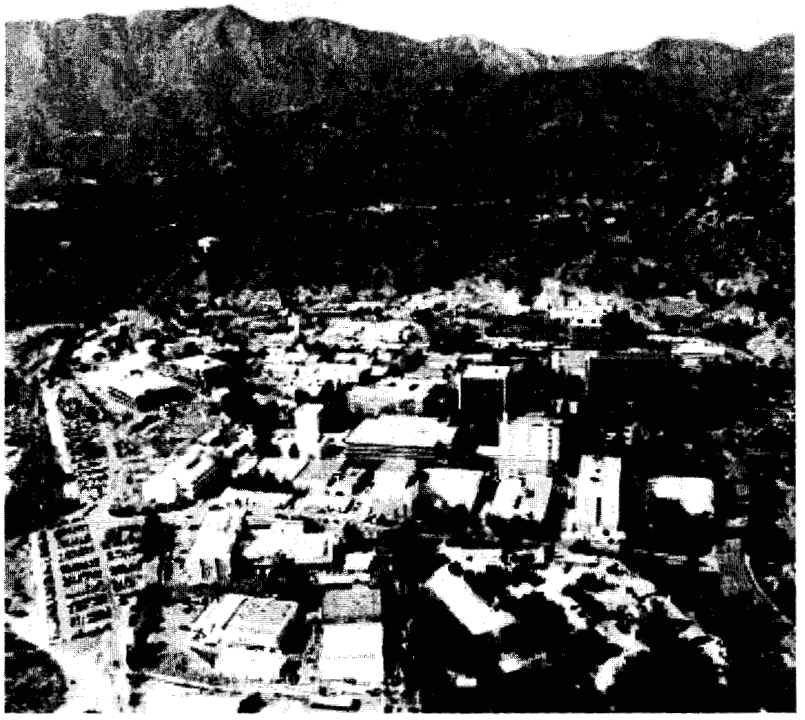
What's New at JPL?
July, 2003

Dan Erickson and Tal Brady

Before We Get Started

- We are not here as representatives of NASA or JPL.
- The opinions expressed are solely our own.
  - (and we reserve the right to change them.)
- We apologize in advance for any errors or omissions.
- Much of the material was copied from publicly available web sites:
  - http://www.jpl.nasa.gov
  - http://www.jpl.nasa.gov/missions
  - http://planetquest.jpl.nasa.gov
  - http://athena.cornell.edu
- Feel free to ask questions.
- We will feel free to say, "I don't know," if we don't.

What Is the Jet Propulsion Laboratory (JPL)?



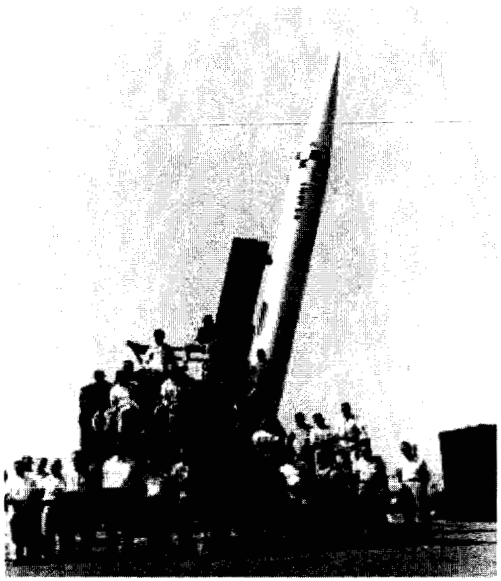
- A division of the California Institute of Technology (Caltech)
- An FFRDC for NASA
- NASA's lead center for robotic solar system exploration and for the Deep Space Network (DSN)
- A collection of buildings, equipment and people in Pasadena and at DSN sites around the world
- Dedicated to humanity's exploration and utilization of space

Images courtesy of JPL/Caltech

How Did JPL Get Started?

