AST 301
Introduction to Astronomy

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Go to Department of Astronomy courses,
AST 301 (Lacy), course website

Rearranged schedule for next few weeks

This week: Introduction to planets and a bit of geology

Next week: Planet formation and a bit on small bodies

Third week: Atmospheres

9/27 Ch 7

10/4 Ch 8 (Prof. Dinerstein)

10/11 Ch 10

10/18 Ch 13 (back on schedule)

Wednesday's quiz

A red laser and a green laser. Both emit 1 mW of power.

Red is longer wavelength.

Green is higher frequency. ($f = c/\lambda$)

Green photons have high energy. ($E = hf$)

Same power (1 mW).

Power = Energy/sec = Energy/photon x photons/sec,

so you need more red photons to carry the same amount of power as the green photons.

Topics for this week

Describe and compare briefly the compositions and orbits of the terrestrial planets, Jovian planets, asteroids, and comets.

What is inside of the terrestrial planets?

What determines the appearances of the surfaces of the terrestrial planets?

How do we determine the age of the planets?

Terrestrial Planets

The inner four planets

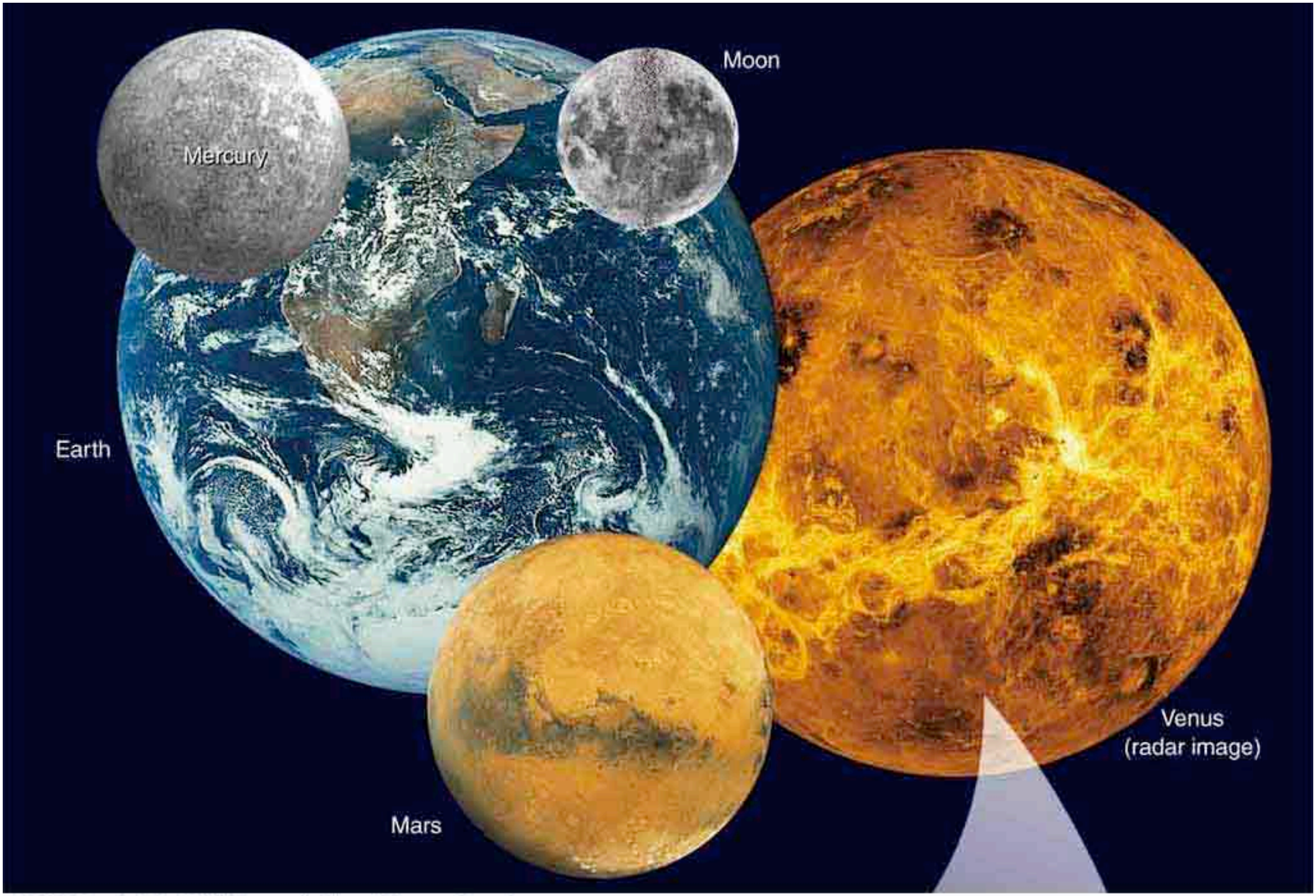
Sizes similar to the Earth's

Interiors made of metals and rocks

Very thin atmospheres (compared to the diameters of the planets)

Earth also has oceans (and Mars may once have). These also make up a small fraction of the volume.

