# The Great Mars Rush

**Hurtling toward Mars at 22,000 mph, Earth is heading for its closest encounter with the Red Planet in a dozen years.**

Marshall Space Flight Center

*Once in about every fifteen years a startling visitant makes his appearance upon our midnight skies --a great red star that ... mounting higher with the deepening night, blazes forth against the dark background of space with a splendor that outshines Sirius and rivals the giant Jupiter himself.* -- from Mars by Percival Lowell (1895)

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**May 15, 2001** -- By the time you finish reading this sentence, you'll be 50 kilometers closer to the Red Planet.

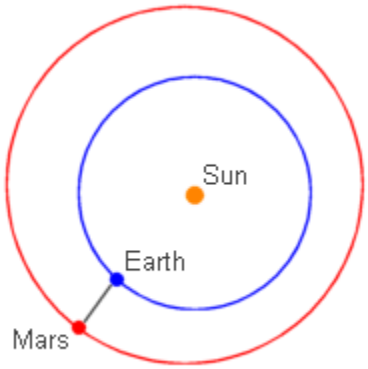
Earth and Mars are converging at 10 km/s (22,000 mph) as the pair head for a close encounter next month. On June 21st Mars will lie just 68 million km from Earth -- the nearest it's been in a dozen years.

**Right**: A global view of Mars captured by NASA's Mars Global Surveyor [more]

"The next few months will be a great time to look at Mars," says astronomy professor George Lebo, a NASA Summer Faculty Fellow at the Marshall Space Flight Center. "You won't need a telescope to see it. By early June Mars will outshine everything except Venus, the Moon, and the Sun itself ."

Mars is already a brilliant morning star. Early rising observers in the northern hemisphere can spot the Red Planet about 30 degrees above the southern horizon. Sky watchers south of the equator will see Mars arcing high overhead before dawn. In either hemisphere, the planet is easy to pick out near the spout of the teapot-shaped constellation Sagittarius. Mars is bright and doesn't twinkle like a real star -- its steady copper-hued gaze is unmistakable.

In the weeks ahead the Red Planet will grow even brighter as it approaches opposition on June 13th, the date when Earth and Mars are lined up on the same side of the Sun. Astronomers call the arrangement *opposition* because Mars and the Sun will lie on *opposite* sides of our planet's sky. Mars is at opposition once every 26 months.



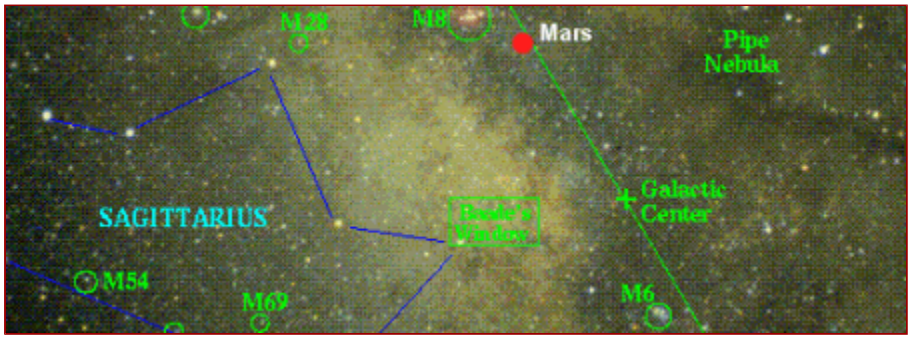

If the orbits of Mars and Earth were perfectly circular, then the distance between two planets would be least at the moment of opposition. But that's not the case. Earth's orbit is slightly elliptical and the martian orbit is substantially more so. As a result, our closest approach to Mars won't happen until eight days later on June 21st.

**Left**: Mars is "at opposition" when it lines up with Earth on the same side of the Sun.

By that time Mars will no longer be a morning star -- it'll be a dazzling "all-nighter," rising near sunset and reaching its highest point in the sky at midnight. Modest telescopes will reveal normally invisible details including martian clouds and icy polar caps. See *Sky and Telescope's* "A Grand Return of Mars" for more information.

Throughout the coming months Mars will linger in a region of the sky that's home to the very center of our galaxy. This will be a treat for dark sky observers who can see the faint Milky Way, a hazy band of stars that bisects the sky along the galactic plane. The Milky Way cuts through Sagittarius and brightens near the spout of the teapot -- right by Mars! There lies the galactic center, the lair of a supermassive black hole around which our entire pinwheel galaxy spins.

