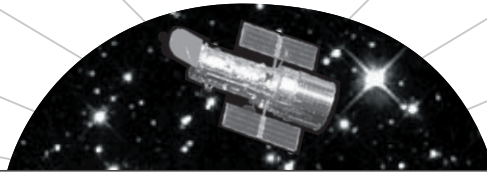




THE STAR ★ WITNESS



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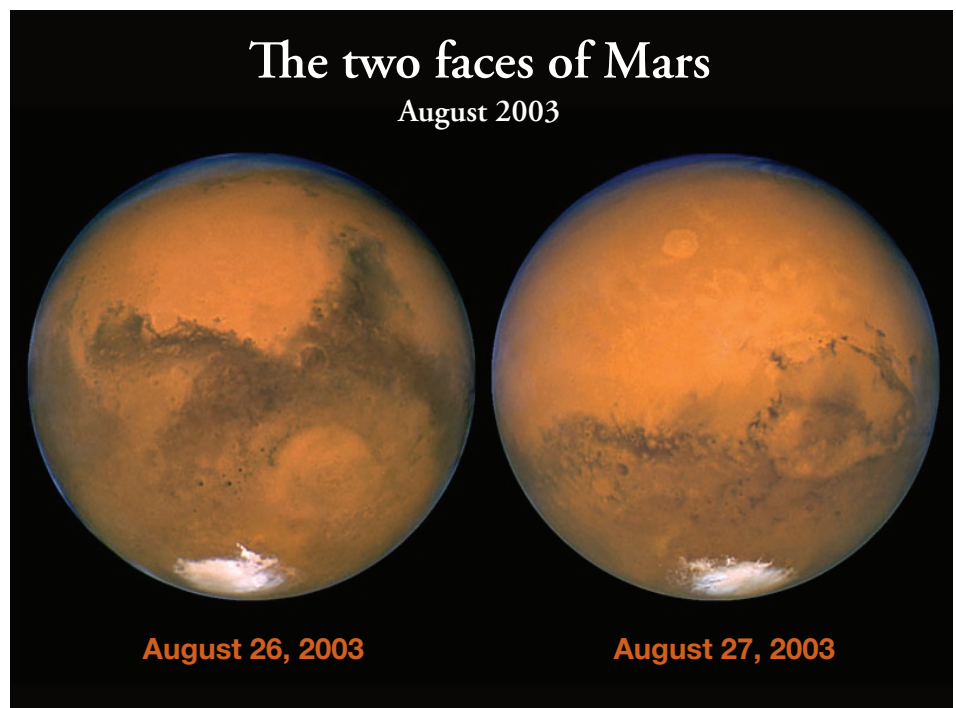
Special Feature

The Red Planet: Up Close and Personal

By NASA's Amazing Space reporters
March 2004

IN AUGUST 2003, MARS blazed brightly in Earth's skies. The last time it shone this brilliantly our planet was in a deep freeze. Our ancestors were cozying up to a campfire to stay warm. That frosty time was during the last Ice Age nearly 60,000 years ago. As our ancestors sat around their campfires gazing at the night sky, they must have clearly seen Mars glowing like a red, burning coal. Little did they realize that the bright object was another world much colder than their own. Our ancestors didn't know they were witnessing an unusually close meeting between Earth and the red planet.

Back then, there was no fanfare about Mars' close brush with Earth. No televisions, radios, newspapers, or websites announcing its coming. No telescopes, like the orbiting Hubble Space Telescope, snapping cool photos of it. The red planet wasn't even called Mars until much later when the Romans named it for their god of war.



NASA, J. Bell (Cornell University) and M. Wolff (Space Science Institute)