The order from the Sun: Mercury, Venus, Earth, Mars



Jovian planets

The next four planets

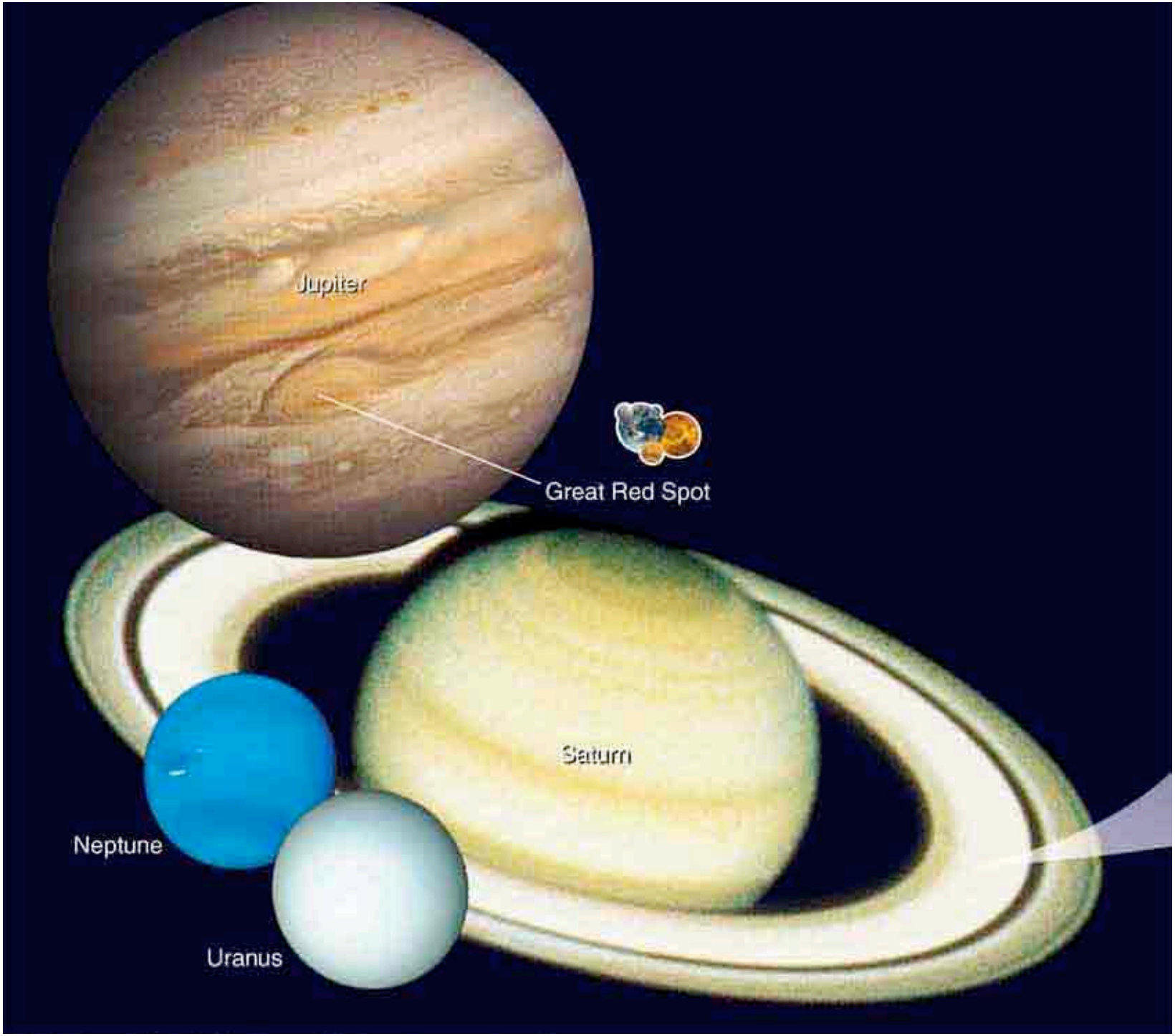
Diameters about 10 times the terrestrial planets'

Interiors made of ices and gasses (probably with small rocky cores)

Jupiter and Saturn are mostly gas.

