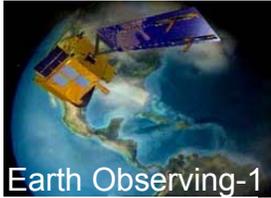


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Section 1

Mission Overview

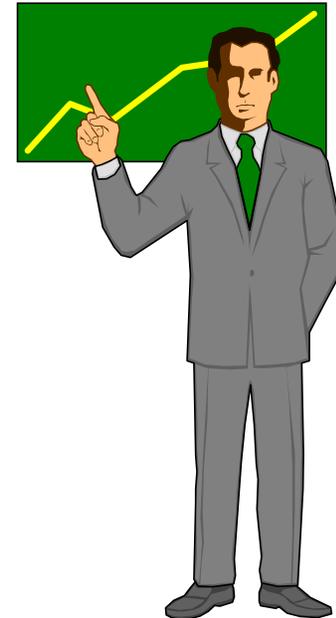


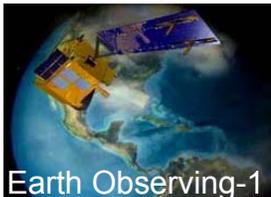
New Millennium Program Goals



June 4, 2002

- ◆ ***The New Millennium Program (NMP) was established in 1994 to:***
 - ***Develop and flight-validate revolutionary technologies;***
 - ***Reduce development risks and life cycle costs of future science missions;***
 - ***Enable highly capable and autonomous space systems; and***
 - ***Promote nationwide technology teaming and coordination.***

