

Landsat Data Continuity Mission

presented by

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Science Team Meeting

UMUC Inn and Conference Center

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Revised Implementation Strategy

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- **OSTP Director Marburger signed Dec. 23, 2005 memorandum with subject line, “Landsat Data Continuity Strategy Adjustment”**
 - supercedes previous direction to fly Landsat sensors aboard NPOESS satellites (Aug. 04, 2004 memorandum)
 - Directs NASA to acquire free-flyer spacecraft
 - Assigns DOI / USGS the responsibility for operating the spacecraft
 - States goal of developing “a long-term plan to achieve, technical, financial, and managerial stability for operational land imaging”

RFP Synopsis - Feb., 2006

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- **NASA placed a synopsis of our intent to release an LDCM RFP on the NASA Acquisition Information System (NAIS) web site on Feb. 22**
 - “NASA is considering issuing a solicitation for a Firm Fixed Price (FFP) contract for a free-flyer spacecraft mission”
 - “NASA is planning a single award for the development and delivery of a spacecraft, instrument, observatory integration and test, and operational systems/sustaining engineering support”
 - “NASA plans to issue the solicitation with an **optional requirement** for the instrument to observe a portion of the **thermal** spectrum”
 - “NASA plans to transfer ownership of the observatory and the associated contract to the USGS who will then operate the spacecraft and manage the data.”
- **Draft technical documents and draft requirements publicly available on LDCM web site:**

<http://ldcm.nasa.gov/procurement.html>

U.S. Senate Guidance from July

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- **Senate Committee Print accompanying the FY2007 Science, State, Justice, and Commerce spending bill, pg. 127:**
 - "While Committee supports continuation of the Landsat program and a follow-on Landsat Data Continuity Mission, the Committee has provided no funding for the Landsat Data Continuity Mission in fiscal year 2007. **The Committee does not agree with the agency's proposed procurement strategy and directs the agency to suspend any further procurement** activity until enactment of the fiscal year 2007 State, Science, Justice, Commerce Appropriations Act.
 - The agency's proposed procurement strategy for Landsat closely resembles the failed NPOESS procurement and marks a significant departure from previous Landsat procurement policy. The Committee urges NASA to return to the previous procurement model that fully competes separate elements of the mission with a NASA center serving as project integrator and manager. This procurement model ensures the best value for NASA and the taxpayer."

 NASA Response to Senate Guidance**LDCM**

- **A new RFP Synopsis is in review at NASA HQ**
- **Content of Synopsis is procurement sensitive until release**

Thermal Advocacy

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- **The Western States Water Council sent two letters to the Director of OSTP, Dr. Marburger (most recently on July 31, 2006)**
 - “I am writing to reiterate our strong support for maintaining a thermal band as part of the Landsat Data Continuity Program. This information is increasingly critical for the management of western water resources, particularly agricultural water use.”
 - “Landsat thermal information has gained wide-spread use in the West.”
 - “We strongly support spending to provide for the continued availability of Landsat-comparable thermal data, and oppose any move to omit or delete the thermal band from future satellites.”
- **The Western Governors’ Association sent a letter to the Director of OSTP (Sept. 12, 2006)**
 - “Including a thermal imaging instrument on the next Landsat vehicle is critical to the continued use of this information in western states for monitoring and measuring agricultural and other outdoor water uses, related evapotranspiration, and administering states water rights, interstate compacts, and surface and ground water budgets.”

Thermal Advocacy (cont.)

