
Landsat Data Continuity Mission Overview

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USGS Land Remote Sensing Program



USGS Land Remote Sensing Program Mission Goals

- ✦ Leadership among U.S. civil agencies for:
 - Managing U.S. requirements for operational land imaging
 - Acquiring, managing, and distributing land-image data
 - Managing land-imaging satellite resources as necessary for U.S. Government



Landsat Data Continuity Mission (LDCM)

- 2001-3: Unsuccessful attempt at government-industry partnership for LDCM “data buy”
- 2004-5: Concept to place LDCM sensor(s) on National Polar-orbiting Operational Environmental Satellite System (NPOESS) proved too complex
- 2005: White House directive for NASA to acquire and USGS to operate a free-flyer LDCM spacecraft; Federal agencies to derive a plan for long-term operational land-imaging capability
- 2006 Future of Land Imaging Interagency Working Group drafted plan for a National Land Imaging Program (post-LDCM)
- 2006-7 NASA/USGS team develops LDCM requirements and operational concepts; prepares procurements for subsystems



NASA/USGS Mission Responsibilities

✦ NASA:

- Procure LDCM space segment: sensor, spacecraft, flight software, and launch service
- Integrate end-to-end mission components
- Lead on-orbit checkout and acceptance testing
- Transfer flight segment to USGS
- Provide pre- and post-launch technical support to USGS
- Co-chair Landsat Science Team

✦ USGS:

- Procure and develop LDCM ground system: flight operations facility, data capture sites, data archive and processing systems, data access and distribution systems
- Operate space segment and ground system
- Lead on-orbit data calibration activities
- Provide pre-launch technical support to NASA
- Co-chair and fund Landsat Science Team



LDCM NASA Procurement Segments

✦ NASA:

- Sensor: RFP to industry released Jan. '07; selection process underway
- Flight Operations Software Package: RFP to industry '07
- Spacecraft: To be procured via NASA's Rapid Spacecraft Development Catalog of commercial vendors
- Launch Vehicle: To be procured via Kennedy Space Flight Center for Vandenberg launch site

LDCM USGS Procurement Segments

✦ USGS:

- Ground Receiving Network Resources: RFP to industry '08
- Flight Operations Team: Request for Information (RFI) Mar. '07; RFP '07
- Mission Operations Facility: TBD – Commercial construction modifications at EROS '08; back-up site to be selected '07
- Image Processing Capability: To be developed by USGS Technical Support Services Contractor
- Archive Capability and Data User Portal: RFI to industry '07; RFP '08
- Collection Planning Capability: Landsat 7 data collection model to be revised by USGS Technical Support Services Contractor



LDCM Data Distribution Concept

- ✦ Maintain primary elements of current data policy
 - Unrestricted user access to Landsat data archive
 - Timely delivery of unenhanced data
 - Unrestricted user applications of USGS-distributed products
 - Value-added services provided by the commercial sector
- ✦ Distribute GIS-ready products electronically
 - Preprocessed, orthorectified (terrain-corrected) imagery
 - Web-enabled user access and data retrieval
 - Global Landsat orthorectified data sets currently available from 1970s, circa 1990, circa 2000 (circa 2005 data set TBD)
 - LDCM pilot project using preprocessed Landsat 7 data to begin spring 2007