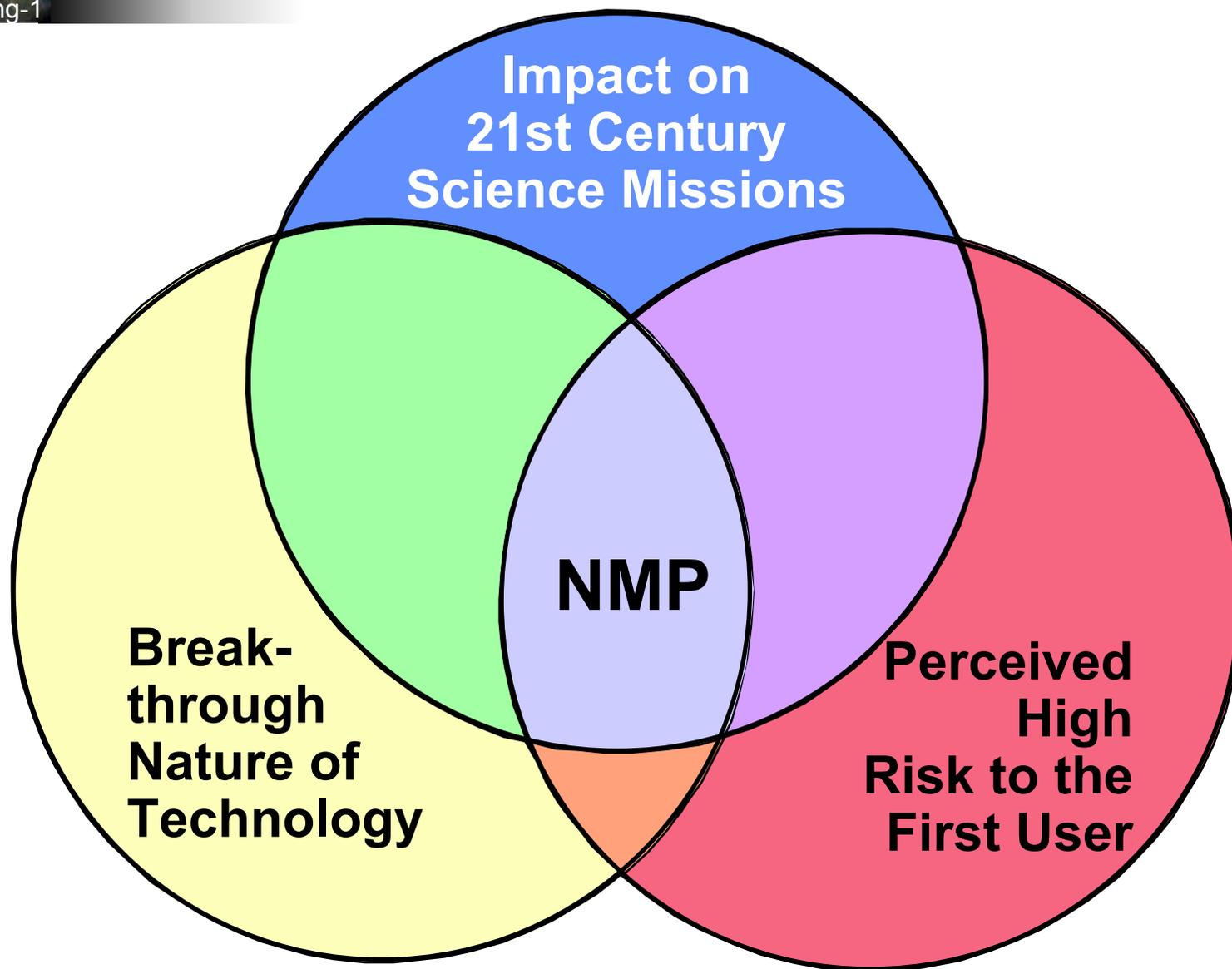


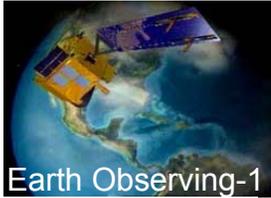


New Millennium Program Role



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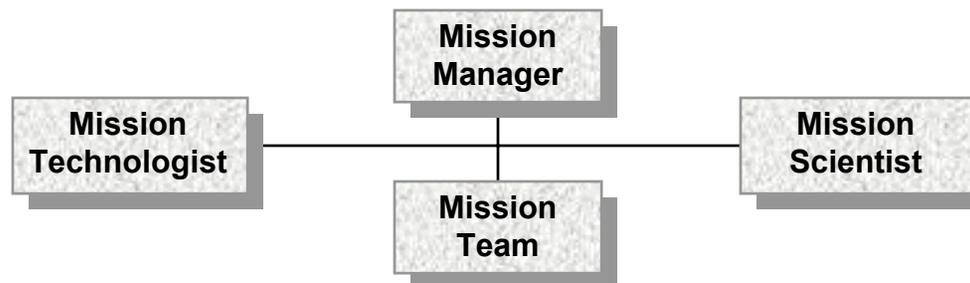


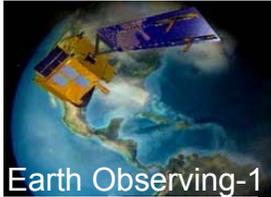
NMP Mission Implementation



June 4, 2002

- ◆ **Mission Team established in early definition**
- ◆ **NMP missions are NOT science missions and cannot be treated as such -- inherently more risky**
- ◆ **Keys to success:**
 - *Resilient “Category” Architecture*
 - *Comprehensive, aggressive risk management*
 - *Adequate reserves in schedule and budget*
 - *Critical role of mission technologist*
 - *Strong system engineering*
 - *Management approach:*



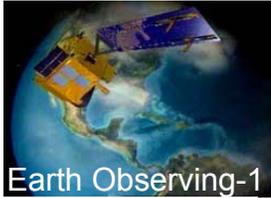


Technology Transfer & Infusion



June 4, 2002

- ◆ ***Validation Plans are executed for each assigned technology during the first year of operation***
- ◆ ***Each validation plan has two parts:***
 - ***Technical***
 - ***Science***
- ◆ ***After flight validation, the Mission Technologist and Technology Provider prepare Technology Transfer Documentation based on:***
 - ***Basic design features and planned performance***
 - ***Ground-based calibration and characterization***
 - ***On-orbit technical and science validation***
 - ***Operational experience***
 - ***Likely applications***
- ◆ ***IPDTs, NMP workshops, technology fairs, etc. are used to disseminate the Technology Transfer documentation***
- ◆ ***NMP works closely with Earth Science Technology Office to facilitate technology infusion into future science missions***



What is EO-1?

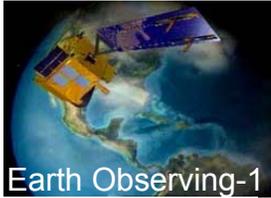


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- ◆ ***New Millennium Program's first Earth Observing Mission (EO-1)***
- ◆ ***Designed to flight validate breakthrough technologies applicable to Landsat follow-on missions***
- ◆ ***Specifically responsive to the Land Remote Sensing Policy Act of 1992 (Public Law 102-55) wherein NASA is charged to ensure Landsat data continuity through the use of advanced technology:***
 - ***Multispectral Imaging Capability to address traditional Landsat user community***
 - ***Hyperspectral Imaging Capability to address Landsat research-oriented community -- backward compatibility essential***
 - ***Calibration test bed to improve absolute radiometric accuracy***
 - ***Atmospheric correction to compensate for intervening atmosphere***

