

LANDSAT MONTHLY UPDATE

June 2003

The Landsat Program is managed by the U.S. Geological Survey under authority established by Presidential Decision Directive NSTC-3.

Landsat 7

The problem with Landsat 7, first noticed in early June, has had a major impact on the global Earth science community. While engineers are studying the cause of the problem, the global user community has recognized the immediate impact of lost data and has shown great concern over the plans for future systems.

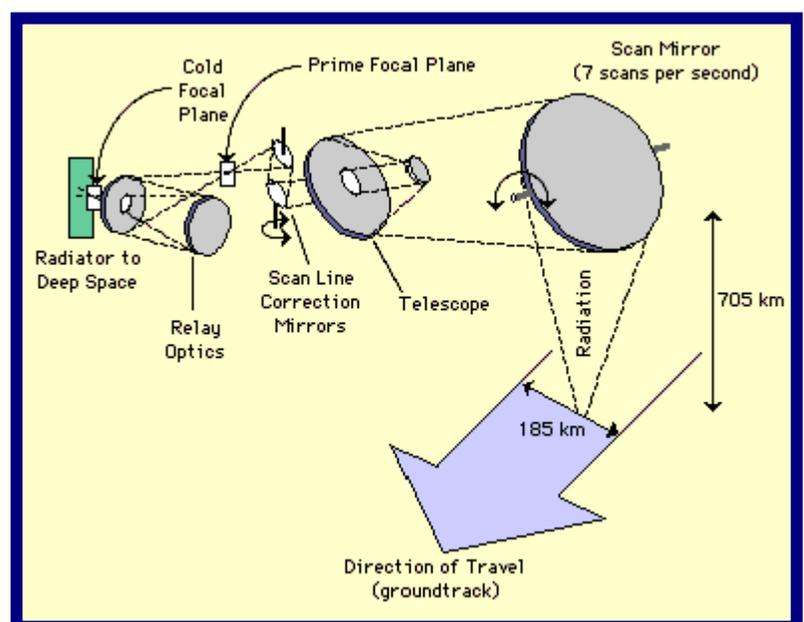
We feel it is important to keep the Landsat User community aware of latest developments: hence, the Landsat Monthly Update subscription list was used to send out early notification of the data anomaly. In that spirit, this issue of the Update will be devoted to a summary of the problem, a description of plans, and resources that will allow you to stay informed, on a regular basis, of developments.

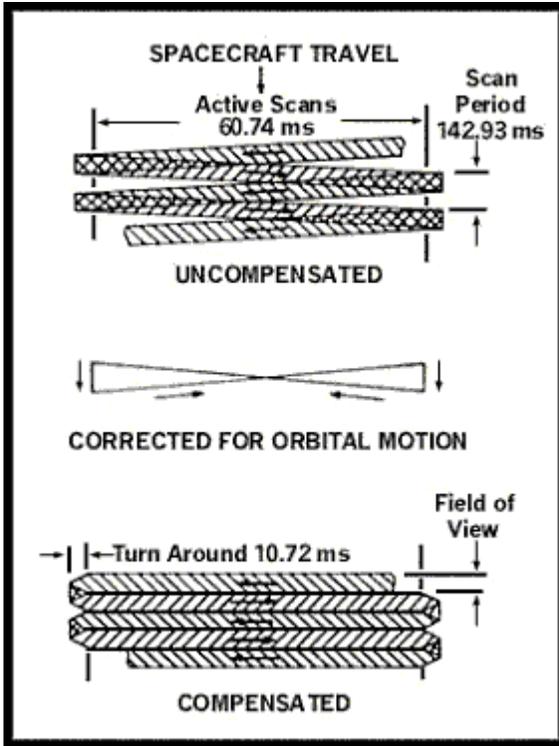
The Problem

In May 31, 2003 at approximately 21:45 GMT unusual artifacts began to appear within image data collected by the Enhanced Thematic Mapper plus (ETM+) instrument on board the Landsat 7 spacecraft. These artifacts are consistent with a failure of the instrument's scan line corrector (SLC). The SLC is an electro-mechanical device that compensates for the forward motion of the spacecraft. Further analysis has confirmed that there is a problem with the SLC.

The spacecraft itself appears to be in no danger; however, it is believed that all data collected by the ETM+ since the initial failure contain the defect. The affected data have been archived and removed from the publicly accessible data ordering systems. Operations, other than those required to support the current investigation, have been limited to routine housekeeping procedures since the data anomaly was discovered. At this time, the root cause of the anomaly – why the SLC ceased functioning – is unknown.

A joint USGS-NASA anomaly resolution team has been put into place under the leadership of the USGS Flight Operations Manager. The team, including the instrument manufacturer, Raytheon Santa Barbara Remote Sensing, is actively investigating both possible causes and remedial actions. This is the fourth incident during the life of the mission that has had the potential to jeopardize the spacecraft's ability to meet its performance requirements. Each of the other incidents was investigated and resolved without significant impact to the Landsat 7 mission. The drawing shows the scan line corrector and scan mirror optics.



