



*7th Annual NASA/JPL Space Science Symposium
for Small Business*



FUTURE SPACE MISSIONS

Rod Zieger

Manager, JPL Systems Management Office (SMO)

March 5, 2002



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TOPICS

- Summary
- SMO/Concept Approach
- Project Life Cycle
 - Industry and Academia Participation
- Teaming with JPL
- JPL Missions Overview
 - Currently Operating
 - In Development
 - Major Instruments and Collaborations
 - Awaiting Near Term Decisions
 - Longer Term Missions
 - Competitively Selected Missions
- Proposal Forecast
- Mission Announcement Opportunities (AO's)
- Opportunities Summary



“Future Space Missions”

- Provide opportunities for Academia, Industry, and JPL...
...to participate in space exploration:
 - Earth
 - Solar system
 - Deep space projects
- What’s been covered today:
 - Doing business with JPL
 - Science
 - Technology
 - Understanding Competitive Opportunities (AO’s and NRA’s)

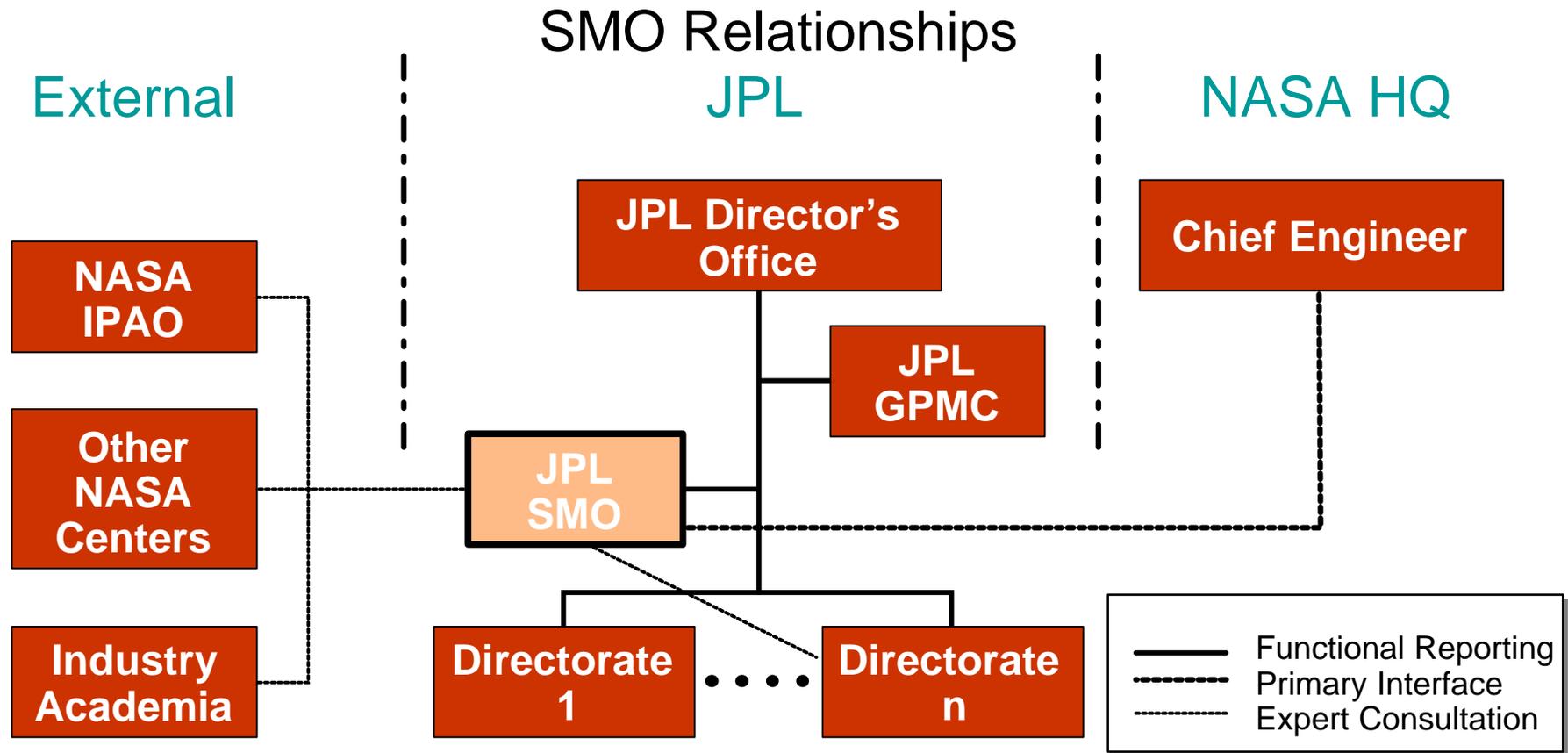


What is the Systems Management Office?

