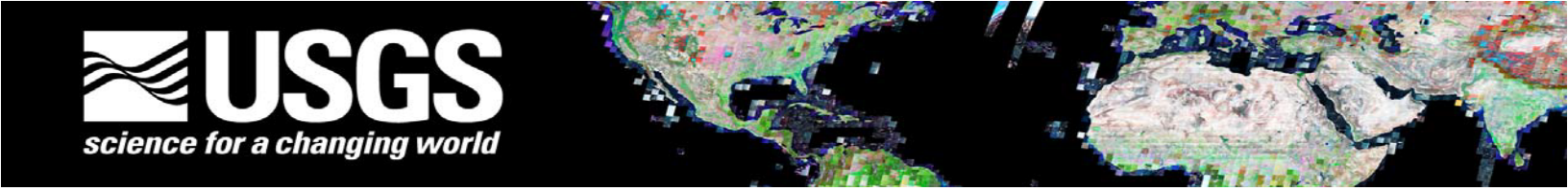

2001 Landsat Updates

January 2001

International Ground Station (IGS) Downlink Statistics

During calendar year 2000 the International Ground Station (IGS) network, comprised of as many as 14 operational ground stations, received 111,383 Landsat 7 scenes. The network as a whole received approximately 90 percent of the scenes they requested. Since the start of Landsat 7 operations a total of 162,354 scenes have been downlinked to IGSs.

New Landsat Ground Station Operations Working Group (LGSOWG) Members

The Landsat Ground Station Operations Working Group (LGSOWG) has recently lost two long-time Landsat participants as a result of their being elevated or reassigned within their respective organizations. Professor Xizhe PAN, formerly the Station Manager at the China Remote Sensing Satellite Ground Station, and Paul Trezise, Station Manager at the Australia Centre for Remote Sensing have recently announced that they are moving to new positions, and have been replaced by Mr. Jiesheng WANG and Ian Shepherd respectively. We welcome the two new members to LGSOWG and look forward to meeting them. We also want to express our profound gratitude to Professor PAN and Paul Trezise for their contributions and support of the Landsat Program. We wish them well in their new positions.

Landsat 7 Data Sales Summary

In calendar year 2000, the USGS distributed 14,609 Landsat 7 scenes. The breakdown by product type is as follows: 1020 Level 0R (L0R) scenes; 146 Level 1R (L1R) scenes; and 13,443 Level 1G (L1G) scenes. The breakdown for distribution formats for L1G products are: Geo-tiff, 33.7%; FastL7, 54.2%; and HDF, 12.1%. Approximately 83% of the Landsat 7 products shipped were on CD-ROM media, while 13% were distributed by File Transfer Protocol (FTP), and the remaining 4% were shipped on 8 mm cassette tape. The USGS intends to gather these data annually from the IGSs in order to document Landsat 7 worldwide data sales. The implementation of this data documentation effort will be discussed at the upcoming Landsat Technical Working Group 9 (LTWG-9) meeting in Maspalomas.

Test Downlinks in January

Test downlinks were provided to the Thailand ground station in Bangkok, and to the South Africa ground station in Hartebeeshoek. Both of these stations should join the IGS network within the next few months.

Landsat 7 Annual Report

The Landsat 7 Program Report for FY2000 is available in hardcopy and on the U.S. Geological Survey (USGS) Landsat 7 web site (under L7 Documents at: Landsat7.usgs.gov). This Report highlights the accomplishments for the Landsat 7 Mission during the first fifteen months of production operations, starting on July 1, 1999 and extending to September 30, 2000. Hardcopies will be mailed to representatives from the IGSs and to Business Partners.

IGS Data Validation

In January 2001, the China Remote Sensing Satellite Ground Station and the Canada Centre for Remote Sensing provided the USGS with LoRp data that were successfully processed and validated to be of equivalent quality to the USGS EROS Data Center's Level-0R data product. There are now four IGS that can exchange data (Raw Computer Compatible (RCC) or Level-0Rp (L0Rp)) with USGS (Argentina, Australia, China and Canada). These four ground stations will now be scheduled for biannual data exchange for data quality validation. Congratulations to you all!

New Tracking Station

As of January 22, 2001, a new satellite ground station, operated by the Datalynx subsidiary of Honeywell, at Poker Flat, Alaska, was certified to provide command uplink, telemetry downlink, Doppler tracking, and X-band receiving for Landsat 7. The new station, co-located with the current Alaska Ground Station, will support data downlink conflicts with other satellites, such as the Earth Observing 1 (EO-1) mission.

LDCM Workshop Summary

A variety of opinions and recommendations resulted from the Landsat Data Continuity Mission (LDCM) Workshop held January 9-10. They include:

1. Participants emphasized the "public good" aspects of the Landsat Program

2. Commercial providers suggest there is insufficient market to justify private investment.

3. An open, nonrestrictive data policy, similar to Landsat 7, is essential for the LDCM.

4. Participants expressed an urgency to move forward with the mission to avoid data gaps.

5. Emphasis was placed on continuing the current cooperation with international ground stations.

6. Retain the mission objective of a seasonal global archive

7. Decrease revisit time to less than 16 days and add a thermal infrared band

8. Retain the Landsat 7 emphasis on geometric and radiometric calibration

Within the next few months the LDCM concept will be finalized and at least one workshop will be conducted on a draft Request for Proposals.

LTWG-9 Meeting

Final plans are being made for the LTWG-9 meeting in Maspalomas. Representation from all the operational ground stations is expected, in addition to representation from as many as three new ground stations.

EO -1 Workshop Summary

The EO-1 mission continues to perform very well and there is a possibility that the life of the mission may be extended beyond the 330 day baseline that is planned. Viewgraphs from the meeting are available on the EO-1 website
(eo1.gsfc.gov).

February 2001

Landsat 7 Milestone

On March 2, 2001, at 00:49 Central Daylight Time (CDT), Landsat 7 will begin its 10,000th orbit. Since its launch on April 15, 1999, Landsat 7 has acquired over 320,000 scenes; approximately 145,000 scenes for the U.S. archive and approximately 176,000 scenes for the archives of the 14 Landsat 7 International Ground Stations (IGSs).

Landsat 7 Program Manager

R. J. Thompson, the current Landsat 7 Program Manager, has accepted a four to six month assignment at the U.S. Geological Survey (USGS) Headquarters in Reston, Virginia, beginning in mid-March 2001. He will be assisting the USGS Director in developing a strategic plan defining the role and responsibility of the USGS in U.S. satellite land remote sensing activities. Tracy Zeiler, the current Landsat 7 Mission Manager, will serve as Acting Landsat 7 Program Manager.

Solid State Recorder Status

On February 13, 2001, the Landsat Ground Station (LGS) at the EROS Data Center (EDC) reported intermittent occurrences of unmodulated X-band. Investigation by the USGS Flight Operations Team revealed a memory board #12 on the Solid State Recorder had failed. This anomaly is similar in nature to the loss of memory board #23 in November 1999. On February 14, 2001, memory board #12 was removed from service and nominal imaging and recording operations were resumed. At no time during the anomaly were real-time imaging operations affected. The Solid State Recorder is now operating with 22 of the 24 memory boards and at 92 percent of its initial at-launch capacity. Landsat 7 data acquisition mission objectives have not been significantly impacted.

