Landsat 7 Anomaly Status

presented by

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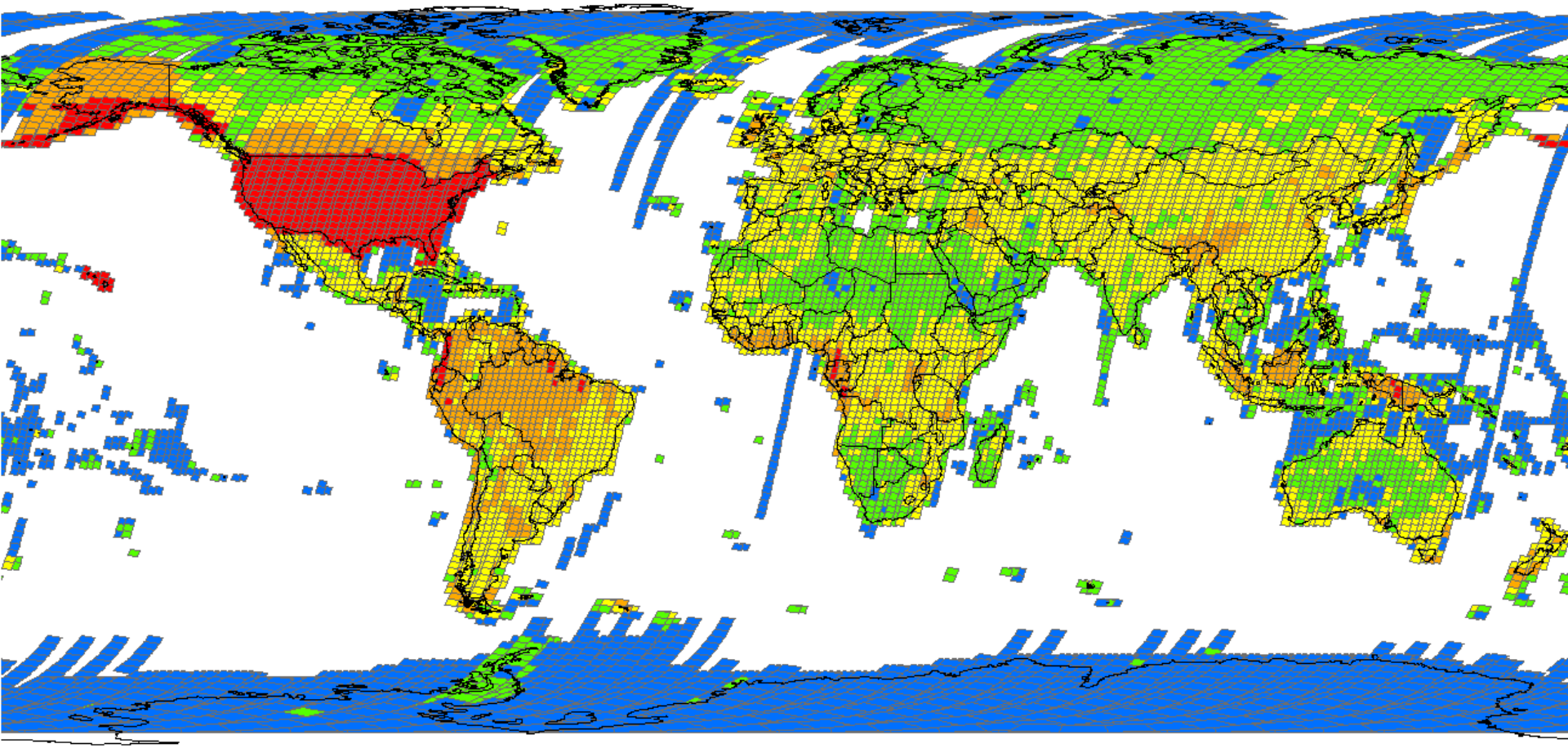
at

