



Mars: Key to Humanity's Future

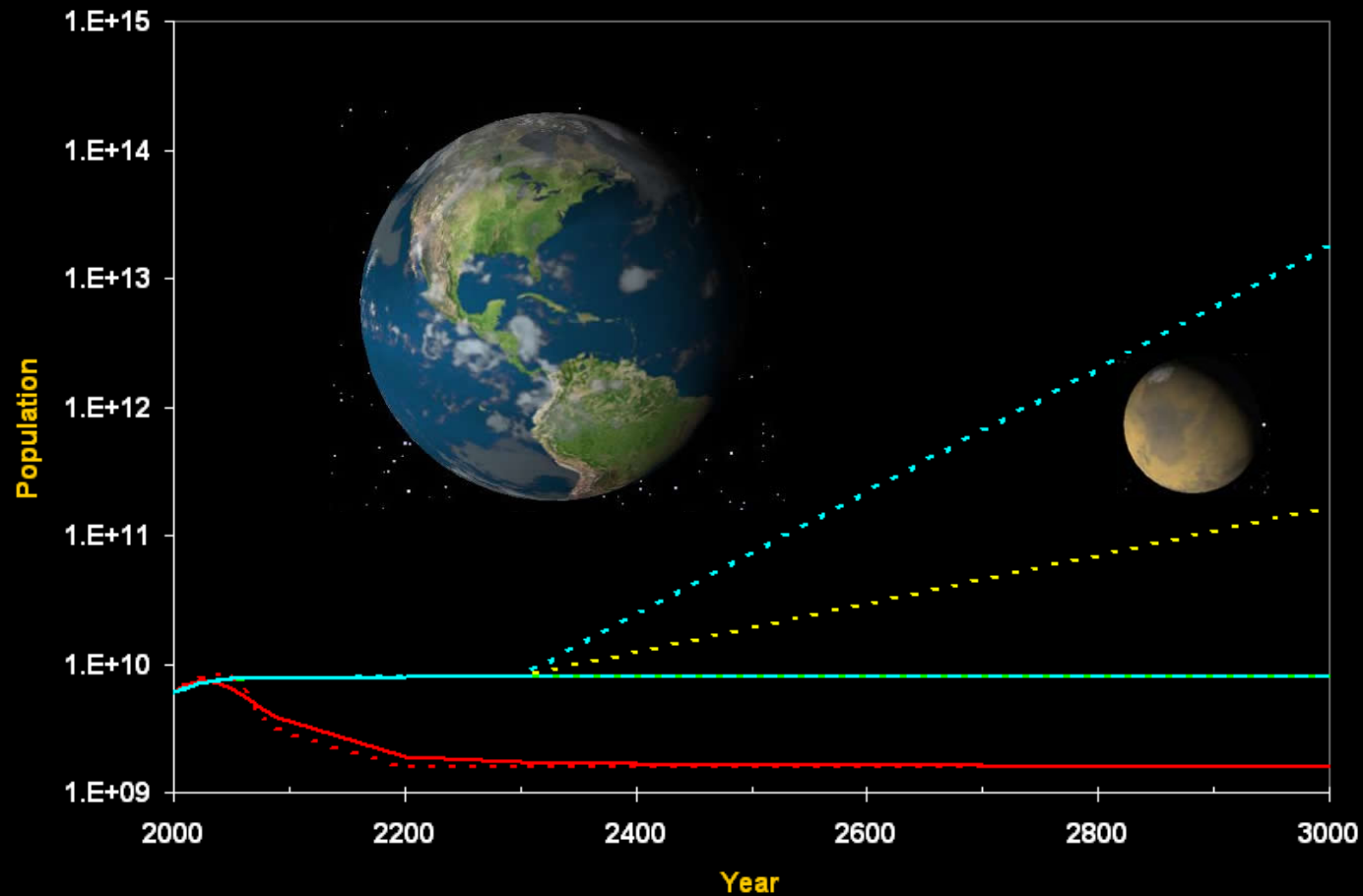
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We are at a critical point in history.

If our population is to continue growing, we must live within our means on Earth so we can settle space, beginning with Mars.

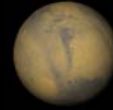


Mars: Key to Humanity's Future

Mars is the best immediate choice for adding to our population.

Mars –

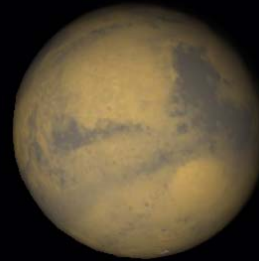
- **Has water, useful gases and minerals**
- **Could eventually sustain a population comparable to Earth**
- **Is accessible to asteroids**