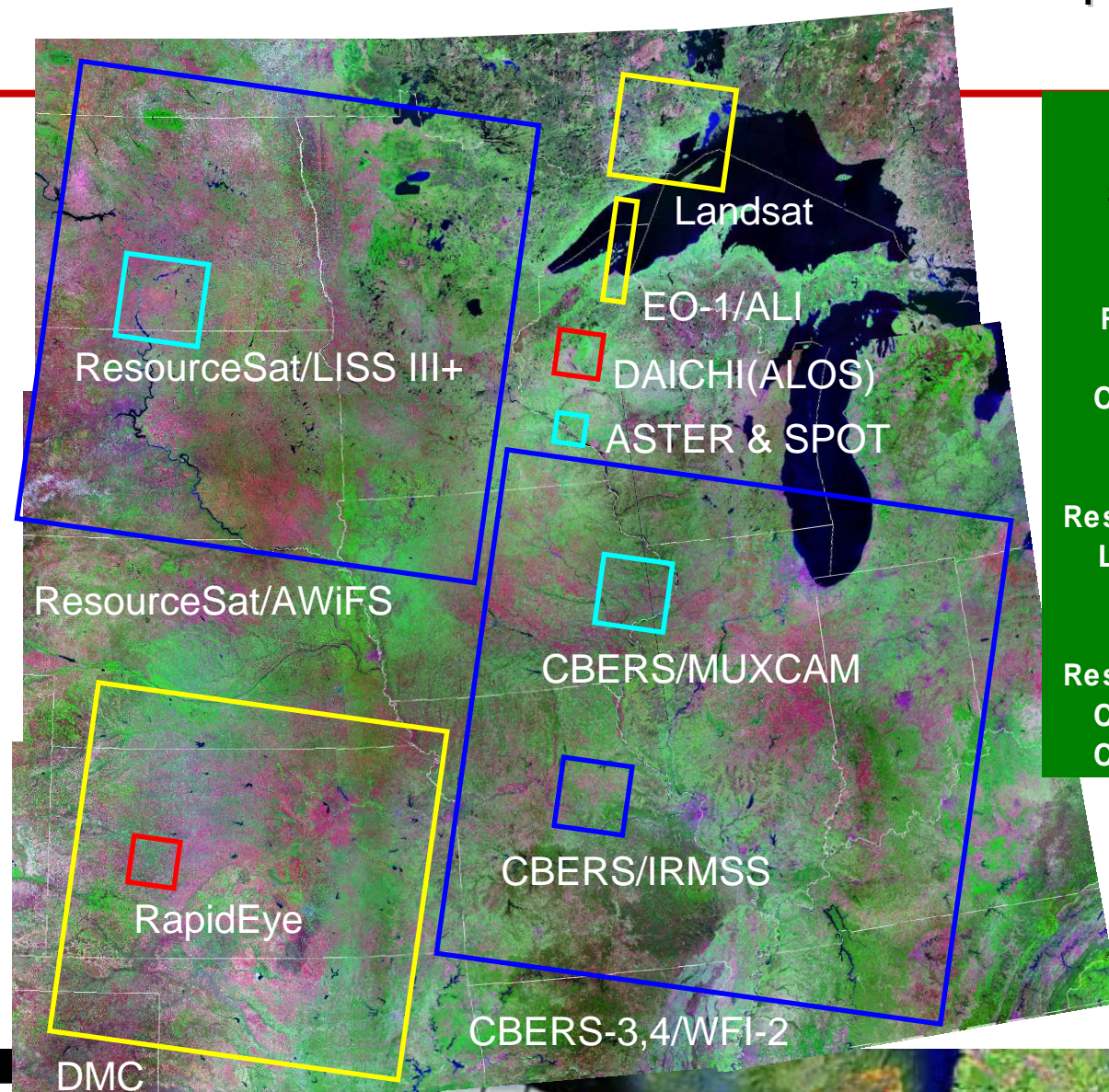


LDCM Launch Date vs. Data Gap

- Projected LDCM launch late 2011 (ambitious schedule)
- Projected fuel depletion of Landsats 5 and 7 late 2010
 - Atmospheric drag has been less than anticipated
 - Repositioning orbital “burns” have been very efficient
 - Revised fuel-depletion dates may be forthcoming
- USGS/NASA-led Data Gap Study Team investigating alternatives to at least partially offset potential data gap
 - Technical investigations of data from India’s ResourceSat and China/Brazil CBERS satellites nearing completion
 - Other systems are also under consideration
 - RFI distributed by USGS February 2007; responses due in April



Some Alternate Data Source Options



Satellite	Sensor	Ground Sample Distance (m)
RapidEye	REIS	6.5
ALOS	AVNIR	10
CBERS-3,4	MUXCAM	20
SPOT 5	HRG	10/20
Terra	ASTER	15/30/90
ResourceSat-1	LISS III+	23.5
Landsat 7	ETM+	15/30/60
EO-1	ALI	30
DMC	MSDMC	32
ResourceSat-1	AWiFS*	56
CBERS-3,4	WFI-2	73
CBERS-3,4	IRMSS	40/80

Landsat 5 Status

- ✦ L5 and its Thematic Mapper (TM) sensor have been operating on orbit for 23 years; three year design life
 - Large fuel tank was designed to lower orbit for Shuttle retrieval
 - No onboard data recorder – US and 9 International Cooperators (12 ground stations) capture TM data
 - Some subsystems running on back-up components
 - Solar array drive malfunctioned in November 2005 and again later; operations changed in 2007 to fixed-array mode
 - Full US and partial global coverage still being captured
 - Fuel to be depleted in 2010, possibly later
 - Satellite could fail anytime before launch of LDCM in 2011



Landsat 7 Status

- ✦ L7 and its Enhanced Thematic Mapper-Plus (ETM+) sensor have been operating on orbit for 8 years; five year design life
 - ETM+ scan line corrector (SLC) failed May 2003; USGS developed filler products
 - 1 of 3 L7 gyros turned off May 2004; USGS developing 1-gyro flight capability
 - Other subsystems still operating nominally
 - Landsat 7 data still worthwhile for some users (global change monitoring, etc.), but is of limited use for others (near-real-time crop assessments, etc.)
 - Full US and seasonal global coverage continues for long-term archive
 - Fuel to be depleted in 2010, possibly later
 - Satellite could fail anytime before launch of LDCM in 2011

