



Landsat Long-Term Acquisition Plan

Jim Lacasse

USGS Landsat Mission Management Officer

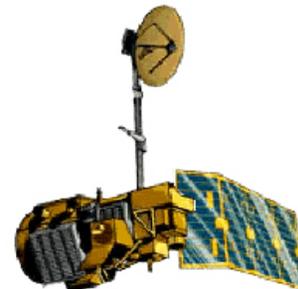
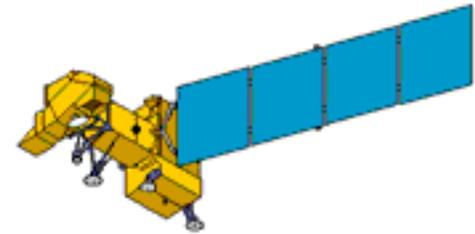
January 9, 2007

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

Landsat/LDCM Science Team Meeting

Agenda

- **Background**
- What is the LTAP?
- Why is there a need for an LTAP?
- How does the LTAP work?
- What are the results of having the LTAP?



Background

- **In the past, most Landsat efforts to define image acquisition approaches were ad hoc:**
 - ◆ NASA: 1972-1978
 - ◆ NOAA: 1979-1985
 - ◆ EOSAT: 1985-2003
 - ◆ USGS: 2003-present
- **Times where NASA Landsat program managers of large-area missions had significant impact in defining mission acquisitions**
- **Innovation of an automated long-term acquisition plan originated in ad hoc Landsat science team discussions**
- **Current LTAP implementation taken up by Landsat Project Science Office in 1995 to support Landsat 7 operations**

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What is the LTAP?

*The LTAP is a method to ensure a seasonally refreshed **US-held archive, with substantially cloud-free observations for all land areas of the Earth . . . with maximum radiometric fidelity***

Primary Tasks

- Defines land by WRS
- Defines Seasons (NDVI, Niches)
- Attempts to avoid clouds (ISSCP, NCEP, ACCA)
- Optimizes radiometry (gains and thresholds)

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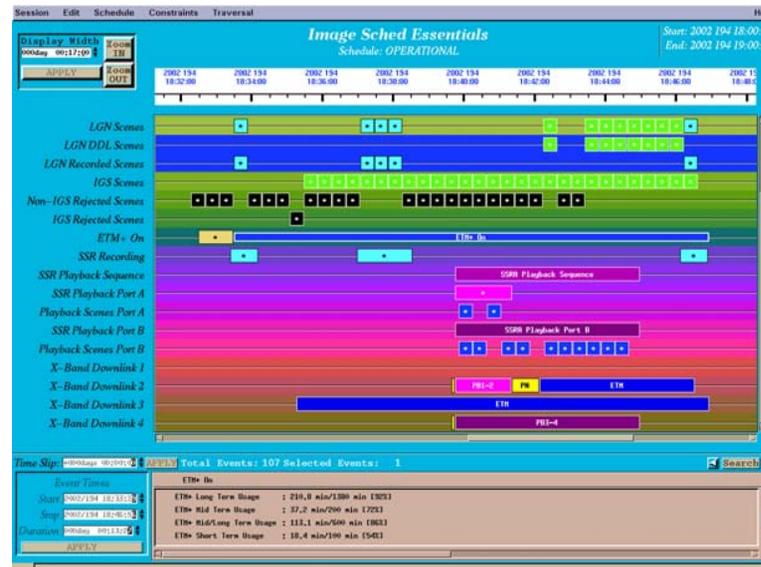
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Why is there a need for an LTAP?

- **No Landsat to-date has collected data continuously while in orbit; if it did...**
 - ◆ Large data volumes
 - ◆ Expensive
 - ◆ Value of additional data to users
- **Maximize science value**
- **Consider system constraints and spacecraft management**
- **All this is implemented through MOC scheduler**