Primary responsibility:

- Help JPL and the JPL director ensure that the commitments JPL makes are appropriate and are properly fulfilled

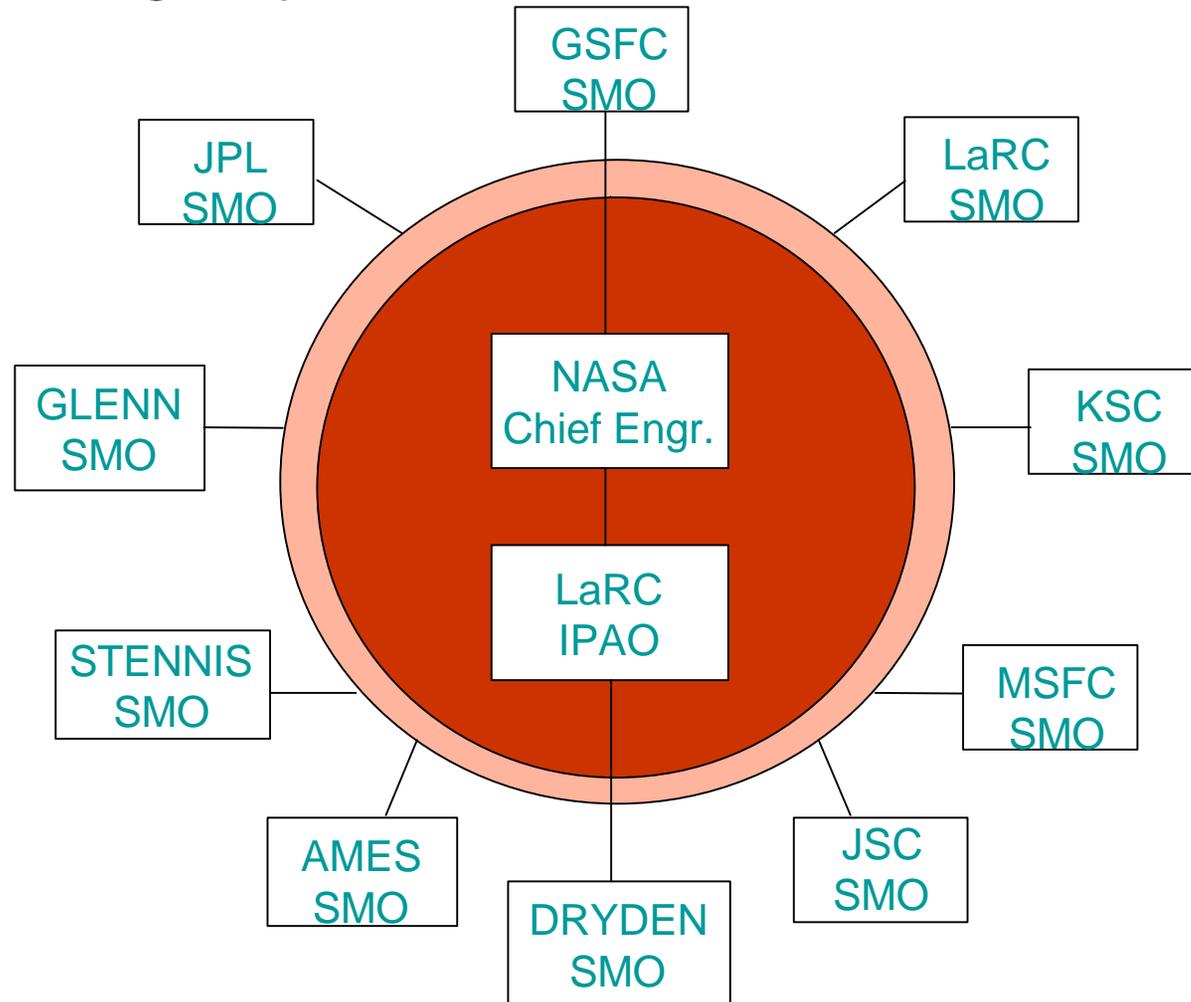
The Manager of the SMO will be the primary interface with the NASA Chief Engineer (Code AE) and the Agency Independent Program Assessment Office (IPAO) on the matters pertaining to the assessment of JPL Programs and Projects (instruments)



