



Discovery Program Overview

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Program Description

- Address high-priority science objectives in solar system exploration
- Frequent opportunities for science community to propose full investigations
- Full and open competition through AO process
- Principal Investigator-led mission. PI responsible for cost, schedule and performance
- Uncoupled Program – each project is independent



- Established in 1992
- **\$450M (FY 15 \$) Phases A – D cap** per mission excluding launch vehicle (FY14 AO)
- Mission opportunities every **24-36** months (budget allowing)
- Open science competition for all solar system objects, except for the Earth and Sun

Additional Programs in SMD's Planetary Science Division

- New Frontiers
- Mars Exploration
- Radioisotope Power Systems
- Planetary Research
- *Lunar Quest ended FY 14*



What to expect if selected

- The selected project(s?) will work closely with the Program Office and HQ
- The Discovery Program at MSFC: Program Manager, Mission Manager, Business Office, Engineering and Mission Assurance support
 - Discovery and New Frontiers Program Office assigned to the Marshall Space Flight Center (MSFC) in 2004, operates as one Programs Office.
 - Capitalizes on MSFC program/project management and systems engineering expertise
 - 19 missions to-date, 10 active in various stages of development and operation
 - Works closely with Headquarters (Program Director, Executives and Scientists) and NASA field Centers
 - Management structure and Program Management Plan shared with NF.
- You'll have big shoes to fill!

Big Shoes to fill: Missions Completed

NEAR – *Launched February 1996*



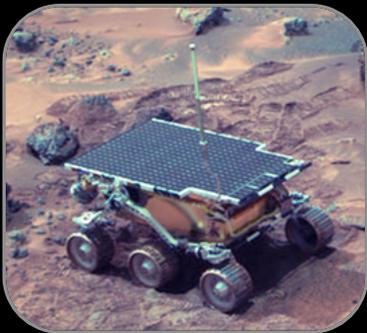
First spacecraft to orbit and land on a near-Earth asteroid, returning 160,000 detailed images of Eros during its year-long orbit

Lunar Prospector – *Launched January 1998*



Orbited the Moon for 19 months, looking for water and other natural resources and returning extensive mapping data

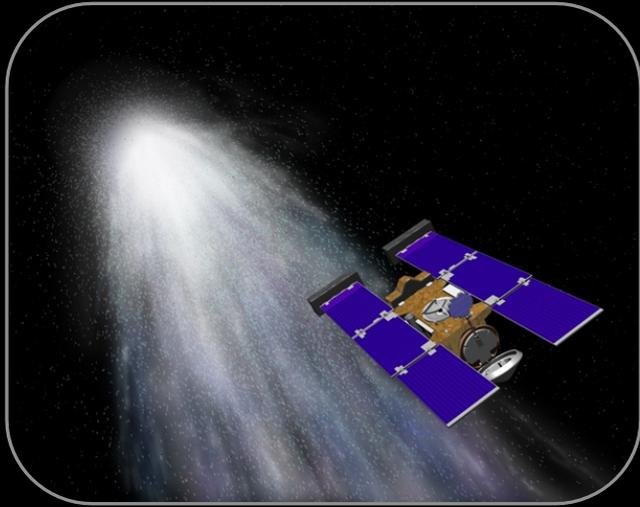
Mars Pathfinder – *Launched December 1996*



First free-ranging rover to explore the surface of Mars, conducting science and technology experiments

Missions Completed

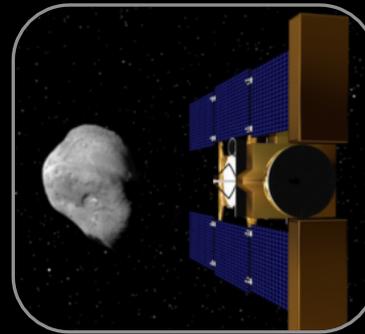
Stardust – Launched February 1999



Captured the first-ever samples from a comet and returned them to Earth to help provide answers to fundamental questions about comets and the origins of the solar system