Landsat 7 Duty Cycle

A new and improved Enhanced Thematic Mapper Plus (ETM+) mid-term duty cycle limitation has been approved by Raytheon Santa Barbara Remote Sensing. The USGS Flight Operations Team (FOT) is currently modeling the new duty cycle constraint to quantify improvements in the number of scenes that can be acquired. Implementation of the new constraint is still pending the results of the modeling. An increase of about five to six scenes per day is expected.

International Ground Station (IGS)

A major milestone for the Landsat 7 Program was met in mid-January 2001 when the Canadian ground stations (PAC and GNC) began transmitting their backlog of International Ground Stations (IGS) scene metadata to the EROS Data Center (EDC) Distributed Active Archive Center (DAAC) for ingest and archive. This function is accomplished using an File Transfer Protocol (FTP) polling server that is now fully operational. The Earth Observing System (EOS) Data Gateway (EDG) client was also enhanced to allow public searching of the IGS holdings via the EDC client. Users who find scenes of interest in an international archive can then be electronically transferred to the corresponding web address for data ordering. This is an important first step in the goal of providing a worldwide catalog inventory of Landsat 7 scenes. Other stations will begin transferring metadata in the next few months.

New Stations Validated for Data Exchange in Support of Quality Validation

In February 2001, the Hatoyama, Japan Ground Station provided the USGS with Level-0Rp (L0Rp) data that were successfully processed and validated to be of equivalent quality to the USGS EROS Data Center's (EDC's) L0Rp data product. There are now five IGS that can exchange data (Raw Computer Compatible (RCC) or Level-0Rp (L0Rp)) with the USGS (Cordoba, Argentina; Alice Springs, Australia; Beijing, China; Prince Albert, Canada; and Hatoyama, Japan). These five ground stations will now be scheduled for biannual data exchange for data quality validation. Congratulations to you all!

Landsat 7 Technical Working Group Meeting #9 Summary

Attending the meeting in Gran Canaria, Spain were 39 participants, representing 14 operational, 3 soon-to-become operational ground stations, 12 International Cooperators and 15 countries. All stations made presentations focusing on the data processing flow from Data Capture to the Archive. Status reports were presented and discussions held on data acquisition priority, data exchange format validation, metadata exchange, and product validation. A sub-working group was established to explore preparing a proposal for Landsat 7 Product Validation. Vince Beruti from European Space Agency (ESA) and Jon Christopherson from the EDC agreed to co-chair the sub-working group. Meeting participants enjoyed visiting the ESA ground station at Maspalomas and experiencing the fascinating geology, ecology, and other features of Gran Canaria. Our thanks to ESA and INSA (Ingenieria Y Servicios Areospaciales) for hosting the meeting.

Landsat 7 Technical Working Group 10 (LTWG-10) Meeting Scheduled

The next meeting of the Landsat 7 Technical Working Group (LTWG-10) is scheduled for the week of June 25, 2001 in Sioux Falls, South Dakota. The meeting will be held at the EDC; ground station reports will features the technical details of the ground station archives and data access systems.

Landsat 7 Science Team Meeting

The final Landsat 7 Science Team meeting is schedule for the week of May 21, 2001 at the Hilton Hawaiian Village in Honolulu, Oahu, Hawaii. The focus of the meeting is on the research results of the team members and on the uses of Landsat 7 for disaster and volcano monitoring applications. A field trip to observe volcano study sites on the "Big Island" is scheduled as part of the meeting.

Landsat Data Continuity

There will be a Landsat Data Continuity Mission (LDCM) follow-on workshop all day April 23 and half day on April 24 at the spring American Society for Photogrammetry and Remote Sensing (ASPRS) conference to be held in St. Louis, Missouri. The purpose of the workshop will be to seek public comment on the revised data specification. Please look for further details at the LDCM Web Site: http://LDCM.usgs.gov

Landsat 4/5 Operations

The USGS and Space Imaging have agreed to discuss issues surrounding continued operation of Landsat 4/5. The USGS will endeavor to support cooperative activities with Space Imaging to ensure continuation of Landsat 4/5 operations as long as possible. Additional information that may impact the current and past Landsat 5 international ground station network will be disseminated as it becomes available.

Product Announcement

Moderate Resolution Imaging Spectrometer (MODIS) and Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) products are now available from the USGS EDC Distributed Active Archive Center (EDC DAAC). For more information about these products see http://edcdaac.usgs.gov/index.html. For more information about MODIS and ASTER see the following websites: http://modis.gsfc.nasa.gov/MODIS and
http://asterweb.jpl.nasa.gov

March 2001

Landsat 4/5 Status

On March 30, 2001, the U.S. Geological Survey (USGS) received notification from National Oceanic and Atmospheric Administration (NOAA) that the contract with Space Imaging, Inc. for operation of Landsat 4 and 5 has been transferred to the USGS. The Landsat Program Management Team is meeting regularly with Space Imaging regarding alternatives for operating or decommissioning either or both satellites with recommendations anticipated by May 1, 2001. Notification to data users and international cooperators will be distributed as quickly as possible regarding future plans.

Antarctica Discovery

Robert Bindschadler, a member of the Landsat 7 Science Team from the National Aeronautics and Space Administration
(NASA) Goddard Space Flight Center (GSFC), compared Landsat 7 images of the Pine Island glacier in Antarctica acquired 10 months apart and detected a crack extending two-thirds of the way across the glacier. Scientists predict the crack will result in the calving of a major iceberg within 18 months. Top television markets and the cable news networks in the U.S. did stories on the study and the value of satellite data for this application. The story and images can be found at the following web site:
www.gsfc.nasa.gov/gsfc/earth/environ/antarctic/pineisland.htm#images

Satellite Data Business Partners

The USGS EROS Data Center (EDC) has recently signed up the 36th satellite data Business Partner. Business Partners are companies that buy USGS products, including satellite data, and redistribute the data either as-is or in some value- added form to their customers. Last year satellite data Business Partners purchased approximately 9 percent of the Landsat 7 products distributed by EDC. During the past quarter (January 1 to March 30), satellite data Business Partners accounted for 25 percent of the Landsat 7 data sales. See the USGS web site for a list of Business Partners: mapping.usgs.gov/www/partners/bpfind.html

Data Validation

The Hobart, Australia (HOA) and the Hiroshima, Japan ground stations have become the sixth and seventh stations to provide Landsat 7 data (Level-0Rp (L0Rp) and Raw Computer Compatible (RCC), respectively) that can be ingested, processed, and validated. The biannual data validation schedule has been implemented. The first two ground stations on the schedule, Cordoba, Argentina, and Alice Springs, Australia, have provided RCC and L0Rp Landsat 7 data respectively, that have been processed successfully to a Level 1G (L1G) product and validated.

Fucino Ground Station Antenna Move

Telespazio, the company that operates the Fucino, Italy ground station, plans to move the Landsat 7 antenna from Fucino to Matera in southern Italy beginning the first week of April. The Landsat 7 antenna at Matera will be fully operational by the last week of June 2001. In the interim, Landsat 7 data will be collected at Fucino by a back-up antenna except for about one week of downtime.

Landsat Technical Working Group 10 (LTWG-10)

Plans for the Landsat Technical Working Group 10 (LTWG-10) meeting scheduled for the week of June 25, 2001 at the EDC are progressing. The meeting announcement with agenda and meeting logistics will be sent to LTWG representatives soon. Options for conducting portions of the meeting in the Black Hills of South Dakota are being examined.