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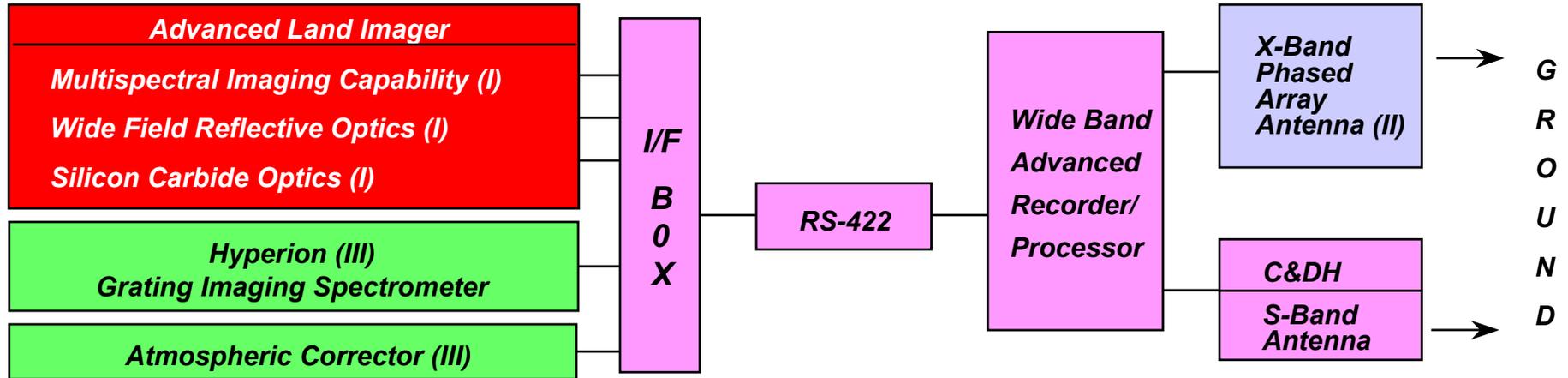


Earth Observing-1

EO-1 Technologies

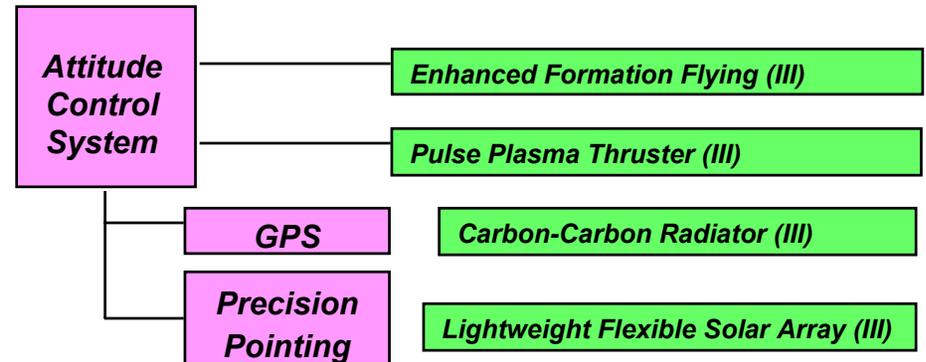


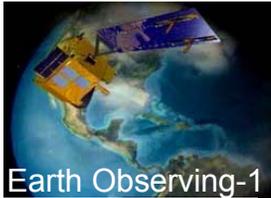
June 4, 2002



EO-1 TECHNOLOGIES

- ◆ *Multispectral Imaging Capability*
- ◆ *Wide Field Reflective Optics*
- ◆ *Silicon Carbide Optics*
- ◆ *Grating Imaging Spectrometer (HYPERION)*
- ◆ *Atmospheric Corrector (AC)*
- ◆ *X-Band Phased Array Antenna*
- ◆ *Enhanced Formation Flying (EFF)*
- ◆ *Pulse Plasma Thruster (PPT)*
- ◆ *Carbon-Carbon Radiator (CCR)*
- ◆ *Lightweight Flexible Solar Array*
- ◆ *Wideband Advanced Recorder / Processor (WARP)*
- ◆ *Global Positioning System (GPS)*
- ◆ *Precision Pointing*





Earth Observing-1

Validation of Breakthrough Technologies



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Advanced Land Imager:

MIT Lincoln Lab, GSFC, Raytheon / Santa Barbara Remote Sensing, & Sensor Systems Group

