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Title: CSES Relation to LANL's NASA Program

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CSES: Center for Space and Earth Science

Los Alamos
NATIONAL LABORATORY
EST. 1943

CSES relation to LANL's NASA Program

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July 20th, 2017

Agenda

- LANL NASA/NSF Program Office
- NASA Role, Missions @ LANL
- Upcoming Mission Proposals
- CSES – NASA Overlap
- Supporting NASA Mission Development at LANL
- CSES NASA Project Support
- CSES Partnered NASA Project support

LANL NASA/NSF Program Office

PADGS GS-NNS (Global Security Nuclear Nonproliferation & Security)

Program Administrator Authorized Org. Rep.
Patty Molina, GS-PSO

CFO Program Analyst
Karen Proicou, CFO-GS

NASA R&D Program Manager
Reiner Friedel, NSEC

0.3 FTE Position
< $100K PD

Discovery Science

Instrument Missions
Angela Mielke, ISR-DO

Theory
Gian Luca Delzanno, T-5

Helio Physics
Alexei Klimenko, ISR-1

Astrophyscis
Tom Vestrand, ISR-2

Planetary Science
Nina Lanza, ISR-2

Other Science, Nuclear Space
Reiner Friedel, NSEC

SuperCam
Roger Wiens, ISR-2

ChemCam
Roger Wiens, ISR-2

Sherloc
Tony Nelson, ISR-4

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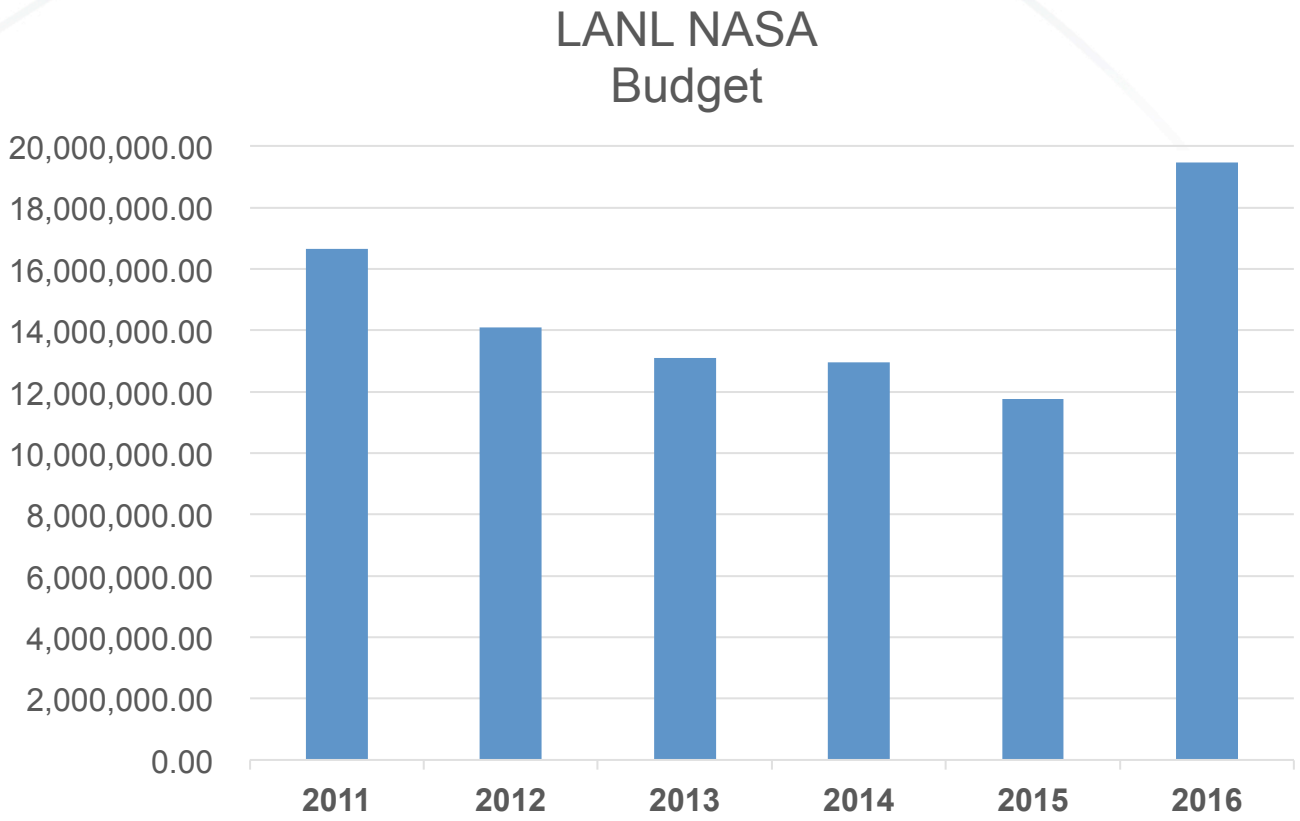
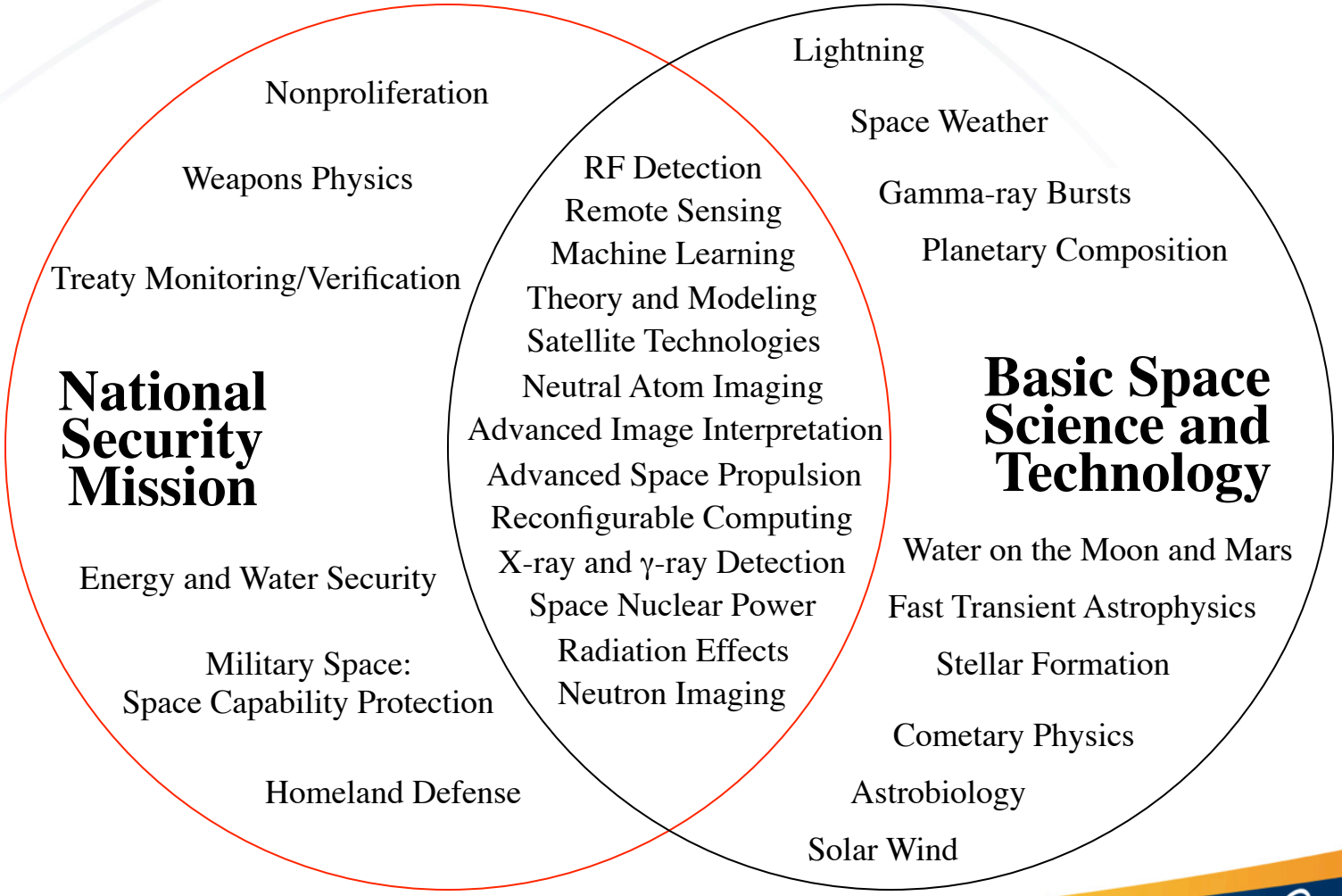
NASA Budgets at LANL