1936: first 5 employees

1942: JATO



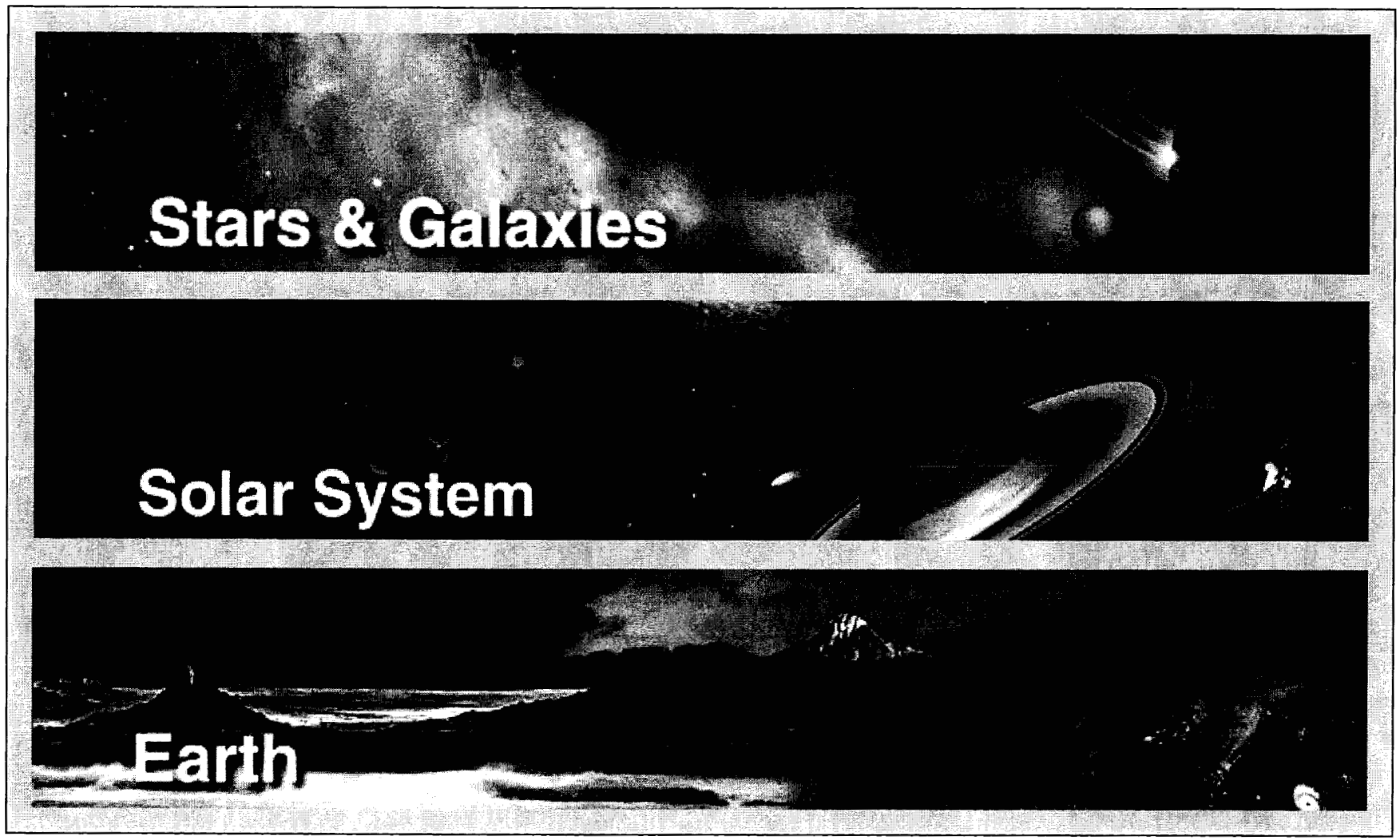
1950's: Army missiles

1958: First US satellite

NASA

Images courtesy of JPL/Caltech

What Do We Explore?