LP DAAC Science Advisory Panel Meeting
USGS Headquarters, Reston, VA
September 10, 2003

EDC Archived – Launch to Date



Daytime full scenes archived at EDC
29 June 1999 through 30 June 2003

1 - 12 | 13 - 27 | 28 - 44 | 45 - 70 | 71 - 91

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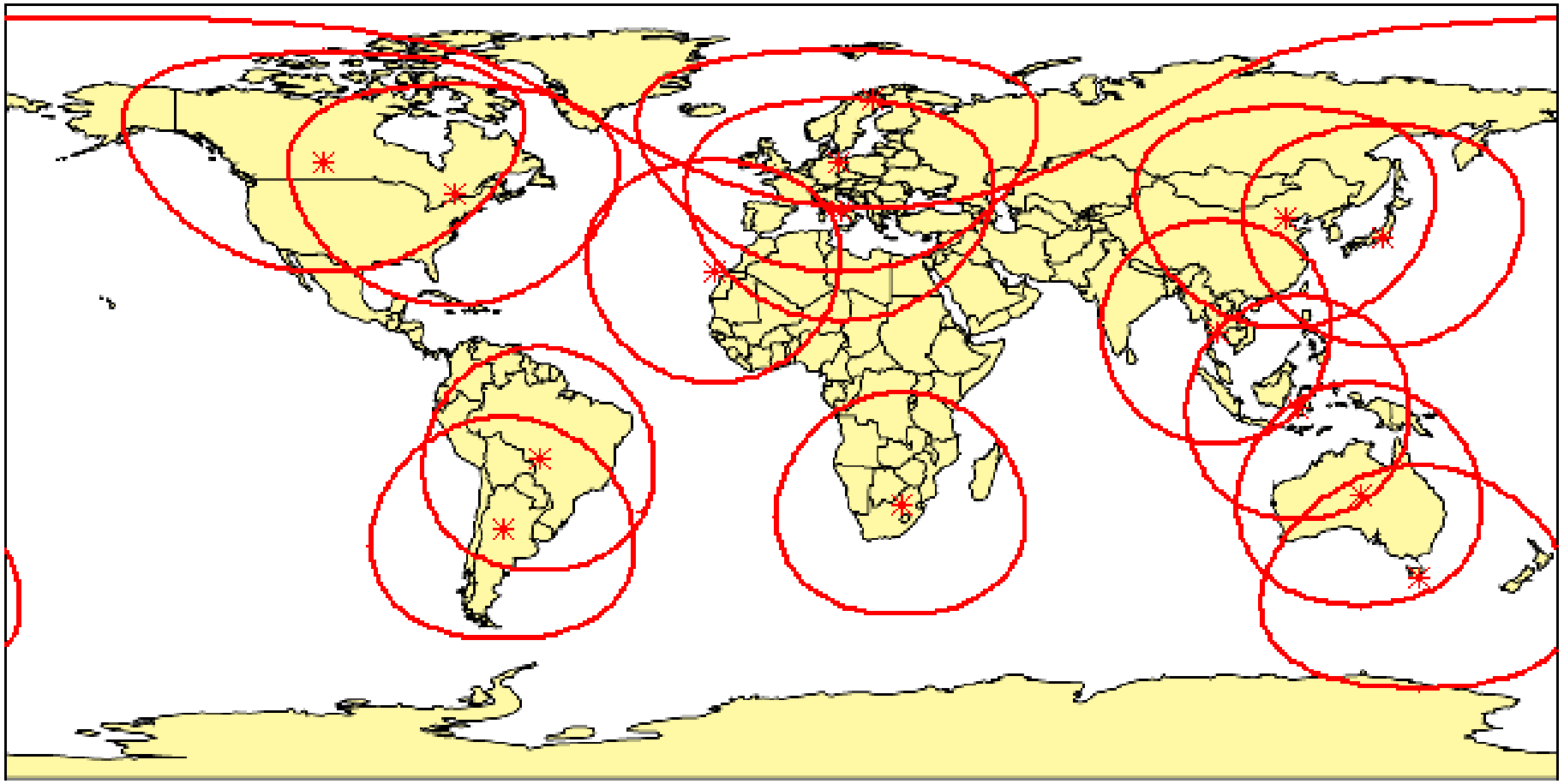
International Cooperator Network