Moon –

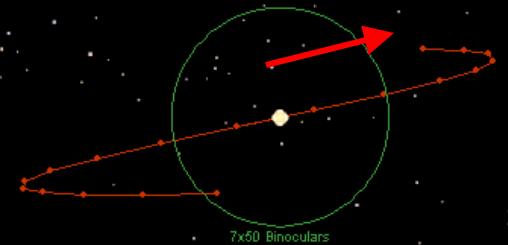
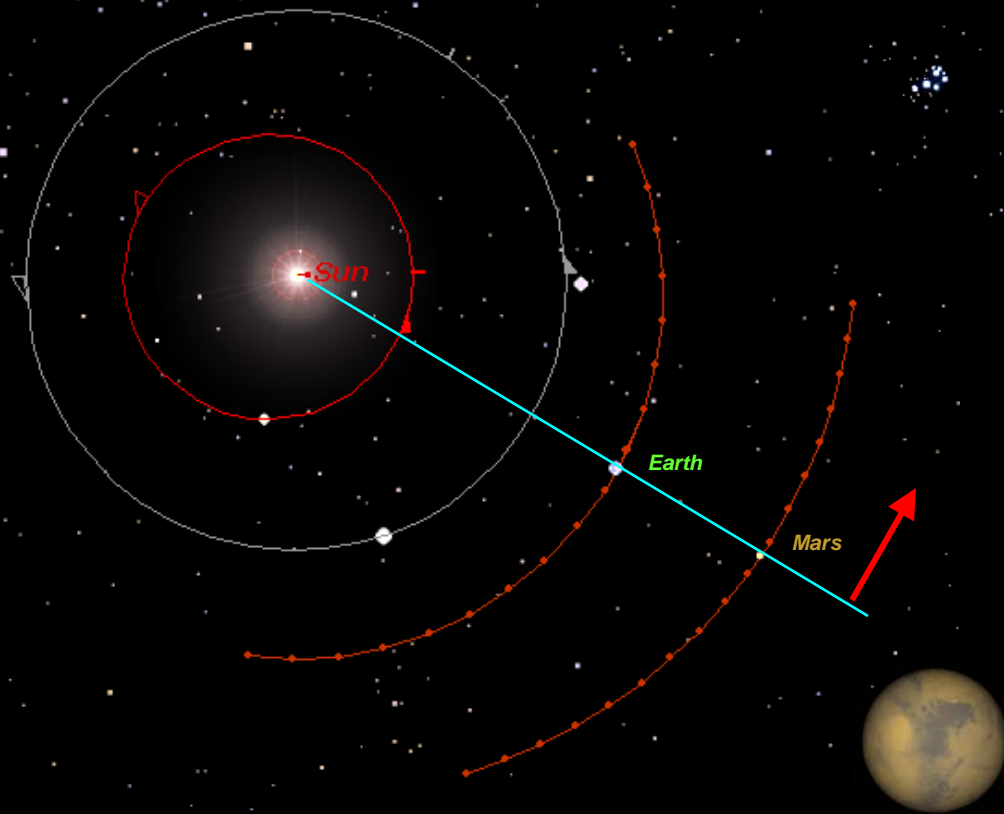
- **Has some water? Energy sources in rocks?**
- **Might eventually sustain small population**
- **May be useful for training and a good base for astronomy**

Quick Facts



- Mars is the fourth planet from the Sun (1.5 AU)
- It has over a third the gravity of Earth (38%)
- Its diameter is about half that of Earth (53%)
- Its day (“sol”) is about the same as Earth (24.6 h)
- Its year is less than twice that of Earth (687 days, 669 sols)
- Its axis is inclined about the same as Earth (25 deg)
- Its atmosphere is very thin and mostly carbon dioxide (95%)
- Temperatures are like Antarctic in winter (-100 deg F to +62 deg F)
- It has the largest volcano, Olympus Mons (13 x 335 miles)

Mars appears large when it is opposite the Sun in the sky (at “opposition”). This is also the best time to launch a spacecraft to Mars, if you want to get there in a short time.



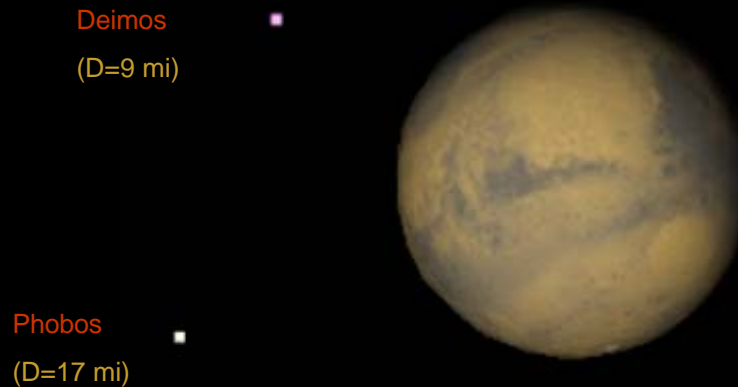
In the sky, Mars appears to go backwards (“retrograde”) as Earth overtakes it