Uranus and Neptune are mostly (partially melted) ices.

The order from the Sun: Jupiter, Saturn, Uranus, Neptune (and then lots of smaller icy bodies like Pluto)


Jupiter
Great Red Spot
Saturn
Neptune
Uranus

“Flying” over Venus

The video was made from radar data from Venera and Magellan orbiters.

Brightnesses correspond to radar reflectivities (generally roughnesses).

The vertical scale is exaggerated by a factor of 10.

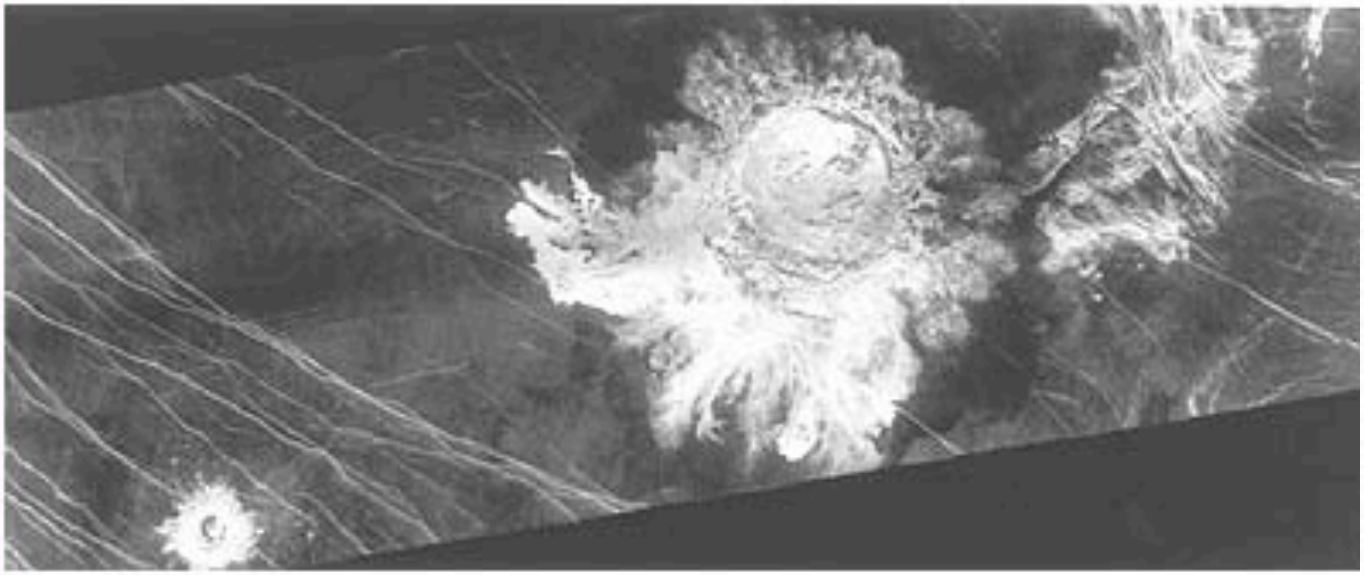
Most of the features are volcanic: domes, lava flows, and calderas.

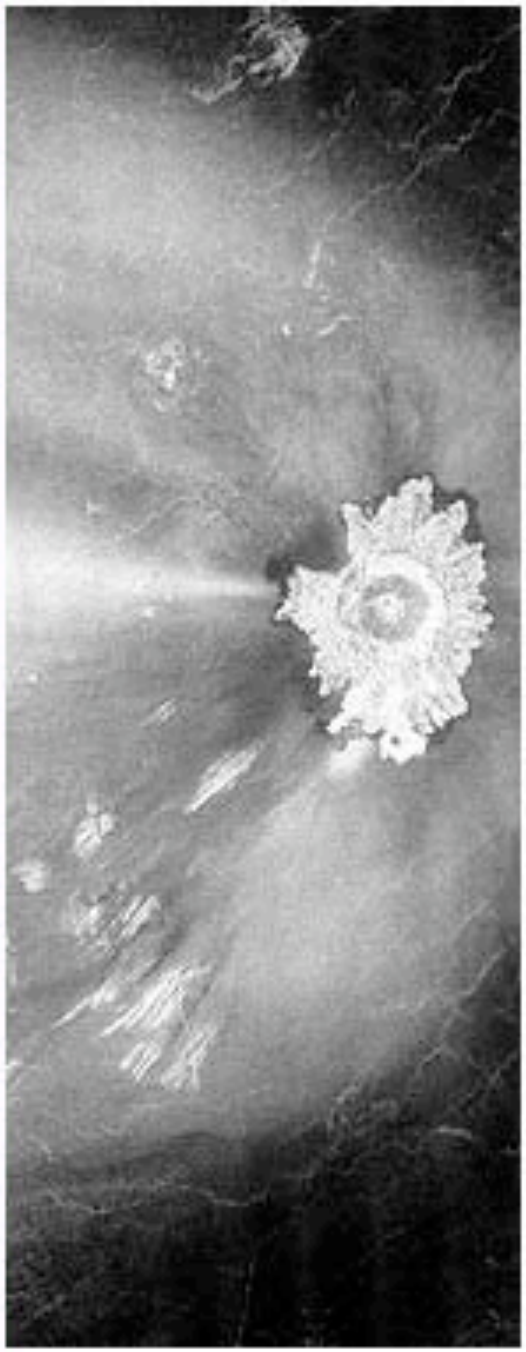
Others are impact craters.

