

Life on Mars?

Early observers speculated that Mars had “Martians” and irrigation canals. No evidence for either has been found. The 1976 NASA Viking landers had devices to test for signs of life. The results were mostly negative, but Mars might have organisms underground or of different kinds than found on Earth. Four rovers have moved around Mars without finding clear signs of life such as fossils. The Mars 2020 rover will have equipment to identify many organic substances and store samples to return to Earth later.

Finding life on Mars would be an incredible discovery, especially if it arose separately rather than being carried on a meteoroid from Earth to Mars or from Mars to Earth.

People to Mars?

After the Moon landings, many expected trips to Mars would soon follow. These voyages have two difficulties beyond cost:

1) Unless high speed trajectories are taken, the minimum duration is several years. That means very heavy supplies have to be brought or the spacecraft must be large enough for farming facilities. There are plans to send missions ahead to make oxygen for astronauts and fuel for the return trip.

2) There are high levels of radiation in space and on the surface of Mars. This is a health concern for astronauts who would be exposed for almost 100 times longer than the Apollo astronauts were.

Only some protection is possible during the voyage; on Mars, astronauts might live and work underground such as shown in the painting to the right.

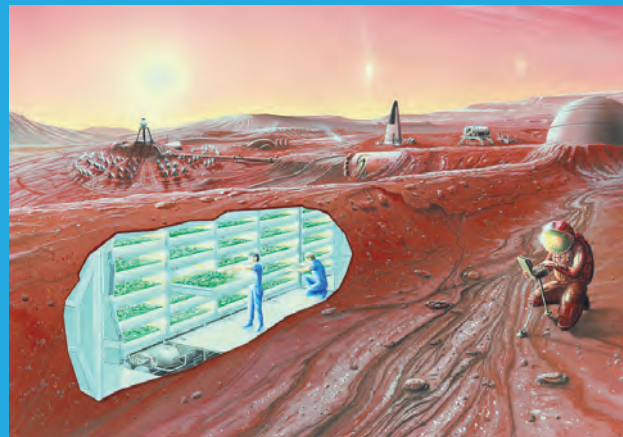


Katrina Ince-Lum

RASC

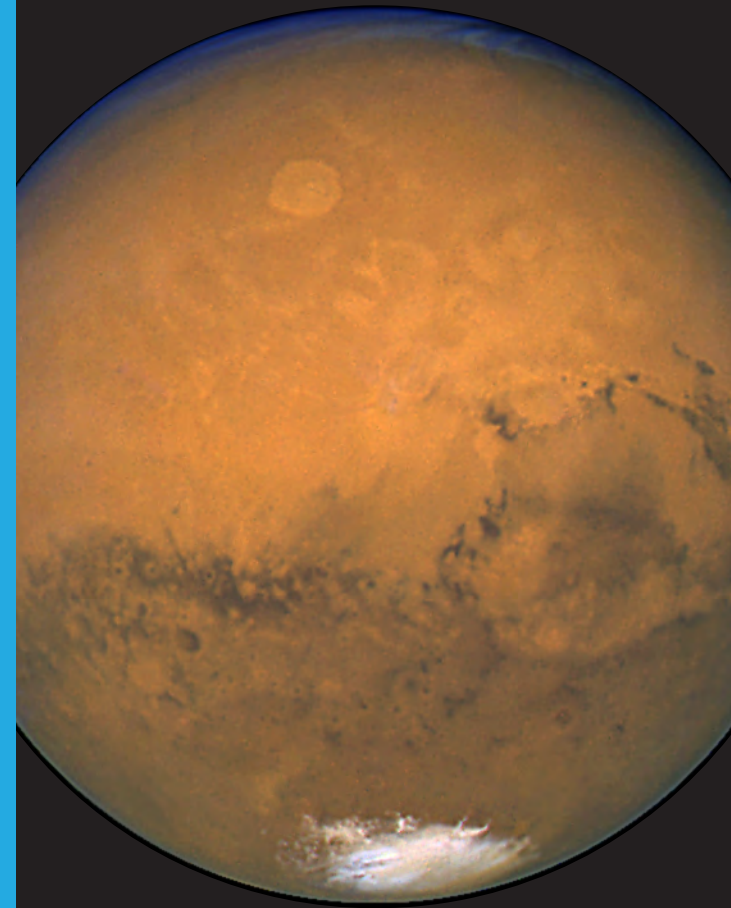
The Royal Astronomical Society of Canada has 28 Centres across the country and 5000 members. Each Centre runs programs with speakers, star parties and outreach where we share our passion with the public. Many beginners have received advice from experienced astronomers about equipment, observing and the challenges of astro-imaging. Astronomy is more fun when shared with others. Details and a list of Centres at:

www.rasc.ca



NASA Ames Artist Conception

Mars



**Observe now.
Human visit soon?**

NASA 2003 Hubble Space Telescope photo showing immense volcanoes, a canyon larger than any on Earth and the south polar ice cap.

Orbits

This scale diagram from above the Sun's north pole shows the orbits of Mars (red) and Earth (blue) with their northern seasons marked. All planets move counterclockwise. Mars not only has a longer orbital path, it also moves 20% slower, taking 1.88 Earth years for one orbit. Mars has a much less circular orbit than the Earth's. Its closest approach to the Sun is marked.



Brian Coleville

Telescope View of Mars

The left picture is a view typical of an amateur telescope showing a polar ice cap and darker areas. We can't see details like the cover Hubble image because of our turbulent atmosphere. The two planets have almost the same day length, so our view of Mars is almost the same on consecutive nights.

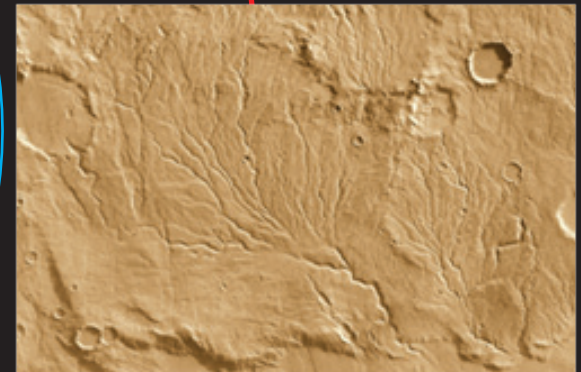
About Mars

- It has half our diameter and 1/9 the mass.
- The carbon dioxide atmosphere is so thin that humans cannot breathe it.
- Without Earth's thick protective atmosphere, the surface of Mars is exposed to strong radiation from space.
- In the past, Mars had a denser atmosphere, and likely had liquid surface water.
- Mars might have supported life in that era.
- Mars is mostly dry now, having lost most of the water because its gravity is weaker.
- This satellite photo shows an ancient Mars feature caused by some liquid (water?) falling and eroding wider valleys downstream.

NASA's Mars Insight Mission was launched on May 5, 2018. This mission will land on Mars and investigate the interior. A probe will penetrate up to 5 metres deep.

Mars fall equinox

Earth summer solstice



NASA Mars Reconnaissance Orbiter Image

Oppositions

We get the closest, brightest and best views of Mars when the Earth passes between the Sun and Mars. The dots for each planet and yellow dashed line show the July 27, 2018 opposition. This is the closest opposition in 15 years because it happens just before Mars is nearest to the Sun. It stays close most of August, only getting 10% further away by August 24. Oppositions of Mars occur about every 2.1 years.

Mars closest to Sun

Insight Arrival Nov. 26, 2018

Getting to Mars - and Back

A route to Mars needing the least rocket fuel is shown by the green dashed line for the Mars Insight mission launched in 2018. It takes over a half year, launching before and arriving after an opposition. If astronauts used a path like that, almost three years would be needed to get to Mars and back home after the next Mars opposition. A shorter trip would need much more rocket fuel or a new type of propulsion.