

## Peeking at the planets

Go outside some evening after sunset this month and you will see that four of our nine planets will be visible with the unaided eye. As you look at these points of light, representing planets ranging in size from the largest to the second smallest, consider that we have already sent robotic emissaries from our world to these far away places. Not only that, but we still maintain an active presence on Mars and Jupiter, and visits are also scheduled for Mercury and Saturn in the near future.

### Mercury

Low over the western horizon, during the first two weeks of the month, the elusive planet Mercury is visible. Being the second smallest, the closest planet to the Sun, and having the shortest orbital time around the Sun limits this planet's visibility from Earth to brief periods on either the morning or evening sides of the Sun. Despite Mercury's elusiveness, the *Mariner 10* spacecraft visited it in a series of three flybys between March 29, 1974 and March 16, 1975.

### Mars

At sunset throughout the month, the red planet Mars is positioned over the southwestern horizon within the somewhat dim stars of the constellation Pisces, The Fishes. It appears as almost the brightest star in the area. Since 1960, the exploration of Mars has included 37 missions from three countries. The *Nozomi* (Japanese, meaning "Hope") spacecraft was launched in 1998 by the Japanese Institute of Space and Astronautical Science and is currently enroute for a January 2004 arrival to Mars. This orbiter is designed to study the outer atmosphere of the planet and its interaction with the solar wind. Between the United States and Russia there have been three-dozen attempts at reaching either an orbit around Mars, or a landing on its surface. Of these 36 missions, only eight of them, all from the United States, were successful. In November of 1964, *Mariner 4* flew past Mars and

returned some vague images that gave us our first indication of what Mars was not. Until that mission, no one really knew exactly how the Martian surface appeared. It wasn't until subsequent missions, including *Mariner 6*, *Mariner 7*, and in 1971 the first successful orbiter, *Mariner 9*, that we were able to get a good look at the planet. What we found is that Mars is a lot like our Moon, but more extreme. In the middle of the seventies, the twin missions, *Viking 1* and *Viking 2*, successfully placed a pair of "orbiters" and "landers" at Mars. Twenty years later, on July 4, 1996, the *Pathfinder Lander* touched down at what is now known as the Sagen Memorial Station. From a platform on its back, the *Sojourner Rover* was released to explore the surrounding area. Currently, the *Mars Global Surveyor* is still successfully imaging and mapping the surface of Mars after nearly six years in orbit. This past October it was joined by the *Mars Odyssey 2001*—an orbiter with a mission to continue scouting out new terrain for us to explore.

### Jupiter

Present over the eastern horizon at sunset is the large, soupy planet Jupiter. During this month Jupiter is at opposition (Jupiter, Earth, and the Sun are lined up with Earth in the middle) and will rise at sunset and be visible all night. Even with small telescopes or steadily held binoculars, the four Galilean satellites can also be seen. These are the largest moons orbiting Jupiter, which make up four of the seven largest moons in the solar system.

These fascinating moons, including Io, the most volcanically active object in the solar system, have been the focus of study via the *Galileo* spacecraft since its arrival during December of 1995. During January, the *Galileo* will perform a flyby over the equatorial regions of the volcanic moon, Io, on its 33rd orbit within the Jovian system.

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## Saturn

Well above the southeastern horizon at sunset, and rising about two hours earlier than Jupiter, is one of the four ringed-planets, Saturn. Unlike Jupiter, Saturn has not been studied by orbiting spacecraft, but instead has only been viewed by the missions of the *Pioneer* and *Voyager* spacecrafts. However, in July of 2004 the *Cassini/Huygens* spacecraft will embark on a multi-year mission to study Saturn, its system of rings, its moons, and to launch a probe into the atmosphere of the moon Titan. Launched from Earth orbit in 1997, the *Cassini/Huygens* is one of the largest and heaviest spacecraft, measuring 6.8 m in length, 4 m in width, and weighing 2,150 kg. Keep in mind that this does not include the 350 kg *Huygens* probe and the over 3,100 kg of propellant! Interestingly, the greater majority of the propellant will not be used until its arrival in the Saturn system.

There are a lot of exciting things happening in our solar system these days. If you are interested in learning more about the exploration of the solar system, including educator workshops and classroom visits, contact the Solar System Education Program (see Internet resources). This is a collaborative effort between NASA/Jet Propulsion Laboratory (JPL), Space Explorers Inc., the Virginia Space Grant, and the Challenger Center for Space Science Education for the purpose of creating educators to represent the JPL's mission to explore the solar system.

## Celestial events

- 1/03 Earth reaches perihelion—minimum distance from the Sun
- 1/04 Quadrantids Meteor Shower
- 1/17 Launch of Space Shuttle *Columbia* (STS-109) for HST Service Mission

## Visible planets

- Mercury is visible over the western horizon at sunset for about the first two weeks of the month.
- Mars is high over the southwestern horizon at sunset and sets at about midnight.



IMAGE COURTESY OF NASA/JPL

An artist's conception shows the *Huygens* probe separating to enter the atmosphere of Saturn's moon, Titan.

- Jupiter rises at sunset and is visible all night.
- Saturn is over the southeastern horizon at sunset and is visible the rest of the night.

## Moon phases

	January
Last quarter	1/05
New Moon	1/13
First quarter	1/21
Full Moon	1/28

## Internet resources

- Solar System Education Program: [www.ssep.org](http://www.ssep.org)
- *Mariner 10*: [www.jpl.nasa.gov/missions/past/mariner10.html](http://www.jpl.nasa.gov/missions/past/mariner10.html)
- Space Explorers, Inc—[www.space-explorers.com](http://www.space-explorers.com)
- Challenger Center for Space Science Education: [www.challenger.org](http://www.challenger.org)
- Missions to Mars: [sse.jpl.nasa.gov](http://sse.jpl.nasa.gov)
- *Galileo* mission to Jupiter: [galileo.jpl.nasa.gov](http://galileo.jpl.nasa.gov)
- *Cassini/Huygens* mission to Saturn: [www.jpl.nasa.gov/cassini](http://www.jpl.nasa.gov/cassini)
- Quadrantids Meteor Shower: [www.comets.amsmeteors.org/meteors/showers/quadrantids.html](http://www.comets.amsmeteors.org/meteors/showers/quadrantids.html)
- STS-109 Launch, *Columbia*: [www.ksc.nasa.gov/shuttle/missions/sts-109/mission-sts-109.html](http://www.ksc.nasa.gov/shuttle/missions/sts-109/mission-sts-109.html)