Second LDCM Workshop

The Landsat Data Continuity Mission (LDCM) Data Specification, which defines the key data characteristics for the next Landsat system, has been revised based upon comments and feedback received from the LDCM workshop in January. The revised Data Specification will be available for review after April 6, 2001 and will be the topic for discussion at the second LDCM workshop on April 23-24, 2001, to be held in conjunction with the upcoming American Society for Remote Sensing and Photogrammetry meeting in St. Louis, Missouri. See the Web site: ldcm.usgs.gov

Landsat 7 Science Team Meeting

The meeting will be the week of May 21, 2001 at the Hilton Hawaiian Village in Honolulu, Oahu, Hawaii. The 14 member Landsat 7 Science Team will meet to present the results of their investigations. Topics will include atmospheric characterization and correction, radiometric calibration, methods for analyzing large amounts of data, and detecting and monitoring change in forests, agricultural, and coastal areas.

Aqua Launch

The NASA Earth Observing System (EOS) PM-1 satellite, renamed Aqua, recently scheduled for launch in July 2001, has been rescheduled to September 2001, from Vandenberg Air Force Base.

EarthWatch Launch

EarthWatch has received National Oceanic and Atmospheric Administration (NOAA) approval to modify its Quickbird 2 satellite from the originally planned 1-meter resolution imaging system to a 61-centimeter resolution system, and announced that Quickbird 2 will be launched on a Boeing Delta II launch vehicle before the end of this year.

ASTER DEM Products

Advanced Spaceborne Thermal Emission and Reflection (ASTER) Digital Elevation Model (DEM) data sets may now be ordered using the EOS Data Gateway. The ASTER DEM data set is derived from the along-track, 15-meter ASTER optical stereo data acquired in the near infrared bands. These data should meet U.S. map accuracy standards for
1:50,000 through 1:250,000 scale maps (up to 7 meter absolute horizontal and vertical accuracy with appropriate ground control). Check the EDC DAAC Web Site for more information (edcdaac.usgs.gov).

April 2001

South Africa Ground Station Operational

On April 20, 2001, the Council for Scientific and Industrial Research in South Africa signed the Memorandum of Understanding (MOU) to receive and distribute Landsat 7 data. The ground station at Hartebeeshoek is operated by the Satellite Applications Centre and began receiving Landsat 7 data operationally on April 1, 2001.

Landsat 4/5 Status

Space Imaging is in the process of notifying International Ground Stations (IGSs) of their intent to transfer responsibility for Landsat 4/5 operations to USGS effective July 1, 2001. The USGS has notified Space Imaging to proceed immediately with actions necessary to fully decommission Landsat 4, including steps to de-orbit the spacecraft. The U.S. Geological Survey (USGS) and National Aeronautics and Space Administration (NASA) are continuing to discuss the disposition of Landsat 5 and will
keep the international and general user community informed as these discussions evolve.

Landsat 7 Browse Image Viewer

The Landsat 7 Program is pleased to announce the public availability of an internet capability to quickly access and view Landsat 7 browse images. This internet capability uses a visual interface to navigate the global Landsat 7 archive managed by USGS. Browse images for scenes acquired during the mission, including scenes acquired through the previous day, can be displayed for the entire earth's surface. The Landsat 7 Browse Image Viewer can be found at: http://edclxs2.cr.usgs.gov/L7ImgViewer.shtml

Validation Success

The Canada Centre for Remote Sensing Ground Station at Gatineau has provided Level 0Rp (L0Rp) data that have been successfully ingested and validated. This station will now be added to the schedule for biannual validation. The China Remote Sensing Satellite Ground Station has provided data to the USGS for their biannual validation that have successfully been processed and validated. The accompanying summary table lists the ground stations that have been validated and the date they were last validated.

Australian IGS Metadata added to the EDC Archive

Landsat 7 scene metadata from two more ground stations have been successfully added to the EROS Data Center (EDC) global inventory. The Australian ground stations at Alice Springs (ASA) and Hobart (HOA) have passed metadata ingest tests with operational ingest starting on 4/23/01. Both station's backlog of scenes have been ingested into the archive with daily ingest now fully operational. The Australian's metadata archive joins the two Canadian stations (Prince Albert, PAC & Gatineau, GNC) in the production database, and brings the total IGS scene inventory to date to approximately 60,000 scenes.

Additional IGS Metadata Search Capability added to Public Client

The NASA Earth Science Enterprise public search client (Earth Observing System Data Gateway) at: http://edcimswww.cr.usgs.gov/pub/imswelcome/ was upgraded on April 27th to add the capability to customize an IGS

scene search with four new extended search criteria. Customers can now customize searches based on the three-letter station-id, scene cloud cover range, and the two solar angles.

Landsat 5/7 Cross Calibration

A section on Landsat 5/7 cross calibration has been added to the Landsat 7 Science Data Users Handbook. The handbook and the new section can be accessed at:
http//ltpwww.gsfc.nasa.gov/IAS/handbook_htmls/chapter8/chapter8.3.html

Landast Techncial Working Group 10 (LTWG-10) Meeting

The meeting is set for June 26-29, 2001 in Rapid City, South Dakota. Participants will be given the option of flying into Sioux Falls and visiting the EROS Data Center on June 25th, or making arrangements to fly into and out of Rapid City, SD.

Landsat Ground Station Operations Working Group 30 (LGSOWG-30) Plans Set

The proposed meeting dates are September 25-28, 2001 in Orlando, Florida.

Earth Observing 1 (EO-1) Meeting

The Earth Observing 1 (EO-1) Science Validation and Instrument Team Meeting is May 1-4, 2001 in Tucson, Arizona. Presentations will cover instrument performance and calibration and field campaign results.

Second LDCM Workshop

Approximately 100 participants reviewed and discussed the latest draft of the Landsat Data Continuity Mission (LDCM) data specification at the Second LDCM Workshop, held April 23-24 in St. Louis, in conjunction with the American Society of Photogrammetry and Remote Sensing conference. Workshop presentations are posted at http://ldcm.usgs.gov/. The final data specification will drive requirements for an LDCM spacecraft to be developed, launched, and operated by a commercial data provider no later than the spring of 2006. At this time, some additions to the Enhanced Thematic Mapper Plust (ETM+) spectral bands are anticipated. Also, the inclusion of one or more thermal bands is uncertain. International Cooperators and USGS Business Partners are encouraged to review LDCM information at the web site and submit comments and suggestions as soon as possible. A draft Request for Proposals will be released to the aerospace community sometime around July or August of this year.

Landsat 7 Canadian Coverage

The Canada Centre for Remote Sensing (CCRS), in partnership with the Centre for Topographic Information, is providing free of charge a one time Canadian coverage of ortho-rectified Landsat 7 satellite imagery. The CCRS is providing the corresponding Level 1G imagery as well. About 600 scenes are required to cover the Canadian landmass and will be made available from a GeoGratis web site (http://geogratis.cgdi.gc.ca/frames.html) after April 1, 2001. Only a select number of scenes will be available initially, but about 200 scenes per year eventually will be available.

May 2001

University of Puerto Rico (UPR) Agreement

The U.S. Geological Survey (USGS) EROS Data Center (EDC) and the University of Puerto Rico (UPR) have signed an agreement allowing the UPR to acquire limited Landsat 7 downlinks to support science applications. Because the UPR station will only receive data that has been selected by the Long-term Acquisition Plan (LTAP), its addition to the ground station network will have little effect on the use of the Enhanced Thematic Mapper Plus (ETM+) duty cycle.