Stardust – NExT

– Launched 1999 (Stardust)

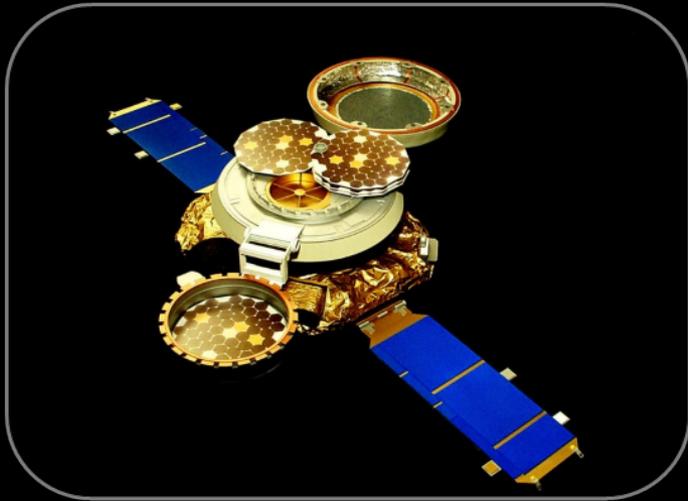


After successfully completing its mission to collect interstellar dust and dust from the nucleus of comet Wild 2 and return the tiny particles safely to Earth, the Stardust spacecraft is undertaking a new task. It flew by comet Tempel 1, the target of the Deep Impact mission in 2005 – the first time NASA has revisited a comet.

Missions Completed



Genesis – Launched August 2001



Collected particles of solar wind and returned them to Earth to learn the chemical composition of the Sun and better understand the evolution of our Solar System

Deep Impact – Launched January 2005

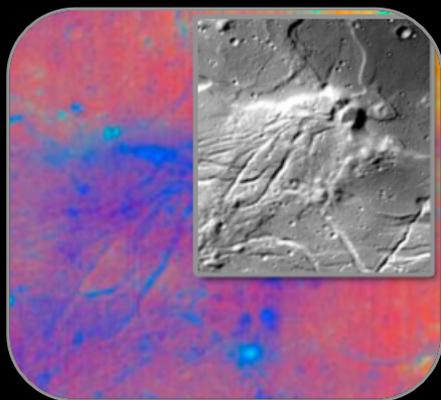


First experiment to send a large projectile into the path of a comet, revealing the never-before-seen interior for extensive study

Mission of Opportunity Completed

Moon Mineralogy Mapper (Mission of Opportunity)

– Launched Oct 2008



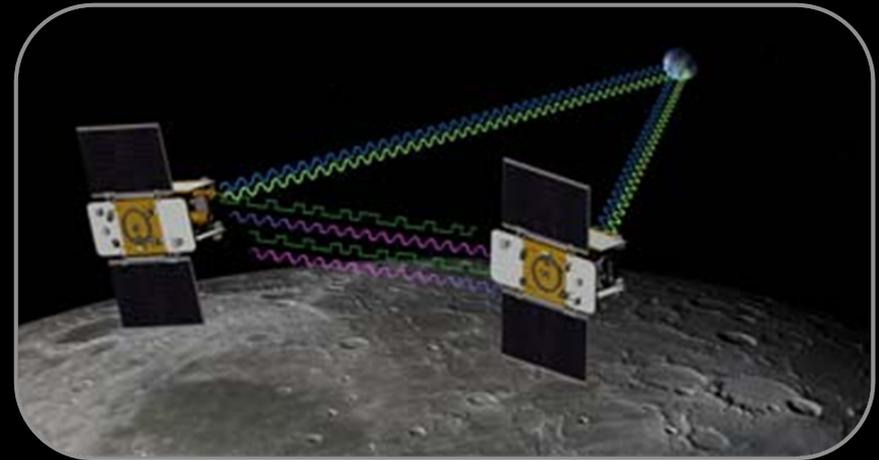
The Moon Mineralogy Mapper (M3), a state-of-the-art imaging spectrometer, gave scientists their first opportunity to examine lunar mineralogy at high spatial and spectral resolution. NASA collaborated with the Indian Space Agency