Without liquid water, there is less erosion on Venus, so craters are more common and prominent than on Earth.

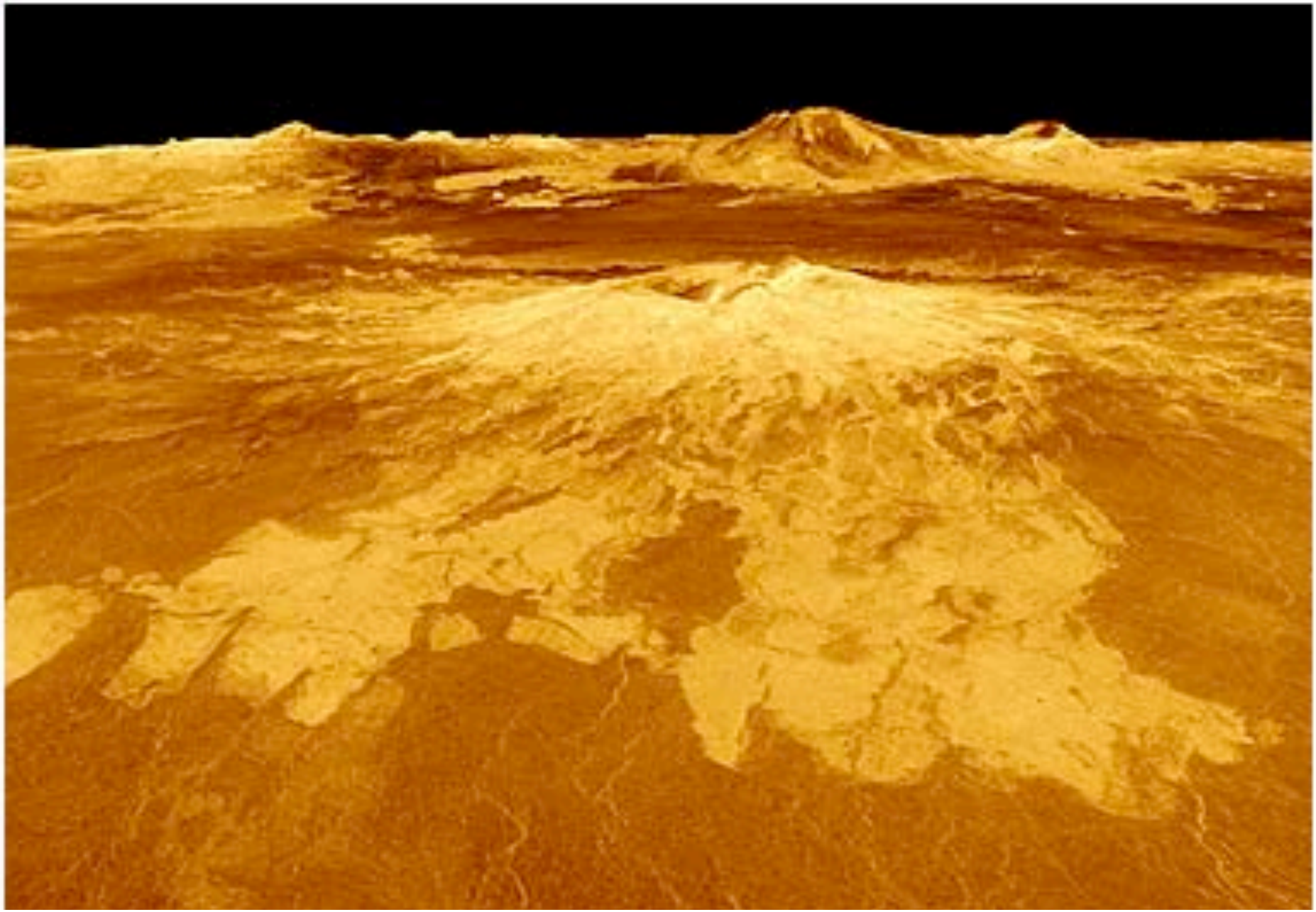
Impact craters