Apparent size varies from 3” at conjunction to 25” at opposition

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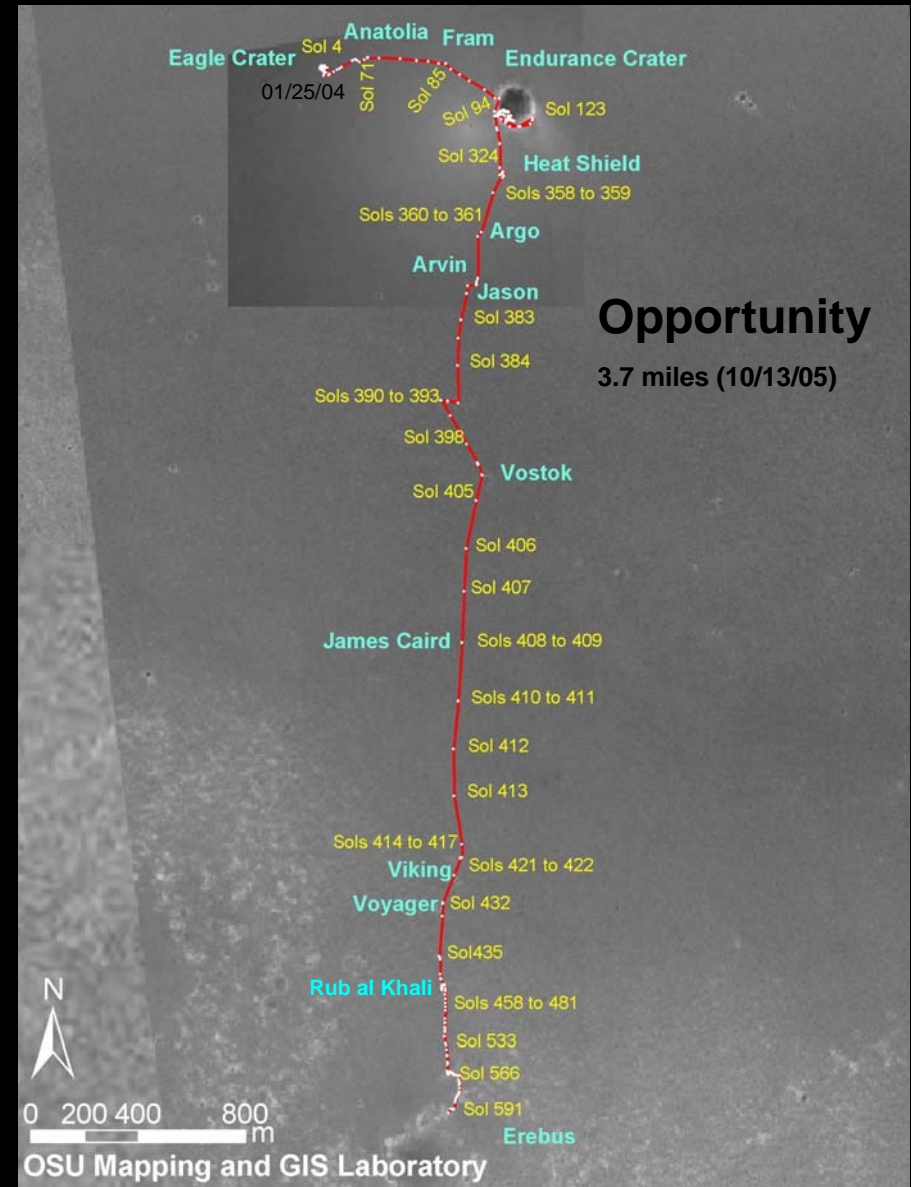
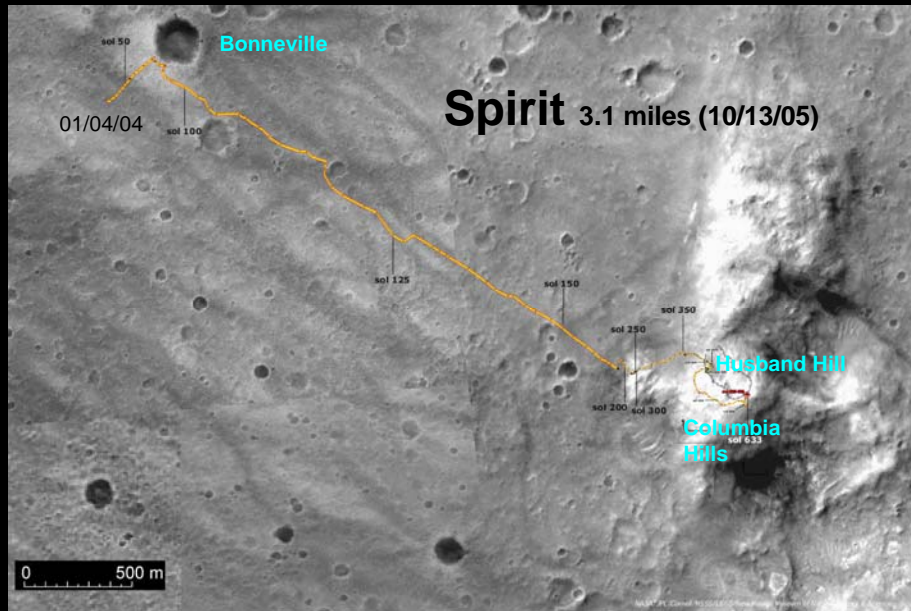
Seen from Earth, Mars is a dusty world, with growing and shrinking polar ice and occasional clouds.

It has two moons, which are likely captured asteroids.