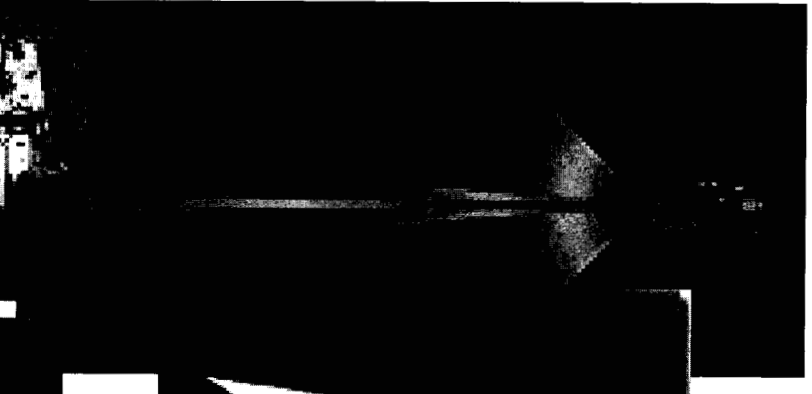
Images courtesy of JPL/Caltech

Telescopes

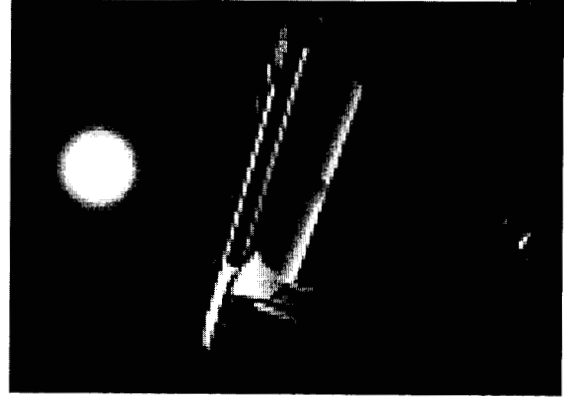
Stars & Galaxies

WFPC1, 1990
WFPC2, 1993:
compensate for
Hubble mirror

Galaxy Evolution Explorer (Galex)
Launched April 24, 2003



SIRTF
Launch
August,
2003



Kepler Launch 2007
Detect planet transits

Images courtesy of JPL/Caltech

Stars & Galaxies

WFPC1, 1990

WFP

comp

Hubb

SI

La

Au

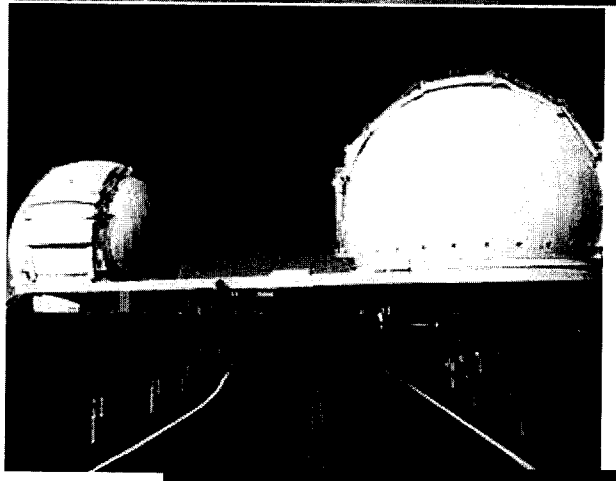
Detect planet transits

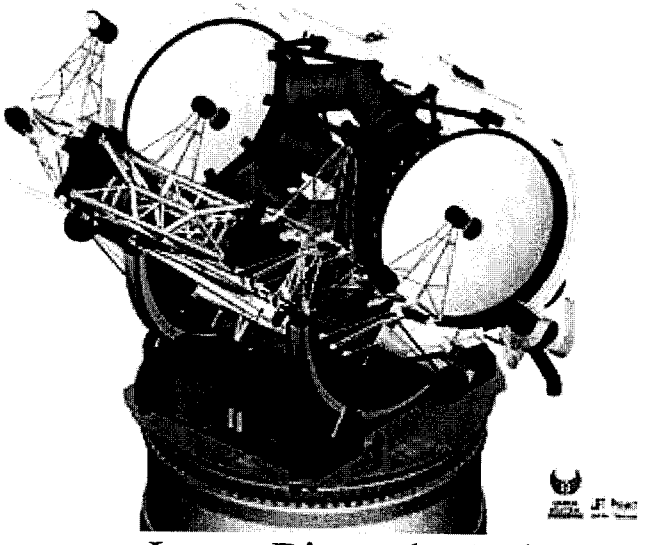
Images courtesy of JPL/Caltech

Interferometers

Stars & Galaxies

Keck Interferometer, 85m baseline, March 2001





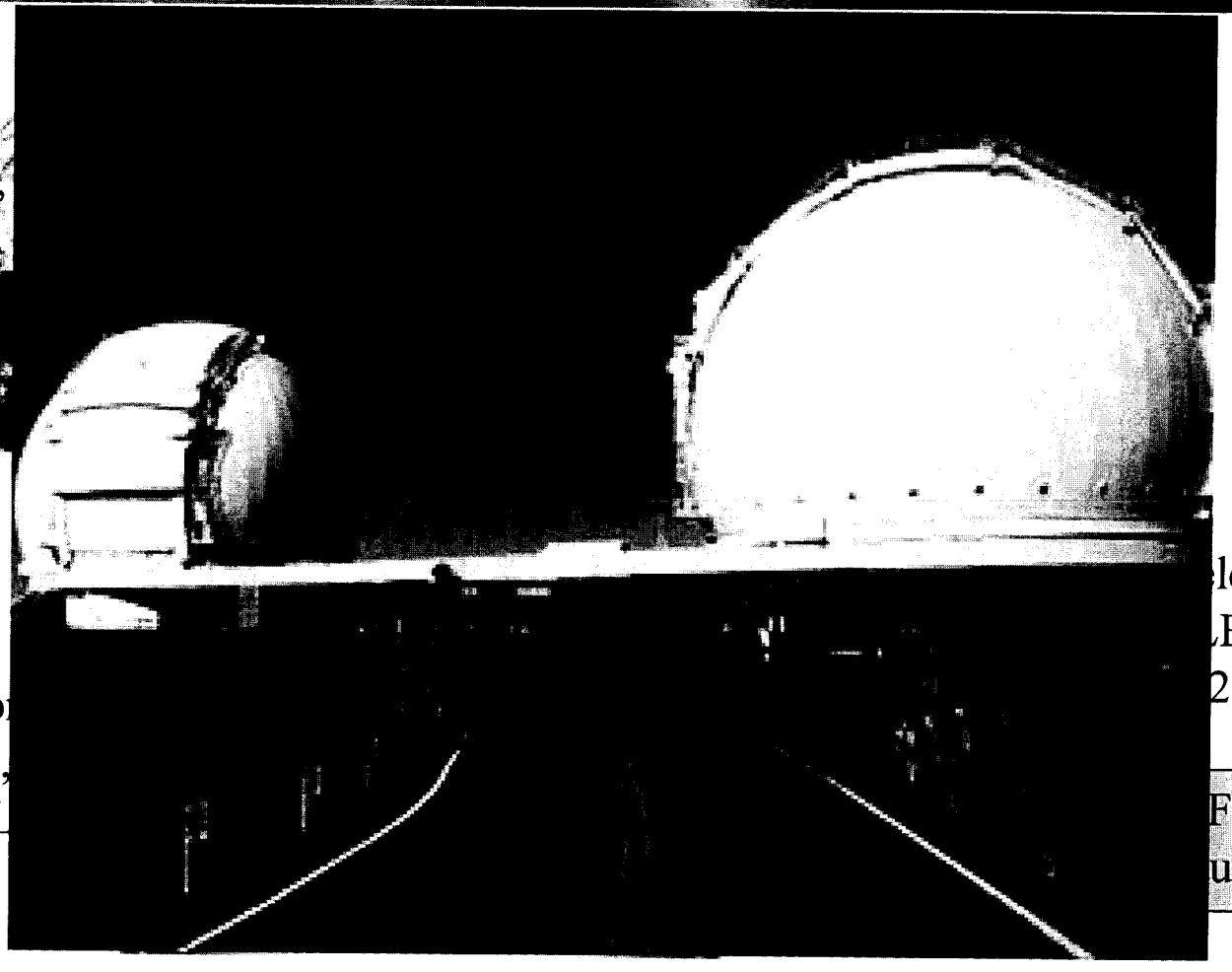
Large Binocular Telescope Interferometer (LBTI) 22.8m baseline, 2004

Space Interferometry Mission (SIM), 10m baseline, 2009 Launch

Terrestrial Planet Finder (TPF), 2014? Launch

Images courtesy of JPL/Caltech

Keck Interferometer, 85m baseline, March 2001



Space Interferometer Mission (SIM), baseline, 2009 Launch

Telescope (LBTI) 2004

Finder

Images courtesy of JPL/Caltech

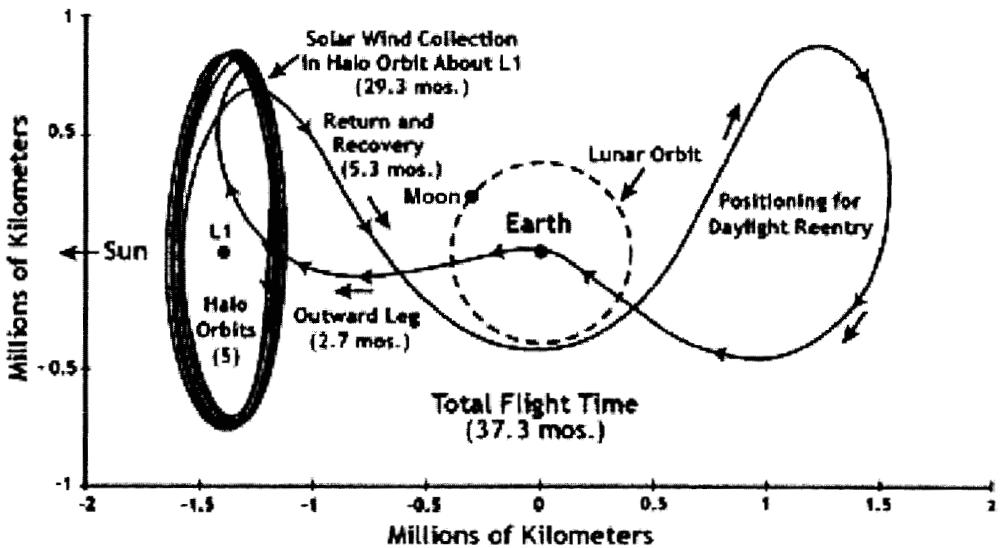
The Sun

Solar System

Ulysses: Launched 1990,
Viewing the sun's poles.

