Status of the Landsat Data Continuity Mission

presented by

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at the

Landsat Science Team Meeting

USGS EROS

Sioux Falls, SD

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Topics

- Current Project Status (What's been happening)
- Schedule
- What lies ahead over the next 6 months
- Additional Instrument(s)

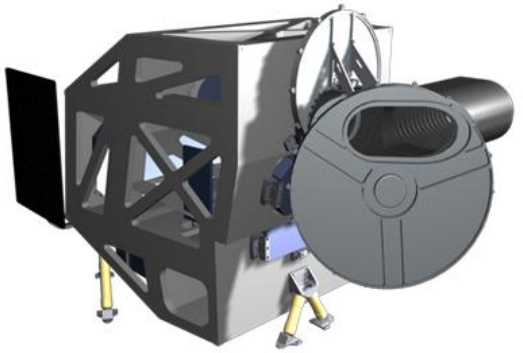
Current Project Status

Current Project Status

- **Project is now moving at full speed**
  - **Project staffing is completed**
  - **1st major contract awarded**
  - **Two other contracts to be awarded by June 2008**
- **Mission Integration and Test Plans are continuing to mature**
- **Standing Review Board coming together**
  - **1st Mission Review scheduled for end of April**
    - **Mission Definition Review/System Requirements Review/Preliminary Non-Advocate Review**
- **Potential for other instruments is still possible, but probabilities are diminishing**

Current Project Status
Operational Land Imager (OLI)

- **Jan. 09, 2007 - NASA released Request For Proposals (RFP) for an Operational Land Imager (OLI)**



- **Proposals were received on Feb. 23, 2007**
- **OLI Contract Awarded to Ball Aerospace in July 2007**
- **Since Contract Award**
  - **Numerous subsystem peer reviews have been conducted**
  - **Completed successful Instrument Systems Requirements Review**
  - **Completed successful Instrument Integrated Baseline Review**
    - **Formally baselines the plan for building the instrument**
  - **Flight optics, filters, detectors, and optical bench in various phases of design and production**
- **NASA successfully fended off a protest of the OLI award to Ball**
  - **No impact OLI development schedule**
- **On-going Requirements Optimization Exercise**
  - **Maximize probability of maintaining 39 month OLI development schedule**

Current Project Status
LDCM Spacecraft

- **April 30, 2007 - NASA Goddard Space Flight Center's Rapid Spacecraft Development Office (RSDO) awarded 4 contracts for Spacecraft Accommodation Study**
  - **Four-month study awarded to Ball Aerospace Technologies Corporation, General Dynamics Advanced Information Systems, Orbital Sciences Corporation, and Space Systems/Loral**
    - **Study was extended one month**
      - **Further instrument accommodations**
      - **Data through put**
      - **Mission assurance**
    - **Study was very successful**
      - **Vendors have full understanding of LDCM**
      - **Over a 1,000 comments, clarifications, etc. received on requirements**
      - **Additional comments received on Statement of Work, Deliverables, etc.**
- **Request For Offer was released on Dec. 7th**
- **Proposals Due Feb. 6th**
- **Contract Award – end of March**

Current Project Status
Mission Operations Element (MOE) & Launch Vehicle

- **Mission Operations Element (MOE)**
  - Command & Control, Mission Scheduling, Long-Term Trending and Analysis, and Flight Dynamics
  - Focus has continued to be on requirement definition and development of procurement documentation
    - Requirements Completed
    - Draft Request for Proposal released in Dec.
      - Comments due Jan. 8th
    - Industry Day conducted on Jan.4th
    - Final RFP release at end of Jan.
    - Contract Award – late May, early June 2008
      - Contract will be a Small Business Set Aside