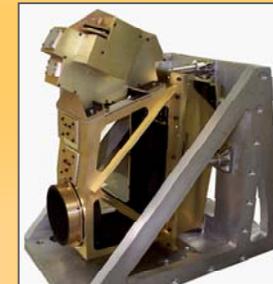


LEISA Atmospheric Corrector:

GSFC

Hyperion:

TRW, GSFC, & JPL



Carbon-Carbon Radiator:

Air Force Research Laboratory, Amoco Polymers, BF Goodrich, GSFC, Langley Research Center, Lockheed Martin, Naval Surface Warfare Center, & TRW



EO-1:
GSFC, Litton, Swales

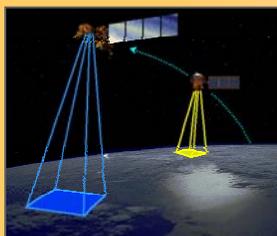
Pulsed Plasma Thruster:

GSFC, Glenn Research Center, & General Dynamics



Wideband Advanced Recorder / Processor:

GSFC, Litton, MIT Lincoln Lab, Swales, & TRW



Enhanced Formation Flying:

GSFC, JPL



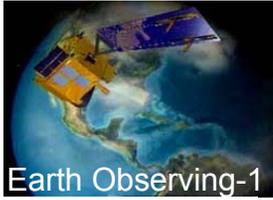
Lightweight Flexible Solar Array:

GSFC, Air Force Research Laboratory, & Lockheed Martin

X-Band Phased Array Antenna:

