

Juno and Curiosity

Exploring in Extreme Environments

Mars and Jupiter: Expeditions

MARS

- Flybys

Mariner 3,4,6,7

- Orbiters

Mariner 8,9, **Viking 1, 2**, Mars Observer, Mars Global Surveyor, Mars 2001 Climate Orbiter, Mars Express, Mars Reconnaissance Orbiter, Mars Atmosphere and Volatile Evolution

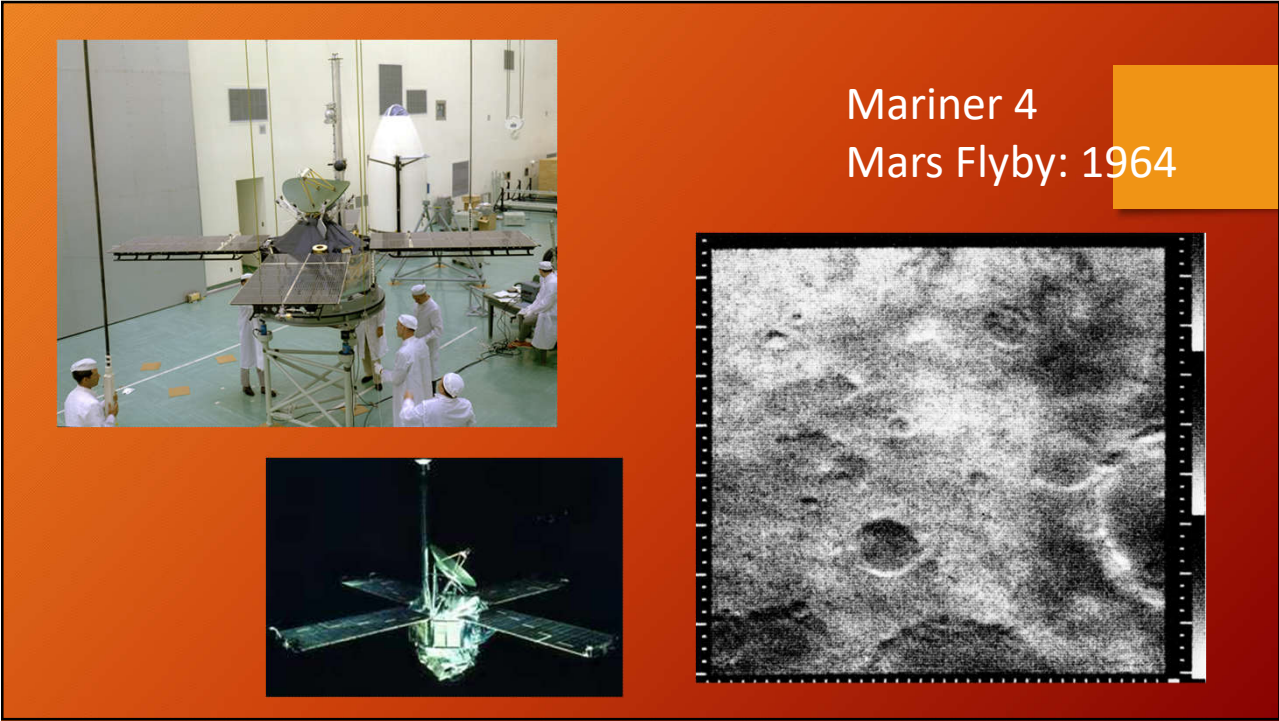
JUPITER

- Flybys

Pioneer 10, 11, Voyager 1, 2

- Orbiters

• Galileo, Gravity Assist Missions, Juno



Mariner 4
Mars Flyby: 1964

This slide features a dark red background with an orange header area. On the left, there are two images: the top one shows the Mariner 4 spacecraft in a cleanroom with technicians, and the bottom one is a photograph of the spacecraft in space. On the right, there is a large black and white photograph of a Martian crater, presented as a film strip. The text 'Mariner 4 Mars Flyby: 1964' is displayed in white on the orange header.



Galileo
Jupiter Orbiter: 1989-Launched
1995-Arrived

This slide features a dark red background with an orange header area. On the left, there is a photograph of the Galileo spacecraft orbiting Jupiter. On the right, there is a photograph of the spacecraft's descent sequence, showing parachutes and the probe entering the atmosphere. The text 'Galileo Jupiter Orbiter: 1989-Launched 1995-Arrived' is displayed in white on the orange header.