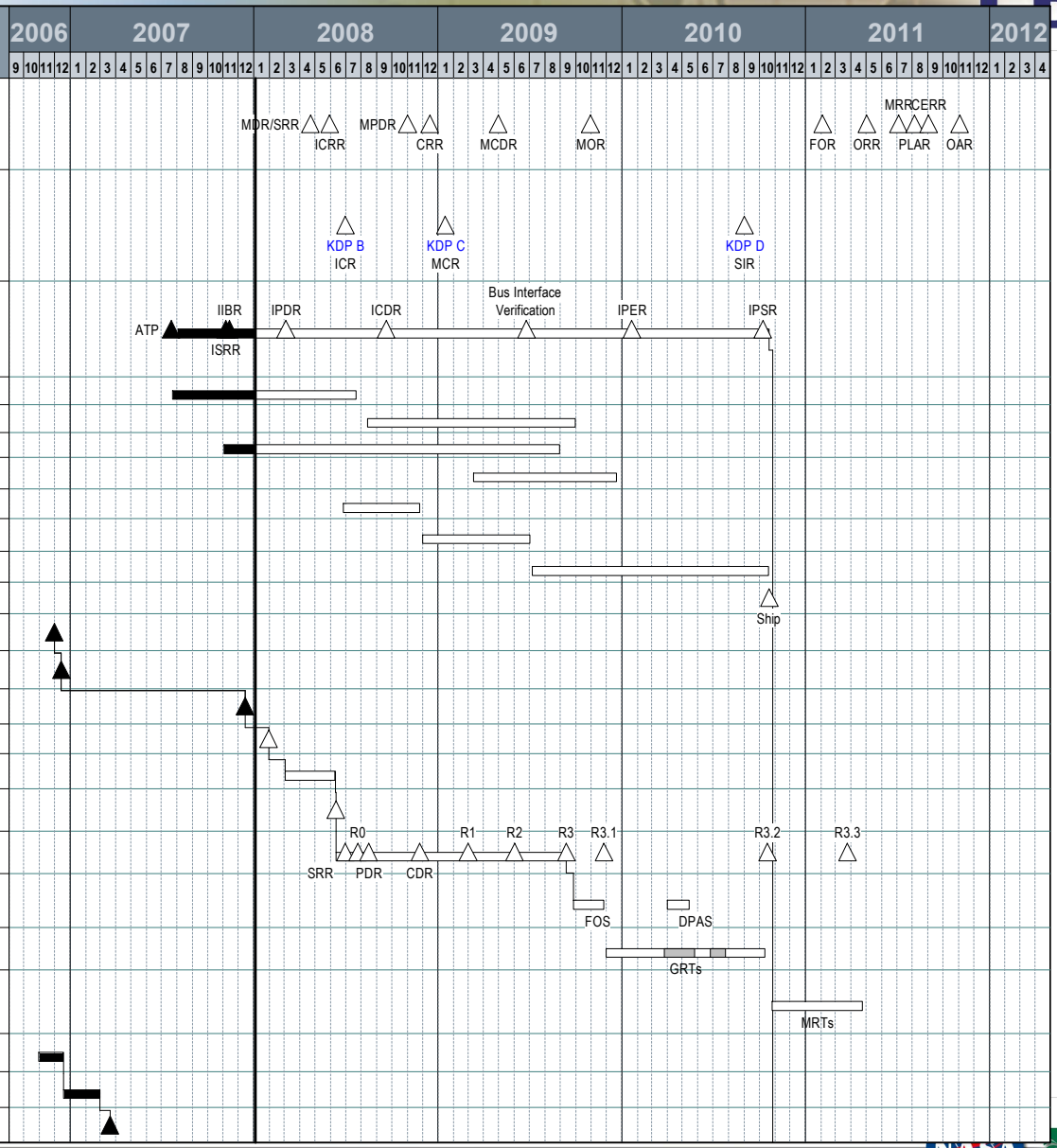
- **Launch Vehicle**
  - Atlas V selected in Sept. 2007