Boeing, GSFC & Lewis Research Center

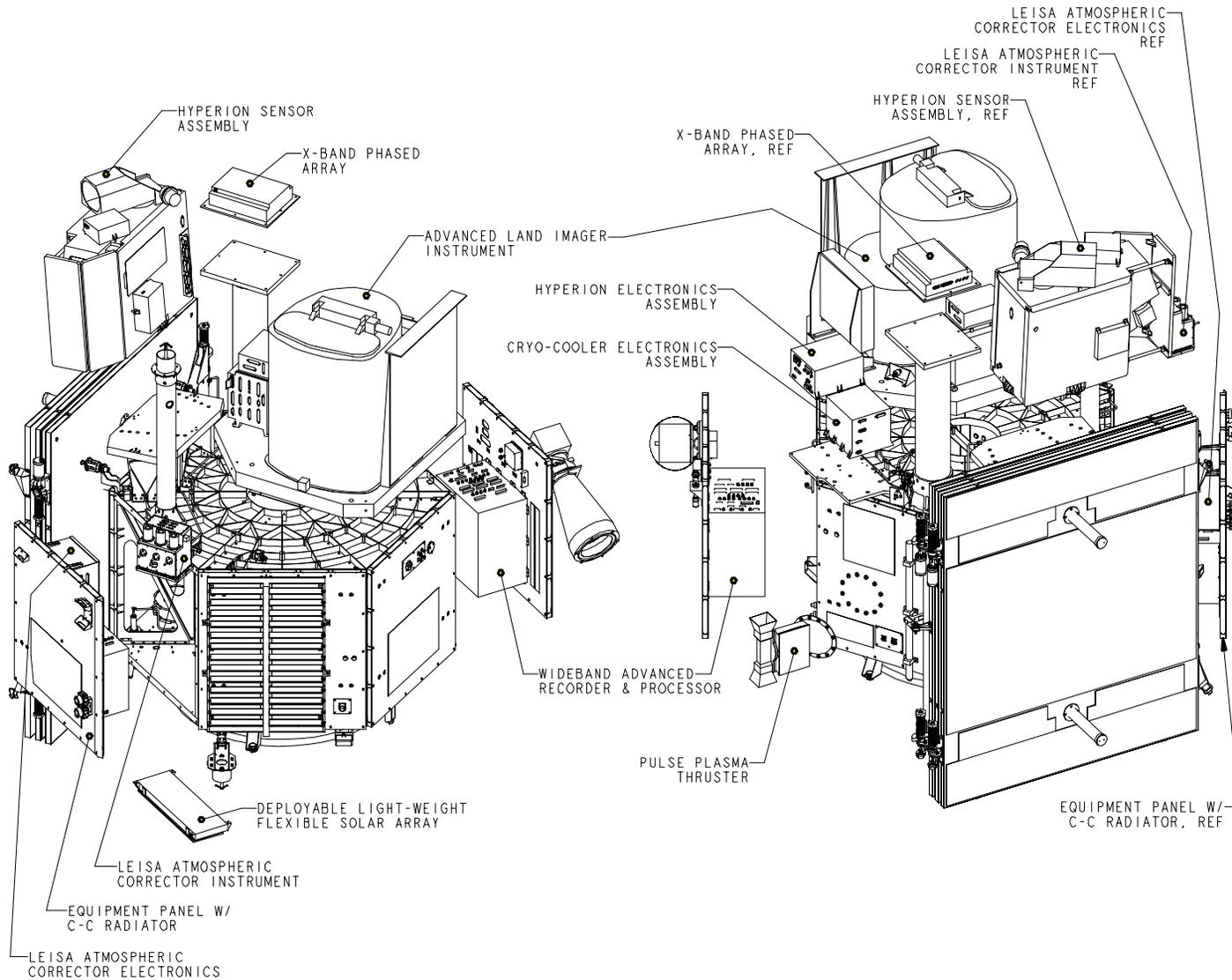


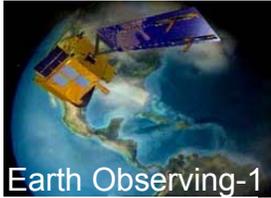


EO-1 Technology Locations



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Mission Characteristics



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Mission Design Life: 18 months

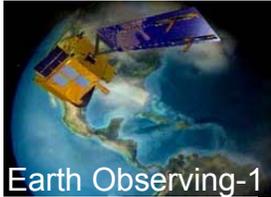
Nominal Life: 12 months

LAUNCH

- ◆ **Date:** 11/21/00
- ◆ **Time:** 10:24 p.m. PST
- ◆ **Window:** 5 seconds
- ◆ **Site:** Vandenberg AFB (SLC-2)
- ◆ **Launch Vehicle:** Delta II DPAF Mission with SAC-C and 1 secondary payload

ORBIT

- ◆ **Equatorial Crossing Time:** 10:03 a.m., descending node
- ◆ **Altitude:** 705 Km
- ◆ **Inclination:** 98.2°
- ◆ **Orbital Period:** 98 minutes

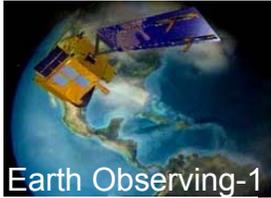


Baseline Operations



June 4, 2002

- ◆ **Normal Operations**
 - *5-7 passes/day (dual S- and X-band) (Norway, Alaska)*
- ◆ **Operations Staffing**
 - *24 hr x 7 days/week*
- ◆ **Ground stations to receive, process, and route science and housekeeping data to GSFC**
 - **X-band**
 - *Receive up to 120 Gbits of science data (typically 5-7 Data Collection Events (DCEs) each day) at 105 Mb/s*
 - *Record the received X-band data on hard media, mail to GSFC, and store raw data for 30 days*
 - **S-band**
 - *Receive data at selected rates up to 2 Mb/s*
 - *Housekeeping data*
 - *Route selected virtual channels to GSFC in real time*
 - *Record up to 200 Mbits of data each day*
 - *FTP recorded data to EO-1 MOC within two hours*
 - *Store raw data for 30 days*
 - *Backup science data (up to 5 Gbits per day): Process as with X-band*