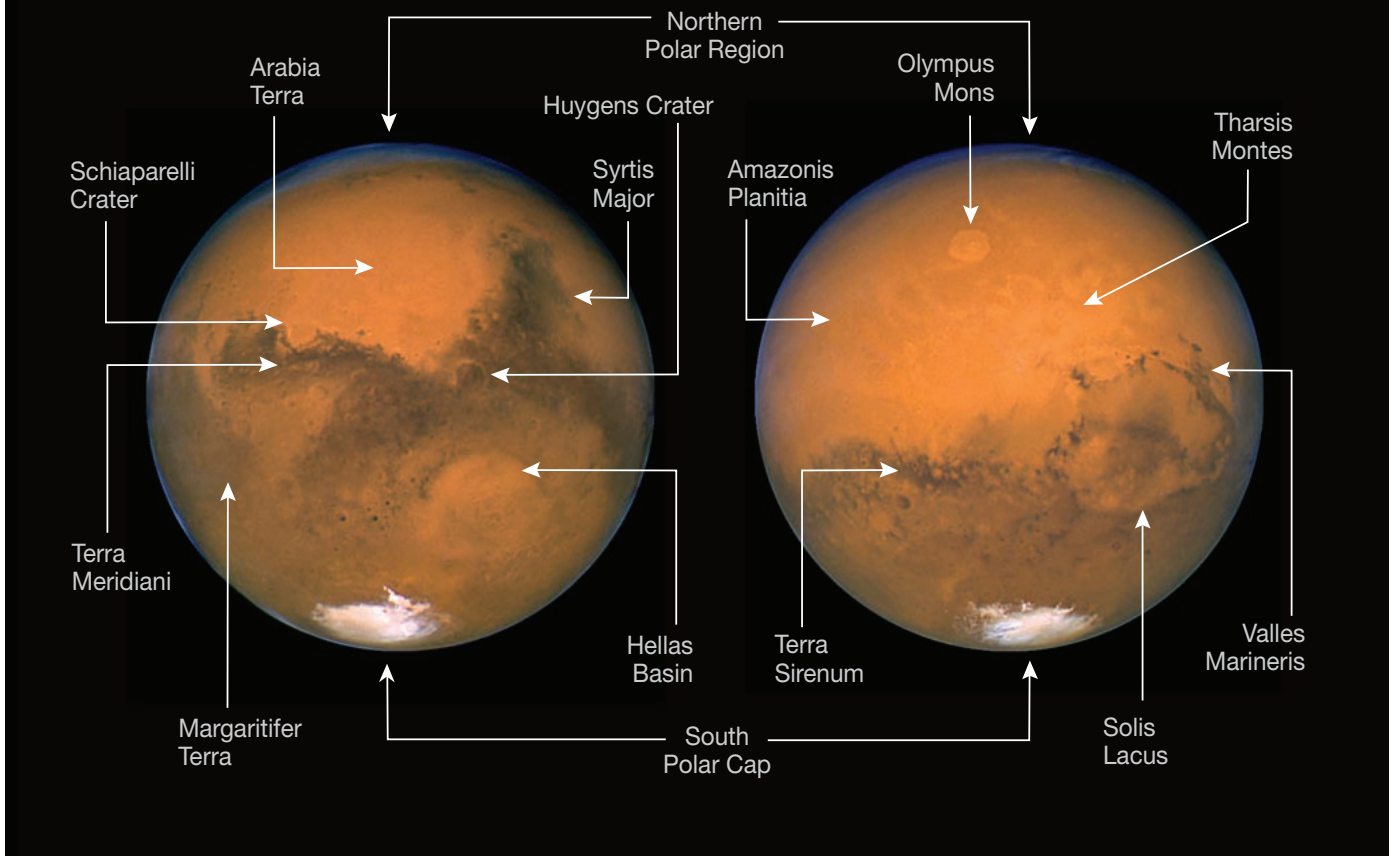
The pair of Hubble images above represents a "postcard view" of Mars at its closest approach to Earth. The two images, taken 11 hours apart, reveal two nearly opposite sides of Mars. We'll have to wait 60,000 years to get this close to Mars again.

Mars at its closest approach is about four times brighter than Sirius, the brightest nighttime star. The sight of Mars, shining more brightly than all of

the nighttime stars, may have led our early ancestors to include the planet in their myths.

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Prominent features of Mars



Ann Feild Didyk, STScl Graphics Dept.

Prominent features of Mars: Mars' surface area roughly equals the combined area of Earth's seven continents. Many of the classic landmarks noted above were identified in the 1800's.

The lefthand image was taken Aug. 26, 2003, several hours before the red planet had its closest encounter with Earth. Two striking Martian features revealed here are Syrtis Major and the Hellas Basin. Syrtis Major (the "shark-fin" shape) is covered with volcanic material. The Hellas impact basin (the circular orange feature near the center of the image) has been pounded by meteoroids.

The righthand image was snapped on Aug. 27, 2003, within minutes of the red planet's closest meeting with Earth. When this photo was taken, the two planets were 34,647,420 miles (55,757,930 km) apart. This may seem like a vast distance, but compared with the distances between other space objects, these planets were close.

Olympus Mons and Solis Lacus are two interesting features on this side of Mars. Olympus Mons (the circular area just above center) is the largest volcano in the solar system. Solis Lacus, also known as the "Eye of Mars," is the immense oval-shaped area with dark markings that looks very much like an eye.

Both images show most of the southern polar ice cap, which is tilted toward Earth. The pictures were taken during the middle of summer in Mars' southern hemisphere. During this season, the Sun shines continuously on the southern polar ice cap, shrinking it. The cap is made up primarily of frozen carbon dioxide, with smaller amounts of water ice. The orange streaks across the ice are evidence of dust blowing over the polar cap.

Hubble's "date" with Mars

The planet's close meeting with Earth in 2003, however, was no surprise. For months before the planet's "big date" with Earth, the media, from newspapers to television news shows, broadcast its coming. People planned Mars parties to witness what would be the closest meeting between the two planets in their lifetimes. And when the big day arrived on Aug. 27, the Hubble Space Telescope took advantage of the close visit by taking detailed snapshots of the planet.