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- **The National Research Council's Decadal Survey Panel received a letter (Sept. 14, 2006) signed by 117 managers and scientists:**
 - “The accuracy of Landsat-scale TIR evapotranspiration (ET) estimates has improved to the point that consumptive use and water rights can be reliably monitored from space at the scale of a single irrigation system.”
 - “In particular, a statement acknowledging the societal benefits of the proposed LDCM TIR imager will be important in encouraging NASA and Congress to ensure continuity of high-resolution satellite TIR imaging.”
- **The World Bank sent a letter to the European Space Agency (ESA) (June 28, 2005) requesting the addition of high resolution thermal sensors for future European Space Agency missions:**
 - “There is a global water crisis”
 - “Water consumption in agricultural and forested areas is a key parameter in any water management planning”
 - “Thermal remote sensing can map water consumption in an operational manner”

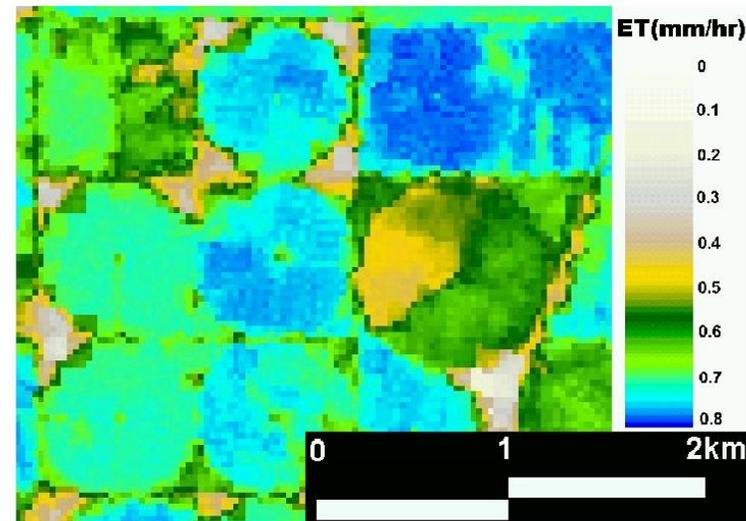
(ESA has no plans for a high resolution thermal sensor)

Basis of Thermal Data Advocacy

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- **The use of Landsat thermal data has increased since 2000; why?**
 - Decrease in the cost of Landsat data; from \$4500 to \$600 per scene
 - Increased rigor in Landsat thermal data calibration
 - Development of operational energy-balanced-based evapotranspiration models
 - SEBAL
 - METRIC
- **Water rights regulation and administration are critically tied to identification and quantification of water consumption on a field-by-field basis**
 - Typical irrigated field sizes in the U.S. range from 180 m to 750 m on a side
- **Quantification of water use from Landsat using thermal data is the only way to independently and consistently measure water use on a field-by-field basis**

Evapotranspiration at time of Landsat overpass
Oakley Fan, Idaho, July 7, 1989



Draft Thermal Band Specifications

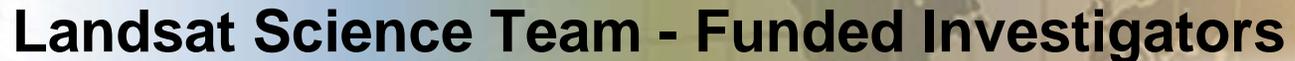
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#	Band	Minimum Lower Band Edge (nm)	Maximum Upper Band Edge (nm)	Center Wavelength (nm)	Maximum GSD
10	Thermal 1	10300	11300	10800	120m
11	Thermal 2	11500	12500	12000	120m

LDCM Science Team

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- **The USGS released a request for proposals (RFP) for eight Landsat Science Team awards on April 21, 2006.**
- **USGS released a second solicitation for proposals for unfunded participation in the Science Team by U.S. federal civil servants and international investigators**
- **Evaluation panel met at USGS EROS in July**
- **Selections announced last week**
 - Kick-Off meeting postponed until early 2007
- **LDCM Ex Officio Members**
 - USGS (Tom Loveland, John Dwyer)
 - NASA (Jim Irons, Jeff Masek)