Supporting LANL's National Security Mission



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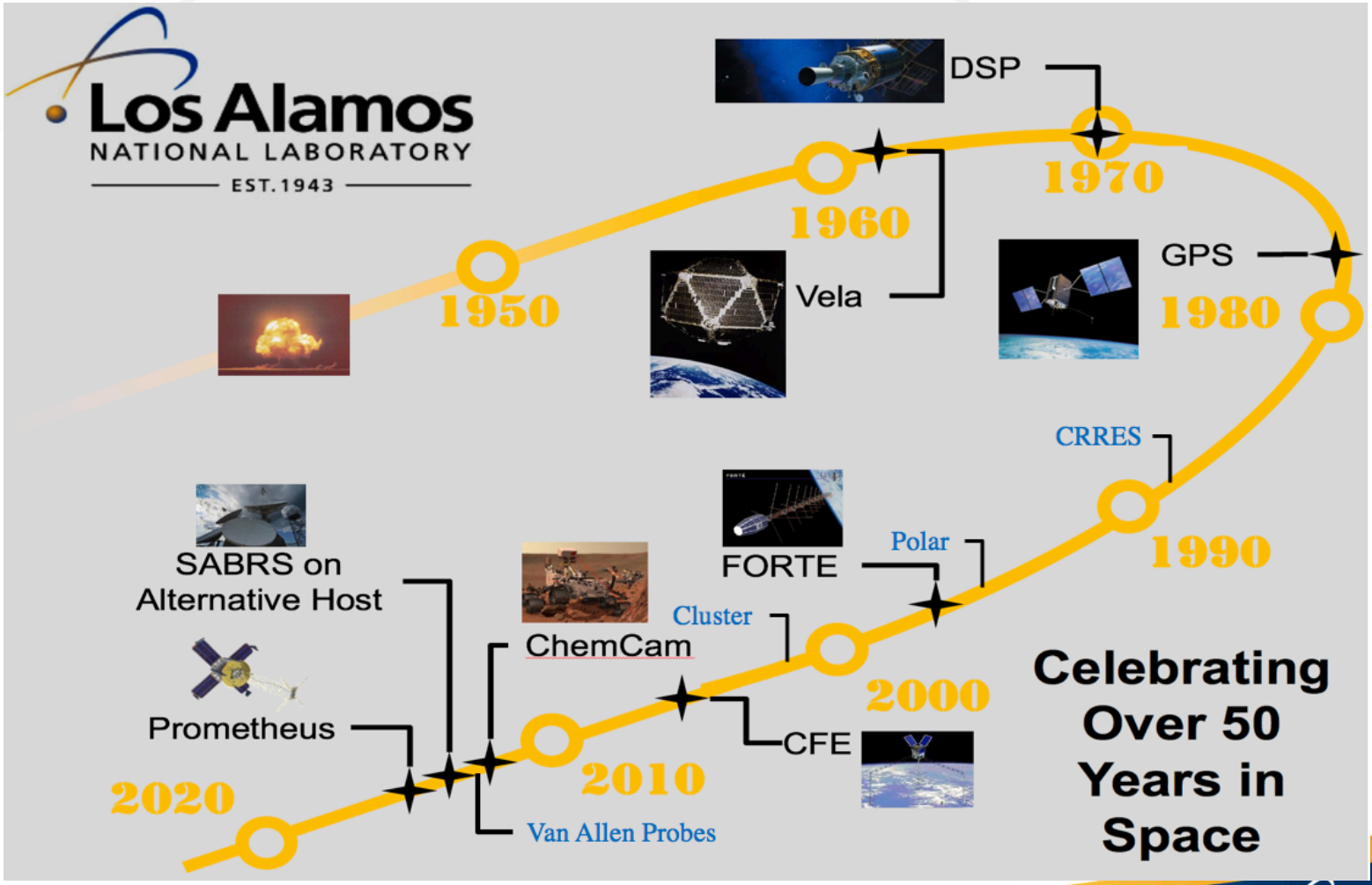
Los Alamos in Space
Historical Perspective

