Landsat Data Continuity Mission (LDCM)

Summary

Background
- LDCM is the follow-on mission to Landsat 7
- NASA and USGS are interagency partners in the LDCM
- NASA and the USGS plan to implement the LDCM by procuring data from a privately owned and privately operated remote sensing system
- NASA released a draft Request for Proposals (RFP) for the implementation phase of the Landsat Data Continuity Mission (LDCM)
  - The main purpose of the draft RFP is to solicit comments of the draft from potential bidders

Invitation to Comment
- NASA invites comments on the LDCM implementation strategy and draft implementation RFP
- The draft RFP contains an LDCM Data Specification and an LDCM Data Policy that are particularly relevant to the community of Landsat Data Users
- The RFP can be found at the following web site:
  - http://prod.nais.nasa.gov/cgi-bin/eps/sol.cgi?acqid=102577#Draft
  - Modications to LDCM Data Specification:
    - LDCM Draft RFP Cost Model Released -September 25, 2002
    - Draft PDR Requirements Released - September 20, 2002
    - MOD-3 LDCM Data Specification and Lexicon Released - September 18, 2002
      - 45 page PDF available at:
    - Draft Data Policy & Synopsis Released - August 02, 2002
    - Mod-2 LDCM Data Specification Released - July 19, 2002
    - Mod-2 Acronym List and Lexicon - July 19, 2002
    - Mod-1 LDCM Data Specification - June 12, 2002
- A link to the web site providing the RFP can be found at the LDCM Home Pages:
  - Public comments will be accepted through October 20, 2002.
    Comments received after this date will be considered based on significance and time available for action.
    - ASPRS RSAD had not yet commented.
- Comments in writing to Jim Becker, Contracting Officer either by:
  - Facsimile at: 301-286-7434, Email at: jbecker@pop200.gsfc.nasa.gov
Mission Objectives
- Provide continuity in the multi-decadal land use/land cover change measurements of the Landsat Program for scientific research
- Facilitate expansion of the commercial remote sensing marketplace and commercialization of Landsat data

Data Procurement Strategy
- A two-step data procurement strategy has been implemented
  - The first step is formulation with multiple contractors
    - An RFP for formulation studies was released in Nov., 2001
    - Called for the formulation of preliminary system designs
    - Two firm fixed-price contracts ($5M each) were awarded in March, 2002
      - Resource 21 of Englewood, CO
      - DigitalGlobe of Longmont, CO
    - Formulation culminates with preliminary design reviews in Nov., 2002
  - The second step is implementation
    - A single contract will be awarded for the acquisition and delivery of LDCM data for a five-year period (with a costed option for an additional five years)
    - A draft implementation RFP was released Oct. 07, 2002 for comment
    - Release of final RFP expected in Jan., 2003
      - Open to third-party “responsible” bidders as well as formulation contractors
  - Operational delivery of LDCM data to begin no later than 45 months after contract award; March, 2007 assuming June, 2003 award

LDCM Data Specification
- The procurement strategy is based upon an LDCM Data Specification
- The LDCM Data Specification requires the implementation contractor to deliver data to the U.S. Government that:
  - Provide multispectral digital image coverage of the Earth’s landmass on a seasonal basis; and
  - Are sufficiently consistent in terms of acquisition geometry, coverage characteristics, spectral characteristics, output product quality, and data availability to ensure continuity of the Landsat mission

Roles & Responsibilities
- NASA will:
  - Procure data from an LDCM Contractor
  - Require the Contractor to deliver the procured data to the DOI/USGS EROS Data Center in Sioux Falls, SD
    - The average daily delivery shall provide coverage of 250 Landsat scenes
  - Validate that the data quality and quantity meet LDCM specifications
DOI/USGS will:
- Receive and archive the LDCM data at the EROS Data Center
- Allow the general public to search the LDCM data archive on a nondiscriminatory basis and to order Level 1 data products (that is, radiometrically corrected data registered to cartographic projections)
- Produce and distribute ordered data products in accordance with an LDCM Data Policy
- Charge no more than $50 per scene for a Level 1 data product

**LDCM Data Policy**
- The LDCM Data Policy maintains Landsat 7 Data Policy tenants:
  - Ensures non-discriminatory access to Level 1 data products derived from Government-procured LDCM data
  - Precludes restrictions on sharing and secondary distribution of LDCM Level 1 data products
- The LDCM Data Policy protects the LDCM contractor’s commercial rights to data exceeding quantity or specifications of LDCM data procured by NASA / USGS

**Procurement Strategy**

![Diagram of LDCM Data Flow](image)
Preliminary Design Concepts

- Both formulation contractors have publicly announced plans to develop remote sensing systems capable of acquiring multispectral image data having finer spatial resolutions (that is, smaller ground sample distances) than required for the LDCM
  - Both contractors plan to sell the finer resolution data commercially
  - **The DOI/USGS EROS Data Center would only distribute Level 1 products where the data had been aggregated and resampled to the maximum ground sampling distances specified for the LDCM (that is, 30m for multispectral data with a 15m sharpening band and a 120m cirrus cloud detection band)**

- Two New Spectral Bands
  - As a result of formulation trade studies, the LDMC Data Specification requires data for two spectral bands that have not previously been included in the heritage Thematic Mapper / Enhanced Thematic Mapper-Plus (ETM+) bands
    - **A new blue band** centered at 443nm (30m spatial resolution) is intended principally for coastal zone studies
    - **A new shortwave infrared band** centered at either 1375nm or 1875nm (120m spatial resolution) is intended for cirrus cloud detection
  - The widths of several of the heritage ETM+ spectral bands have been refined to avoid atmospheric absorption features

- Thermal Band Deletion
  - **As a result of formulation trade studies, the LDCM Data Specification does not require data for a thermal band**
    - Actively cooled detectors are required to meet the performance of the ETM+ thermal band - active cooling is a cost and system driver
    - Passively cooled detectors are evolving but are not yet able to meet the heritage performance
      - NASA is investing in the development of passively cooled detector technology for future missions
**DigitalGlobe System Overview**

**Team**

DIGITALGLOBE

**Business Approach**

- Complements existing QuickBird hi-res business
  - Wide-area coverage, frequent revisits & additional spectral bands
- Augment QuickBird and SPOT in supporting world-wide agricultural market
  - Also supports environmental monitoring, disaster relief, etc.

**Space Segment Overview**

- "M5" system
  - 4 satellite constellation
- Multi-spectral
  - 5m nadir GSD
  - Off-nadir capability
  - 165km swath width
- Constellation operational Q3 2007

**Resource21 System Overview**

**Team**

BOEING

**Business Approach**

**Space Segment Overview**

- 1 or more satellites
- Multi-spectral
  - 5+ bands
  - 10m/20m GSD
- International Cooperator support
Pecora Sessions

- Wednesday, November 13, 4:15 to 5:45 PM, *Emerging Commercial Sectors: Challenge and Promise*, Silver Room, Tower Building
  
  - *Continuing the Tradition: the Landsat Data Continuity Mission (LDCM)*. Thomas Holm (USGS EDC), Bruce Quirk, Darla Duval, Jon Christopherson, Jeff Masek, Dog McCuistiton, and James Irons.

- Wednesday, November 13, 2:00 to 3:30 PM, *Landsat: Current Status and Future Plans*, Tower Court B
  
  