Greetings from Mars

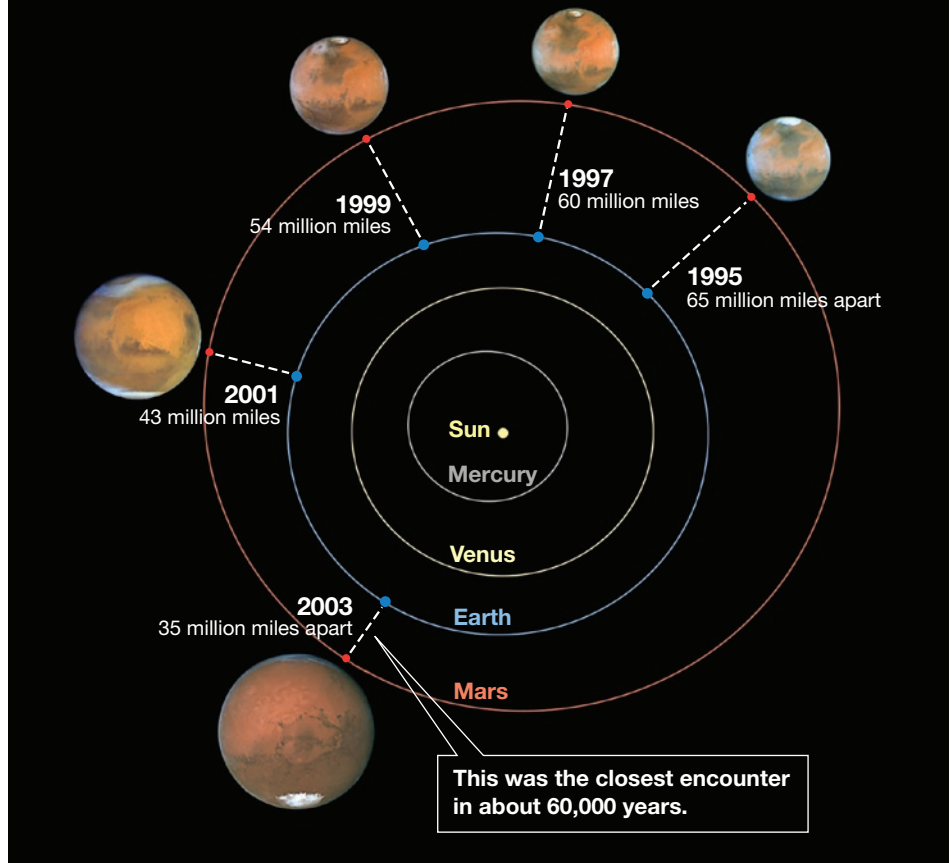
The pair of Hubble images of Mars represents a "postcard view" of the planet at its closest approach to Earth. The two images, taken 11 hours apart, reveal two nearly opposite sides of Mars.

The images, taken Aug. 26 and 27, reveal a harsh landscape, full of craters, canyons, and extinct volcanoes (see illustration, page 2). These features are similar to those seen on Earth and the Moon. For example, meteoroids have hit Mars, creating pockmarks, or craters, similar to those on the Moon. The red planet's canyons and volcanoes are like Earth's Grand Canyon and Kilauea volcano.

Unlike Earth, the planet is bone dry. There are no lakes, oceans, or rivers. Some of the planet's craters and canyons, however, may once have held water. The biggest mystery is this: Where did the water go? Although there is no water on Mars, there is dust everywhere. Some of the dust is fine, like powder, and red; some is larger, like sand, and dark.

Close, closer, closest: Mars at opposition

Some oppositions bring us closer to Mars than others, as shown here by Hubble's photos of Mars during the last five oppositions. Each time, Mars appeared bigger, as the distance between Earth's and Mars' orbits decreased. In 2003, Mars was about as close as it ever gets to Earth.



Zoltan Levay and STScI Graphics Dept.

Catching up with Mars

What event brought Mars and Earth so close that the Hubble telescope could snap these awesome pictures of the red planet?

Two factors led to the unusually close meeting. First, like all planets in our solar system, Earth and Mars orbit the Sun. Earth is closer to the Sun, and therefore races along its orbit more quickly, going around the Sun in 365 days, or one year. (An orbit is the path a planet follows around the Sun.) Earth makes nearly two trips around

the Sun in the same amount of time that Mars takes to make one trip (687 Earth-days).

Every 26 months, Earth catches up with Mars. When this happens, Mars and the Sun are on opposite sides of Earth, and Mars is said to be in "opposition." Opposition is the best time to observe Mars because the red planet is closer, brighter, and more fully lit than at other times.

The second factor that created this close meeting was the distance

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between Earth and Mars during the 2003 opposition. The distance at each opposition changes because neither planet's orbit is perfectly round. Earth's orbit is almost, but not quite, circle-shaped, while Mars' path is a little more oval-shaped (see illustration of Mars at opposition, page 3).

The last five times the planets lined up, the distance between them decreased, ending in 2003's unusually close approach. That year, opposition occurred where the orbits of the two planets were about as close as they ever get.

The next time Earth and Mars come this close — in 2287 — your great-great-great-great-great-great-great-grandchildren might witness the event. ★

SEE MORE Hubble images and read more Star Witness news stories at Amazing Space, NASA's award-winning educational Web site for K-12 students and teachers.

