

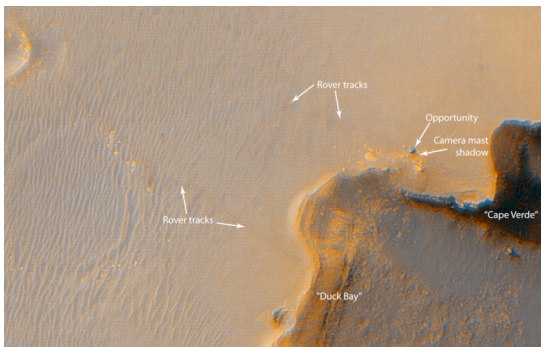
## Exploration of Mars



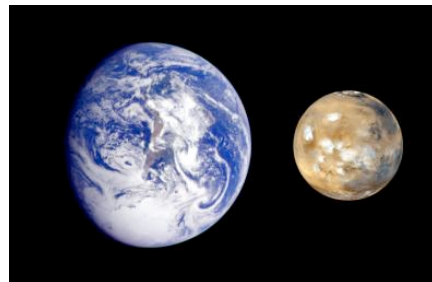
Why is Mars of such great interest, and what do we know about it?



## The study of Mars today

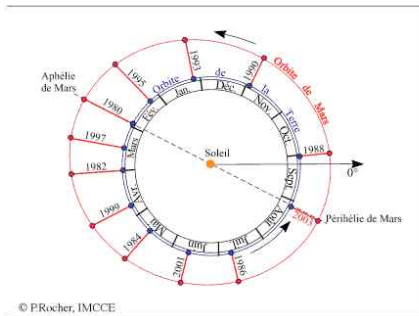


## Physical characteristics of Mars

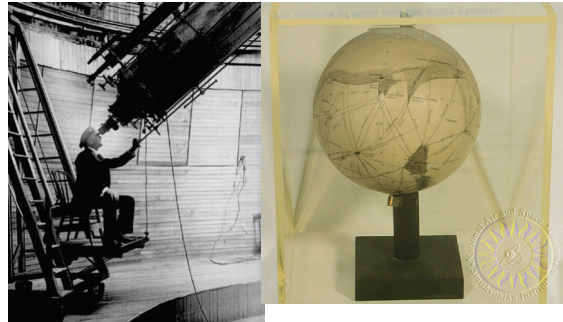


Radius 53% that of Earth (3397 km), mass is 11 percent that of Earth

## The varying distance of Mars at opposition

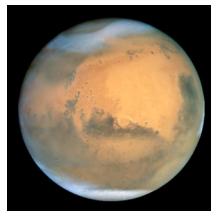


## Percival Lowell and the Canals of Mars



## Earth-like attributes of Mars (leave out smaller size of planet)

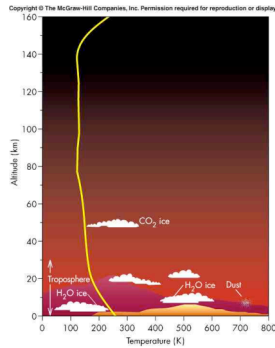
- Polar caps at north and south poles, that change with the seasons
- Rotation period of 24.6 hours
- Obliquity of the ecliptic = 25 degrees
- In time of Lowell, apparent coming and going of features on Mars, perhaps indicating seasonal changes in vegetation



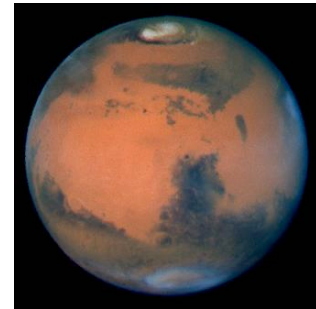
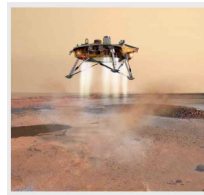
By the 1960s it was known that Lowell's view of an Earth-like Mars with higher life forms could not be right; the atmosphere on the surface of Mars is about 0.7 % the sea-level pressure on Earth. Water cannot exist in liquid form under those conditions.