Landsat Science Team - Funded Investigators


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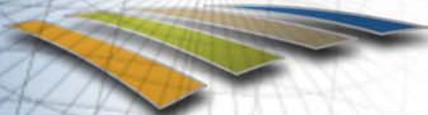
Principal Investigator	Organization	Proposal Title
John Schott	Rochester Institute of Technology	The Impact of Land Processes on Fresh and Coastal Waters
Dennis Helder	South Dakota State University	A Systematic Radiometric Calibration Approach for LDCM and the Landsat Archive
Lazaros Oraopoulos	University of Maryland Baltimore County	Cloud Detection and Avoidance for the Landsat Data Continuity Mission
Sam Goward	University of Maryland	The LDCM Long Term Acquisition Plan: Extending and Enhancing the Landsat 7 LTAP Approach
Richard Allen	University of Idaho	Operational Evapo-transpiration Algorithms for LDCM as a Member of the Landsat Data Continuity Mission Science Team
Eric Vermote, Chris Justice, Nazmi Saleous	University of Maryland	A Surface Reflectance Standard Product for LDCM and Supporting Activities
Curtis Woodcock	Boston University	Toward Operational Global Monitoring of Landcover Change
Feng Gao	Earth Resources Technology	Developing a Consistent Landsat Data Set from MSS, TM/ETM+ and International Sources for Land Cover Change Detection



Landsat Science Team - International & Federal

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Principal Investigator	Organization	Proposal Title
Michael Wulder	Canadian Forest Service	Large-Area Land Cover Mapping and Dynamics: Landsat Imagery to Information
Eileen Helmer	U.S. Forest Service International Institute of Tropical Forestry	Cloud-Free Landsat Image Mosaics for Monitoring Tropical Forest Ecosystems
Martha Anderson	USDA Agricultural Research Service	Mapping Drought and Evapo-transpiration at High Spatial Resolution Using Landsat Thermal and Surface Reflectance Band Imagery
Alan Belward, Frederic Achard, Philippe Mayaux	EC Joint Research Center	Natural Resources Management - Meeting Millennium Development Goals
Warren Cohen	U.S. Forest Service Pacific Northwest Research Station	Landsat and Vegetation Change: Towards 50 Years of Observation and Characterization
Robert Bindshadler	NASA Goddard	Advancing Ice Sheet Research with the Next Generation Landsat Sensor
Prasad Thenkabail	International Water Management Institute	Global Irrigated Area Mapping using Landsat 30-m for the Years 2000 and 1975
Rama Nemani	NASA Ames	Developing Biophysical Products for Landsat
Jim Vogelmann	SAIC/EROS	Monitoring Forest and Rangeland Change Using Landsat Continuity and Alternative Sources of Satellite Data



Science Team Responsibilities

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- Provide science-based feedback on critical design issues, including instrument and data systems
- Contribute to the specification and design of the data acquisition strategy and data access systems
- Conduct experiments on science and applications elements of program
- Represent the breadth of user perspectives and their requirements on product formats and product generation issues
- Provide insights on long-term issues (e.g., gap-filling options, future missions)
- Consider interoperability of Landsat with other systems currently in orbit or planned for launch within the LDCM operational timeframe
- Participate in representation tasks (e.g., provide data for demos or presentations and represent mission in selected forums including scientific meetings)

Additional Efforts

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- **Mid-Decadal Global Land Survey**
- **Landsat Data Gap Study Team**
- **NSTC Future of Land Imaging - Interagency Working Group (FLI-IWG)**
 - Follow-up to direction in Dec. 23 Marburger memo: “The National Science and Technology Council, in coordination with NASA, DOI/USGS, and other agencies and EOP offices as appropriate, will lead an effort to develop a long-term plan to achieve, technical, financial, and managerial stability for operational land imaging”
 - Working Group held public workshop on July 26 at the DOI Main Auditorium, Washington, DC

Summary

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- **The procurement approach for a free-flying LDCM satellite is in review at NASA HQ pursuant to guidance in Senate Report language**
- **A Landsat data gap is likely**
 - Mitigation strategies in development
- **USGS has selected a Landsat Science Team**
 - First meeting tentatively planned for early 2007
- **The future of land imaging is being deliberated by a NCST-convened interagency working group**