AcrimSat: Launched 1999,
Precision measurement of
sun's radiance.

Genesis: Launched 1999,
Collect solar wind particles
and return in Sept. 2004.



Images courtesy of JPL/Caltech

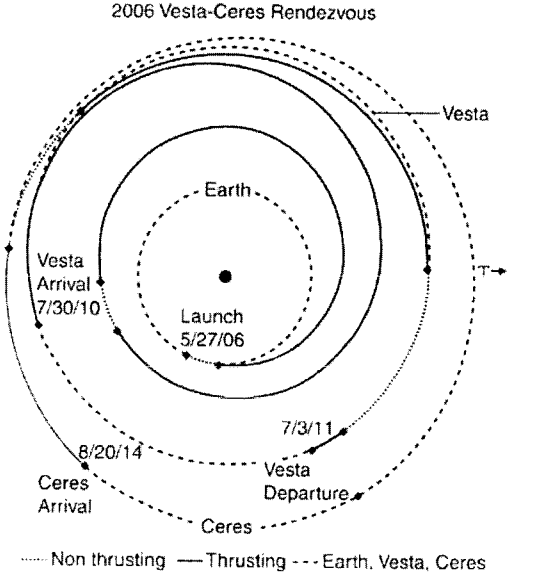
Small Bodies

Solar System

Stardust: Launched 1999,
Fly through Wild 2 Jan. 2, 2004,
Return dust samples Jan. 2006

Deep Impact:
Launch 2004.
Crash into Temple 1.

QuickTime™ and a YUV420 codec decompressor are needed to see this picture.



Dawn: Launch 2006.
Orbit Vesta and Ceres

Images courtesy of JPL/Caltech

Deep Impact:
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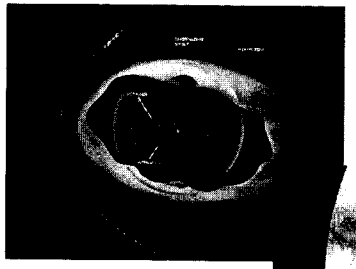
Outer Planets

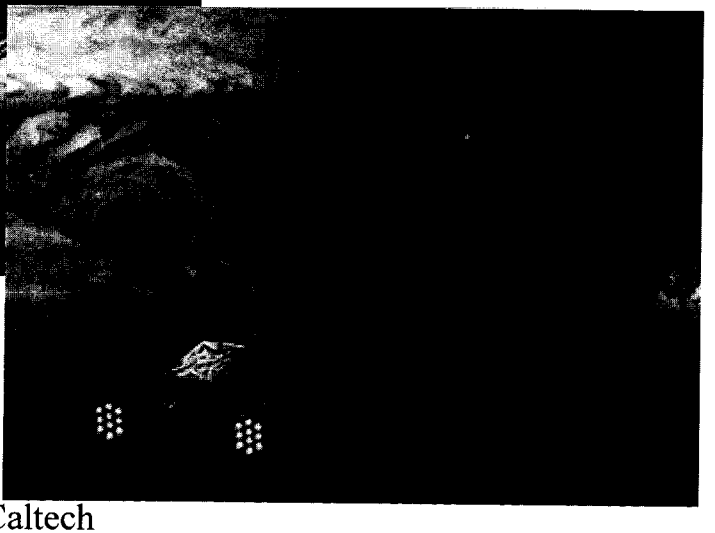
Solar System



Voyager 1 and 2: Launched in 1977.
Heading toward the heliopause and interstellar space.

Galileo: Launched in 1989.
The "little spacecraft that could" will meet its fiery end Sept. 21, 2003

Cassini spacecraft and Huygens Probe:
Launched 1997. Orbits Saturn July 1, 2004 and Probes Titan.



Jupiter Icy Moons Orbiter (JIMO):
Proposed for 2011 launch.
Nuclear powered ion drives orbit 3 Jovian moons.

Images courtesy of JPL/Caltech

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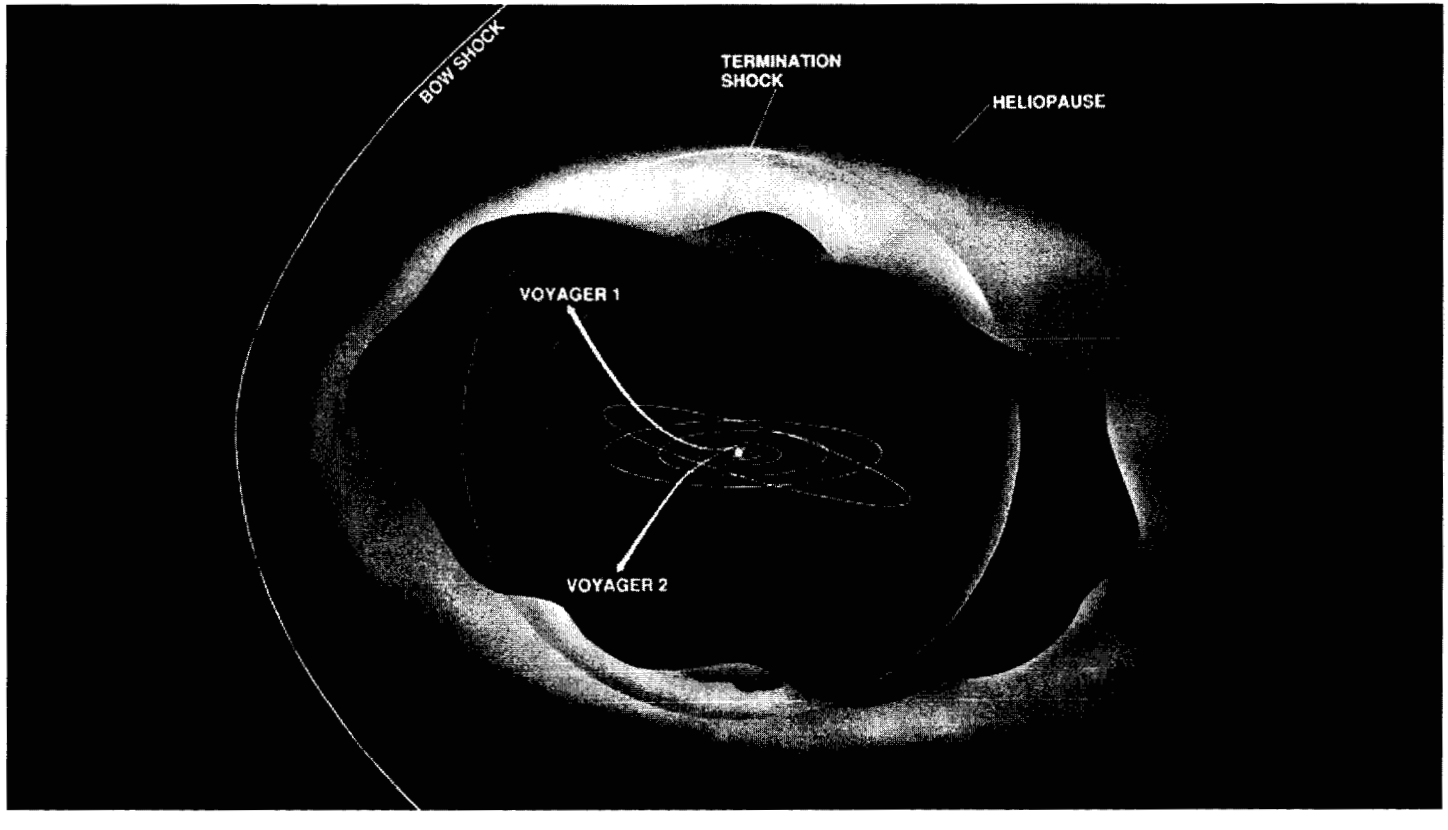