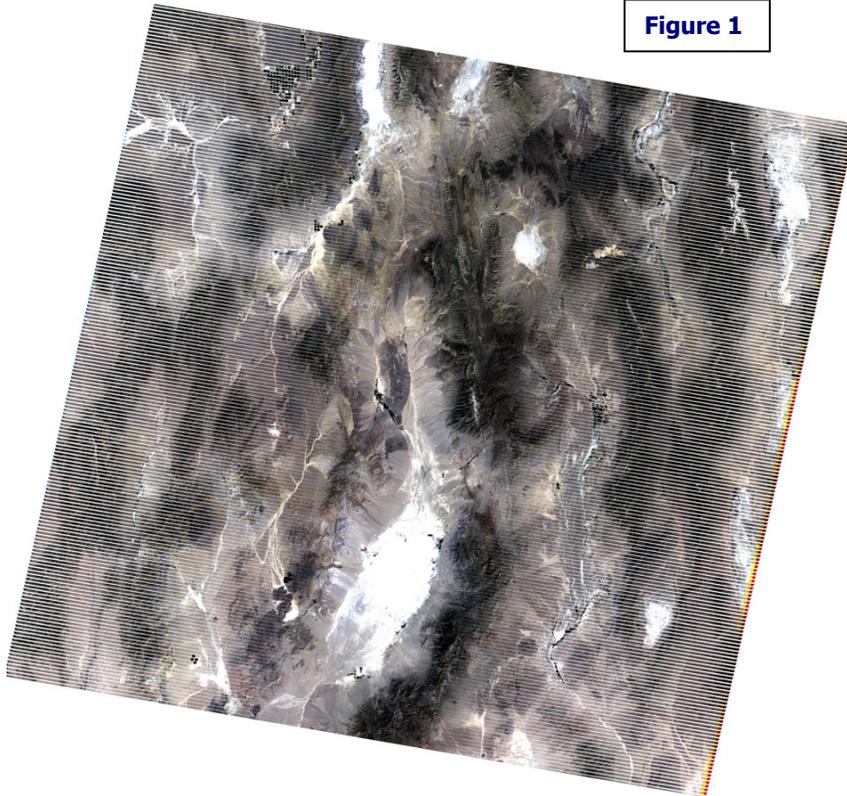


The scan line corrector compensates for the forward motion of the spacecraft. The following drawing illustrates the results with the scan line corrector functioning versus non-functioning.

The following three images show the results in actual data sets. In Figure 1, the scan line problem can be seen; in Figure 2, a close-up of the scene shows the affected scene; in Figure 3, the middle section of a scene, less affected by the problem is marked.

Teams, led by the USGS Landsat Flight Operations Manager, are evaluating probable causes of the problem. Through the use of a 'fault tree', potential causes are compared to the technical data in hand. Through a methodical process of elimination likely causes of the problem will be identified and remedial actions will be considered. Only when the anomaly team has concluded, with confidence, the most probable cause of the problem will appropriate action take place.

Figure 1



Secondly, test data are being evaluated by a team of experienced users. They are evaluating data collected for test purposes since May 31 to determine the viability and scientific integrity of data with the scan line corrector information. While early reports are encouraging, no data collected since May 31 have been processed for wide distribution.

In place of Landsat 7, Landsat 5 acquisitions have increased. A number of International Cooperators are preparing to acquire and process Landsat 5 data.



Figure 2

The Landsat 7 scan line collector problem is unique. Causes and remedial actions are under careful review and evaluation. Daily updates are posted on the landsat7.usgs.gov web site. Users and interested parties are encouraged to check that site regularly for the latest developments.

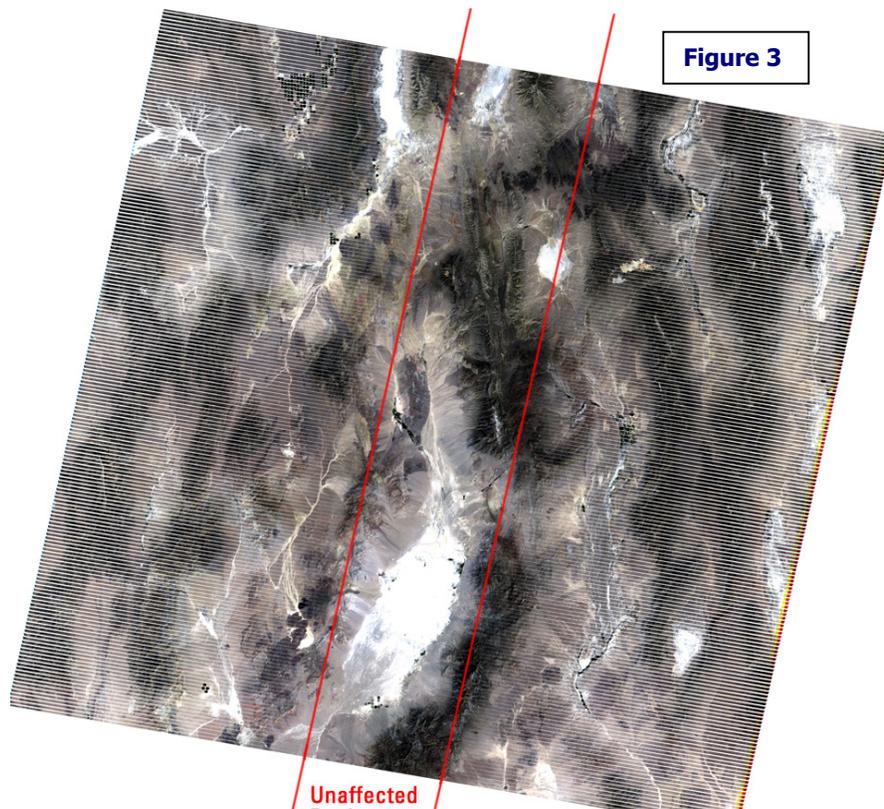


Figure 3

Unaffected

The Landsat monthly update is an informal communication tool, prepared monthly and distributed electronically to USGS Landsat partners, to provide information about Landsat activities and related topics of interest. If you have any ideas, comments, corrections, or successes you would like to share with the Landsat community, please contact Ronald Beck, USGS Landsat team, at the following e-mail address: beck@usgs.gov.