

**Planetary Wonderings**  
**October Focus: Mars Overview**  
**By Mary-Frances Bartels, NASA Solar System Ambassador**

Mars has long been a special curiosity of man. Named for the Roman god of war, it is the second closest planet to the earth. A little more than half the size of Earth, it is almost twice as far from the sun. The Martian day is a little longer than that of Earth, and year is almost twice as long. Johannes Kepler \* discovered that planetary orbits are ellipses (Kepler's First Law) instead of circles while studying Mars's orbit, which happens to have one of the most eccentric orbits of all the planets. (Had Mars's orbit been more circular it is doubtful that Kepler would have made his discoveries.) Mars has played an important role in many science fiction stories. *War of the Worlds* made headlines this month in 1938 when Orson Welles's broadcast caused widespread panic over an imaginary invasion by creatures from this planet.

The study of Mars using unmanned spacecraft has proved most challenging, leading to more failures than successes. Out of 38 total missions only 16 have been successful with 23 resulting in failure (two missions were counted as half-successes and half-failures because they were two-part missions). The first unmanned spacecraft, Korabl 4, was launched by the USSR in 1960. It failed to reach Earth orbit. Twenty more flyby or flyby/lander missions followed, including the well-known Mariners 3, 4, 6, 7, and 8 (3 and 8 failed). Vikings 1 and 2 became the first successful lander missions. †

Today we have five missions studying the red planet. Mars Global Surveyor was the first successful Mars mission in two decades. It arrived at Mars in 1997 and is still studying the Martian surface, atmosphere, and interior. Weather observations made by the Mars Orbital Camera on MGS are helping our newest spacecraft, Mars Reconnaissance Orbiter, attain proper orbit.

Still in orbit around Mars, NASA's 2001 Mars Odyssey has collected more than 130,000 images and continues to send information to Earth about Martian geology, climate, and mineralogy. Odyssey is currently supporting landing site selection for the Phoenix Scout Mission, to be launched in 2007.

Probably the most well known modern Mars mission is that of the Spirit and Opportunity Mars Exploration Rovers. In January 2004, they landed on opposite sides of the red planet. With far greater mobility than the 1997 Mars Pathfinder rover, these robotic explorers have trekked for miles across the Martian surface, conducting field geology and making atmospheric observations.

NASA is participating in a mission of the European Space Agency and the Italian Space Agency called Mars Express, which has been exploring the atmosphere and surface of Mars from polar orbit since arriving at the red planet in 2003. Initially, Mars Express also carried a small lander called Beagle 2, named for Charles Darwin's ship. The lander was lost on arrival in December, 2003. One of NASA's most fascinating contribution to Mars Express includes coordination of radio relay systems to make sure that different spacecraft operate together.

NASA's Mars Reconnaissance Orbiter, launched in August, 2005, carries the most powerful camera ever flown on a planetary exploration mission for homing in on details of Martian terrain with extraordinary clarity. The MRO also carries a sounder to find subsurface water. In addition, it will study surface minerals and how dust and water are

carried in the atmosphere. Lastly, it carries telecommunications technology which will lead to the establishment of an interplanetary Internet hub at Mars in 2009 with the arrival of Mars Telecommunications Orbiter.

Many future Mars missions are in the planning stages. Phoenix and Mars Telecommunications Orbiter have already been mentioned. The Mars Science Laboratory, NASA's next rover mission, is scheduled to launch in fall 2009. After that there are plans to use balloons and airplanes in the Martian atmosphere to study the planet.<sup>‡</sup> Other proposals include a Mars sample return and an astrobiology laboratory.

**Resource of the Month:** Elementary and Junior High students might be interested in the games, activities, and information on Mars at [http://mars.jpl.nasa.gov/funzone\\_flash.html](http://mars.jpl.nasa.gov/funzone_flash.html).

**Activity of the Month:** High School students might want to determine the orbit of Mars themselves. To learn how, check out [http://homepage.mac.com/dtrapp/ePhysics.f/labII\\_7.html](http://homepage.mac.com/dtrapp/ePhysics.f/labII_7.html).

Suggestions, questions, and comments about "Planetary Wonderings" are welcomed and may be directed to stargazer @ keeplookingup.net.

**Remember to *keep looking up!***

**Sources used:**

<http://mars.jpl.nasa.gov/missions/>

<http://www.spacetoday.org/SolSys/Mars/MarsExploration/MTO.html>

\* Known for his discoveries in astrophysics, an often overlooked contribution is Kepler's work *Somnium (The Dream)*, the very first science fiction story, written around 1622.

† The thirtieth anniversary of the landing of Viking 2 was last month.

‡ When I lived near Denver, CO my family personally helped test these technologies.