SMO relationships ensure mission success with strategic review insight



SMO Agency-Wide Interconnections



GSFC Goddard Space Flight Center
 JPL Jet Propulsion Laboratory
 JSC Johnson Space Center
 KSC Kennedy Space Center
 LaRC Langley Research Center
 MSFC Marshall Space Flight Center

**Quarterly SMO Working Groups Ensure
Best Practices for NASA Mission Success**



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Project Life Cycle Commonality Facilitates Risk Mitigation

NASA Phases	FORMULATION		IMPLEMENTATION					
JPL Life Cycle Phases	Pre-Phase A: Advanced Studies	Phase A: Mission & Systems Definition	Phase B: Preliminary Design	Phase C: Design & Build	Phase D: ATLO	Phase E: Operations		
Major JPL Reviews <i>(Review Cluster Includes a Director's GPMC)</i>	Concept Review ¹ STEP 1 TMC ^{2,3}	Preliminary Mission & Systems Review PMSR ^{1,4} STEP 2 TMC ²	Project PDR ⁵	Project CDR	Assembly, Test & Launch Operation Readiness Review ARR	Operations & Mission Readiness Reviews ORR & MRR	Post Launch Assmnt Review PLAR	Critical Events Readiness Review CERR ⁶
Major NASA Enterprise Reviews	Concept/ Proposal Review	Initial Confirmation Review ICR	Confirmation Review CR			Mission Briefing		
Major Events	Down Select for STEP 1	Commitment, Select for STEP 2	Contract			Launch		
(1) Program driven projects (2) AO driven projects (3) Not a GPMC review		(4) A PMSR is equivalent to what Code S refers to as a combined Mission Definition Review and SRR (5) For Earth Science Missions, a PDR may be combined with a Mission Design Review (6) CERRs are established at the discretion of Program Offices						



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Project Life Cycle Demands Early Team Building Relationships