Mars and Jupiter Expeditions (Continued)

MARS

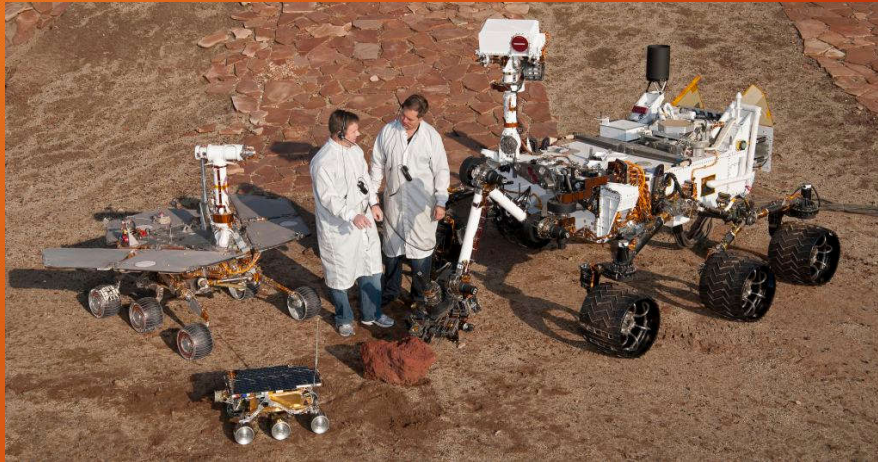
- Landers and Rovers
- Viking 1,2, Pathfinder,
Polar Lander/Deepspace 2,
Phoenix, Spirit, Opportunity,
Curiosity



Viking 1
Lander: 1974



Sojourner Rover: 1964
Spirit and Opportunity Rovers: 2004
Phoenix Lander: 2008
Curiosity Mars Science Laboratory: 2012



Curiosity
Mars Rover: Nov 2011 Launched
Aug 2012 Landed
1538 days



Juno

Jupiter Orbiter: August 5, 2011 Launched
July, 2016 Arrived
109 days



Why Mars? Looking for Signs of Life

IS IT ALIVE?

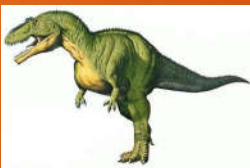
Alive or Never Alive?

How do we know if something is alive?

- Shout out some characteristics of living things:
 - Uses energy
 - Needs an energy source
 - Needs and uses water
 - Responds to environment through growth and change

Looking for Life on Mars

- Life in Extreme Environments.
What might the life look like?

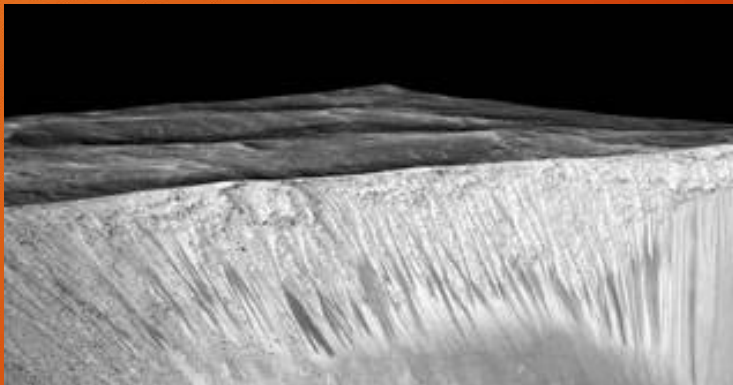


Water: What's the Big Deal?



Examples and Demonstrations

These dark, narrow, 100 meter-long streaks called recurring slope lineae flowing downhill on Mars are inferred to have been formed by contemporary flowing water. Recently, planetary scientists detected hydrated salts on these slopes at Hale crater, corroborating their original hypothesis that the streaks are indeed formed by liquid water.



Why Jupiter? Into the Unknown

Juno will improve our understanding of the solar system's beginnings by revealing the origin and evolution of Jupiter

<https://www.youtube.com/watch?v=SgEsf4QcR0Q>

Mars and Jupiter Basic Facts

Smartboard Game

Mars

- 1/2 the diameter of Earth
- 1/3 of Earth's gravity
- Red color due to iron
- Core is iron, nickel and sulfur
- Crust is silicon, oxygen, iron, magnesium, aluminum, calcium, potassium
- Cold
- No ozone layer. Radiation is intense
- Little to no atmosphere
- 4 months to travel there

Jupiter

- Oldest planet in our solar system
- One of the four giant planets
- Primarily made of gas and liquid with a possible rocky core
- Atmosphere is 75% hydrogen, 24% helium and 1% other elements
- Interior of the planet is 71% hydrogen, 24% helium, and 5% other elements such as methane, water vapor, ammonia, and trace amounts of others
- Mass is 2.5 times the mass of all the other planets
- Volume is equal to 1,321 Earths (but only 318 times as massive)
- Radius is 1/10 of the sun's
- Dense core surrounded by a layer of liquid metallic hydrogen and some helium (78% of planet)
- Next layer is transparent interior atmosphere of hydrogen that is neither gas or liquid. This layer becomes hotter and denser as one descends
- Outer layer of molecular hydrogen
- Surface temp is 67 C or 152 F; and transition area is 9700 C or 17,500 F
- Magnetosphere
- Radiation very high

Designing a Space Probe or Rover

- Get into Teams
- Will it be a manned mission?