Despite their proximity in the sky, Mars and the galactic center are really very far apart. A spacecraft from Earth traveling at light speed would arrive at the Red Planet in only a few minutes. Reaching the inner regions of our galaxy would take an extra 30,000 years!




**Above**: This annotated map of the constellation Sagittarius shows the galactic center and the approximate location of Mars in mid-May. The galactic center lies behind a think veil of absorbing dust in the galactic plane. Nearby "Baade's Window" is a relatively dust-poor region that allows some of the light from the innermost galaxy to shine through. Click to enlarge.

If spacecraft could travel at the speed of light, we could visit Mars any time we wished. However, NASA's advanced propulsion systems aren't yet *that* advanced. We have to choose our opportunities carefully and visit Mars when the planet is nearby -- in other words, at opposition.

NASA's latest Mars probe, 2001 Mars Odyssey, blasted off on April 7th and it's hurtling toward the Red Planet even faster than we are. Earth's approach will slow and then reverse as Mars reaches opposition in June, but Mars Odyssey will continue until it enters Mars orbit on October 24th. During the probe's two and a half year mission, it will monitor space radiation, seek out underground water, and identify interesting minerals on the martian terrain.

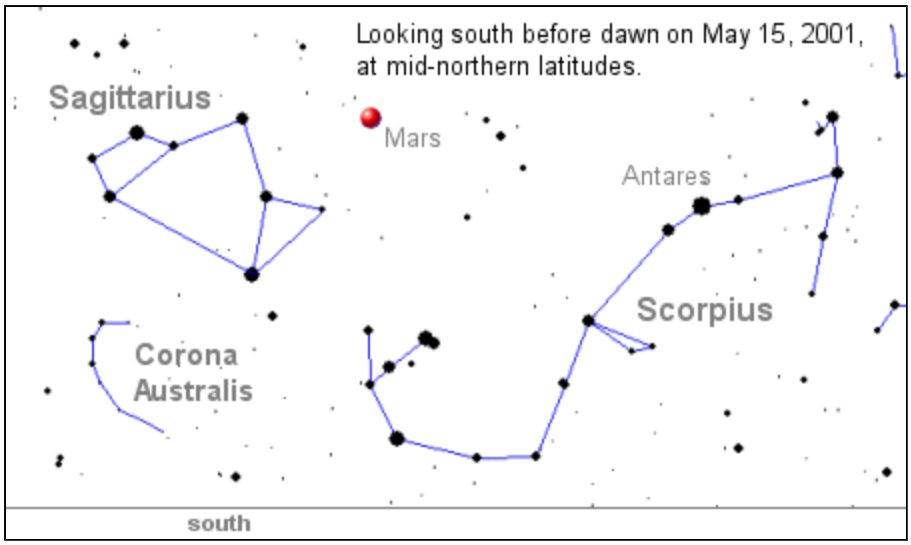


Because of Mars' eccentric orbit, not all oppositions are alike. At the next one, on August 28, 2003, Mars and Earth will be just 56 million km apart -- closer than any opposition since 1924. It will be the perfect time to send a new batch of robotic explorers to Mars. Indeed, NASA plans to launch a pair of Mars Exploration Rovers in 2003, and the European Space Agency will send a lander of its own, the Beagle 2, which will ride to Mars on board the Mars Express Mission.

Favorable oppositions of Mars recur with a 15-to-16 year cycle. Perhaps the series of close

encounters 15 years from now could be our first opportunity to send humans to the Red Planet!

Meanwhile, don't miss the ongoing show. Mars is out there now, fiery red and beckoning from your own back yard!




**Above**: The southern sky shortly before dawn on May 15, 2001. Copper-hued Mars shines at visual magnitude -1.5 between the constellations Sagittarius and Scorpius. Don't confuse Mars with Antares ("anti-Mars"), the red first magnitude star in Scorpius.

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| Web Links |
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| Why 2003? -- This site from the European Space Agency explains why we launch spacecraft to Mars during opposition, and why some oppositions are better than others. |
| Oppositions of Mars, 1901-2035 -- from The Planet Mars: A History of Observation and Discovery (University of Arizona press) |
| Perihelic Oppositions of Mars -- a table of our closest encounters with the Red Planet. |
| 2001 Mars Odyssey -- home page at the NASA Jet Propulsion Laboratory |
| Mars -- the book by Percival Lowell, 1895 |

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