Images courtesy of JPL/Caltech

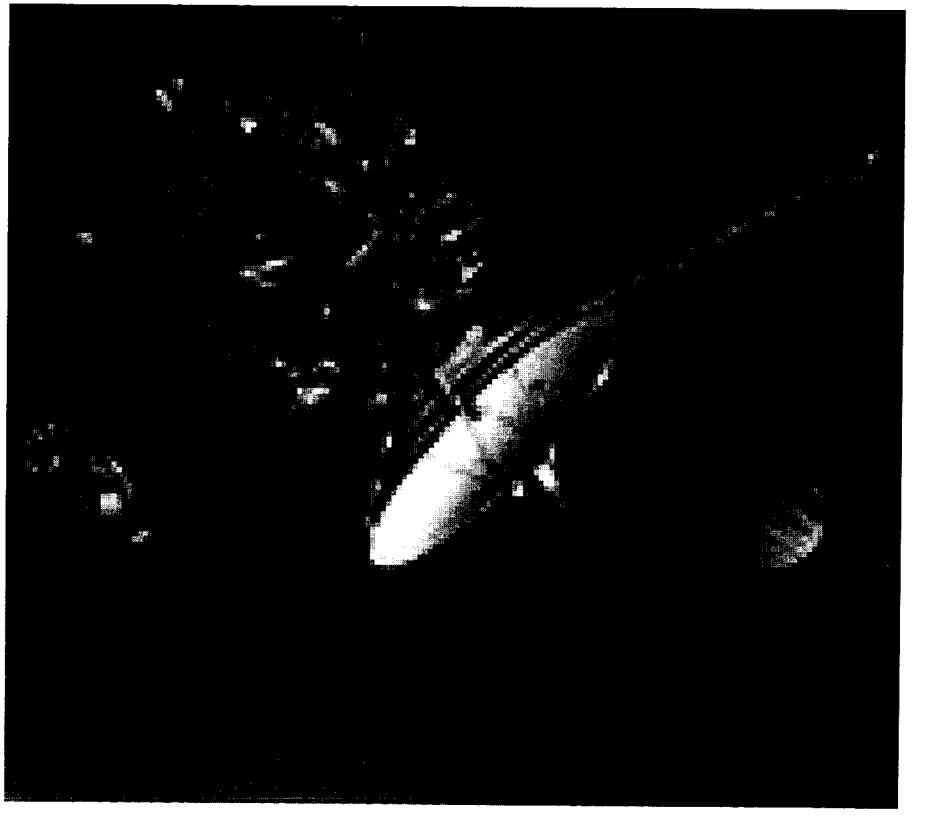
Galileo

Solar System

Images courtesy of JPL/Caltech

Cassini/Huygens

Solar System



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Solar System

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Mars

Solar System

1995: Mars Global Surveyor (MGS)

1998: Mars Polar Lander & Mars Climate Orbiter
(both failed)

2001: Mars Odyssey

2003: Mars Express (ESA)
Orbiter & Beagle 2

2003: Mars Exploration Rovers
Spirit & Opportunity

2005: Mars Reconnaissance Orbiter (MRO)
20-30 cm resolution.

