MAGS EXPLORER

Memphis Archaeological and Geological Society Youth Newsletter

August 8, 2003 • Volume 2, Number 8

Mars

MIKE BALDWIN--It's finally here--the best appearance of the Red Planet any of us will ever see. On August 27, 2003 Mars comes closer to Earth than at any time in the past 50,000 years or more. It will appear as the brightest object in the southern sky [other than the moon]. Clear viewing of Martian planetary features requires stable air. Get away from the built-up daytime heat of houses, paved driveways, and stone patios. We have a perfect surface for setting up a telescope, barely radiates heat at all–grass. Try to get away from the city and enjoy Mars this month.

The Red Planet

Mars is the fourth planet from the Sun and is commonly referred to as the Red Planet. The rocks, soil and sky have a red or pink hue. The distinct red color was observed by stargazers throughout history. It was given its name by the Romans in honor of their god of war. Other civilizations have had similar names. The ancient Egyptians named the planet *Her Descher* meaning *the red one*.

Before space exploration, Mars was considered the best candidate for harboring extraterrestrial life. Astronomers thought they saw straight lines crisscrossing its surface. This led to the popular belief that irrigation canals on the planet had been constructed by intelligent beings. In 1938, when Orson Welles broadcast a radio drama based on the science fiction classic *War of the Worlds* by H.G. Wells, enough people believed in the tale of invading Martians to cause a near panic.

Another reason for scientists to expect life on Mars had to do with the apparent seasonal color changes on the planet's surface. This phenomenon led to speculation that conditions might support a bloom of Martian vegetation during the warmer months and cause plant life to become dormant during colder periods.

In July of 1965, Mariner 4, transmitted 22 close-up pictures of Mars. All that was revealed was a surface containing many craters and naturally occurring channels but no evidence of artificial canals or flowing water. Finally, in July and

continued on page two

MAGS Explorer is published monthly by and for the youth members of the Memphis Archaeological and Geological Society. Please send your comments and articles to Editor Mike Baldwin, 367 N. Main St., Collierville, TN 38017 or rockclub@earthlink.net. Youth can give articles, artwork, poems, puzzles, experiments, or stories to co-editors Jennifer Baldwin, Emily Randolph, Kelly Baldwin, or Abbey Randolph.

Mars... continued from page one

September 1976, Viking Landers 1 and 2 touched down on the surface of Mars. The three biology experiments aboard the landers discovered unexpected and enigmatic chemical activity in the Martian soil, but provided no clear evidence for the presence of living microorganisms in the soil near the landing sites. According to mission biologists, Mars is self-sterilizing. They believe the combination of solar ultraviolet radiation that saturates the surface, the extreme dryness of the soil and the oxidizing nature of the soil chemistry prevent the formation of living organisms in the Martian soil. The question of life on Mars at some time in the distant past remains open.

Other instruments found no sign of organic chemistry at either landing site, but they did provide a precise and definitive analysis of the composition of the Martian atmosphere and found previously undetected trace elements.

The Atmosphere of Mars

The atmosphere of Mars is quite different from that of Earth. It is composed primarily of carbon dioxide with small amounts of other gases. The six most common components of the atmosphere are:

Carbon Dioxide (CO2)	95.32%
Nitrogen (N2)	2.7%
Argon (Ar)	1.6%
Oxygen (O2)	0.13%
Water (H2O)	0.03%
Neon (Ne)	0.00025 %

Martian air contains only about 1/1,000 as much water as our air, but even this small amount can condense out, forming clouds that ride high in the atmosphere or swirl around the slopes of towering volcanoes. Local patches of early morning fog can form in valleys. At the Viking Lander 2 site, a thin layer of water frost covered the ground each winter.

There is evidence that in the past a denser martian atmosphere may have allowed water to flow on the planet. Physical features closely resembling shorelines, gorges, riverbeds and islands suggest that great rivers once marked the planet.

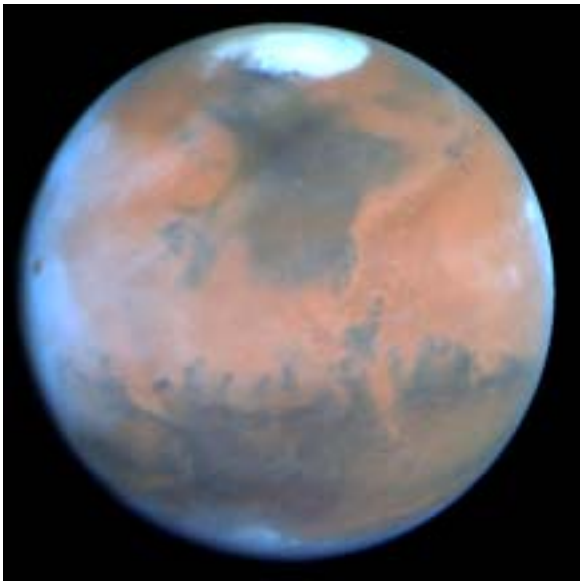
Temperature and Pressure

The average recorded temperature on Mars is -63° C (-81° F) with a maximum temperature of 20° C (68° F) and a minimum of -140° C (-220° F).