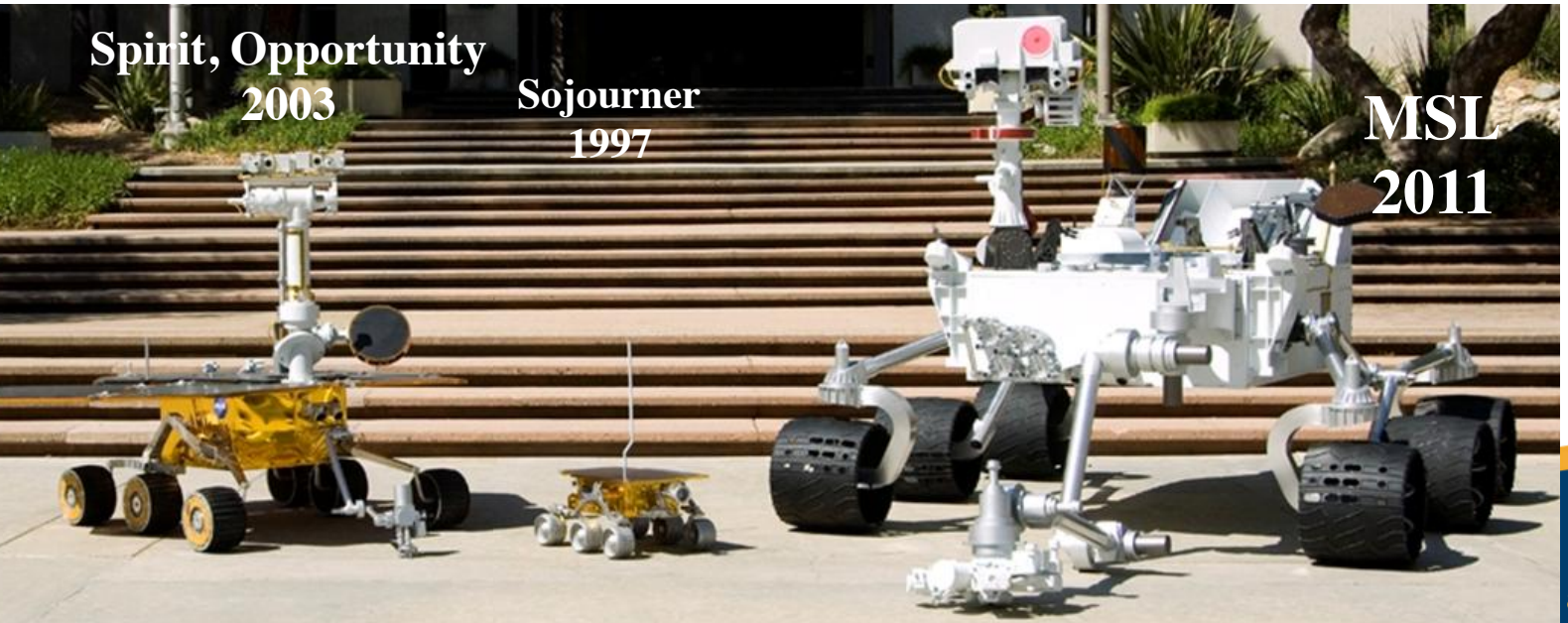


Los Alamos in Space
NASA Projects Since 1997

Instrument	Mission	Launch	Orbit	Science
Radioisotope Heat Sources	Pioneer, Voyager, Viking Apollo, Galileo, Ulysses, Cassini, Mars Rover	1960s to present	Multiple	Heat source for RTGs, heater units
Plasma analyzers	ACE	1997	L1	Solar wind and space weather
Ion mass spectrometer & ion beam spectrometer	Cassini	1997	Saturn	Saturn & Titan magnetospheres
Neutron/α/γ-ray spectrometer	Lunar Prospector	1997	Moon	Lunar water and crust composition
Energetic Particle spectrometers	POLAR	1997	Earth	Magnetospheric electrons & protons
Ion mass spectrometer (PEPÉ)	New Millennium (Deep Space 1)	1998	Comet flyby	Ion Thruster/asteroid composition
Digital Processing Unit for the Optical Monitor	X-ray Multi-Mirror	1999	Earth	X-ray astronomy
Wide Field X-ray Monitor	HETE	2000	Earth	Gamma ray bursts
Neutral Atom Imager (MENA)	IMAGE	2000	Earth	Magnetospheric processes
Imaging electron spectrometer	CLUSTER II	2001	Earth	Magnetospheric electrons & protons
Neutron spectrometer	Mars 2001	2001	Mars	Water ice search
Solar wind monitors and concentrator	Genesis	2001	L1	Solar wind composition
X-ray cameras (MOXE)	Russian Spectrum-X γ	???	Earth	X-ray astronomy
Coded Aperture	SWIFT	2003	Earth	Gamma-Ray Burst
Neutral atom imager	TWINS	2003/5	Earth	Magnetospheric science
Neutral atom imager	IBEX	2008	Heliosphere	Heliopause
HOPE	Van Allen Probes (RBSP)	2012	Earth	Radiation belt science