Argentina	Australia (2)	Brazil	Canada (2)
China	ESA (4)	Indonesia	Japan (3)*
Thailand	South Africa		

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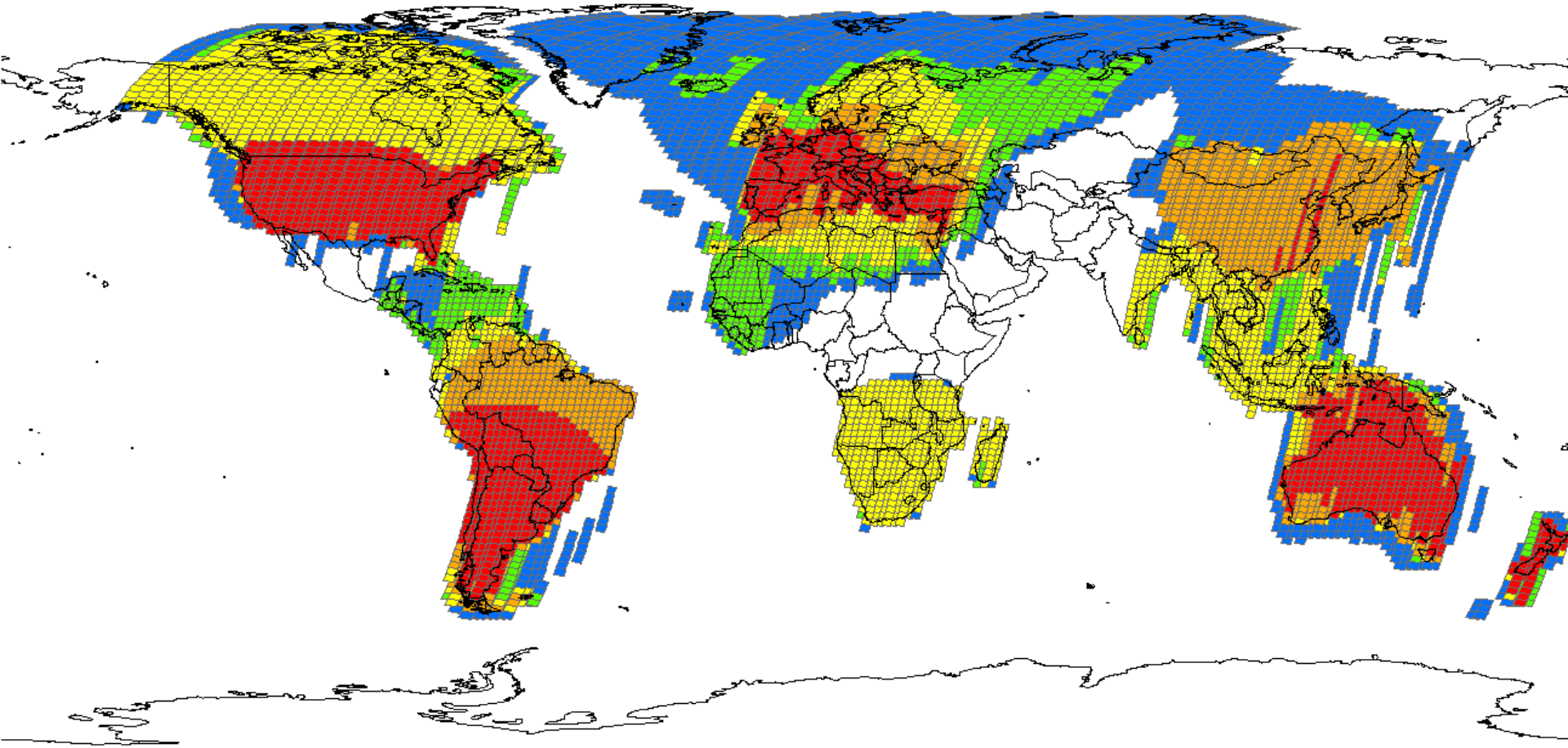
IGS Acquired – Launch to Date