Current Schedule

Current Schedule

LDCM

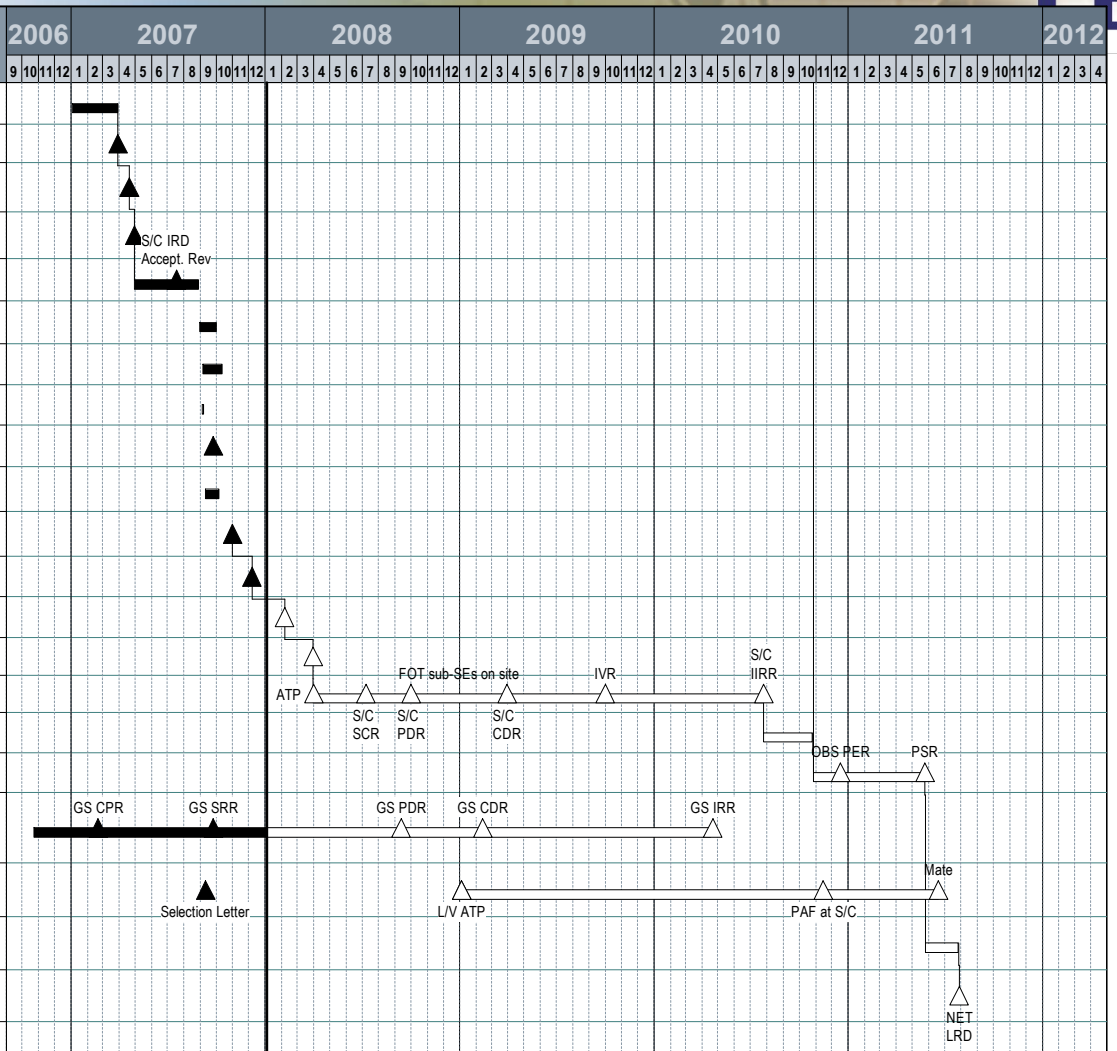
	TASK	Start Date	End Date
1	LDCM Mission Milestones	4/22/08	11/3/11
2	Key Decision Points (KDPs)	6/30/08	9/1/10
3	OLI Instrument Development	7/20/07	10/20/10
4	FPA Design	7/23/07	7/23/08
5	FPA Assy & Test	8/14/08	10/1/09
6	FPE Design, Assy & Test	11/2/07	8/31/09
7	FPS I & T	3/12/09	12/21/09
8	Optical Bench AI & T	6/26/08	11/26/08
9	Telescope AI & T	12/1/08	7/2/09
10	Instrument AI & T	7/6/09	10/20/10
11	Ship Instrument	10/20/10	10/20/10
12	MOE RFI Release	11/30/06	11/30/06
13	MOE RFI Responses Due	12/14/06	12/14/06
14	MOE Draft RFP Release	12/14/07	12/14/07
15	MOE Final RFP Release	1/30/08	1/30/08
16	MOE SEB	3/3/08	6/10/08
17	MOE Contract Award	6/11/08	6/11/08
18	MOE Development	6/11/08	3/25/11
19	GS Integration (w/MOC)	9/24/09	5/15/10
20	Ground Readiness Tests (GRTs)	12/1/09	10/12/10
21	Mission Readiness Tests (MRTs)	10/26/10	4/24/11
26	RSDO On-Ramp	10/30/06	12/18/06
27	RSDO On-Ramp Eval Complete	12/18/06	3/1/07
28	New RSDO Catalog	3/21/07	3/21/07