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LTAP Scheduler Architecture

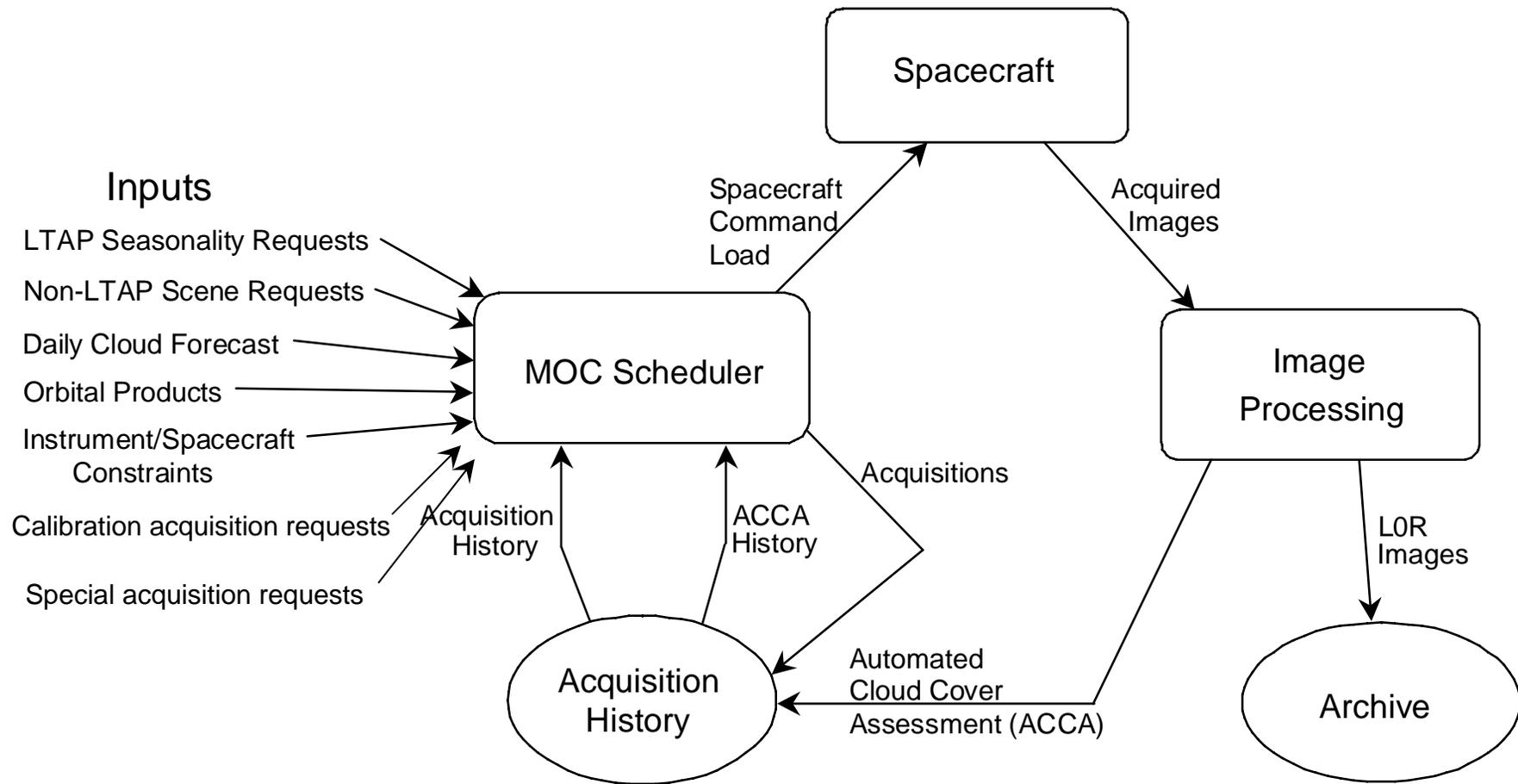
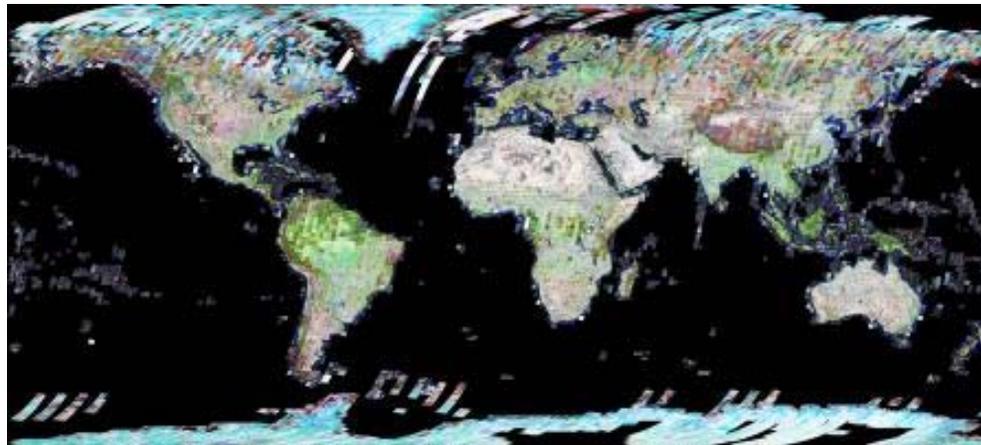


Fig. 6 from the paper: Arvidson, T., Gasch, J., & Goward, S.N. (2001). Landsat 7's Long Term Acquisition Plan - an innovative approach to building a global archive, Special Issue on Landsat 7. *Remote Sensing of Environment*, 78, 13-26.

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What are the results of having the LTAP?

- **Improved seasonality coverage**

- ◆ Good global cloud-free coverage obtained quarterly

- **Cloud Avoidance**

- ◆ Reduced cloud contamination in archived imagery

- **Radiometry**

- ◆ Multiple gain change approach
- ◆ Changed solar zenith threshold to 75° from 85°
- ◆ Recommended that future missions include requirements such that gain changes will be unnecessary

LTAP Enhancements

- **Implemented**

- ◆ Reduced desert and winter acquisitions
- ◆ Focused Boreal and tropical forest acquisitions
- ◆ Converted niches to campaigns

- **Potential**

- ◆ Continuous Variable Seasonality (NDVI)
 - Better use of LTAP decision making capability
- ◆ Include Land Mask for ACCA Assessment
- ◆ Low-Gain-Only Operations
 - Gain changes are more of a problem than a solution

Reference for Presentation: PE&RS Landsat Special Edition, October 2006, Volume 72, Number 10