Daytime full scenes scheduled for IGS stations
29 June 1999 through 30 June 2003

1 - 15 | 16 - 36 | 37 - 58 | 59 - 77 | 78 - 90

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Landsat-7 ETM+ Scan Line Corrector Anomaly

- What happened
- What is its impact on the data
- What is the prognosis/status of resolution
  - Timeline
  - Options

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What Happened

- Normal motion of the scan line corrector (SLC) stopped at 21:44:05 GMT on 5/31/2003
- SLC compensates for forward motion of spacecraft to provide parallel forward and reverse scans and full ground coverage

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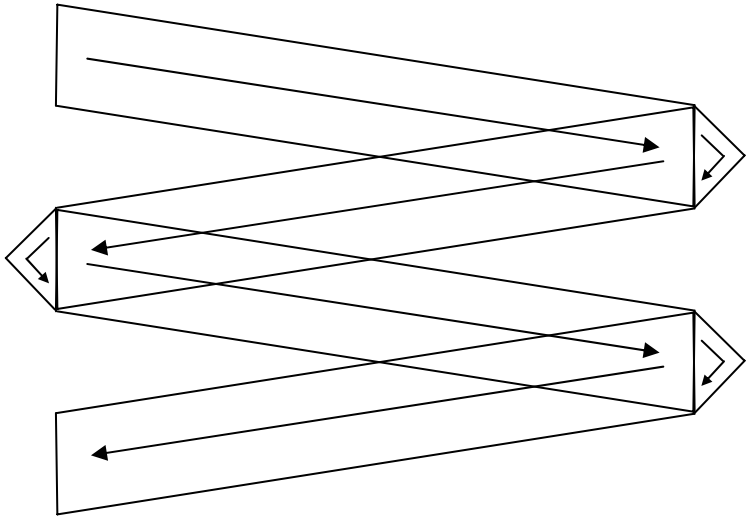
Impact of Stopped SLC