Landsat 4/5 Status

Plans call for the decommissioning of Landsat 4 and 5 with Landsat 4's decommissioning expected by the end of June 2001. It is the USGS intention to allow Landsat 5 imaging through June 30. Discussions for continuing operation of Landsat 5 beyond June 30 are in progress. Partners will be notified of any changes to the plan to decommission Landsat 5.

Data Validation

During May, the Hatoyama (Japan) ground station provided the USGS EDC with Level 0Rp (L0Rp) data that can be ingested, processed, and validated to be of equivalent quality to the corresponding L0Rp data in the USGS EDC archive. To date, nine ground stations have been validated (two with Raw Computer Compatible (RCC) and seven with L0Rp data).

Updated RCC DFCB

An updated version of the Raw Computer Compatible (RCC) Data Format Control Book (DFCB) was recently signed and distributed to representatives of the International Ground Station (IGS) community.

Landsat Technical Working Group 10 (LTWG-10) Meeting

Plans are firming up for the Landsat Techncial Working Group 10 (LTWG-10) meeting scheduled for Rapid City, South Dakota on June 26-29, 2001. Participants who have not had the opportunity to visit the EDC, located near Sioux Falls, have been encouraged to fly into Sioux Falls and spend a half-day on June 25 at EDC and then take a bus to Rapid City. To date, representatives from nine International Cooperators (ICs) will attend the meeting.

Landsat Ground Stations Operations Working Group 30 (LGSOWG-30)

The Landsat Ground Stations Operations Working Group 30 (LGSOWG-30) meeting is scheduled for September 24- 28, 2001, in Orlando, Florida at the Rosen Centre Hotel. The meeting announcement will be sent to LGSOWG members in July.

Landsat 7 Science Meeting

The last Landsat 7 Science Meeting was held in Honolulu, Hawaii during the week of May 21, 2001. The results from the Landsat 7 science investigations will be published in an upcoming special edition of the journal of Remote Sensing of the Environment.

Annual AmericaView Meeting

The USGS EDC in Sioux Falls, South Dakota will be hosting the annual AmericaView meeting on August 7–8, 2001. AmericaView is a joint USGS and National Aeronautics and Space Administration (NASA) program dedicated to expanding remote sensing education through a network of numerous state consortia. The annual meeting will be an opportunity to learn about what research partner consortia are doing, the services and products commercial vendors have available, to understand the roles of the USGS and NASA, and to exchange ideas with each other as to how AmericaView can increase the Geographical Information systems (GIS)/Remote Sensing education within your state. To register, please complete the on-line form at americaview.usgs.gov/resources/conferences.html

Landsat 7 International Coordinator to Retire

Dave Carneggie, International Coordinator for the Landsat 7 Program, will retire from the USGS in late June. Jay Feuquay (feuquay@usgs.gov), the current Landsat 7 Data Acquisition Manager, will assume most of Dave's international coordination responsibilities, including presiding over the LTWG meetings. Judy Knox will be taking over responsibility for assembling and distributing the Landsat 7 Monthly Update.

June/July 2001

Data Validation

As part of the data validation, the Maspalomas, Spain ground station provided the U.S. Geological Survey (USGS)/EROS Data Center (EDC) with Raw Computer Compatible (RCC) data that were processed on the USGS/EDC systems but could not be validated because the corresponding data did not reside at the USGS/EDC.

Landsat 7 Technical Working group Meeting #10 Summary

Attending the meeting in Rapid City, South Dakota were 46 participants, representing 11 countries. Each country made presentations focusing on the data processing flow from data capture, through the archive, and how it is sold on their websites. Each country participated in a one-on-one meeting with members of the Landsat 7 Program and EDC Distributed Active Archive Center (DAAC) to discuss issues such as data exchange, product validation, acquisition scheduling, and satellite status.

Landsat Technical Working Group (LTWG) Survey

At Landsat Technical Working Group (LTWG) 10, the USGS will send a survey to the LTWG Representatives regarding upcoming LTWG agenda items, potential sub-working group topics, and the overall meeting format. Some Representatives expressed interest in lengthening the time span between LTWG meetings. Tentatively, the USGS will leave the schedule as is through Landsat Ground Station Operations Working Group (LGSOWG) 31. This topic will be addressed in the survey.

Landsat 5 Status

At the LTWG 10 in Rapid City, RJ Thompson, Landsat 7 Program Manager, discussed Landsat 5 and USGS efforts to gain funding to continue operations past June 30th (the end of the USGS / Space Imaging contract). Tracy Zeiler reported that RJ has secured funding for July and August 2001 operations. He is attempting to secure funding for September 2001 and all of Fiscal Year 2002 (October 2001 to September 2002). RJ reported that Space Imaging's data rights were terminated on June 30, 2001.

Staffing Update

As was stated in the February report, the following United States Geological Survey (USGS) personnel are currently filling temporary assignments:

RJ Thompson On a short-term detail to the USGS Headquarters.

Tracy Zeiler Acting Landsat 7 Program Manager

Kristi Kline Acting Landsat 7 Mission Management Officer

Jay Feuquay Acting Landsat 7 International Coordinator along with his permanent duties as the Landsat 7 Acquisition Officer

Landsat Data

In regard to the Landsat Data Continuity Mission (LDCM), for which a late 2005 launch is anticipated, a Draft Request for Proposals (RFP) is due to be released on or shortly after July 31, 2001. The current concept for this mission is to have the private sector build, launch, and operate a
system designed to meet U.S. Government specifications for Landsat-like data from approximately 2006 through 2011, with an option for five additional years of LDCM data purchases. One potential aspect of this mission is that a private owner-operator would deal directly with International Cooperators to provide Landsat-like data. Landsat 7 International Cooperators are encouraged to review the draft RFP and respond with comments to an LDCM WEB site within three weeks of its release. When the Draft RFP is released, Landsat 7 International Cooperators will be notified by e-mail that will include appropriate WEB site information. In the meantime, information on LDCM planning, documentation, and public workshops held to date can be found at http://ldcm.usgs.gov/

Metadata

The South Africa ground station has also provided the USGS with RCC data that were successfully processed and then validated to be of equivalent quality to the corresponding data at the USGS/EDC. The South Africa ground station will need to have their L0Rp product validated to complete their data validation cycle. The Fucino, Italy ground station has become the 12th ground station to be completely validated by providing RCC data that were processed to a L1G product and is found to be of equivalent quality to the corresponding data at the USGS/EDC.

Metadata from Canada and Australia continue to be archived successfully. As of July 9th there were 4,881 L7 IGS subintervals archived for 92,791 L7 Worldwide Reference System scenes. It was noted that a few extra partial scenes were being archived for Prince Albert, Canada (PAC) throughout the month of June. These occurrences are due to scan mirror anomalies or PAC Primary Reception System problems, and reflect the actual state of the data received by PAC. A tape containing Brazil metadata and browse was mailed to the Earth Observing System Data and Information System Core System Performance Verification Center for 6A.XX testing. South Africa and Fucino, Italy metadata were successfully tested, and EDC is ready to support ingest of their data into the DAAC archive.

Next month it is anticipated that Kiruna, Sweden, Maspalomas, Spain, Neustrelitz, Germany, and South Africa will be transmitting metadata for ingest into the DAAC archive. EDC will initiate preparations for receiving metadata from Matera, Italy (MTI).