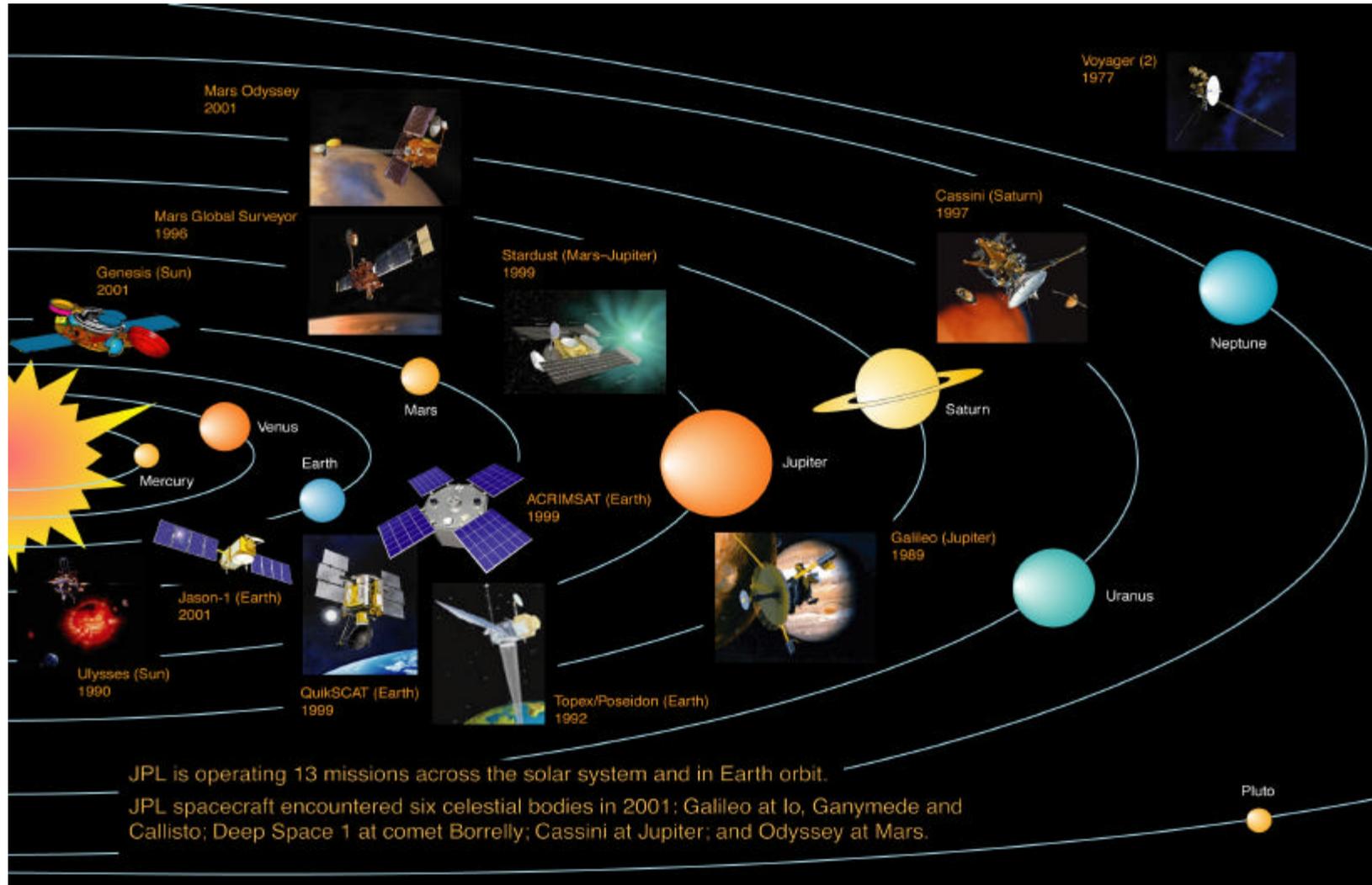
NASA Phases	FORMULATION		IMPLEMENTATION			
JPL Life Cycle Phases	Pre-Phase A: Advanced Studies	Phase A: Mission & Systems Definition	Phase B: Preliminary Design	Phase C: Design & Build	Phase D: ATLO	Phase E: Operations
Major JPL Reviews	▲ Concept Review		▲ Project PDR	▲ Project CDR	▲ ARR	▲ (MRR)
Review Boards/Teams	Project Standing Review Board (PSRB)	▲	▲	▲	▲	▲
Independent Review Team (IRT)			▲	▲	▲	▲
SMO/Independent Assessment Team (IAT)	▲	▲	▲	▲	-----	
Other	▲ Science Program		Peer Reviews		Peer Reviews	
Academia and Industry participation with JPL	<div style="background-color: #90EE90; padding: 5px; border: 1px solid black;"> <i>Teaming Opportunities</i> </div>		<div style="background-color: #90EE90; padding: 5px; border: 1px solid black;"> <i>Commitments</i> </div>			



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JPL Operates 13 Missions Simultaneously

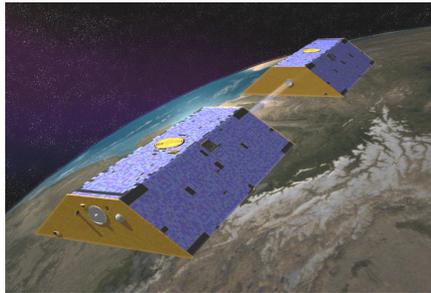




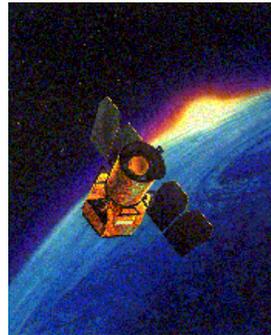
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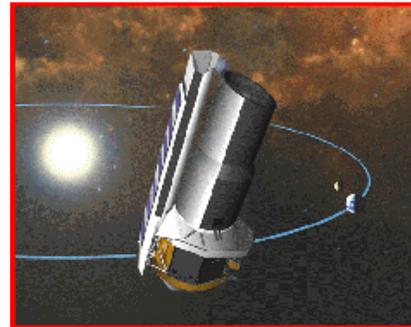
JPL Missions in Development