2007: Mars Scout missions. TBD.
Airplane? Ballon?,

2009: Mars Science Laboratory
Big rover, smart landing, long mission

Images courtesy of JPL/Caltech

Mars Global Surveyor

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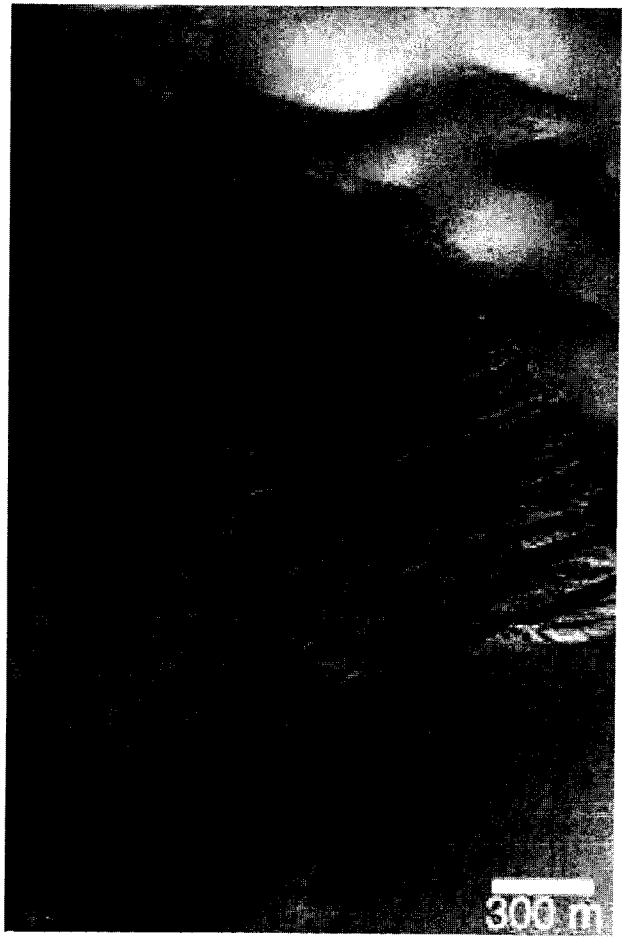

Images courtesy of JPL/Caltech

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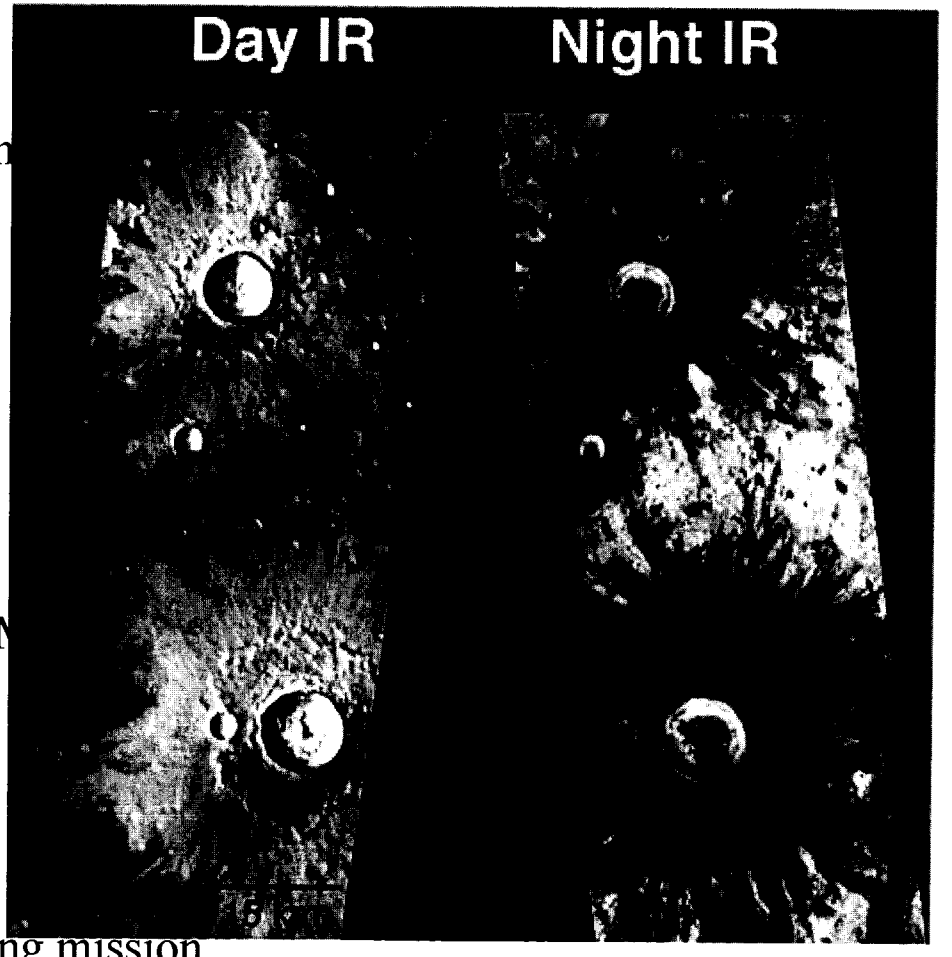