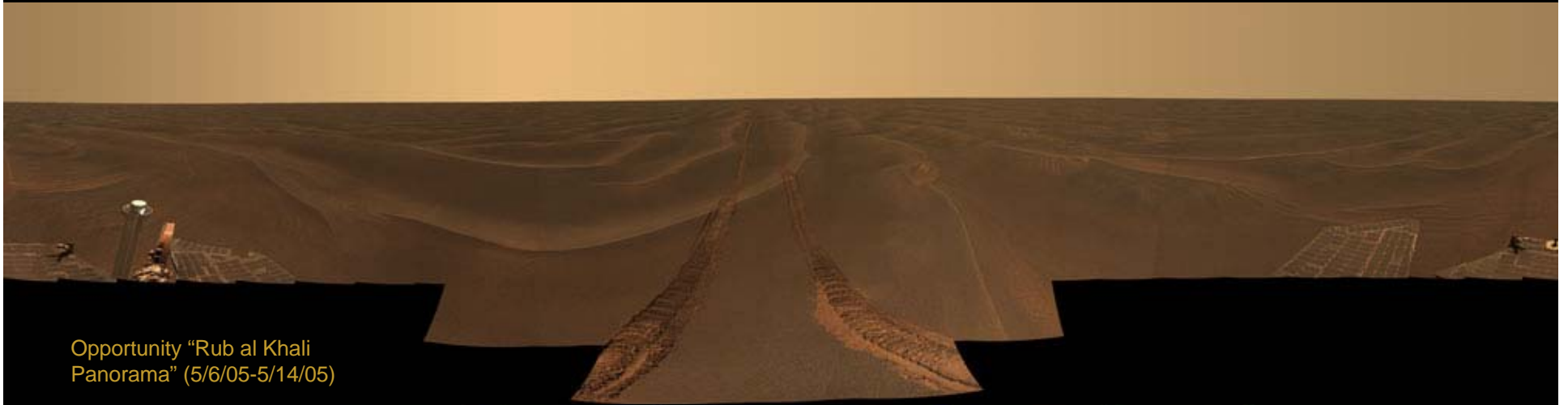
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Mars has been visited by several spacecraft. Currently the Mars Exploration Rovers are exploring opposite sides of the planet.

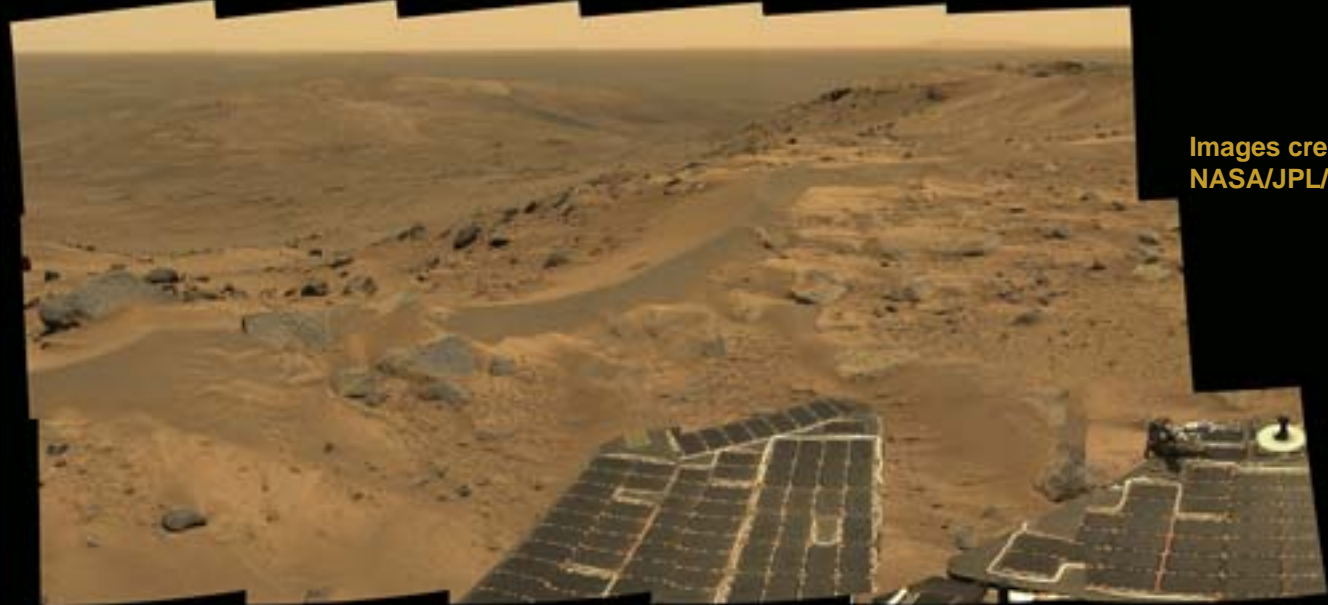


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From the ground, Mars looks like a high desert on Earth.