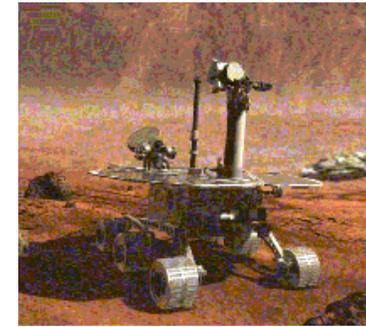
GRACE, March 2002



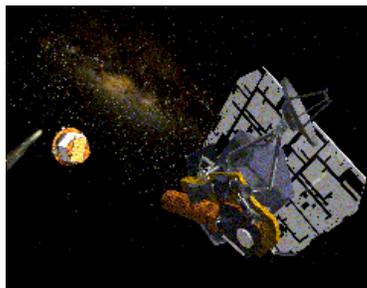
GALEX, July 2002



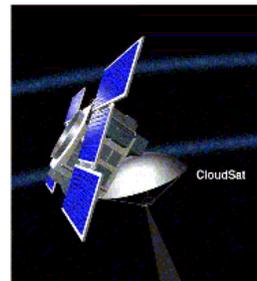
SIRTf, January 2003



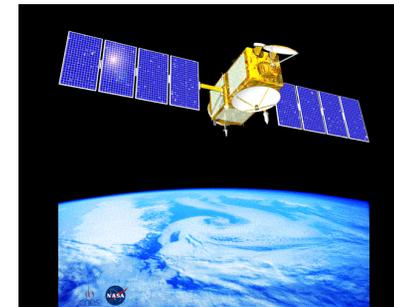
**Mars Exploration Rovers,
Spring 2003**



Deep Impact, January 2004



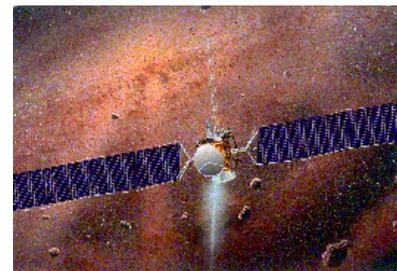
Cloudsat, April 2004



Jason II, January 2005



**Mars Reconnaissance
Orbiter, August 2005**



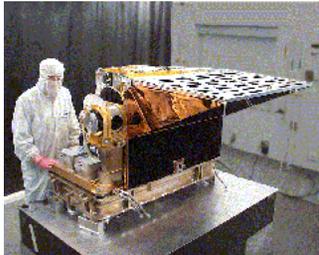
Dawn, June 2006



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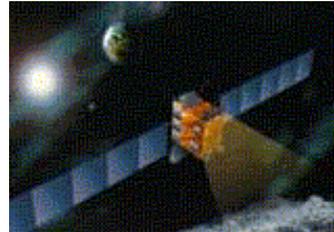
JPL Major Instruments and Collaborations



AIRS, April 2002



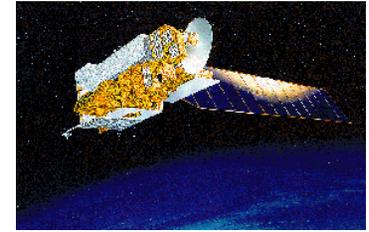
Seawinds: November 2002



**Rosetta Instruments;
February 2003**



**Mars Express,
June 2003**



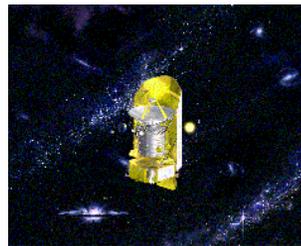
**Tropospheric Emission
Spectrometer (TES on AURA
spacecraft); June 2003**



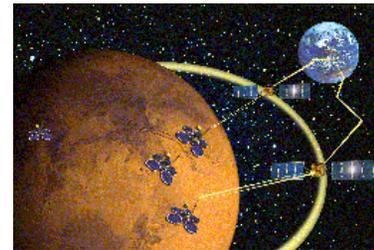
**Microwave Limb Sounder
(MLS); June 2003**



**Low Temp Physics
Exp, Nov 2005**



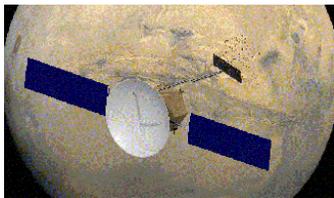
**Herschel/Planck:
2006 (ESA, JPL)**



**Mars NetLander,
Sept 2007**



**Mars French Orbiter:
2007 (CNES, JPL)**

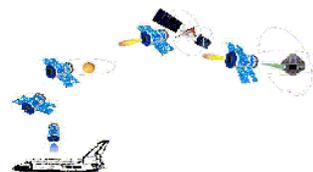


**Marconi Mars Telecom:
2007 (ASI, JPL)**

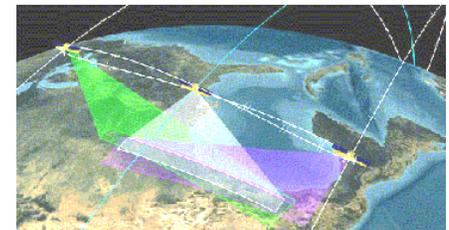
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**Mid-Infrared Instrument
(MIRI) on NGST**



