



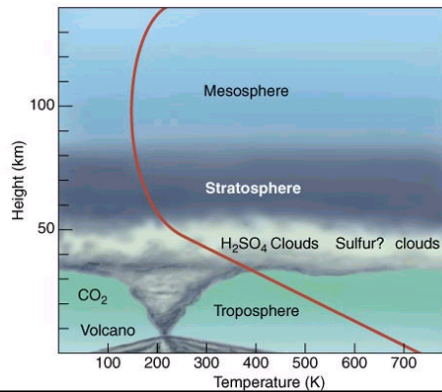
Venus

	Venus	Earth
Diameter	0.95	1
Mass	0.81	1
Density	0.96	1
Rotation (days)	-243	1
Semi-major axis	0.72	1

The Atmosphere of Venus

	Venus	Earth
CO ₂	96%	0.03%
N ₂	3.5	78.1
Ar	0.006	0.93
O ₂	0.003	21.0

- Surface Pressure = 92 x Earth's
- Surface Temperature = 482° C
 - melting point of lead: 327°
- Sulfuric acid cloud layer.



Venera Landers (USSR)

Venera 7 (1970)
 Venera 9,10 (1975)
 Venera 11,12 (1978)
 Venera 13,14 (1981)



ВЕНЕРА-14 ОБРАБОТКА ИППИ АН СССР И ЦДКС



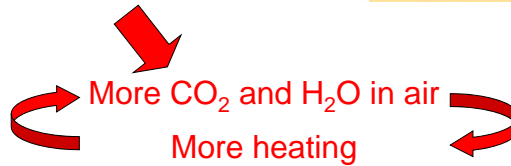
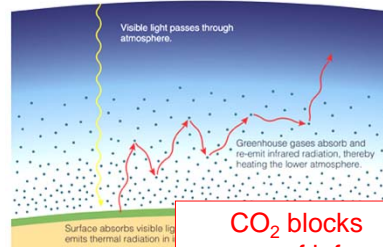
ВЕНЕРА-14 ОБРАБОТКА ИППИ АН СССР И ЦДКС

The view from Venera 14

Venera 13, 14 soil samples: basalts

The Runaway Greenhouse Effect

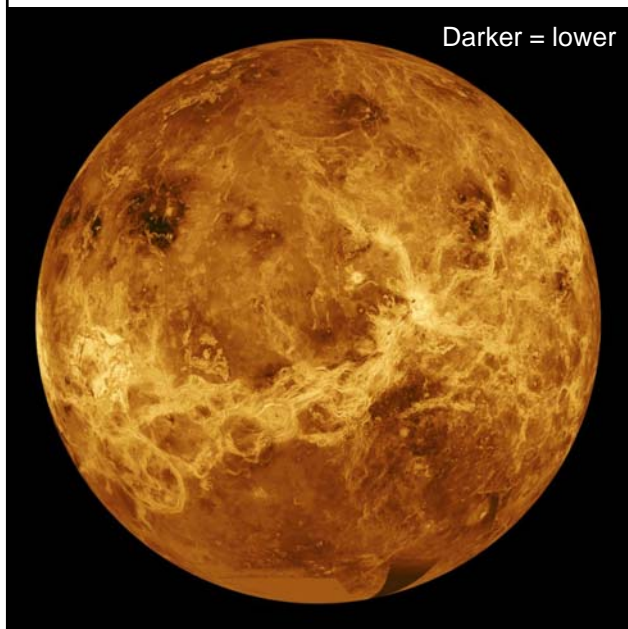
- Suppose Venus started like Earth
 - CO₂ originally dissolved in oceans or combined with rocks
- Modest extra heating



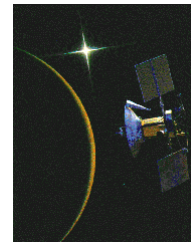
- H₂O → 2H + O
- Hydrogen atoms escape from gravity field

Atmosphere evolves... no going back.

Radar Map of Venus



Made by
Magellan orbiter
in 1991-93.

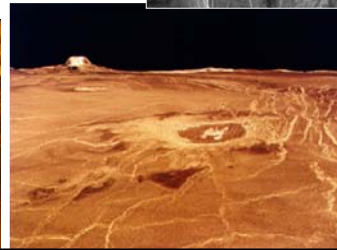
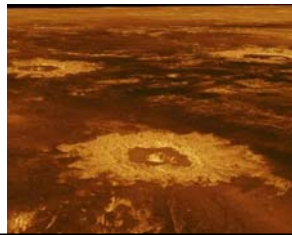
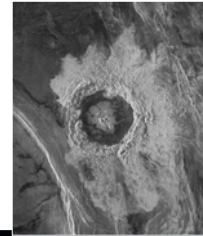


Rotating Venus

The surface of Venus

[7.4]

- Impact craters
 - age dating of surface
 - only 15% as many craters as lunar maria.
- → Oldest terrain only 750 million yrs old
 - compare to 3.8 billion yrs on Earth

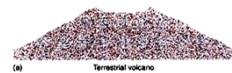


Radar Images of craters.