Current Schedule

LDCM

	TASK	Start Date	End Date
29	S/C Bus Study RFO Preparation	1/3/07	3/30/07
30	S/C Bus Study RFO Release	3/30/07	3/30/07
31	S/C Bus Study RFO Responses Due	4/20/07	4/20/07
32	S/C Bus Study RFO Selection	4/30/07	4/30/07
33	Four Month Study	4/30/07	8/29/07
34	Study Extension	8/30/07	10/1/07
35	Finalize the DRC - 16	9/5/07	10/12/07
36	Conduct Subsystem Peer Reviews	9/4/07	9/8/07
37	Conduct a System Peer Review	9/25/07	9/25/07
38	Incorporate Changes From the Reviews	9/11/07	10/6/07
39	SC Bus Draft RFO Release	10/31/07	10/31/07
40	S/C Bus RFO Release	12/7/07	12/7/07
41	S/C Bus RFO Response Due	2/6/08	2/6/08
42	S/C Bus Selection	3/31/08	3/31/08
43	S/C Bus Development	3/31/08	7/26/10
44	S/C Bus Schedule Reserve	7/26/10	10/26/10
45	Observatory I & T	10/27/10	5/25/11
46	USGS Ground System Development	10/23/06	4/21/10
47	Launch Vehicle	9/11/07	6/20/11
48	Launch Site	5/26/11	7/27/11
49	LRD	7/28/11	7/28/11



Next 6 Months

Next 6 Months

- **OLI**
  - 11 Peer Reviews in Jan./Feb. timeframe
  - Preliminary Design Review (PDR) in early March
    - Critical Design Review in Fall

- **Spacecraft**
  - Contract Award at end of March
  - S/C Requirements Review in July
    - PDR at end of Sept.

- **MOE**
  - RFP release at end of Jan.
  - Contract Award at end of May/early June
  - MOE Systems Requirements Review end of June
  - 1st instance of MOE delivered at end of July

Next 6 Months

- **Project**
  - 1st Major System Review conducted in April
    - Mission Definition Review/System Requirements Review/Preliminary Non-Advocate Review
  - Leads to Initial Confirmation Review with HQ at Agency Level at end of June
  - MDR and Initial Conformation are major efforts for the Project over the next 6 months
    - Requires not only presentation material, but generation of many programmatic documents
  - Purpose of review
    - System Requirements Review (SRR)
      - Examines the functional and performance requirements defined for the system and the preliminary project plan and ensures that the requirements and the selected concept will satisfy the mission
    - Mission Definition Review (MDR)
      - Examines the proposed requirements, the mission architecture, and the flow down to all functional elements of the mission to ensure that the overall concept is complete, feasible, and consistent with available resources
    - Preliminary Non Advocate Review (PNAR)
      - PNAR is conducted as part of the MDR to provide Agency management with an independent assessment of the readiness of the project to proceed to Phase B