Opportunity "Rub al Khali
Panorama" (5/6/05-5/14/05)

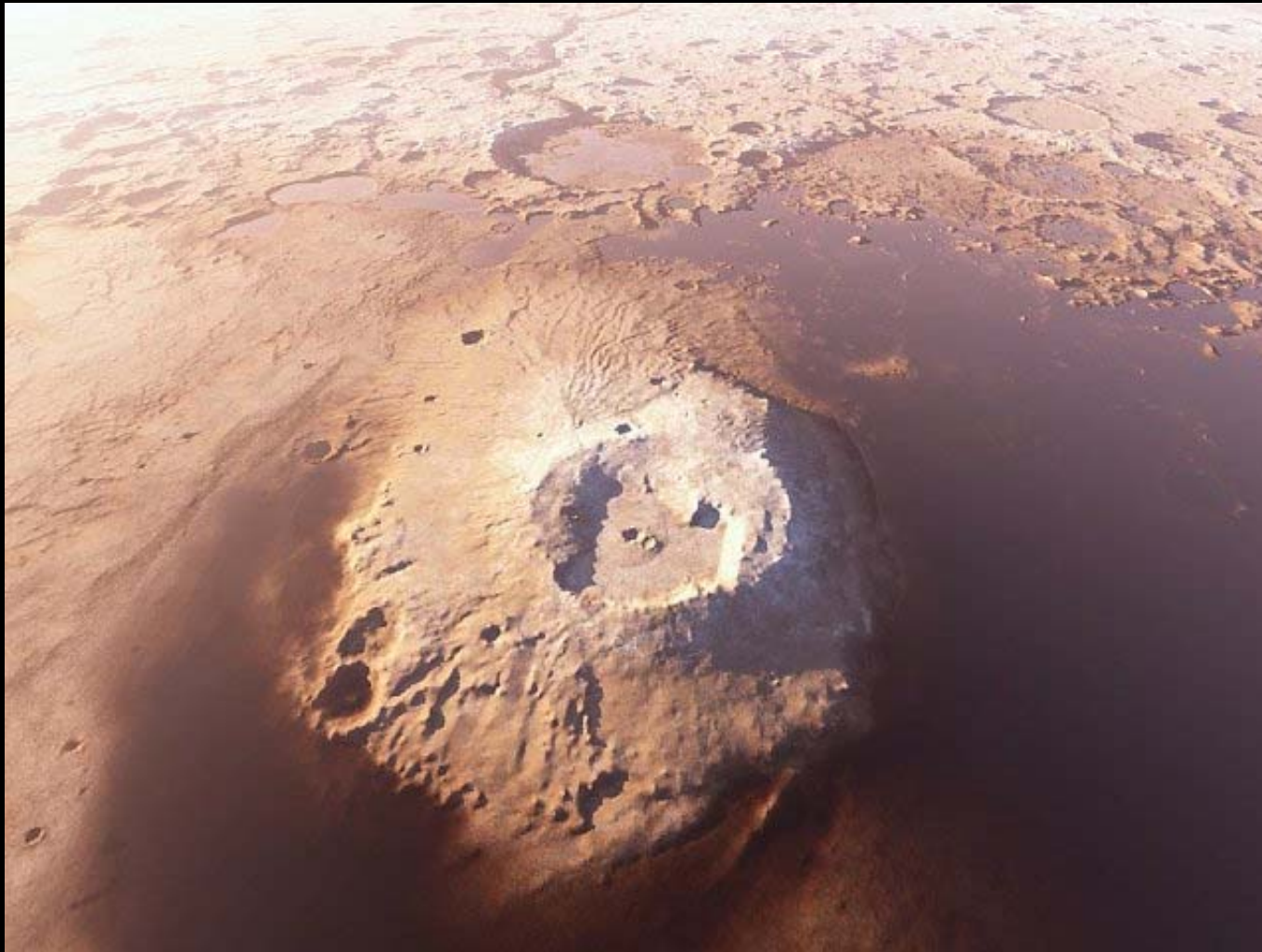


Spirit "Independence
Panorama" from Husband Hill
(7/6/05-7/13/05)

Images credit:
NASA/JPL/Cornell

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Mars is thought to have once had water on the surface. Most water was lost to space, and the rest is frozen beneath the surface.



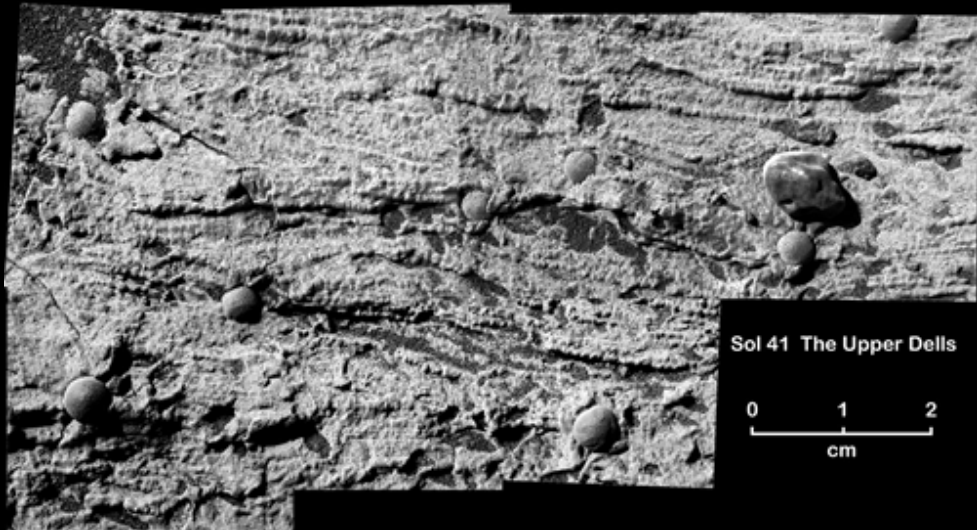
Apollinaris Patera by Kees Veenenbos

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This view has been confirmed by the Mars Exploration Rovers.