**NMP ST6 autonomous
rendezvous with XSS11**



**NMP ST6 USAF Techsat-21
constellation**

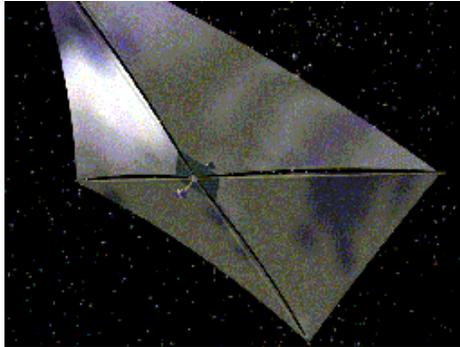
Rod Zieger
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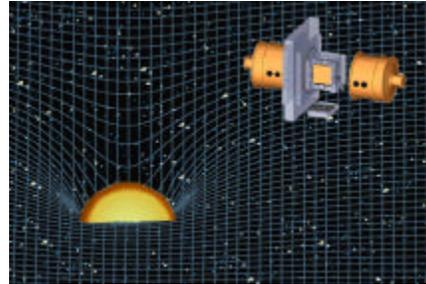
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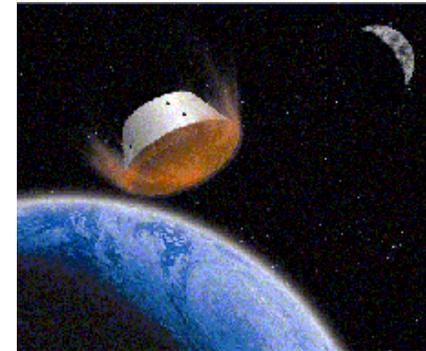
JPL Missions Awaiting Near-term Decisions



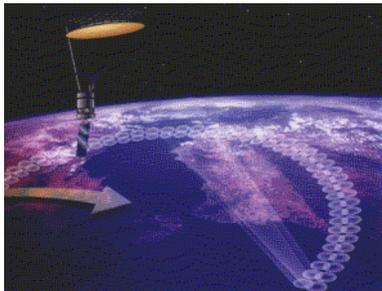
**New Millennium ST7
solar sail proposal**



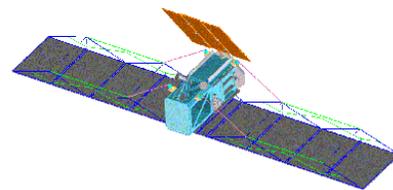
**New Millennium ST7 drag
reduction system proposal**



**New Millennium ST7 Aerocapture
Flight Test Experiment**



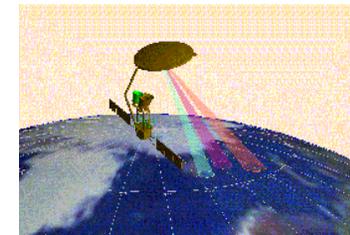
**ESSP Hydros soil
moisture and freeze/thaw
mission**



**Earth System Science Program
(ESSP) Earth Change and Hazard
Observatory (ECHO)**



**ESSP Orbiting
Carbon Observatory**



**ESSP Aquarius sea surface
salinity mission**

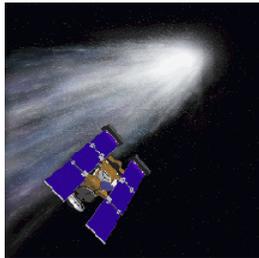


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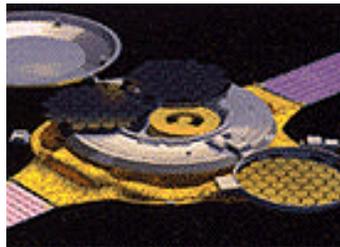
Missions Competitively Selected from Announcements
of Opportunity