Barometric pressure varies at each landing site on a semiannual basis. Carbon dioxide, the major constituent of the atmosphere, freezes out to form an immense polar cap, alternately at each pole. The carbon dioxide forms a great cover of snow and then evaporates again with the coming of spring in each hemisphere. When the southern cap was largest, the mean daily pressure observed by Viking Lander 1 was as low as 6.8 millibars; at other times of the year it was as high as 9.0 millibars. The pressures at the Viking Lander 2 site were 7.3 and 10.8 millibars. In comparison, the average pressure of the Earth is 1000 millibars.

Reference:
Mars; PlanetScapes; Solarviews.com; http://solarviews.com/eng/mars.htm; 08 August 2003.

Hubble View of Mars



Hubble view of Mars
This picture was taken with Hubble's Wide Field Planetary Camera 2 in PC mode. Exposures were taken through three different color filters to create this true color image. The pictures were map-projected onto a sphere for accurate registration and perspective.
Credit: Philip James (University of Toledo), Steven Lee (University of Colorado), NASA. Reprinted for educational purposes under the "fair use" provision of the U.S. Copyright Act.

This NASA Hubble Space Telescope view of the planet Mars is the clearest picture ever taken from Earth, surpassed only by close-up shots sent back by visiting space probes. The picture was taken on February 25, 1995, when Mars was at a distance of approximately 65 million miles (103 million km) from Earth.

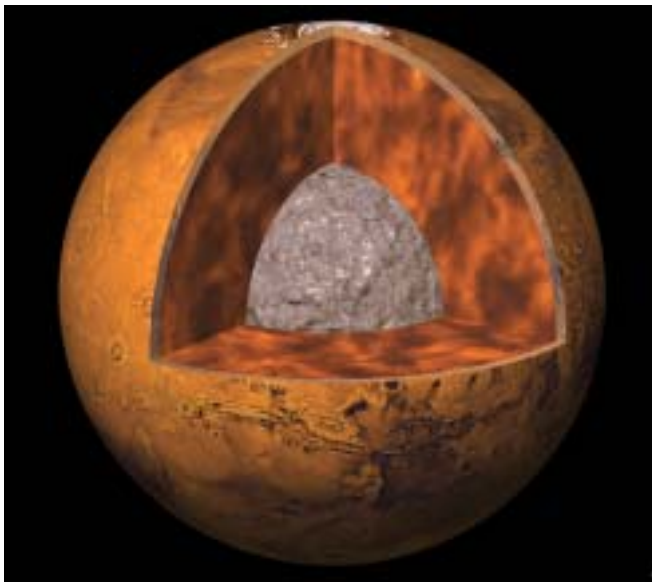
Because it is spring in Mars' northern hemisphere, much of the carbon dioxide frost around the permanent water-ice cap has sublimated, and the cap has receded to its core of solid water-ice several hundred miles across. The abundance of wispy white clouds indicates that the atmosphere is cooler than seen by visiting space probes in the 1970s. Morning clouds appear along the planet's western (left) limb. These form overnight when Martian temperatures plunge and water in the atmosphere freezes out to form ice-crystal clouds.

Towering 16 miles (25 km) above the surrounding plains, volcano Ascraeus Mons pokes above the cloud deck near the western or limb. This extinct volcano, measuring 250 miles (402 km) across, was discovered in the early 1970s by Mariner 9 spacecraft. Other key geologic features include (lower left) the Valles Marineris, an immense rift valley the length of the continental United States. Near the center of the disk lies the Chryse basin made up of cratered and chaotic terrain. The oval-looking Argyre impact basin (bottom), appears white due to clouds or frost.

Seasonal winds carry dust to form striking linear features reminiscent of the legendary martian "canals." Many of these "wind streaks" emanate from the bowl of these craters where dark coarse sand is swept out by winds. Hubble resolves several dozen impact craters down to 30-mile diameter. The dark areas, once misinterpreted as regions of vegetation by several early Mars watchers, are really areas of coarse sand that is less reflective than the finer, orange dust. Seasonal changes in the surface appearance occur as winds move the dust and sand around.

The Interior of Mars

What we currently know about the interior of Mars suggests that it can be modeled with a thin crust, similar to Earth's, a mantle and a core. Using four parameters, the Martian core size and mass can be determined. However, only three out of the four are known and include the total mass, size of Mars, and the moment of inertia. Mass and size was determined accurately from early missions. The moment of inertia was determined from Viking lander and Pathfinder Doppler data, by measuring the precession rate of Mars. The fourth parameter, needed to complete the interior model, will be obtained from future spacecraft missions. With the three known parameters, our model of Mars is limited. If the Martian core is dense (composed of iron) similar to Earth's or meteorites thought to originate from Mars, then the minimum core radius would be about 1300 kilometers. If the core is made out of less-dense material such as a mixture of sulfur and iron, the maximum radius would probably be less than 2000 kilometers.



Notes from the meeting

1. What is the name of the August Specimen-of-the-Month? _____
2. Cut out the specimen card below, fold it in the middle,and put it with your mineral specimen.
3. Write down a few things you know about Mars. _____

   _____
4. August MAGS Field Trip will be August 23 to Frankstown, Mississippi to collect fossils. Sign up tonight!
5. This is your newsletter. Put your name on it, and take it home with you.

Your Name _____

Composition: $CaMg(CO_3)_2$ Hardness: 3.5-4 Crystal: Trigonal–Rhombohedral Luster: Vitreous (Glassy) Streak: White Color: white, gray, reddish white, brownish white, or gray Location: Queen Valley, AZ	**Marble** Specimen of the Month August 2003