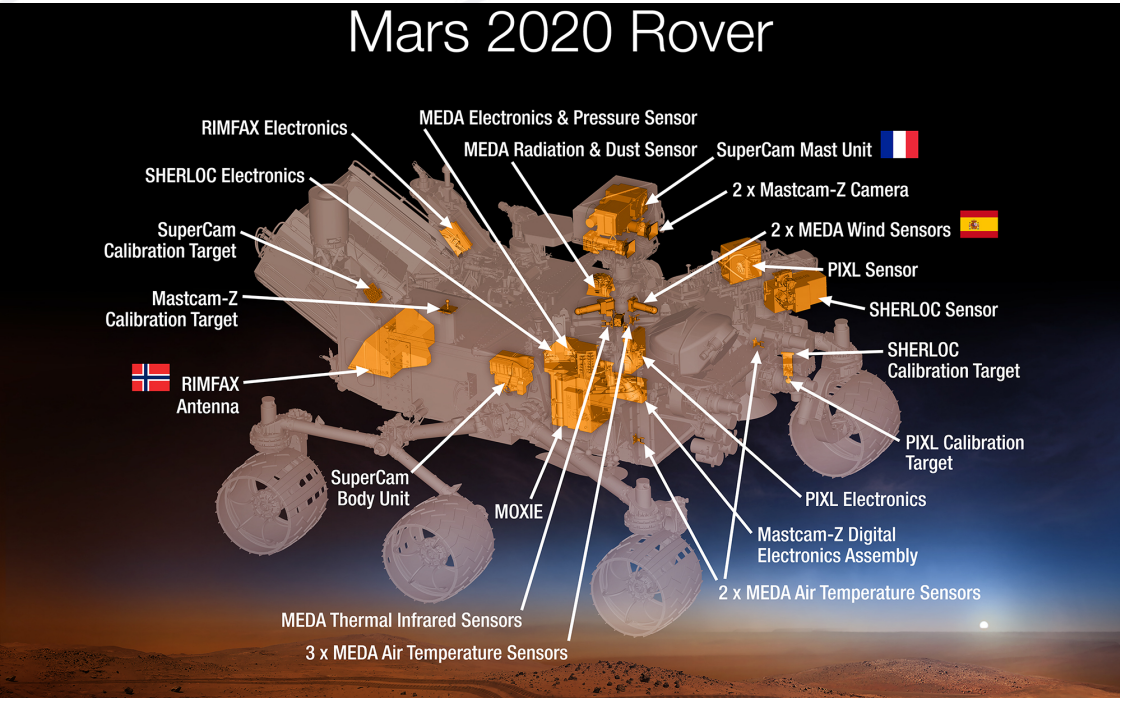
Mars Science Laboratory

- Assess Mars' biological potential by
  - Searching for organic carbon compounds,
  - Looking for the chemical building blocks of life,
  - Identify biologically relevant clues.
- Characterize the geology of the landing region
- Investigate Mars' past habitability (including the role of water)
- Characterize the human hazards on Mars



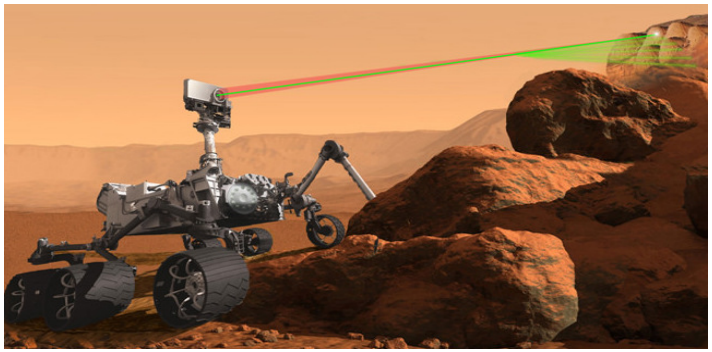
See keynote Talk on Laser-Based Planetary Science

LANL MARS 2020 Participation



Exame rocks and soils with a camera, laser and spectrometers

SuperCam Instrument, LANL PI, French partners



Scanning Habitable Environments with Raman & Luminescence for Organics & Chemicals: SHERLOC, LANL hardware Co-I