With SLC



Without SLC

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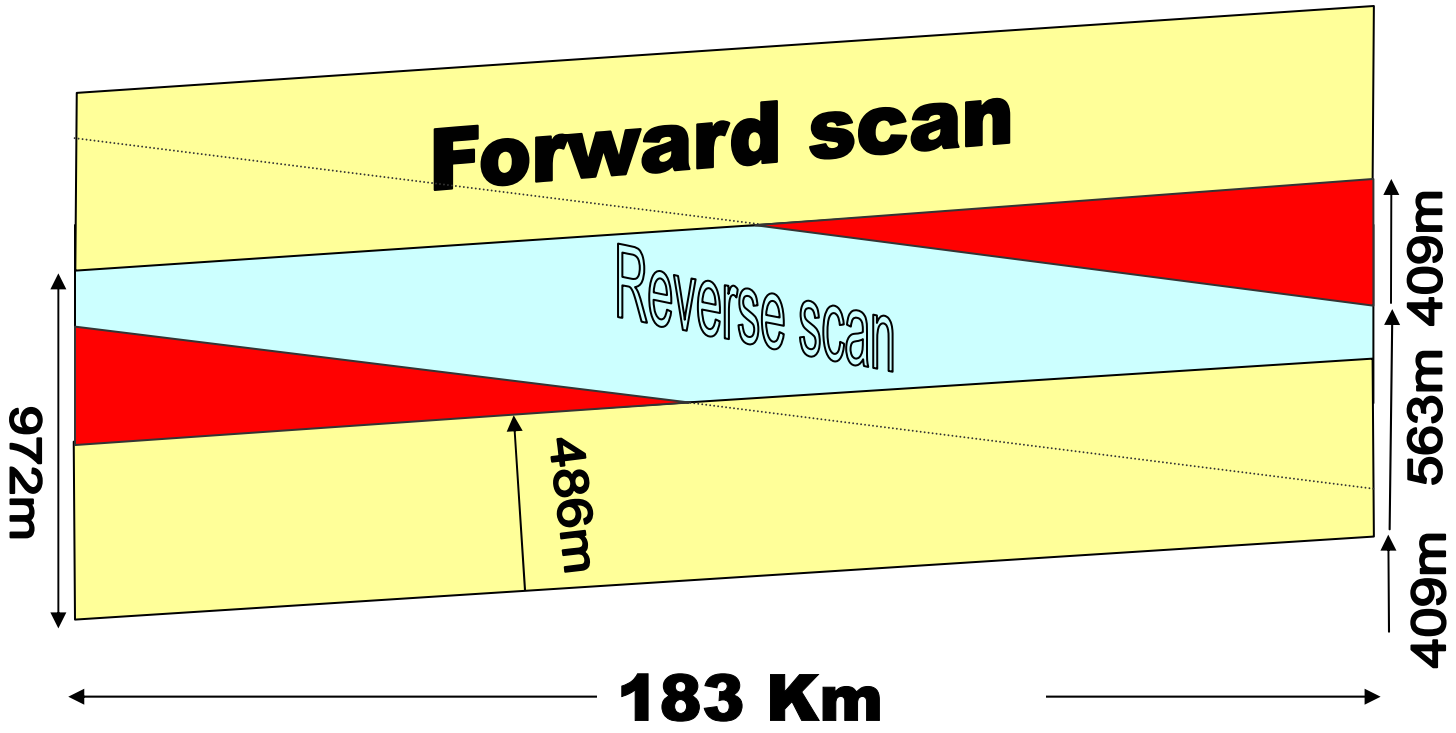
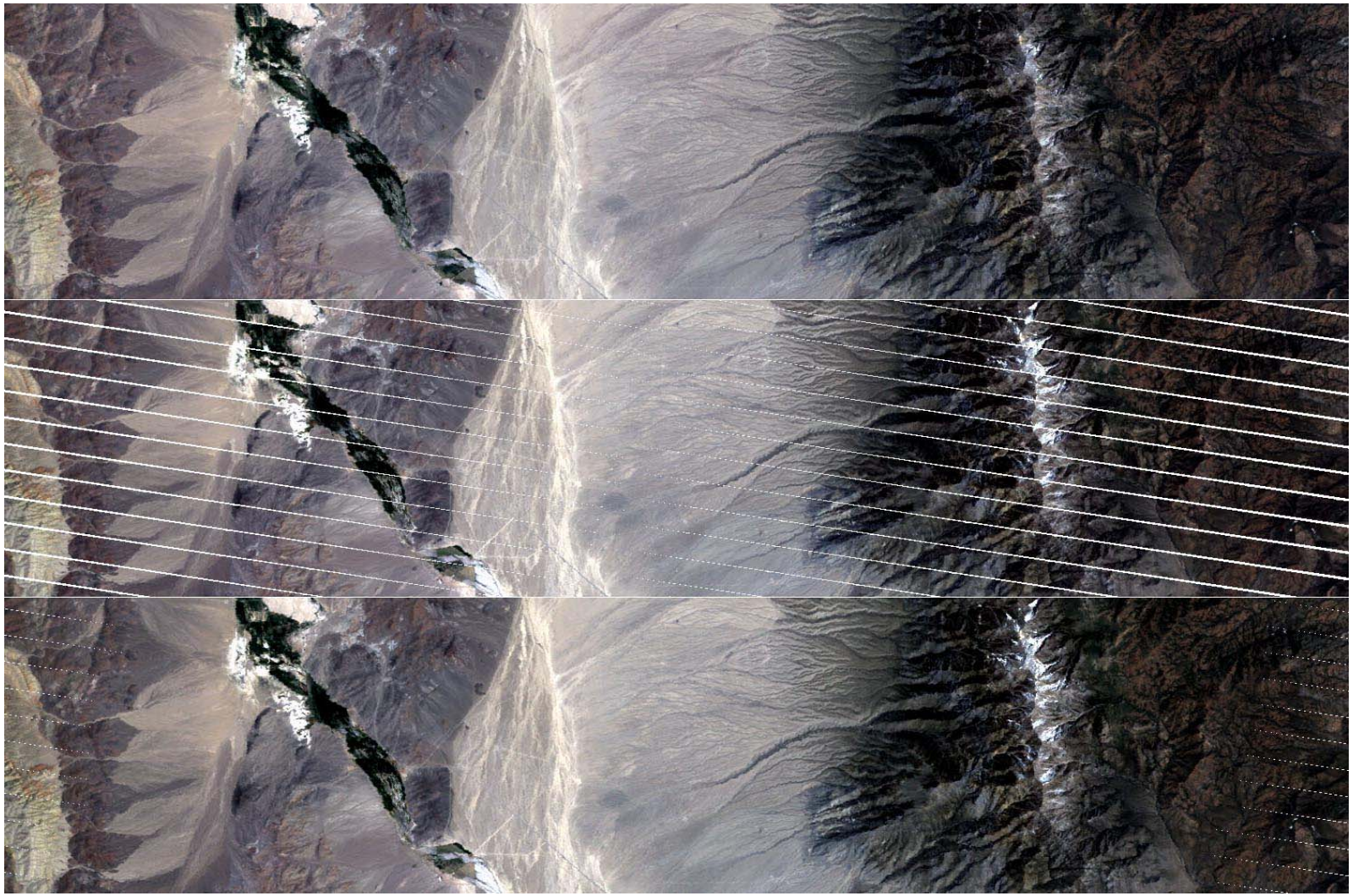
Scan Gap Dimensions