Comet dust sampling:
Stardust



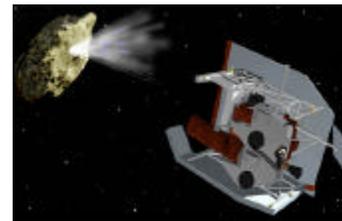
PI: D. Brownlee (U of Washington)

Solar wind sampling:
Genesis



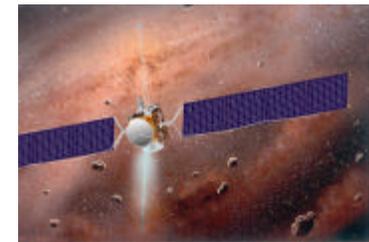
PI: D. Burnett (Caltech)

Comet internal structure:
Deep Impact



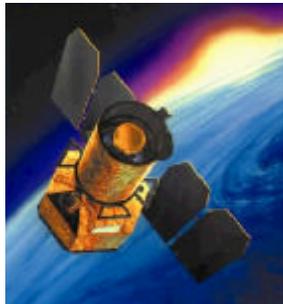
PI: M. A'Hearn (U of Maryland)

Asteroid composition
and diversity:
Dawn



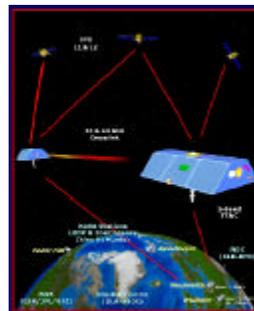
PI: C. Russell (UCLA)

Galaxy evolution and
star formation:
GALEX



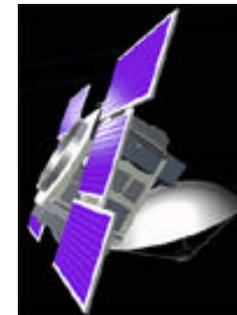
PI: C. Martin (Caltech)

High-resolution Earth
gravity mapping:
GRACE



PI: B. Tapley (UT)

Structure of clouds:
CloudSat



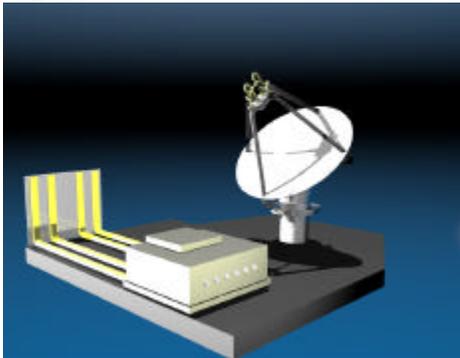
PI: G. Stephens (CSU)



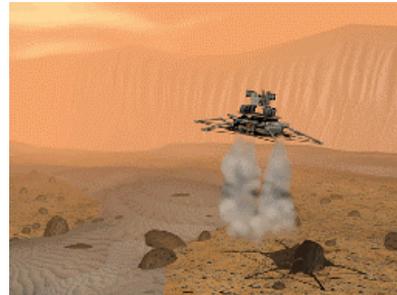
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Mission Concepts in Development at JPL



Ocean Vector Winds, 2007



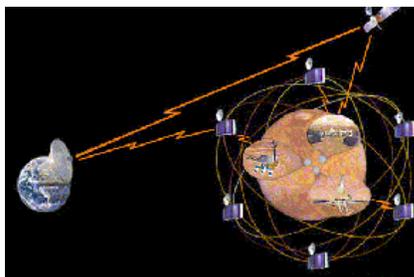
Mars Smart Lander, 2009



SIM, 2009



Laser Interferometer Space Antenna (LISA), 2011



Interplanetary Network

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Future Competitive Opportunities

- Mars Scouts: 2007
- New Frontier: 2007-2008
- Discovery: 2008-2010
- Earth System Science Program (ESSP): 2008-2010
- Small Explorer (SMEX): 2006-2010
- Mid-sized Explorer: (MIDEX): 2007-2010