Images courtesy of JPL/Caltech

Mars Express

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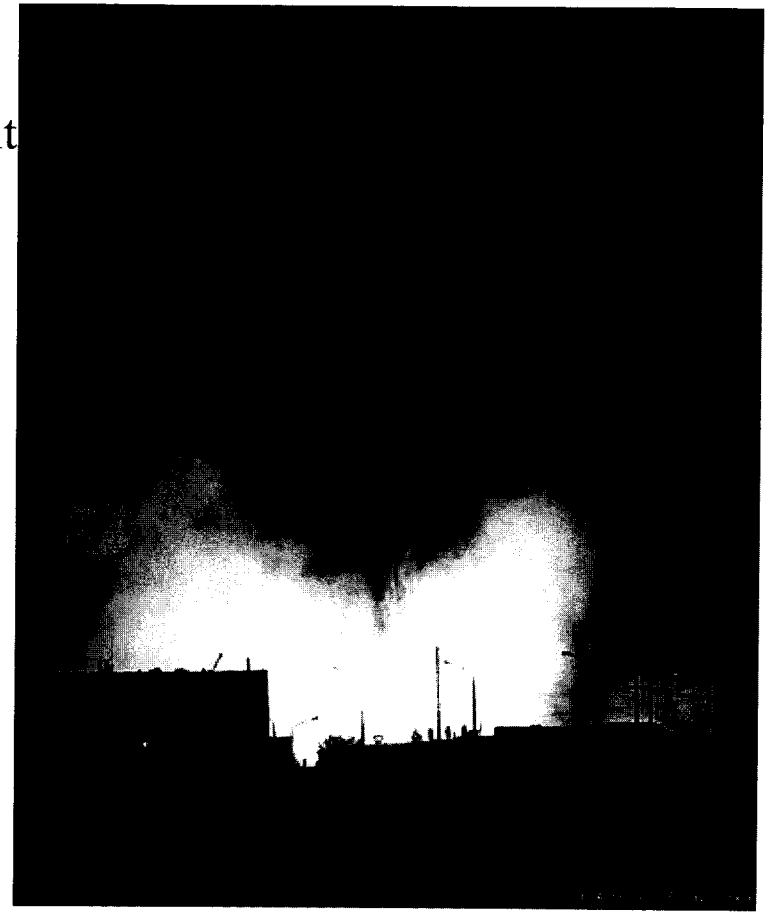
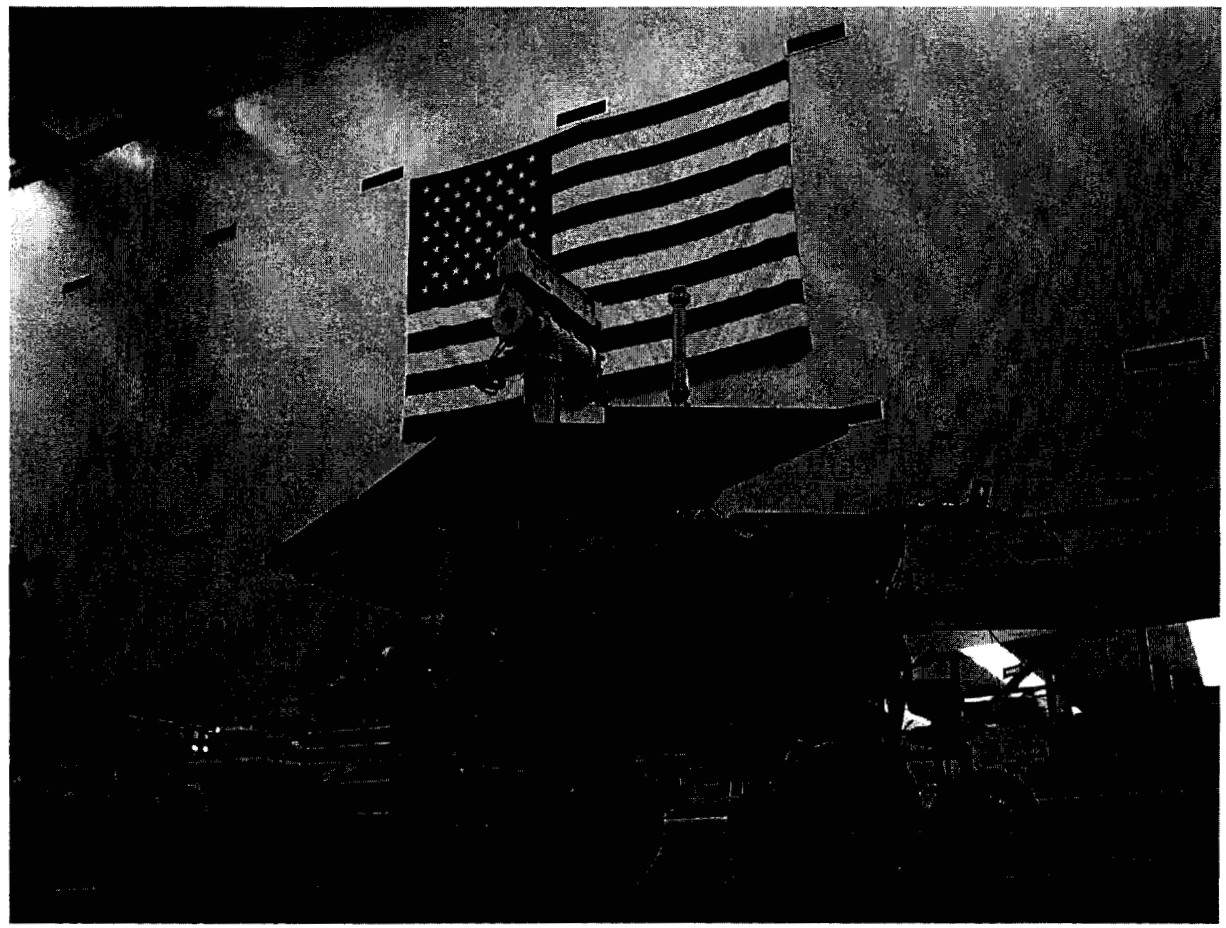


Images courtesy of JPL/Caltech



Images courtesy of JPL/Caltech

Mars Reconnaissance Orbiter

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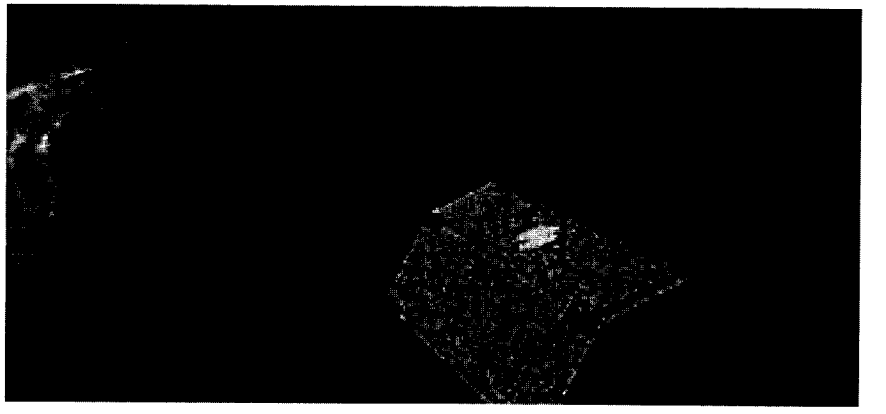
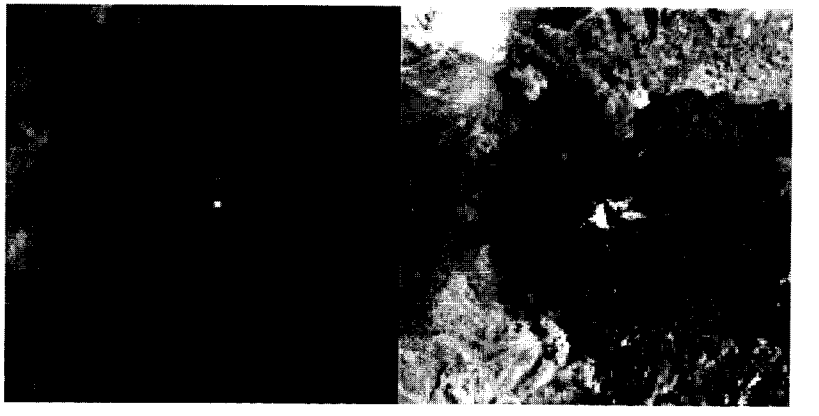
GRACE: twin satellites
Launched March, 2002
Precision mapping of Earth's gravity