Turn Around Time

LTWG 10, Tracy Zeiler stated that the Landsat 7 Program is considering a future test to determine if Landsat 7 ETM+ usage affects the rate of growth in scan mirror turn around time. During this test, sensor on time and the number of power cycles would be manipulated for a period of time and turn around time monitored and studied. An in-depth discussion on this topic is planned for the upcoming LGSOWG in September 2001. No testing will occur prior to further consultation with the LGSOWG Representatives.

Landsat Ground Stations Operations Working Group 30 (LGSOWG 30)

The LGSOWG 30 meeting is scheduled for September 24-28, 2001, in Orlando, Florida at the Rosen Centre Hotel. The meeting announcement will be sent to LGSOWG members in July.

LTWG 11 is planned for January/February timeframe. Ground station reports will focus on product generation. The one-on-one sessions would most likely be broken up into multiple sessions, each based on a different topic.

Upcoming Meetings

Meeting Timeframe Location

LGSOWG 30 Sept. 2001 Orlando, Florida

LTWG 11 Jan/Feb 2002 TBD

LTWG 12 May/June 2002 Argentina

LGSOWG 31 Sept. 2002 TBD

LTWG 13 Jan/Feb 2003 TBD

August 2001

Data Validation

At this time there have been no new International Ground Station (IGS) data validations to report. Communications have continued with the Maspalomas, Spain, (Raw Computer Compatible (RCC)) and the Parepare, Indonesia, (Level Zero Reformatted Distribution Product (L0Rp)) Ground Stations for upcoming initial data validations. The Parepare Ground Station may be the first IGS to provide the U.S. Geological Survey (USGS) with L0Rp data via FTP. This will eliminate the cost of writing the Landsat 7 image data to media and the cost of shipping that media, in addition to the inherent 5 – 10 day time delay of international mail.

New USGS Land Remote Sensing Program

The USGS is preparing to realign the activities of the National Mapping Discipline into three offices, coincident with establishment of three new national programs to carry out the work of the Discipline. The offices of Cooperative Topographic Mapping, Land Remote Sensing, and Landscape Analysis will become the official organizational elements of the National Mapping Discipline effective October 1, 2001. R.J Thompson has been selected to lead the Office of Land Remote Sensing, and will function as the USGS Land Remote Sensing Program Coordinator. The Office of Land Remote Sensing will now have oversight responsibility for Landsat activities. Mr. Thompson will report to the Associate Director for Geography, USGS. His official address will be the EROS Data Center (EDC) in Sioux Falls, and his email address remains rjthompson@usgs.gov.

Metadata

Metadata from Canada and Australia continue to be archived successfully (GNC, PAC, HOA, and ASA). As of August 14th there were 5,106 L7 IGS subintervals archived for 97,719 L7 Worldwide Reference System scenes. EDC received metadata from Hatoyama, Japan (HAJ) for evaluation. The HAJ metadata tested successfully. The metadata from Cordoba, Argentina (COA) is currently being corrected and resubmitted to EDC.

Activities at EDC are underway to facilitate metadata ingest from new IGS's. These activities include efforts to configure ingest software to support Matera, Italy (MTI). Another change involves the horizontal display shift field, which is required for ingest at this time, but will not be in the future based upon recent changes in the IGS Interface Control Document.

At this time EDC is ready to support the ingest of IGS metadata from Fucino, Italy (FUI), Kiruna, Sweden (KIS), Maspalomas, Spain (MPS), Neustrelitz, Germany (NSG), Cordoba, Argentina (COA), Hatoyama, Japan, (HAJ), and Hartebeesthoek, South Africa (JSA). Stations not all ready providing metadata to the EDC should can contact Paula Smit at smit@usgs.gov.

Calibration-Validation Working Group

EDC staff have formed an ad hoc Calibration-Validation Working Group (CVWG) as a means of facilitating discussion on instrument calibration and data validation issues associated with ongoing EDC projects. The group's initial objective is to enhance each participant's level of awareness of the scope of current activities and to stimulate information exchange. A longer term goal is for this group to serve as a forum for discussing technical issues, formulating and submitting proposals for additional research and funding, and to serve as a forum to define and/or review proposed solutions to new problems. The EDC CVWG would also serve as one of several USGS nodes of expertise in this area, and it would strive to strengthen bureau-wide collaboration on calibration-validation activities as appropriate. Those wishing to get involved in the CVWG may contact Jon Christopherson at jonchris@usgs.gov.

Landsat Ground Stations Operations Working Group 30 (LGSOWG 30)

The LGSOWG 30 meeting is scheduled for September 24 - 27, 2001, in Orlando, Florida, at the Rosen Centre Hotel. Those who have not visited Orlando before will find it to be a vibrant, international destination offering visitors an array of options and theme parks (Walt Disney World, Epcot, Universal Studios, Sea World and more). Due to the popularity of the Orlando area rooms are extremely limited; therefore, make sure you have made your reservations through Brad Heegl at heegel@wise.augie.edu or Jay Feuquay at feuquay@usgs.gov. The LGSOWG consists of ground station management from the USGS, National Aeronautics and Space Administration (NASA), and the Landsat International Cooperator (IC) Community.

Some of this year's topics for LGSOWG 30 will be mission operations including cloud avoidance, three tier priority implementation, Distributed Active Archive Center (DAAC) metadata ingest, spacecraft and sensor performance for Landsat 5 and 7, ground systems, data exchange, USGS program restructuring, station reports, and Earth Observing System (EOS) instruments and data.

Quarterly Management Meeting

The Landsat Quarterly Management Meeting (QMM) was held on August 14th and 15th at the EROS Data Center, Sioux Falls, SD. The following are a few of the topics discussed: completion of the deorbiting maneuvers for Landsat 4 on June 15, 2001; continuation of Landsat 5 operations through Sept 30, 2001; and prospects for government funding of Landsat 5 operations in Fiscal Year 2002. The L7 turn-around-time is still being investigated; so far, no direct cause and effect link has been established to explain the increase in the turn around time.

Upcoming Meetings

Meeting Timeframe Location

LGSOWG 30 Sept. 2001 Orlando, Florida

LTWG 11 Jan/Feb 2002 Australia

LTWG 12 May/June 2002 Argentina

LGSOWG 31 Sept. 2002 TBD

LTWG 13 Jan/Feb 2003 TBD

Welcome Aboard

Thailand signed the Memorandum of Understanding (MOU) to download Landsat 7 data on August 1, 2001. The Landsat 7 team, the LGSOWG, and the LTWG are looking forward to working closely with the Thailand Team.

Matera, Italy (MTI) was declared operational as of August 1.

September 2001

Mission Operation Center (MOC)

Landsat 7: Two Delta-V maneuvers on September 14, 2001 and September 18, 2001 were completed this month to maintain the +/- 5 km Worldwide Reference System (WRS) requirement and prepare for an upcoming Delta-I maneuver. A Delta-I maneuver is planned for October 9, 2001 to maintain a Mean Local Time (MLT) about 10 a.m., Zulu time. Imaging is expected to be impacted from approximately 11:30:00Z October 9, 2001 to 04:00:00Z October 11,2001. A new Scheduler release occurred on September 17, 2001, which provides a new Special Request feature that is easier to schedule and allows more flexibility in making requests even though antenna and duty cycle resources remain the primary limiters. Due to the U.S. National emergency on September 11, 2001, operations were reduced to essential personnel and automated when possible. No disruption in service occurred.