Impact of Stopped SLC
(near center of image)



SLC

NO SLC

No SLC With interp

SLC Anomaly Response - Initial Actions

- Anomaly Review Team (ART) formed
- SLC powered off on June 6th (DOY 157-21:22:08 GMT)
- Data acquisitions reduced to thermal maintenance and anomaly investigation imaging
  - Duty cycle increased from 2.8% to 11% on July 14 (16% nominal duty cycle)
- Post-anomaly data not currently orderable

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SLC Anomaly Investigation

- Electrical and Mechanical Fault Trees generated and analyzed--no purely electrical failure explained anomaly
- Electronic Simulation (SPICE) model generated -- produced results consistent with observed telemetry when "stuck" mechanism assumed
- On-orbit results indicate mirror has moved some since event, i.e., not completely frozen
- Engineering SLC model analyzed
- After much analysis, deliberation, and review, the ART recommended a test with power sent to the SLC from the redundant "B-side" electronics
  - Approved by USGS Director Groat with concurrence of NASA AA Asrar

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“Side B” Test Results

- **No Joy**
  - **ETM+ operations were switched to the B-side electronics beginning last Thurs., Sept. 04**
  - **Power from the B-side electronics was sent to the SLC for a period of less than three minutes last Sun., Sept. 07**
  - **Power from the B-side failed to restore SLC operability; no mirror oscillation observed**
  - **Telemetry from the SLC motor tachometer indicates that the mechanism and motor are jammed or stuck**

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Plans

- Return to A-side electronics and resume full ETM+ acquisition schedule with SLC turned off
- Modify product generation software in EDC systems to produce Level 1 products with SLC-off data
- Work with USGS and DOI to fund continuing Landsat 7 operations in light of lost revenue for International Ground Stations and reduced ETM+ data sales
- Explore other possible actions to restore SLC function
  - Additional efforts are unlikely

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