The average surface temperature on Mars is also about 60 degrees Centigrade below freezing (210K rather than 293K in this room).

## The atmosphere of Mars: 95% CO<sub>2</sub>



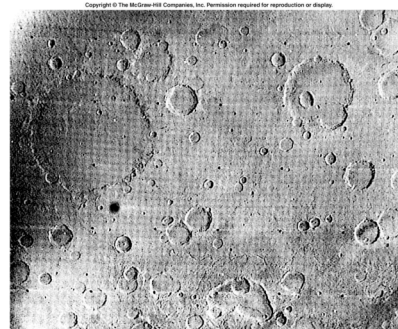
## Robotic Exploration of Mars



## The exploration of Mars by spacecraft

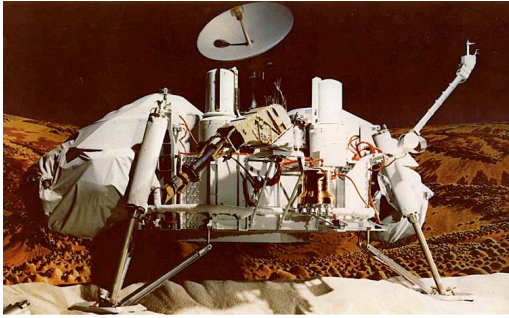
- Began in 1960
- 37 missions attempted
- 18 successful
- First with results was US Mariner 4 in 1965
- Mariner 4 gave us our first close-up view of Mars
- Several other major ones since then (Mariner 9 in 1971, Viking 1 and 2 in 1976, MER in 2004- present)

## Mariner 4, our first close view of the surface of Mars

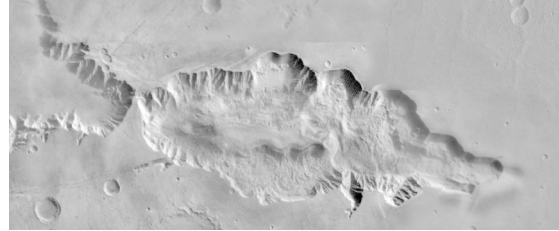


What does this mean?

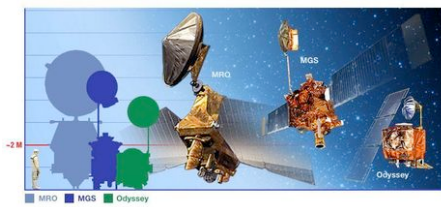
The "new era" in Mars studies began in the 1970s: the Viking spacecraft



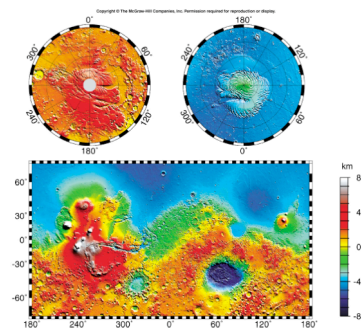
Orbiting spacecraft revealed more varied terrain, e.g. Hebes Chasma