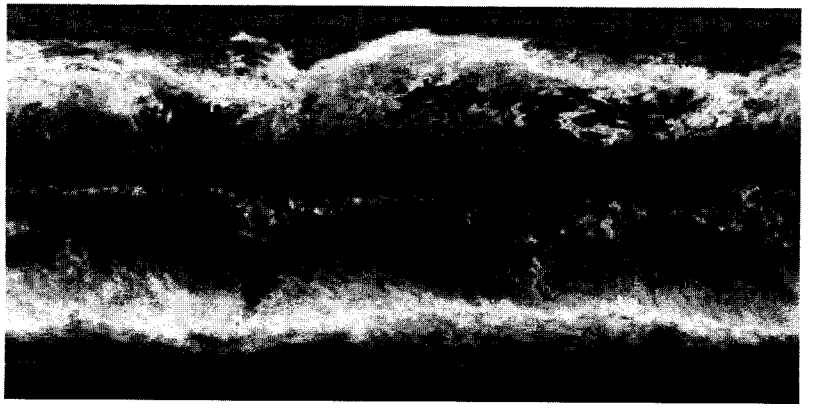
Instruments on NASA's Terra Satellite
Launched December, 1999

- Multi-angle Imaging SpectroRadiometer (MISR)
- Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER)



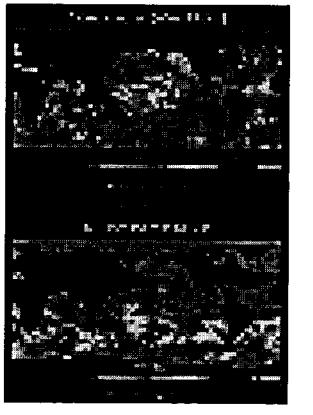
Images courtesy of JPL/Caltech

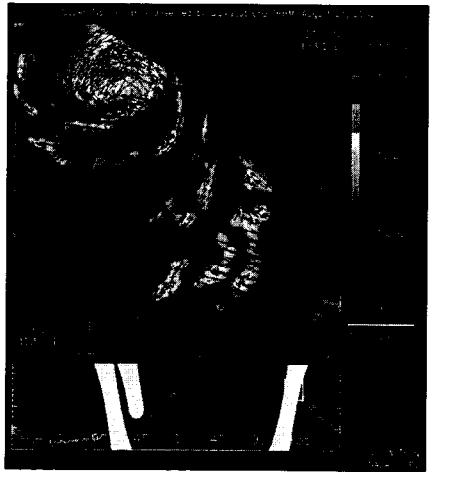
The Atmospheric Infrared Sounder(AIRS) instr. on Aqua launched May 4, 2002. Takes temperature of surface or intervening clouds.



Topex/Poseidon launched 1992 and Jason 1, launched Dec. 7, 2001. Measuring ocean topography.

The Seawinds instrument on Quickscat, launched 1999, and Adeos2, launched Dec. 13, 2002. Measure winds at ocean surface.





Images courtesy of JPL/Caltech

El Niño and La Niña

The top frame shows sea height relative to normal:

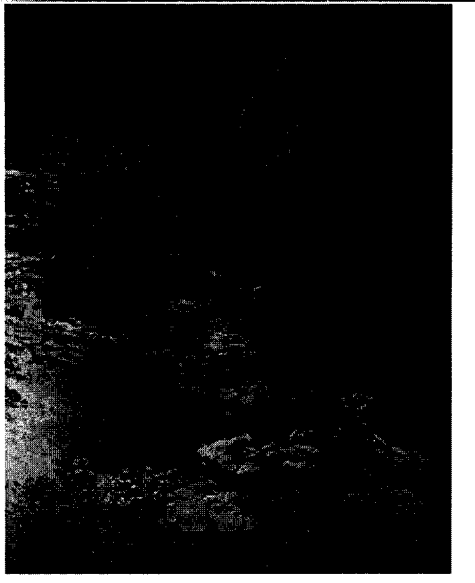
red is high, purple is low.

QuickTime™ and a Sorenson Video decompressor are needed to see this picture.

The lower frame shows sea temperature relative to normal:

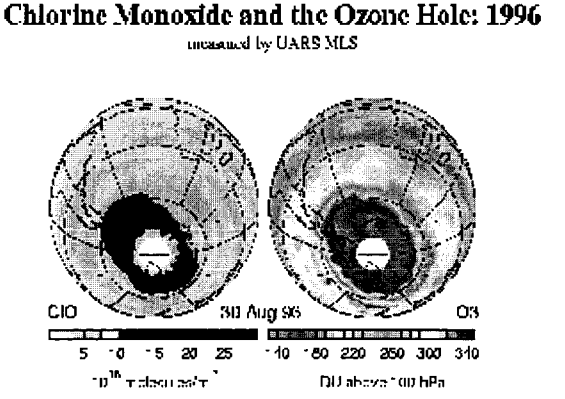
red is warmer, purple is cooler.

Images courtesy of JPL/Caltech



CloudSat, launch November, 2004.
Measure the vertical structure of clouds using radar.

Tropospheric Emission Spectrometer (TES) and Microwave Limb Sounder(MLS) instruments on Aura satellite, launch 2004.
Measure chemicals in the atmosphere.



Images courtesy of JPL/Caltech

Conclusions

- Some exciting missions
  - space exploration
  - Earth monitoring
- This is an international effort involving government agencies, universities, and private industry.
- You can find out more on the web:
  - http://www.jpl.nasa.gov
  - http://www.jpl.nasa.gov/missions
  - http://planetquest.jpl.nasa.gov
  - http://athena.cornell.edu
- You can get on mailing lists for news
- Where robots go, people may follow.