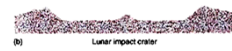
The surface of Venus

[7.4]

- Impact craters
 - age dating of surface
 - only 15% as many craters as lunar maria.
- → Oldest terrain only 750 million yrs old
 - compare to 3.8 billion yrs on Earth
- Constant resurfacing by volcanic action.
 - Some still going on.

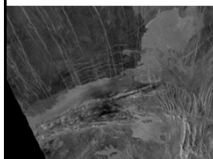


(A) Terrestrial volcano

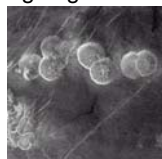


(B) Lunar impact crater

Sif Mons, a shield volcano
300 mi diameter x 3 mi high.



Lava flow



"Pancake" volcanoes
(very thick lava).



Corona: collapsed dome
over magma chamber.



Interior Structure

More Magellan
Radar
Images

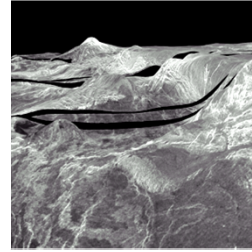
- Similar to Earth
- Iron core 3700 miles in diameter
- Molten mantle
- Crust

Tectonics

- No plates as on Earth
- But much shearing, compression and stretching of crust by convection currents in mantle.
- Has pushed up "continents"
 - Aphrodite and Ishtar



Lakshmi Planum
Hilly area on Ishtar



Ridges & cracks

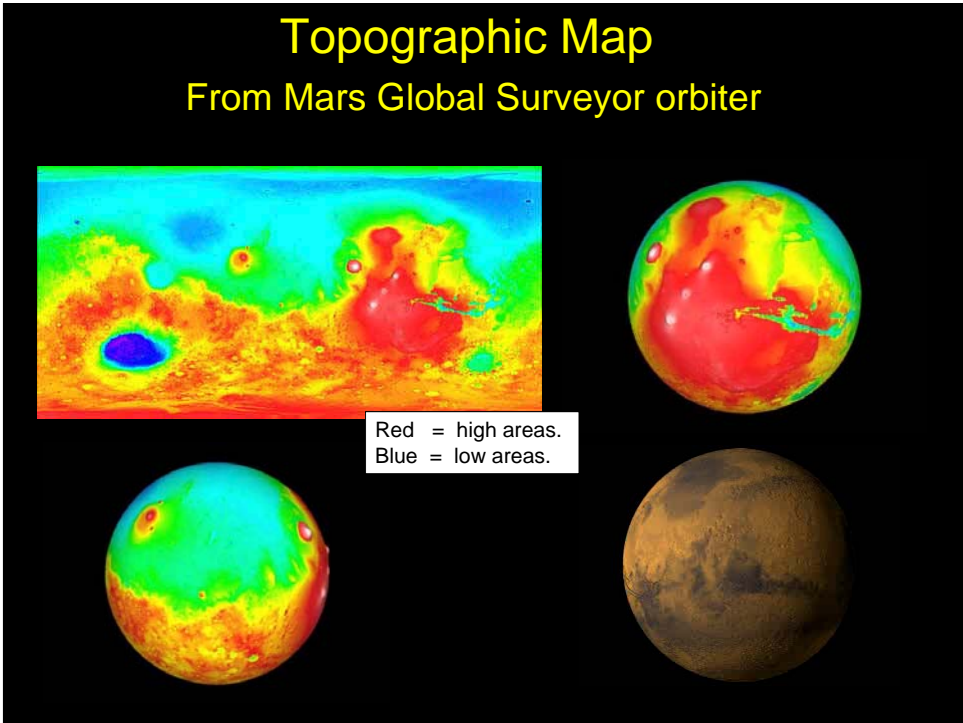
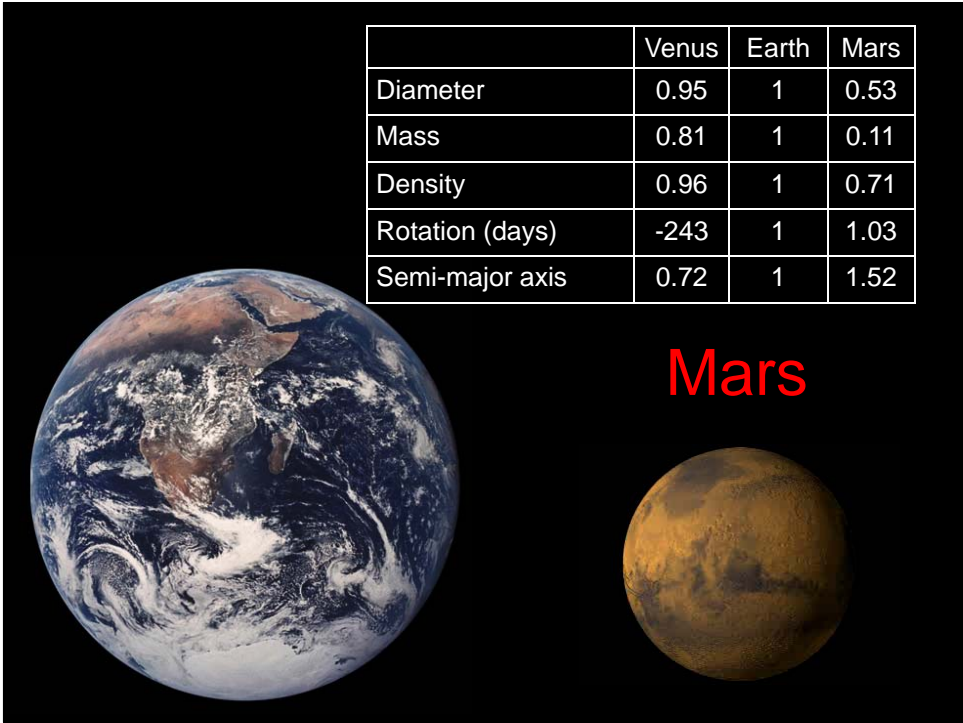