Upcoming Mission planning

Mission Name	LANL PI	Status	Dec-16	Jan-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Nov-17	Dec-17	Mar-18	Apr-18	Jun-18	Oct-18	Nov-18	Dec-18	Jun-19	Jul-19	Sep-19	Oct-19
CONNEX - NASA Midex Lead@GSFC, Electron Accelerator	Eric Dors	Upcoming												AO Expected Spring 2018									
Europa Lander, Lead@JPL, Sherloc like	TBD (Wiens)	Upcoming					Advance Notice of AO		Mission Workshop	AO Release	Pre Proposal Conf.	Proposals Due				Competitive Phase A Selection	10 Proposals selected for the Step 2 Phase A Concept studty @ $1.5M FY18 dollars			Phase A Concept Study due		Phase A Down Select	
IMAP Neutral Atom Imager, Lead@PPL	Herb Funsten	Upcoming				Draft AO Release	Draft AO Comments Due	Anticip. AO Release			Proposals Due					Competitive Phase A Selection				Phase A Concept Study due			Phase A Down Select
MMX Neutron Insturment, LANL Lead	Laura Stonehill	Submitted			AO Release	NOI Due		Proposals Due					Project Start										
VICI/Vemcam, Venus Lander, Lead@GSFC	Sam Clegg	Submitted	AO Release	Pre Proposal Conf.		Step 1 Proposals Due						Step-1 Selections	2-3 Proposals selected for the Step 2 Phase A Concept study						Phase A Concept Study due		Phase A Down Select		

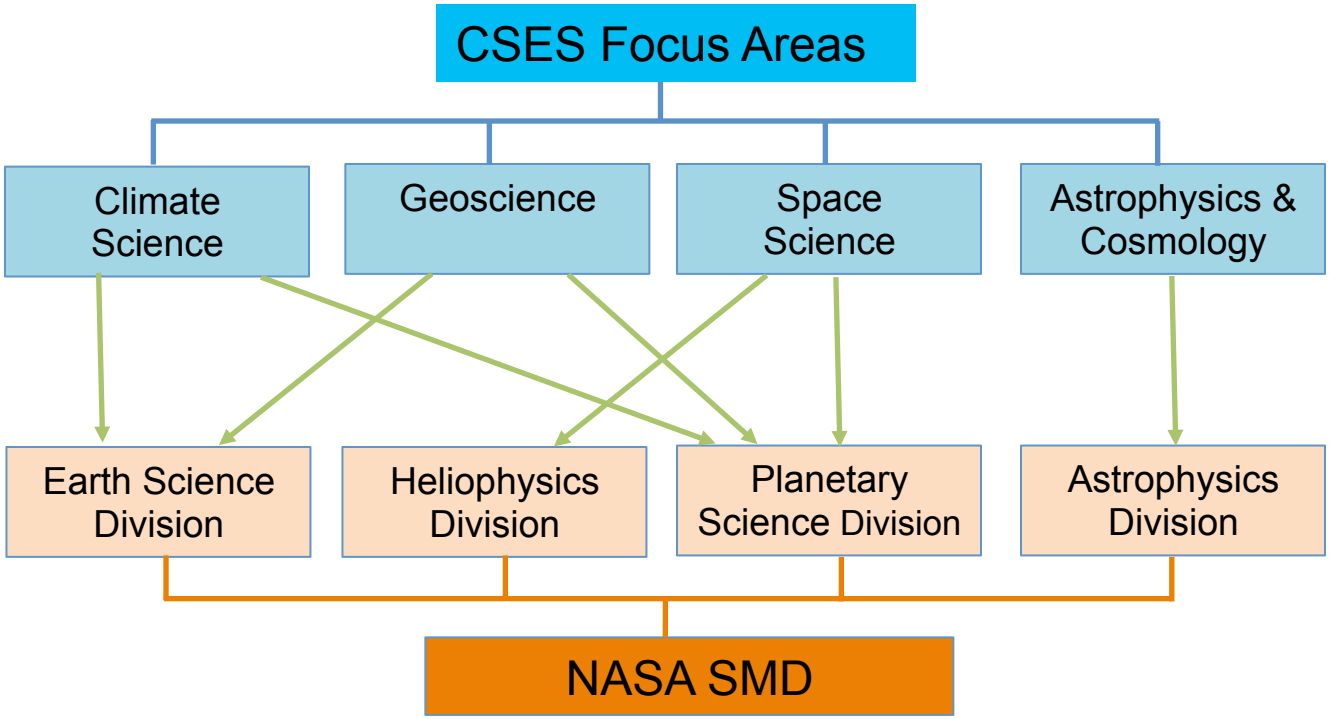
Announcement of Opportunity release or anticipated release
Due dates for proposals or deliverable
NASA selection dates
Step-1 / Phase A Study period
Anticipated Launch Date