Landsat 5: Three Delta-V maneuvers on September 4, 2001, September 17, 2001, and September 27, 2001 were completed this month to maintain the +/- 10 km WRS requirement. The MLT is currently at 9:52 a.m. A Delta-I maneuver is being considered for the Spring. USGS is leading an ongoing investigation into the "Caterpillar Tracks" that have been observed in the imaging as a result of the Shutter and Scan Mirror out of phase condition. Current investigation attributes this to Bumper Wear exacerbated by colder operating temperatures due to fewer stations receiving data. A temporary or possibly permanent fix has been implemented that keeps the instrument on during specific periods without the transmitter on, which maintains the temperature balance needed for Phase Lock.

Landsat Monthly Renamed

We have changed the name of this publication from the Landsat 7 Monthly Update to the Landsat Monthly Update. The new title better reflects the expanded scope of the Landsat Program with the addition of Landsat 5 operations. In addition to reports about Landsat 7, we will include more information on Landsat 5 and the National Land Remote Sensing Program.

Data Validation

During the month of September four International Ground Stations (IGSs) passed their biannual data validation exercise. Another IGS has, for the first time, provided the U.S. Geological Survey (USGS) with Raw Computer Compatible (RCC) data that can be processed and validated to be of equivalent quality to the corresponding data residing at the EROS Data Center (EDC). The IGSs are Hiroshima, Japan (biannual), Cordoba, Argentina (biannual) Alice Springs, Australia (biannual), Hobart, Australia (biannual) and Maspalomas, Spain (first validation). At this time there are 13 of 16 cooperating IGSs validated with either RCC or Level Zero Reformatted Distribution Product (L0Rp) data.

Metadata

EDC began archiving metadata from Neustrelitz, Germany (NSG), and Kiruna, Sweden (KIS) on September 21, 2001. Metadata from Canada and Australia continue to be archived successfully. As of September 28, 2001, metadata were archived for 5,529 L7 IGS subintervals and 105,955 L7 Worldwide Reference System (WRS) scenes.

Hartebeesthoek, South Africa (JSA) and Bangkok, Thailand (BKT) submitted metadata for testing this month. Testing will continue for these, and hopefully other stations.

The EOSDIS Core System (ECS) continues to work to support new IGS, and to make the horizontal display shift field optional. It is anticipated that the implementation of these changes at EDC will occur in the next two months. Another ECS change will enable path/row searches for IGS metadata using the EOS Data Gateway. This ECS functionality will be tested next month, and implemented by the end of the year. IGS metadata and browse ingest from tape has been delayed. Testing is planned to begin this year, and will carry over into 2002.

Landsat Ground Stations Operations Working Group (LGSOWG) 30

After the tragic events of September 11, 2001, the Landsat Program decided to postpone Landsat Ground Stations Operating Group (LGSOWG) 30. With the uncertainty about domestic and international air travel that followed the attacks on New York and Washington, DC, we felt that it was in the best interest of all participants to reschedule the meeting. Our new dates for LGSOWG 30 are November 12 – 15, 2001, in Orlando, Florida. As before, we will meet in the Rosen Plaza Hotel. Participants should contact Brad Heegel (heegel@wise.augie,edu) and inform Brad of your new flight arrival and departure information. We regret any inconvenience this postponement may have caused and thank you for your patience. The Landsat team is looking forward to seeing all participants in Orlando.

Upcoming Meetings

Meeting Timeframe Location

LGSOWG 30 Sep 2001 Orlando, Florida

LTWG 11 Jan/Feb 2002 Australia

LTWG 12 May/Jun 2002 Argentina

LGSOWG 31 Oct 2002 TBD

LTWG 13 Apr/May 2003 TBD

New International Ground Stations

The Landsat 7 network welcomes a new IGS, Ulaanbaatar, Mongolia (ULM). ULM is operated by the German Space Agency (DLR) through a cooperative agreement with the Government of Mongolia. In Addition to being the newest IGS, ULM is also our first “campaign” station. Campaign stations are only active for a short time (no more than 192 days per year) and acquire a limited amount of data (up to 5,000 scenes per year). The campaign station concept was developed by the USGS to serve the global community without adversely affecting existing“full coverage” stations.

October 2001

Landsat 5 Funding

Funding for Landsat 5 operations has been included in the fiscal year 2002 Department of the Interior (DOI) appropriations bill that was signed November 6, 2001.

Landsat 5 Antenna

The U.S. Geological Survey (USGS) has installed a new 5.4m antenna at the EROS Data Center (EDC) to support multi-mission operations. The antenna has full S-Band receive and transmit capabilities, in addition to X-Band data downlink reception. The system is scheduled to initially support Moderate Resolution Imaging Spectrometer (MODIS) direct broadcast reception from Terra (AM-1), but support for other missions is planned. The antenna will be certified to support all Landsat 5 (L5) and Landsat 7 (L7) services, so EDC now has a backup capability in the event the main L7 antenna is unavailable.

Landsat Metadata

EDC began archiving metadata from Hartebeesthoek, South Africa (JSA) on September 26, 2001, and from Hatoyama, Japan (HAJ) on October 12, 2001. Metadata from Canada, Australia, and Europe continue to be archived successfully. As of October 29, 2001, there were 5,554 L7 International Ground Station (IGS) subintervals archived for 98,469 Landsat 7 Worldwide Reference System (WRS) scenes. These totals are lower than previously reported due to the deletion of duplicate metadata records from the EDC archive.

EOSDIS Core System

The Earth Observing System (EOS) Data and Information System (EOSDIS) Core System (ECS) has made significant progress this month in support of IGS metadata ingest. Ingest testing for the new station in Matera, Italy is now possible, and should commence in November. The Horizontal Display Shift field has been reset to optional in accordance with the IGS Interface Control Document. On October 25 EDC sent out a request to the IGSs to remove this field from their metadata if it is not being calculated. Thus far, IGSs in Canada and Australia have complied with this request. Lastly, WRS path/row searches for IGS metadata have been enabled using the EOS Data Gateway (EDG) located on the Internet at http://edcimswww.cr.usgs.gov/pub/imswelcome. The ECS will implement tape ingest for IGS metadata and browse during the first quarter of next year.

200,000th Landsat7 Scene

The USGS is about to acquire the 200,000th Landsat 7 scene for the U.S.
archive. Landsat 7 has proven to be a major success. In the 2½ years of operation there has not been a major spacecraft anomaly. Total earth coverage, including record numbers of repetitive coverage, exceeds 6.2 billion square kilometers. The data have provided new insights into natural and man made alterations of the Earth's surface, atmospheric phenomena, and insights into volcanic activity.

Landsat 7 Delta 1

Landsat 7 successfully completed its third inclination correction maneuver (Delta I) October 9 through 11. In order to maintain a mission desired 10:00 am Mean Local Time (MLT) through October of 2002, two inclination maneuvers about the Descending Node (DN) were performed. To minimize the efforts, resources, and impacts that are associated with inclination maneuvers, they were planned together and treated as one large burn. The maneuvers were separated by two orbits in order to verify spacecraft performance and reestablish a converged attitude. Prior to the Delta I, Landsat 7 had a MLT of 10:01 am of the DN trending toward 9:30 am.

Maneuver planning also took into account Landsat 7's proximity to the Earth Observer 1 (EO1) and other spacecraft in a formation called the AM constellation satellites. Landsat 7 is the lead spacecraft in this Constellation of four spacecraft following in the same orbit but with different DN crossing times. EO1 trails just 1 minute behind Landsat 7, requiring cooperative planning between missions to avoid any possibility of collision.