At the rim of Bonneville crater, Spirit found evidence that water may have changed the rocks.



Cross-bedding indicates that Opportunity may be on the shore of an ancient salty sea. Other indications of water: minerals typically found in hot springs.

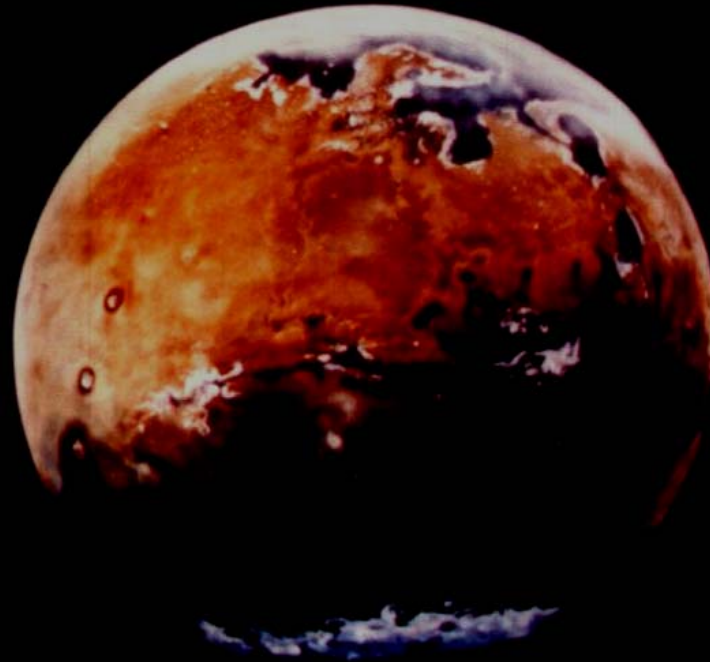
Images Credit:

NASA/JPL/Cornell/USGS

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The discovery of water is important for several reasons:

- It implies that life may have existed, and may continue to exist.
- It would be a necessary resource for human settlements.

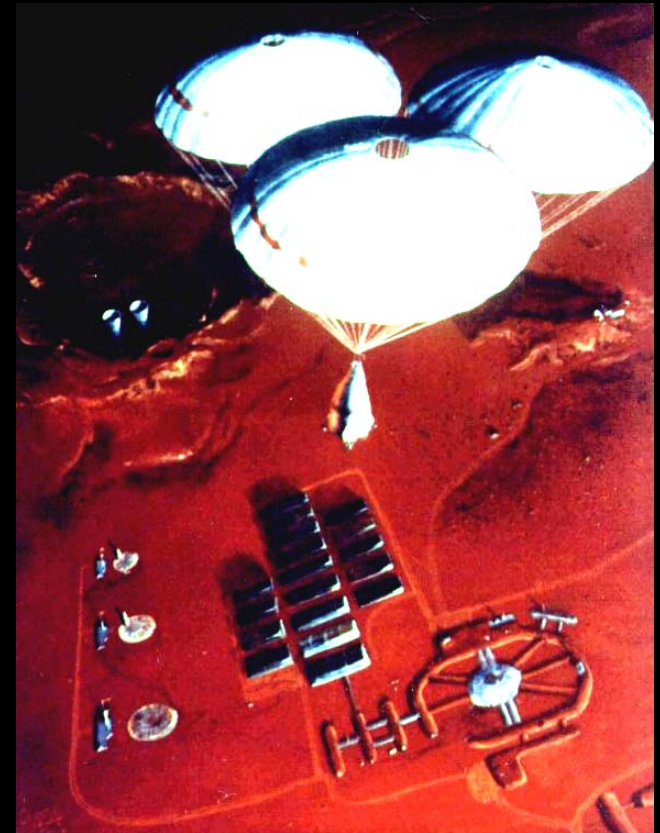


Painting by Mike Carroll

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Mars has other useful natural resources:

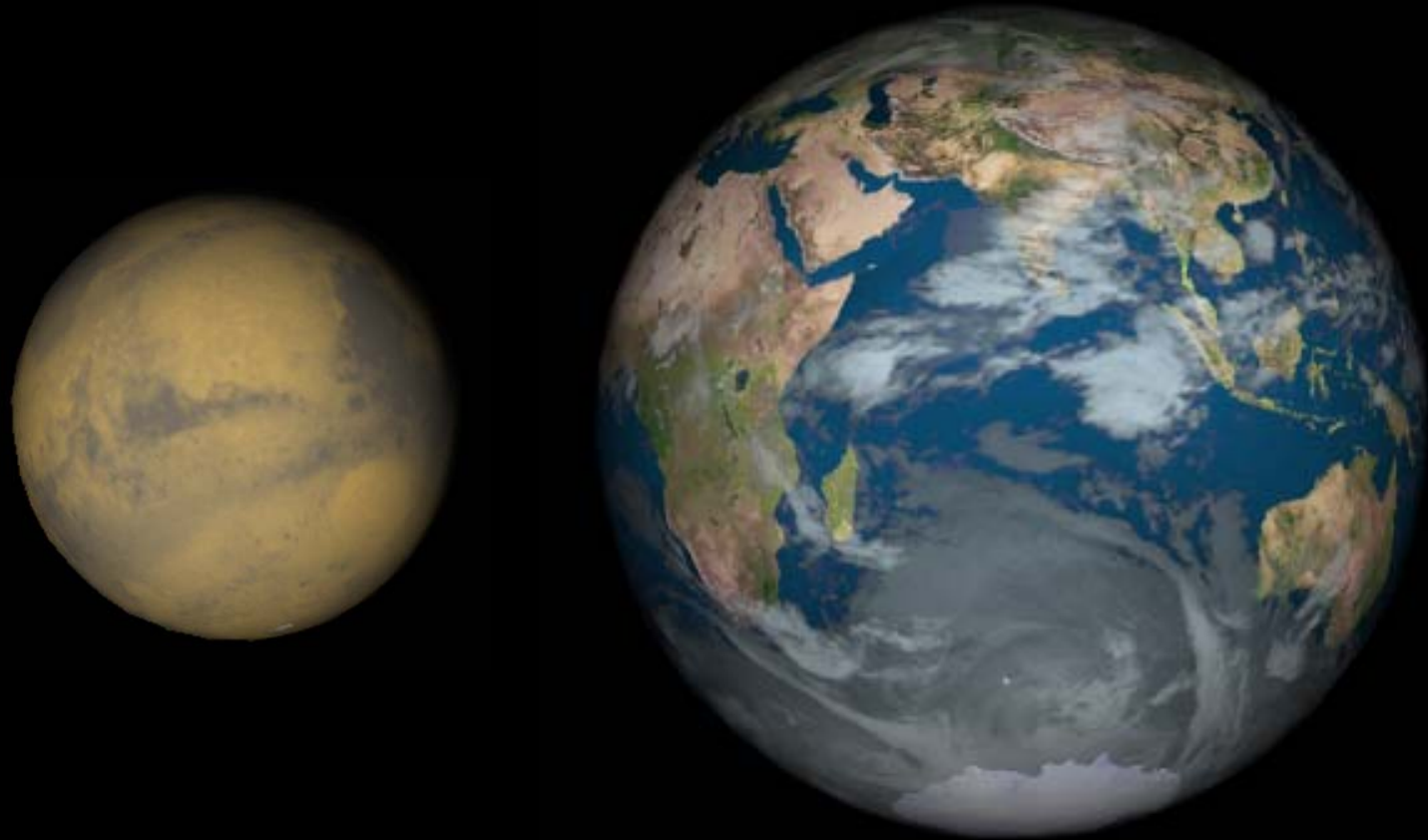
- Carbon dioxide (atmosphere, poles)
- Silicon
- Iron (responsible for red color of dust)
- Aluminum
- Magnesium
- Calcium
- Sodium
- Sulfur
- Titanium
- Potassium
- Copper?



Painting by Mike Carroll

Another resource Mars has is land.

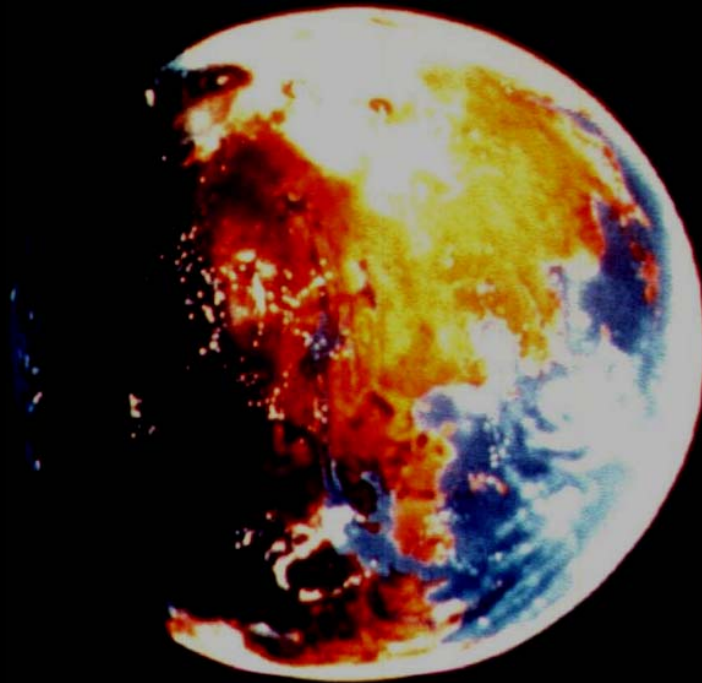
The amount of land on Mars is about the same as the dry land on Earth.



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With a mostly carbon dioxide atmosphere at less than one percent the air pressure of Earth on the ground, life on Mars would require enclosed environments.

To accommodate a large population, it would need to be “terraformed” – made Earth-like. This could take centuries.