Venus Lander: New Frontiers Program mission
The Europa Lander: NASA Program Element Appendix (PEA) for the Third Stand Alone Missions of Opportunity Notice (SALMON-2) for instrument investigations for a Europa lander mission
MMX: NASA Announcement of Opportunity for Third Stand Alone Missions of Opportunity Notice (SALMON-3) for the Discovery Program - MMX Neutron and Gamma-Ray Spectrometer Investigation
IMAP: (AO) for Solar Terrestrial Probes #5
Interstellar Mapping and Acceleration Probe (IMAP) Mission

Also in the NASA planning: follow on for FY17 start LDRD-DR Cubesat Mission TACOS
CubeSat-based UV/Visible spectral imager to perform targeted mapping of NO2, SO2, and other gases, delivering high-impact science in anthropogenic and volcanic emissions monitoring

CSES – NASA Overlap:

CSES Focus Areas have a strong correspondence to the NASA HQ Science Mission Directorate (SMD) Divisions



Supporting NASA Mission Development at LANL

- The NASA program used to be a “Center” in its own right with a full LDRD–DR level of funding: Center for Space Science and Exploration (CSSE, 2001 - 2006)

- Current status is that NASA support is assembled from several sources:
  - NASA Program Office PD (no R&D)
  - GS Pathfinder program PD (no R&D)
  - LDRD competition and LDRD reserve (R&D)
  - CSES Programs (PD and R&D)

CSES NASA project Support

- Support of NASA Mission Relevant Projects through CSES Programs
  - Laboratory Validation of Electron Beam Emission Mediated by a Plasma Contractor, Gian Luca Delzanno, T-5,
    FY16-18 University Student
  - Feasibility Study of Using a Pulsed Space-Based Electron Accelerator for Radiation Belt Remediation, Bruce Carlsten, ADE, FY 16 Emerging Ideas R&D
  - Elpasolite Planetary Ice and Composition Spectrometer (EPICS), Laura Stonehill, GS-IET, FY 16 Emerging Ideas R&D
  - Assessing substorm prediction capabilities and feasibility of proposed methodologies, Steve Morley, ISR-1, FY16 Emerging Ideas PD
  - Opening a New Frontier in time-domain Astrophysics with GPOSE, Przemek Wozniak, ISR-2, FY16 Emerging Ideas PD

CSES NASA project Support

- Support of NASA Mission Relevant Projects through CSES Programs
  - IMAP-Hi The High Energy Neutral Atom Imager for the Interstellar Mapping and Acceleration Probe (IMAP), Herb Funsten, ISR-1, FY17 Emerging Ideas R&D
  - Development of LANL team for the Allsky Medium Energy Gamma-ray Observatory, Pat Harding, P-23, FY17 Emerging ideas PD
  - NASA ROSES Habitable Worlds Proposal, Chris Jeffery, ISR-2, FY17 Emerging ideas PD
  - NASA MMX Proposal, Nick Dallmann, P-21, FY17 Emerging ideas PD
  - Refining the Search for Water on Mars Using a Balloon-Borne Neutron Spectrometer, Steve Johnstone, ISR-3, FY17 Emerging ideas PD

CSES Partnered NASA project support

- Emerging Idea proposals received relevant to the NASA program ranked and selected by CSES and then partner funds sought. Using CSES proposal submission and ranking mechanism for NASA related projects.
  - Solar and Heliospheric Particle Dynamics Modeling for LANL Space Missions - Fan Guo, T-2, NASA PD
  - Concept and Proposal Development for the NASA Europa Lander Mission, Roger Wiens, ISR-2, NASA PD
  - Understanding Measurement Requirements for the CONNECTIONS Magnetospheric Mapping Mission, Mike Henderson, ISR-1, Pathfinder

CSES / NASA program

- These two activities naturally go well together
- Trying to make up for the demise of CSSE
- Having Center Lead and NASA Programs Manager in one person helps this synergy