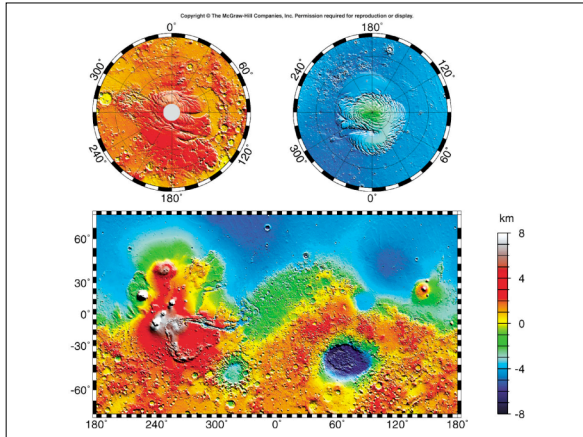


A summary of what we have learned from orbiting spacecraft, 1971-present

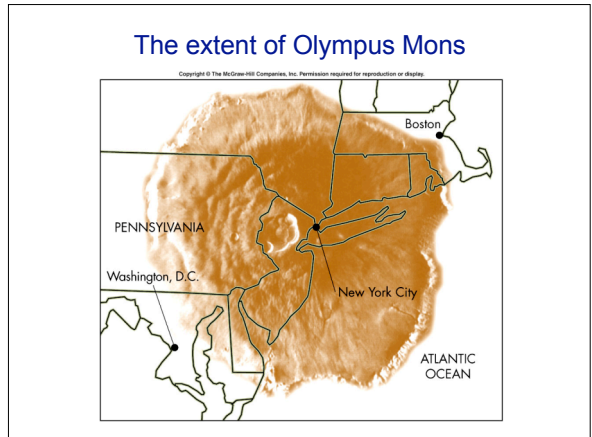
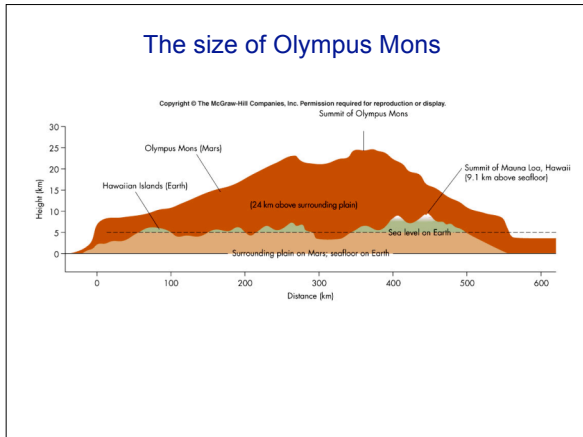


Spacecraft finding #1 - the north-south asymmetry

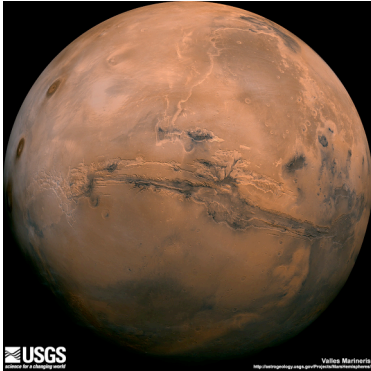




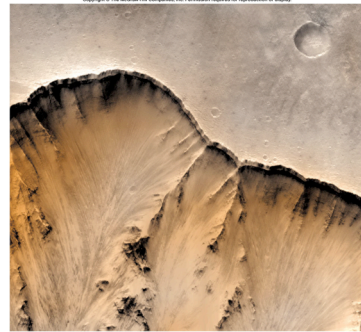
Finding #2:  
The  
volcanos of  
Mars:  
Olympus  
Mons



### Valles Marineris...Grand Canyon of Mars



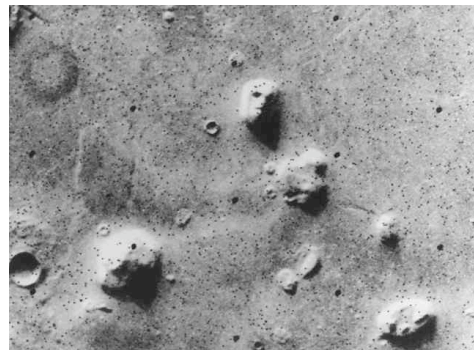
### Valles Marineris



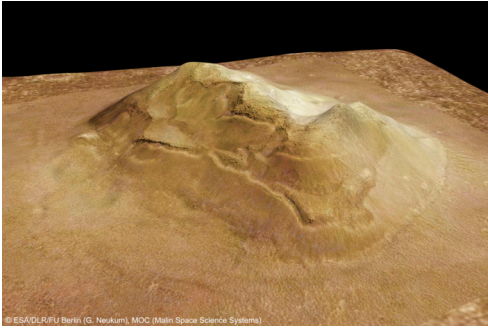
### Valles Marineris...the view of a future astronaut



### More mysteries on Mars?



A better look at "The Face"



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