"Caterpillar Tracks"

Recently the quality of Landsat 5 data has been in question due to the observance of "Caterpillar Tracks." These tracks, a known and expected characteristic for this type of imager, occur while the Scan Mirror (SM) and Shutter become un- synchronized. Operationally, the instrument undergoes a short warm up period to allow for synchronization prior to any imaging event. During the past several months, however, Landsat 5 has exhibited periods where synchronization either exceeded the warm up period or did not occur at all. The Landsat 5 missions operations center has recently quantified a relationship between bumper wear, SM Turn Around Time (TAT), and Thermal operating conditions. The fundamental relationship between these items shows that the motion of the SM wears down the surface of the bumpers over time, thereby increasing the distance that the SM travels between strikes of the bumpers, which translates to a longer travel time. This pattern of aging is what we refer to as TAT growth. It has been predicted that at some time during the instrument life, the TAT growth would increase to a period in which the SM would not be able to sync with the Shutter and end the mission.

Although bumper wear is the leading contributor to this anomaly, it is prematurely precipitated by a decrease in operating temperatures. The operating temperatures of the TM recently changed as direct result of significant changes in its tasking profile. The Landsat 5 missions operations center recently implemented an operational strategy that maintains the optimum thermal conditions the instrument requires. This is still under investigation the anomaly but so far this methodology has removed all traces of the "Caterpillar Tracks" from the image data. USGS still believes that the TAT will continue to grow and eventually be uncorrectable, but USGS is hopeful that that may not happen for quite some time.

Calibration Parameter File Update

The USGS recently released updated and new Calibration Parameter Files (CPF). A July 2001 CPF release, used in processing to characterize how the Landsat 7 sensor is performing, has been changed. Striping in band 6 data was noticed and required changes to the band 6 high gain. The changes correct the striping and a 0.1 % difference between the high and low calibrated images.

The October 2001 CPF release makes a change to band 7 gains, but only for detector 5. A 3 percent drop in relative gain was noted for detector 5 beginning in January 2001; therefore, the change is only for CPFs for the period after December 31, 2001.

Modulation Transfer Function Compensation

New Modulation Transfer Function Compensation (MTFC) parameters for the Landsat 7 Calibration Parameter File were submitted for inclusion in the October 2001 CPF release. The new coefficients used in the CPF are derived from on-orbit estimates of the Enhanced Thematic Mapper Plus (ETM+) along- and across-scan MTF and replace the previous coefficients, which were based on prelaunch MTF measurements in the along-scan direction only. The MTF describes how the sensor optics and electronics modulate the original signal (image), as a function of spatial frequency, in the conversion of input radiance at the ETM+ aperture to an output digital image. The goal in MTFC resampling is to partially compensate for the system response by boosting the higher spatial frequencies attenuated by the MTF. This enhances fine spatial detail (e.g., edges) but has the side effect of also increasing the image noise somewhat. Because of this, MTFC images usually exhibit sharper edges but also have a grainier appearance. Users should evaluate the relative importance of image sharpness versus noise to their applications in deciding whether MTFC processing is appropriate. An example of the new MTFC processing has been posted on the Landsat 7 Data Quality web site at:

http://edcwww.cr.usgs.gov/l7dhf/ias_folder/mtf.html.

L0R Validation

The Beijing, China and the Prince Albert, Canada ground stations have both provided Level Zero Reformatted Distribution Product (L0Rp) data for the biannual validation activities and were validated successfully. The use of ftp capabilities has also been quite useful to reduce the time and costs of delivering validation data to the USGS at EDC. At this time 13 of the 16 cooperating international ground stations have been successfully validated.

Leonid Activity

In anticipation of Leonid activity on Nov 18, 2001, both Landsat 5 and 7 will shutdown operations for the 19-hour period of the Shower/Storm. The flight operations team will operate the instrument while the spacecraft is behind the Earth and away from the Leonids. This will help maintain a nominal thermal balance of the ETM+. The user community and the International Cooperators will be notified of the details of the plan as they are developed.

LGSOWG Meeting

The Landsat Ground Stations Operations Working Group (LGSOWG) 30 meeting, originally scheduled for September, will be held in Orlando, Florida on November 12-16, 2001. The LGSOWG consists of ground station management from the USGS, National Aeronautics and Space Administration (NASA), and the Landsat International Cooperator (IC) community. The November meeting topics include cloud avoidance, implementation of a multi-level priority system, Distributed Active Archive Center (DAAC) metadata ingest, spacecraft and sensor performance for Landsat 5 and 7, ground systems, data exchange, USGS program restructuring, station reports, and the planned USGS/NASA Millennium Assessment Program.

Three New Publications Highlight Landsat Data

KUNSTWERK ERDE: SATELLITENBILDER AUS DEM ALL, published for GEO in Germany by Frederking and Thaler offers views of the planet's surface, many of the images are reproductions of Landsat data.

The summer 2001 Hardrock, published by the South Dakota School of Mines and Technology Alumni office, carries a simulated view of the South Dakota Black Hills developed from Landsat 7 data and from digital terrain data.

The journal, Remote Sensing of the Environment, October 2001 issue, is dedicated to Landsat.

November 2001

Leonid Activity

As reported in October, the Enhanced Thematic Mapper Plus (ETM+) instrument was turned off for 19 hours beginning 0500z on day 322, to protect the system from the effects of the Leonid shower activity. The thermal stability of the ETM+ during this 19-hour period was maintained by image acquisition when the Earth shielded the satellite.

Landsat Metadata

Metadata from Canada, Australia, South Africa, Japan, and Europe continue to be archived successfully. As of November 27, 2001, there were 6,683 L7 International Ground Station (IGS) subintervals archived for 111,075 Landsat 7 Worldwide Reference System (WRS) scenes. Metadata from Matera, Italy were tested successfully and will be archived at EROS Data Center (EDC) once European Space Agency (ESA) has complied with the request sent out last month regarding the Horizontal Display Shift field. Thus far, IGSs in Canada, Japan, and Australia are in compliance. Tape ingest for IGS metadata and browse is scheduled to be implemented during the first quarter of 2002.

EDC Ground Architecture Re-Engineering Phase 1 Completed

The EDC engineering and operations staff recently completed phase 1 of a major, two part ground architecture re-engineering effort. The Landsat Program sponsored this re-engineering effort to accomplish several goals.

1. Lower Program maintenance expenditures by installing new, maintainable computer hardware.

2. Implement a simple, deployable capture system to support contingency capture operations.

3. Automate the archiving of Raw Computer CompatiblLGSOWG Meeting

4. The Landsat Ground Stations Operations Working Group (LGSOWG) 30 meeting, originally scheduled for September, will be held in Orlando, Florida on November 12-16, 2001. The LGSOWG consists of ground station management from the USGS, National Aeronautics and Space Administration (NASA), and the Landsat International Cooperator
(IC) community. The November meeting topics include cloud avoidance, implementation of a multi-level priority system, Distributed Active Archive Center (DAAC) metadata ingest, spacecraft and sensor performance for Landsat 5e (RCC) and Level Zero Reformatted Archive Product (L0Ra) data and the distribution of Level Zero Reformatted Distribution Product (L0Rp) data through the use of a Storagetek near line silo-based system called the Landsat Archive Manager (LAM).