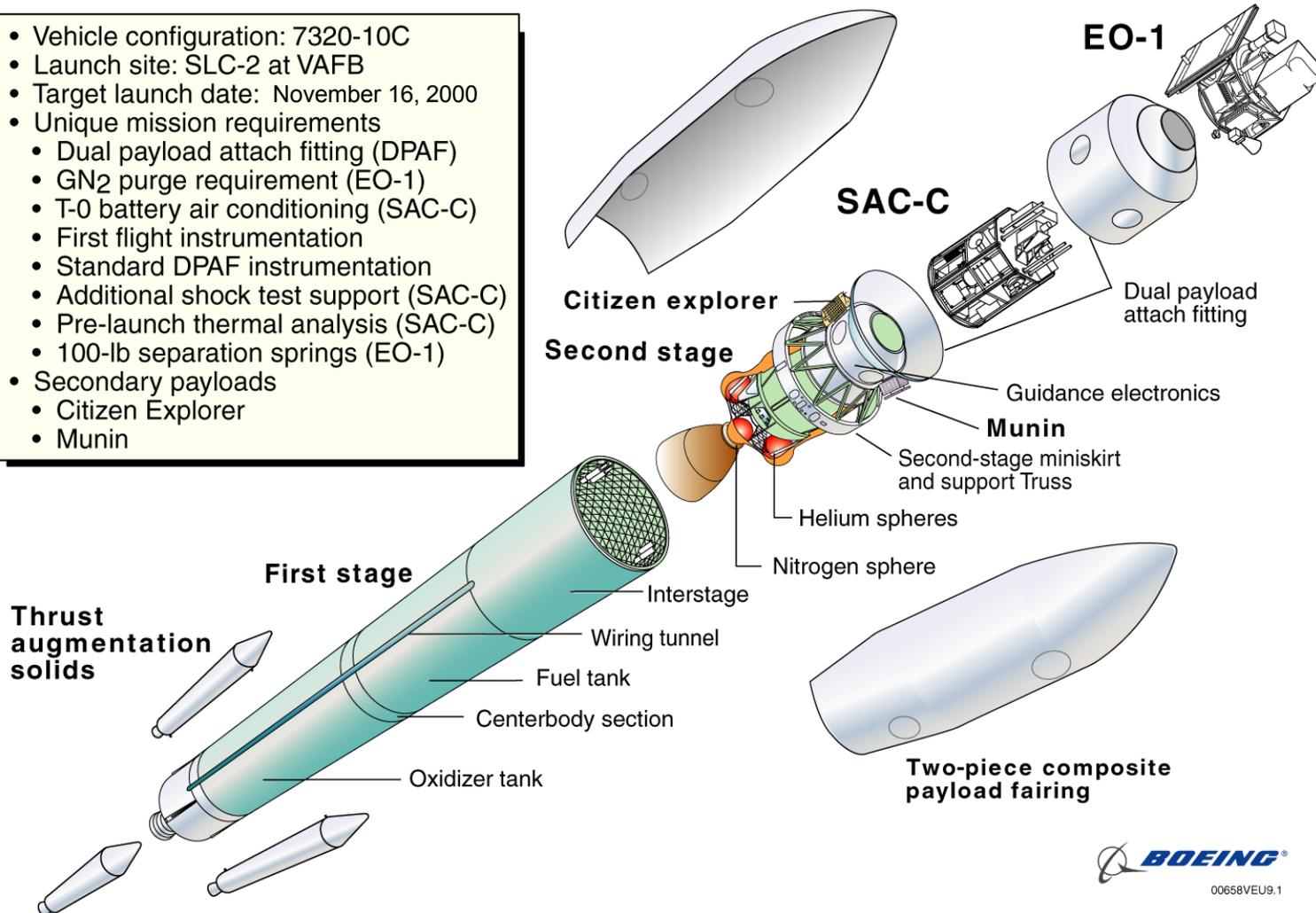


Vehicle Configuration Overview 7320-10C

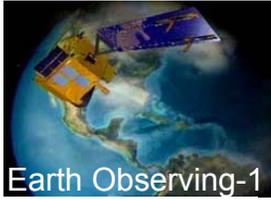


June 4, 2002

- Vehicle configuration: 7320-10C
- Launch site: SLC-2 at VAFB
- Target launch date: November 16, 2000
- Unique mission requirements
 - Dual payload attach fitting (DPAF)
 - GN₂ purge requirement (EO-1)
 - T-0 battery air conditioning (SAC-C)
 - First flight instrumentation
 - Standard DPAF instrumentation
 - Additional shock test support (SAC-C)
 - Pre-launch thermal analysis (SAC-C)
 - 100-lb separation springs (EO-1)
- Secondary payloads
 - Citizen Explorer
 - Munin



00658VEU9.1



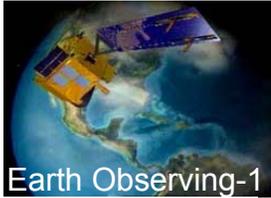
Integrated Spacecraft



June 4, 2002



Launch



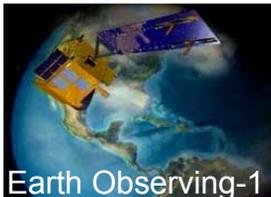
Earth Observing-1



June 4, 2002

- ◆ *EO-1 was successfully launched on November 21, 2000 on a Delta 7320 from Vandenberg Air Force Base , California*
- ◆ *The desired orbit was readily achieved and, following orbital check-out, the first images were taken on November 26, 2000*