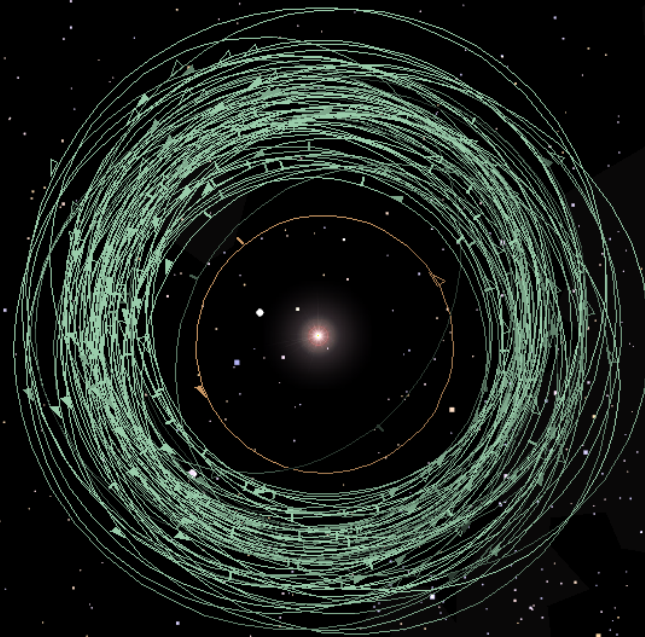


Painting by Mike Carroll

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Mars is very close to the asteroid belt, which increases its chances of impacts (twice that of Earth).

There are also multiple advantages: access to a great amount of resources (such as iron, water as ice, and carbon), and new destinations for increasing the population.



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**Mars is presently an interesting place to study.
Some day it could be someone's home.**

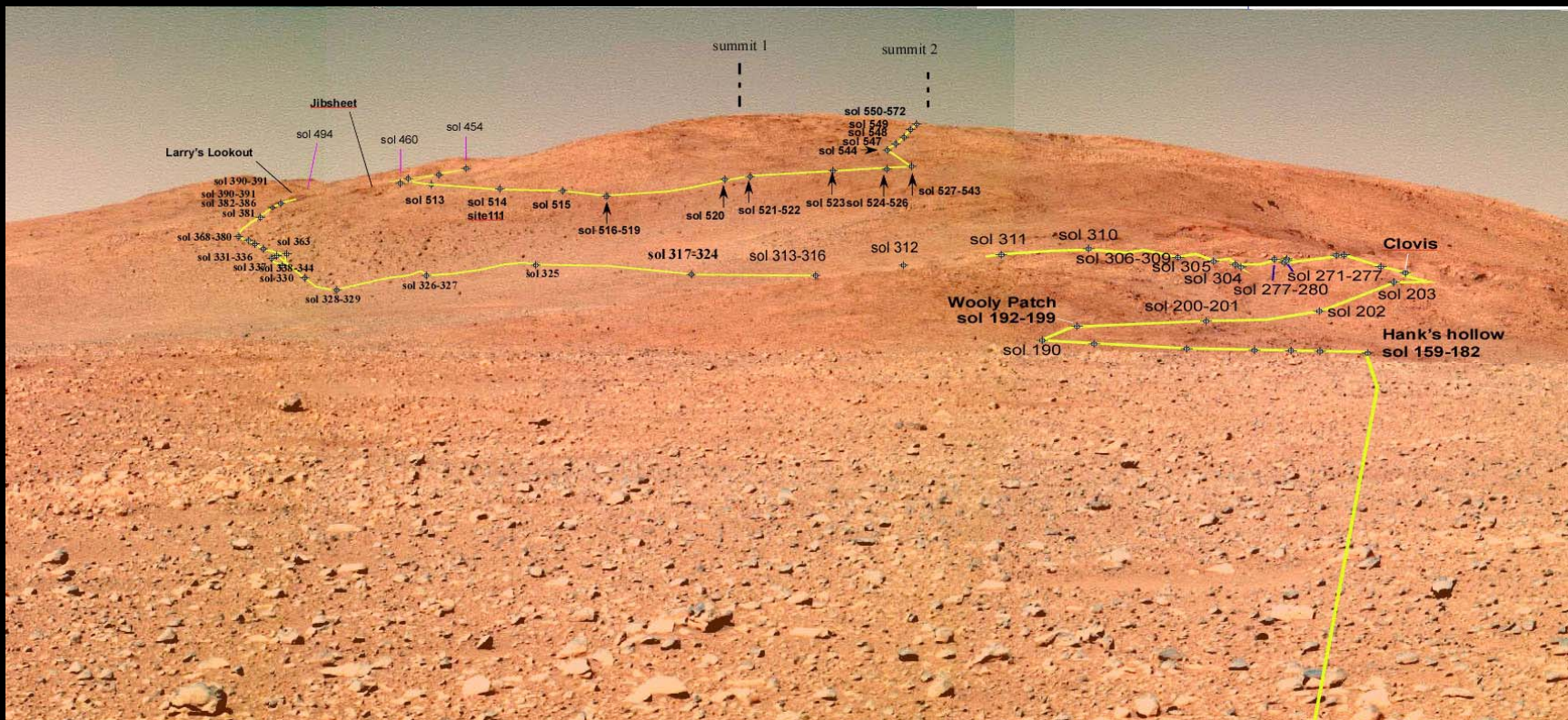


Image Credit: NASA/JPL

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