5. Position the architecture to support additional missions.

The phase 1 implementation accomplishes the first three goals and a portion of the fourth. On November 8th, the Re- Engineering Team completed all phase 1 development and test activities and commenced operations with the phase 1 architecture. During November, the Development Team also completed the Phase 2 Critical Design Review. The phase 2 implementation will accomplish the remainder of the four goals and the fifth. Additionally, during phase 2, the Development Team will streamline the Landsat 7 data flow by transitioning the current Landsat Program interface with the EDC Distributed Active Archive Center (DAAC) from the Landsat 7 Processing System (LPS) to the LAM. This change will automate the LAM L0Rp production
activities and reduce operator workload. Phase 2 is scheduled to complete in April 2002.

Landsat 7 Ground Station Milestone

The Landsat 7 Ground Station (LGS) located at the EDC has gone one complete calendar year without losing a single Landsat 7 scene during reception operations. Since Nov 26, 2000, the LGS Team has down linked 52,934 full scenes successfully. The LGS Team also performs satellite reception operations for Landsat 5 and the Moderate Resolution Imaging Spectrometer (MODIS) (TERRA) sensor. These statistics speak well of the dedication shown by the LGS Operations and support staff as well as the training and certification program that has been implemented to ensure solid image data reception and telemetry and commanding activities in support of the Landsat 7 Mission Operations Center (MOC).

Data Validation

During the month of November two ground stations, Gatineau, Canada and Hatoyama, Japan, provided L0Rp data to the USGS for their second biannual validation exercise this year. The Bangkok, Thailand ground station provided the USGS with both RCC and L0Rp data for their first successful data validation. This brings the total number of successfully validated IGSs to fourteen. (The following is a graphic showing the status of the International Ground Station data validation)

al Arts & Science pavilion is hosting an exhibit, ”Landsat as Art.” Scenes were selected for their aesthetic value rather than their scientific information. Framed images, with captions, are on display for two months. The exhibit, which brings a different visibility to the Landsat data, will be shown in other federal facilities around the country in 2002. IGSs may wish to consider similar exhibits to bring regional visibility to their programs.

LGSOWG Meeting Summary

The 30th Landsat Ground Station Operators Working Group (LGSOWG) meeting was held in Orlando, Florida the week of November 12th. The meeting was attended by nine out of ten of the Landsat 7 International Cooperators (ICs) and was also attended by representatives from Russia and Ecuador. Among the meeting highlights was a presentation by the USGS Associate Director Ms. Barbara Ryan on the vision for the future of Land Remote Sensing activities in the USGS. The attendees enjoyed a full week of technical presentations and discussions as well as the opportunity to interact informally during two evening events. A CD-ROM will be mailed out to all participants containing the presentation materials.

Publication News

The December issue of Photogrametric Engineering & Remote Sensing carries a cover image of the 200,000th Landsat 7 scene to put in the U.S. archive. The image was acquired on November 3, 2001, and covers the Santa Barbara, California region. Co-incidentally, the ETM+ instrument was built at the Santa Barbara Research Center.

Landsat as Art

Staff at the EDC developed a special showing of Landsat 7 data. A local Arts & Science pavilion is hosting an exhibit, ”Landsat as Art.” Scenes were selected for their aesthetic value rather than their scientific information. Framed images, with captions, are on display for two months. The exhibit, which brings a different visibility to the Landsat data, will be shown in other federal facilities around the country in 2002. IGSs may wish to consider similar exhibits to bring regional visibility to their programs.

LTWG Meeting

The 11th Landsat Technical Working Group (LTWG) meeting will be held February 4-8, 2002 in Canberra, Australia. The focus of the meeting will be product generation systems. The meeting will be held at the Crowne Plaza Hotel and the formal announcement and logistics information will be emailed out shortly.

December 2001

Landsat 7 Year-end Transition Incident

In the first few milliseconds of every year, the Landsat 7 spacecraft performs a script with a rapid-fire series of commands to reset itself for the new year. This actually involves changing multiple parameters, all intended to bring the clock from day-of-year (DOY) 365 back to DOY 1. Among these commands are several which tell the spacecraft where it is in relation to the earth through reference to the ephemeris table. With this information, it can properly orient itself for nadir viewing.

Unfortunately, complications arose during this year’s transition as a result of an unusual Monday (DOY 365) delta- velocity maneuver. The post-burn ephemeris file loaded on the spacecraft did not match that expected for DOY 1 by the script. Consequently, the end-of-year commands pointed the on-board software to an incorrect place in the file, causing the satellite to incorrectly calculate its location in space. Fast action by the Flight Operations Team (FOT) prevented any serious problems, but not before the instrument ‘safed’ itself. This resulted in a warming of the Enhanced Thematic Mapper (ETM+) cold stage, preventing normal operations for about 24 hours. As of DOY
2/00:00:00, the spacecraft was in its nominal configuration and running standard operations.

Landsat Metadata

Metadata from Canada, Australia, South Africa, Japan, and Europe continue to be archived successfully. As of December 28, 2001 there were 6965 L7 International Ground Station (IGS) subintervals archived for 114,629 Landsat 7 Worldwide Reference system (WRS) scenes. IGS metadata from China (BJC) has been tested successfully, and will be released to the public in January 2002. Argentina (COA) is installing new software next month, after which they will resume IGS metadata testing. Tape ingest for IGS metadata and browse remains scheduled for the first quarter of 2002.

LDCM Mission Procurement Under Way

National Aeronautics and Space Administration (NASA) and the U.S. Geological Survey (USGS) have teamed up to implement the follow-on to the highly successful Landsat 7 mission. The follow-on is the aptly named Landsat Data Continuity Mission, or LDCM. As directed by public law, this mission is being pursued as a government-commercial partnership, via a two-step procurement. NASA issued the Request For Proposals for the first step in November of 2001. The results of this first procurement should be announced in early 2002. The successful bidders will then carry out a nine-month mission formulation activity in preparation for a second procurement for the LDCM data.

Data Validation

While no new ground stations were validated during the month of December, the scheduled biannual validations have continued. The Kiruna, Sweden and Neustrelitz, Germany ground stations have both provided Raw Computer Compatible (RCC) data to the USGS and are at some stage of the biannual validation process. Two active IGSs, Indonesia (Level Zero Reformatted Distribution Product (L0Rp)) and South Africa (L0Rp), have yet to be successfully validated. Refer also to the Data Validation chart in the November Update.

L7 ETM+ Floating Scene Products Coming Soon

Currently, the USGS EROS Data Center (EDC) distributes only single WRS scene ETM+ data products. In early February 2002, EDC is planning to offer “multi” or “floating” scene products to customers. The January release will include 0.5 to 10 scene Level Zero Reformatted (L0Rp) products delivered through several media options: FTP, CD-R, DVD-R, 8mm and DLT tape. In April, EDC plans to offer multi / floating scene Level 1 data products. Customers will be able to choose from a 0.5 to 3-scene swath for the Level 1 products.

LTWG Meeting Scheduled

The 11th Landsat Technical Working Group (LTWG) meeting will be held February 4-8, 2002 in Canberra, Australia. USGS managers will present a report on the health and status of the Landsat 5 and 7 programs. Group discussions will focus on the maturing of the system from reception and archiving to processing changes. Attendees will tour the Australian Center for Remote Sensing (ACRES) facility, then travel to Tidbinbilla to visit NASA’s Deep Space Network station. During the meeting a special dinner will be held to honor Robert Denize, ACRES Chief Engineer, who will be retiring at the end of February.