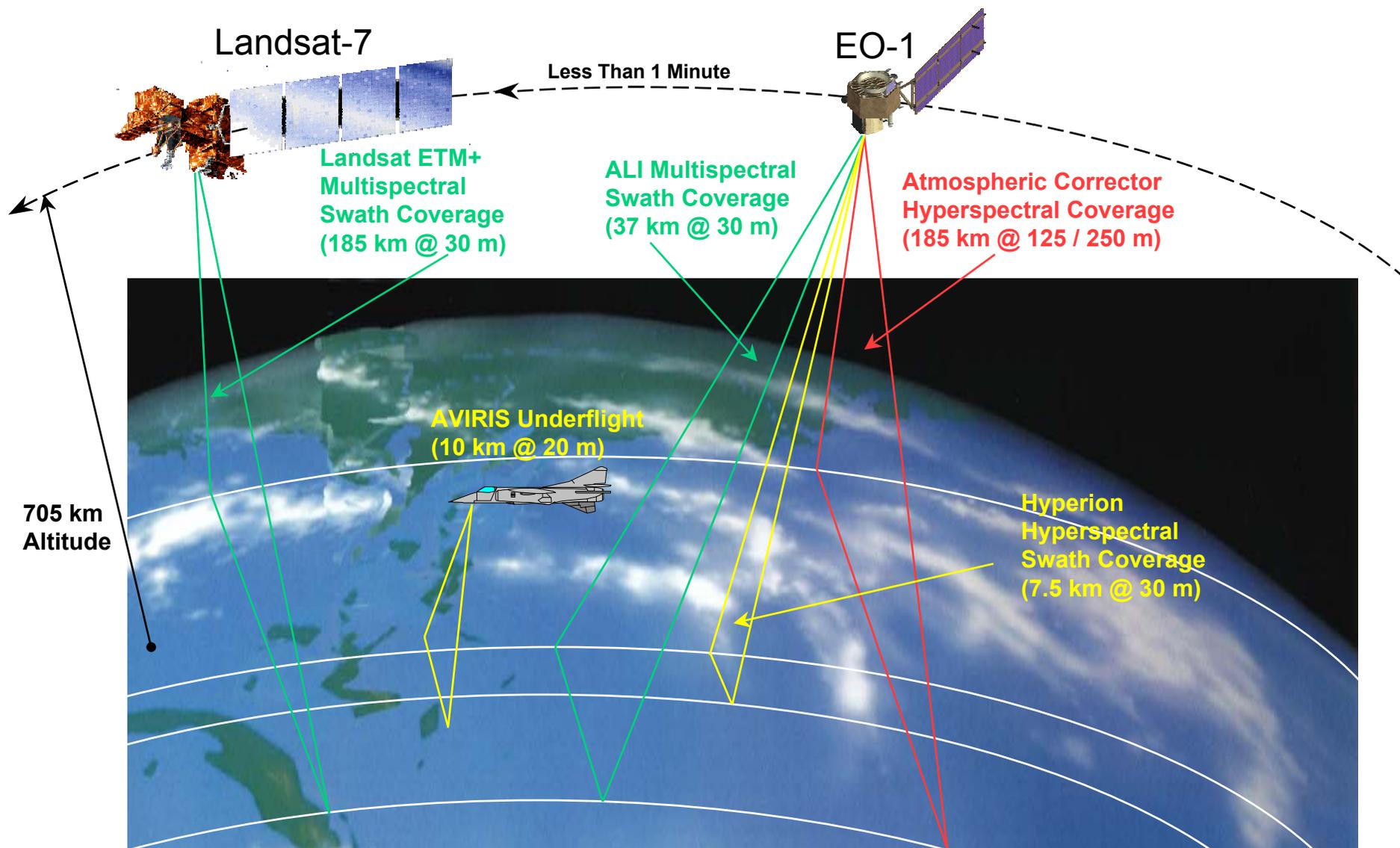


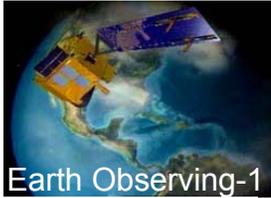


EO-1 and Landsat



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EO-1 Instrument Comparisons

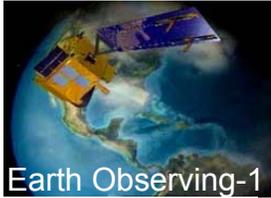


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Parameters	Landsat 7	EO -1	EO -1	
	ETM +	ALI Multispectral	HYPERION	AC
Spectral Range	0.4 - 2.4 μm *	0.4 - 2.4 μm	0.4 - 2.5 μm	0.9 - 1.6 μm
Spatial Resolution	30 m	30 m	30 m	250 m
Swath Width	185 Km	36 Km	7.5 Km	185 Km
Spectral Resolution	Variable	Variable	10 nm	2.3 - 9 nm **
Spectral Coverage	Discrete	Discrete	Continuous	Continuous
Pan Band Resolution	15 m	10 m	N/A	N/A
Total Number of Bands	7	10	220	256