Flight Portion Completed; Science Analysis Ongoing



GRAIL – *Launched September 2011*

The Gravity Recovery and Interior Laboratory, or GRAIL, flew twin spacecraft, Ebb and Flow, in tandem orbits around the moon for several months to measure its gravity field in unprecedented detail. The mission will also answer longstanding questions about Earth's moon and provide scientists a better understanding of how Earth and other rocky planets in the solar system formed

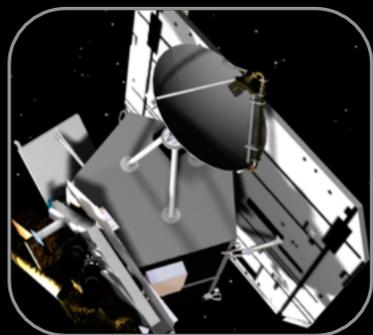


Discovery Missions of Opportunity

EPOXI

– Launched 2005 (Deep Impact)

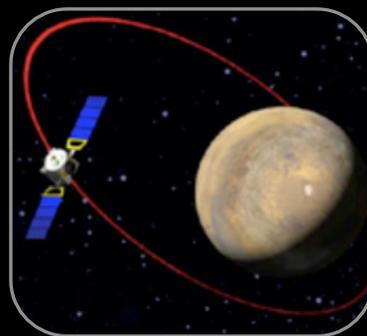
Lost in 2013



After successfully completing its mission to comet Tempel 1 in 2005, NASA gave the Deep Impact flyby spacecraft a new assignment called EPOXI: to search for planets around other stars and to observe another comet

ASPERA-3 - transferred to Mars program

– Launched June 2003

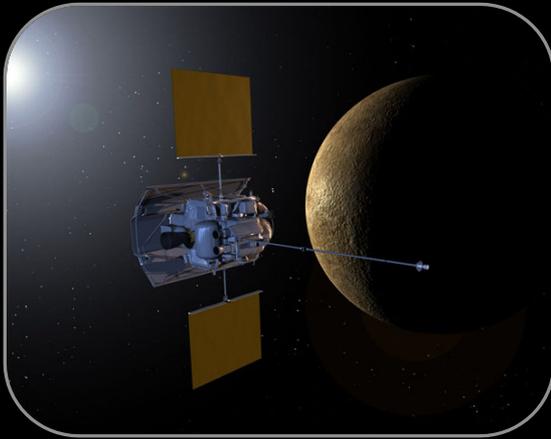


One of seven scientific instruments aboard the Mars Express spacecraft. Mars Express is a European Space Agency mission that launched from Russia and entered into orbit around Mars on December 25, 2003. ASPERA-3 will study the interaction between the solar wind and the atmosphere of Mars and characterize the plasma and neutral gas environment in the near-Mars space

Missions Currently in Flight

MESSENGER

– Launched August 2004



Arrived at Mercury in 2011, with 2 flybys of Venus and 3 of Mercury along the way. Will complete extended mission and end operations in March, 2015.