Next 6 Months

- **Project (continued)**
  - **MDR/SRR/PNAR is run by the Standing Review Board (SRB)**
    - **Independent review panel which runs system level reviews and follows mission for life of the Project**
    - **Role of the SRB**
      - **Provides expert assessment of technical and programmatic approach, risk posture,and progress against baseline**
        - » **Advisory role to program/project**
        - » **Makes recommendations to improve performance or reduce risk**
        - » **Reconciles Independent Cost Estimates**
      - **Has single chairperson and review manager**
        - » **Organizes key experts both independent and from host organization for review board**
      - **Following review issues a board report (~30 days) to relevant teams**
        - » **Briefs each level of mgt in succession after review**

Additional Instruments

Thermal Infrared Sensor (TIRS)

- GSFC engineering assigned a very capable Instrument Manager and Instrument System Engineer for "risk reduction" studies as well as a small team of engineers
  - These studies concluded in the development of a feasible concept and a System Definition Review
- Study funding for the TIRS effort was exhausted at the end of Sept., with no new additional funding received
- Study team has been disbanded
- Spacecraft will be "scarred" for TIRS instrument, with a contract option for the physical integration of the instrument
- Resumption of TIRS effort now would result in 1 year delay to launch

Total Solar Irradiance Sensor (TSIS)

- **TSIS consists of the Total Irradiance Monitor (TIM), the Spectral Irradiance Monitor (SIM), and a pointing platform**
  - **Built by University of Colorado's Laboratory of Atmospheric and Space Physics**
  - **TIM and SIM are flying on the Solar Radiation and Climate Experiment (launched in Jan. 2003)**
  - **TIM is schedule to fly on GLORY (to be launch in 2009)**

- **TSIS was removed from NPOESS platform as result of Nunn-McCurdy**

- **In the recent Decadal Survey, the total irradiance measurement was given highest priority**
  - **Total Solar Radiance measurements are to be continuous with no gaps**

- **In testimony by Office of Science and Technology Policy to the US House Of Representatives Committee On Science and Technology Subcommittee On Energy and Environment it was recommended that the TSIS sensor be launched on any available and suitable vehicle in time to overlap with the Glory mission**

- **LDCM is prime candidate**

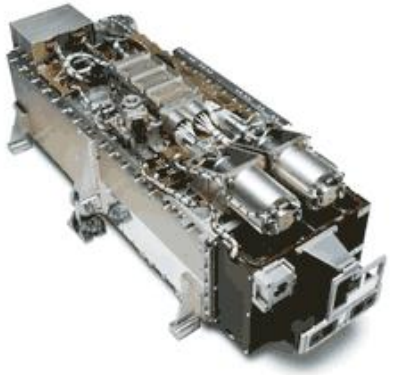
Total Solar Irradiance Sensor (TSIS)

- **TSIS Science**
  - **Make precise and accurate measurements of Total Solar Irradiance (TSI) and Solar Spectral Irradiance**
    - **Connect TSI measurements to previous TSI observations extending the long-term climate record**
  - **Improves our understanding of the sun/earth climate connection**
    - **How does variable solar irradiance affect our atmosphere and climate?**
    - **How and why does variability occur at the Sun?**
    - **Use new knowledge to estimate past and future solar activity**

Total Solar Irradiance Sensor (TSIS)