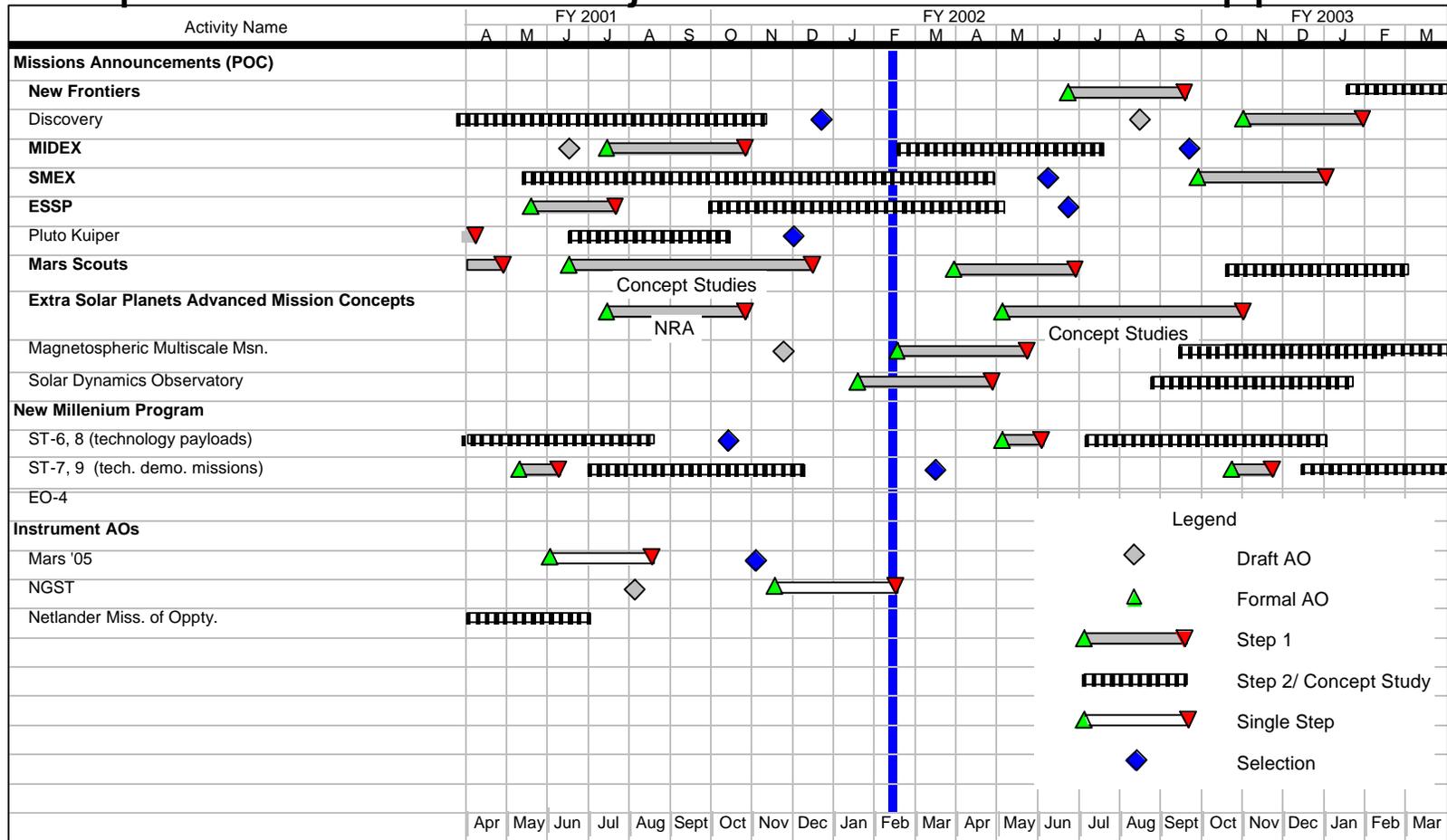
In concert these missions provide many opportunities for team relationships



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Proposal Forecast - Major Announcement of Opportunity



Project Life Cycle lead time demands early team relationships



Mission AO's Summary

- JPL successfully acquires and executes missions from AOs.
 - New Frontiers provide new challenges:
 - Nuclear power source
 - New technology risks
- Competitive mission proposals became major activities at JPL and accessed larger mission market share
- JPL constantly examines best practices to ensure effective and efficient proposal generation processes
 - Concurrent Engineering Teams X, A, I, G AT JPL
 - Review Process Workshop
 - Costing Office
 - Proposal Center Upgrade
 - Proposed PDC Upgrades



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Summary

- Space mission concepts
 - Come from many sources
 - Create projects that give access to what we do not know that we do not know
- Open your imagination for future explorations...
 - Ideas and opportunities
- Form team relationships early in Project Life Cycle

“People Team With People”

“Relationships Make the Difference”

Mel Roberts February 2002