* *Excludes thermal channel*

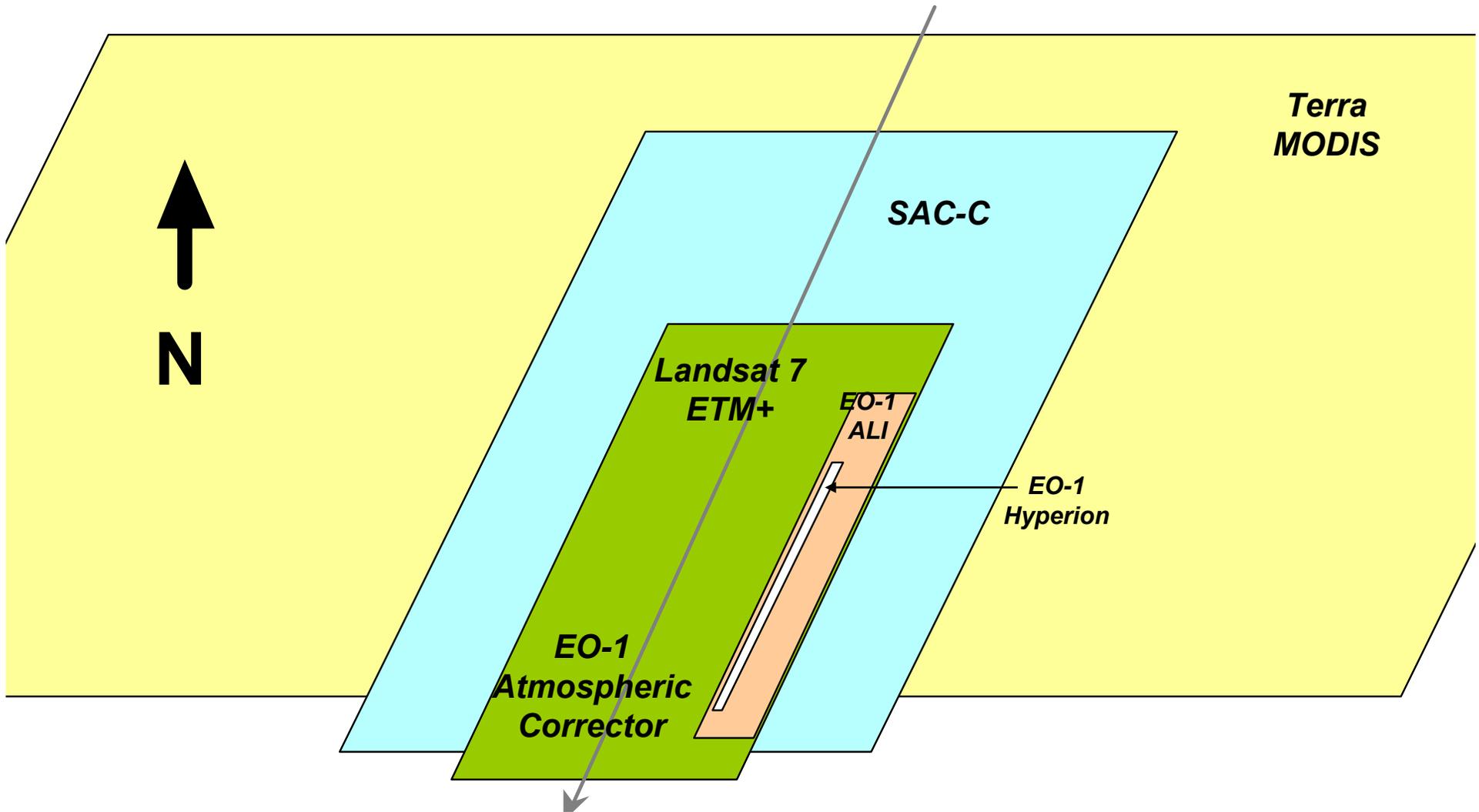
** *35 cm⁻¹ constant resolution*

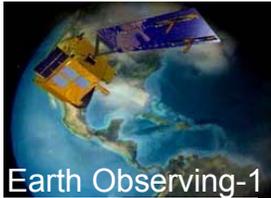


AM Constellation Descending Orbit Ground Tracks



June 4, 2002





The EOS AM Constellation Alignment for March 2001



June 4, 2002