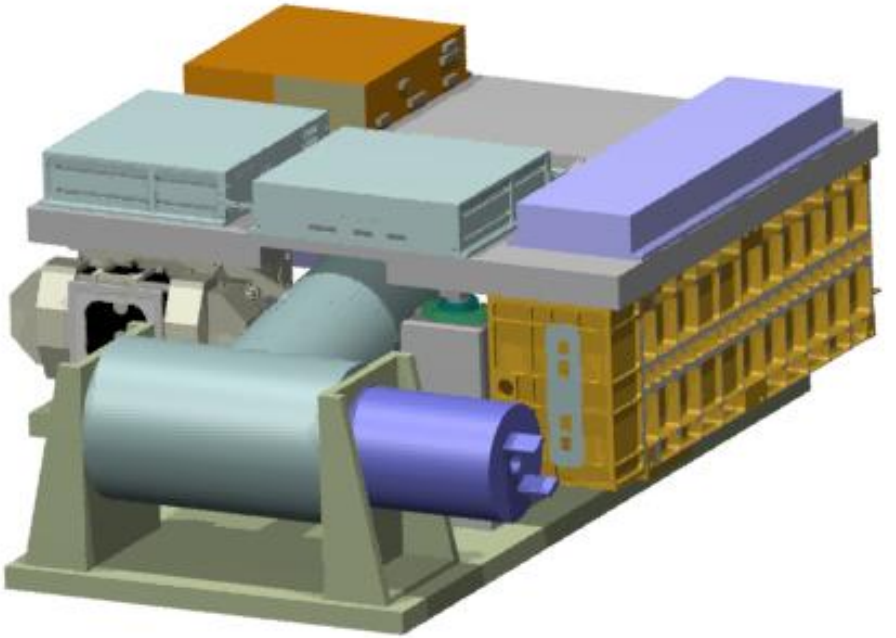
- **Instruments**
  - **Total Irradiance Monitor, Measures total solar irradiance with an absolute accuracy of 0.01%**
    - **Active cavity radiometer**

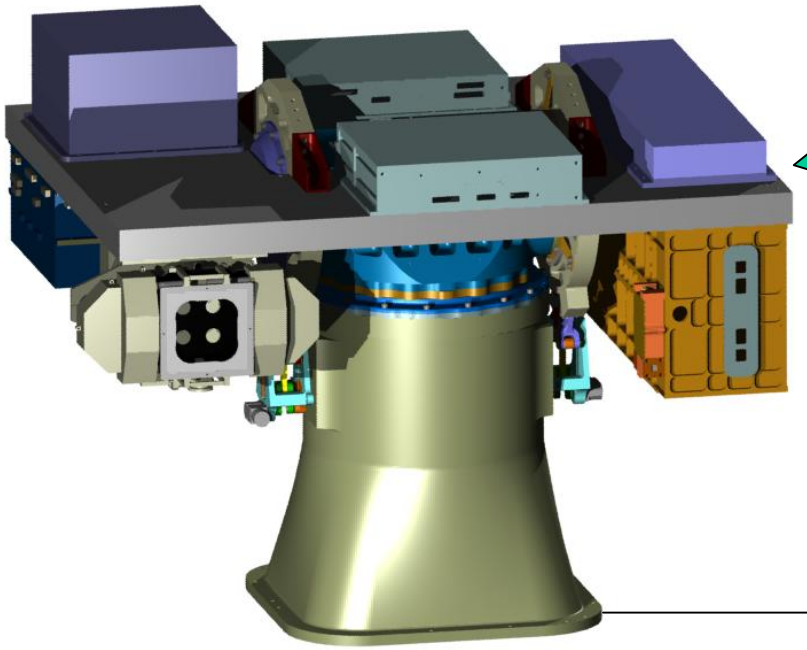
  - **Spectral Irradiance Monitor, Measures spectral solar irradiance in the near-ultraviolet, visible, and near infrared, from 200 to 2000nm**
    - **Scanning prism spectrometer**



TSIS ON LDCM

- 150 kg NTE mass estimate
- 0.9m x1.1m x0.4m





TSIS ON NPOESS

- 162 kg NTE mass estimate
- 1.1m x1.1m x1.1m

Total Solar Irradiance Sensor (TSIS)

- Spacecraft will be “scarred” for TSIS, with a contract option for the physical integration of the instrument

- Addition of TSIS could delay launch by 6 mos.