Dawn

– Launched in September 2007



Completed its mission at Vesta and now cruising onward to Ceres, the oldest and most massive asteroids to remain intact since their formation 4.5 billion years ago, providing a better understanding of the conditions and processes at the beginning of the solar system

Kepler - transferred to Exoplanet Exploration Program

– Launched in March 2009



Searches for Earth-sized habitable planets in other solar systems using new technology to detect transits from space

Missions Currently in Flight

Lunar Reconnaissance Orbiter (LRO) - transferred in to Discovery FY 14 – launched 2009

Exploration Mission, 2009 (launch) to 2010 (transition to SMD)

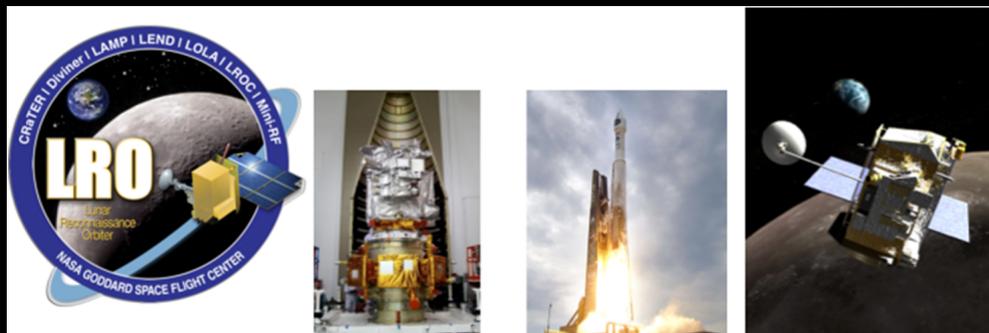
Exploration Goals: locate resources, identify safe landing sites, measure the space environment, and demonstrate new technology

Prime Science Mission, 2010 to 2012

Objectives: Bombardment history of the Moon; lunar geologic processes; processes that have shaped the global lunar regolith; types, sources, sinks, and transfer mechanisms associated with volatiles; how the space environment interacts with the lunar surface

Extended Science Mission, 2012 to 2016

Objectives: The nature of volatiles deposited in the Moon's polar regions; differentiation of the Moon and early planetary processes; the impact history and process as recorded on the Moon's surface; the Moon's interactions with its external environment



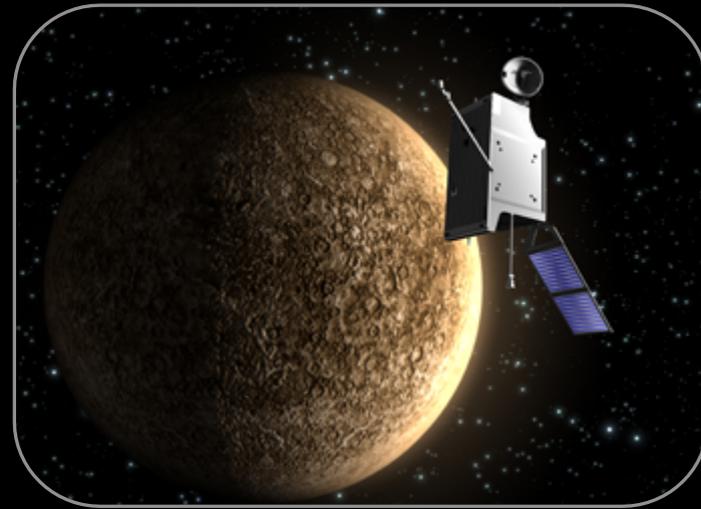
Discovery Missions – Currently In Development

InSight to Launch in 2016



The InSight (Interior exploration using Seismic Investigations, Geodesy and Heat Transport) mission is a terrestrial planet explorer that will place a geophysical lander on Mars to study its deep interior, to give us a glimpse into the processes that shaped the formation of the rocky planets of the inner solar system, including Earth, more than four billion years ago

Strofió to Launch in 2016



Strofió is a unique mass spectrometer that is part of the SERENA instrument package that will fly on board the European Space Agency's BepiColombo/Mercury Planetary Orbiter (MPO) spacecraft

- The instrument will determine the chemical composition of Mercury's surface, providing a powerful tool to study the planet's geological history



One of you is next to write new chapters in science textbooks!

- Long and challenging path ahead
- Can be a top highlight of your career
- Everyone involved has the same goal:
Mission Success.
- Good luck.