Mars

Some of the 19 spacecraft
that have gone to Mars:

- Mariner 9 orbiter (1971-72)
- Viking 1,2 landers (1976-80)
- Pathfinder lander + rover (1997)
- Odyssey: orbiting Mars since Oct 2001
- Mars Express: orbiting Mars since Dec 2003
- Mars Rovers: driving around since Jan 2004
- Mars Reconnaissance Orbiter: orbiting since Nov '06
- Phoenix Lander: 2008

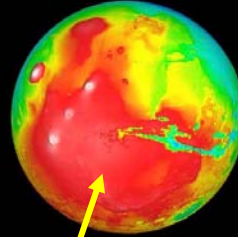
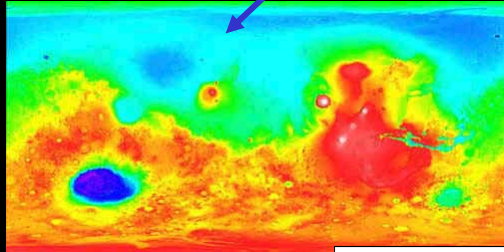




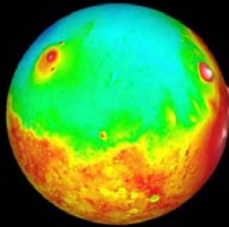
Topographic Map

Low-lying lava plains

- average of 3 miles lower than continents.
- Same age as lunar maria - 3-4 billion yrs old.



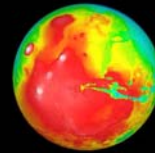
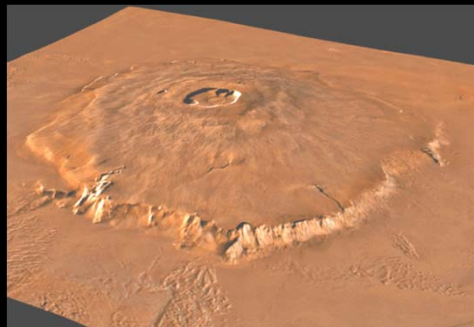
Red = high areas.
Blue = low areas.



Tharsis bulge

- uplifted continent 6 miles high.
- has 4 huge volcanoes, 9 miles (49,000 feet) high.

Olympus Mons



- 300 mile diameter.
 - Would cover MI lower peninsula.
- 15 miles above surrounding plains.
- Largest mountain in Solar System.
 - 100 x volume of Mauna Loa.
- Less than 100 million yrs old (impact crater counts).
 - Mars still geologically active.