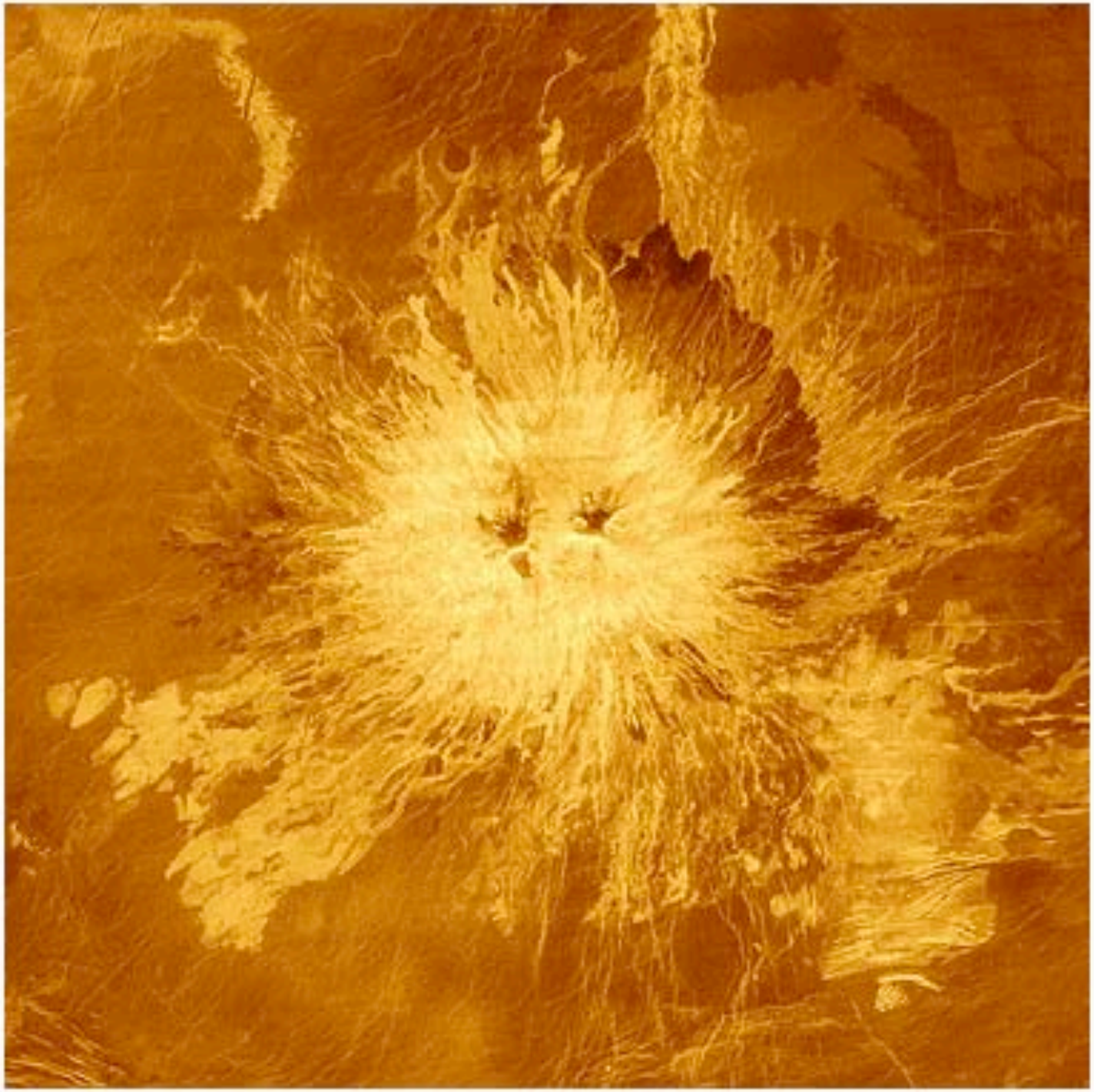
Why is it bright around the craters?
What is the streak going to the left?
Why is the surface between the craters smooth?



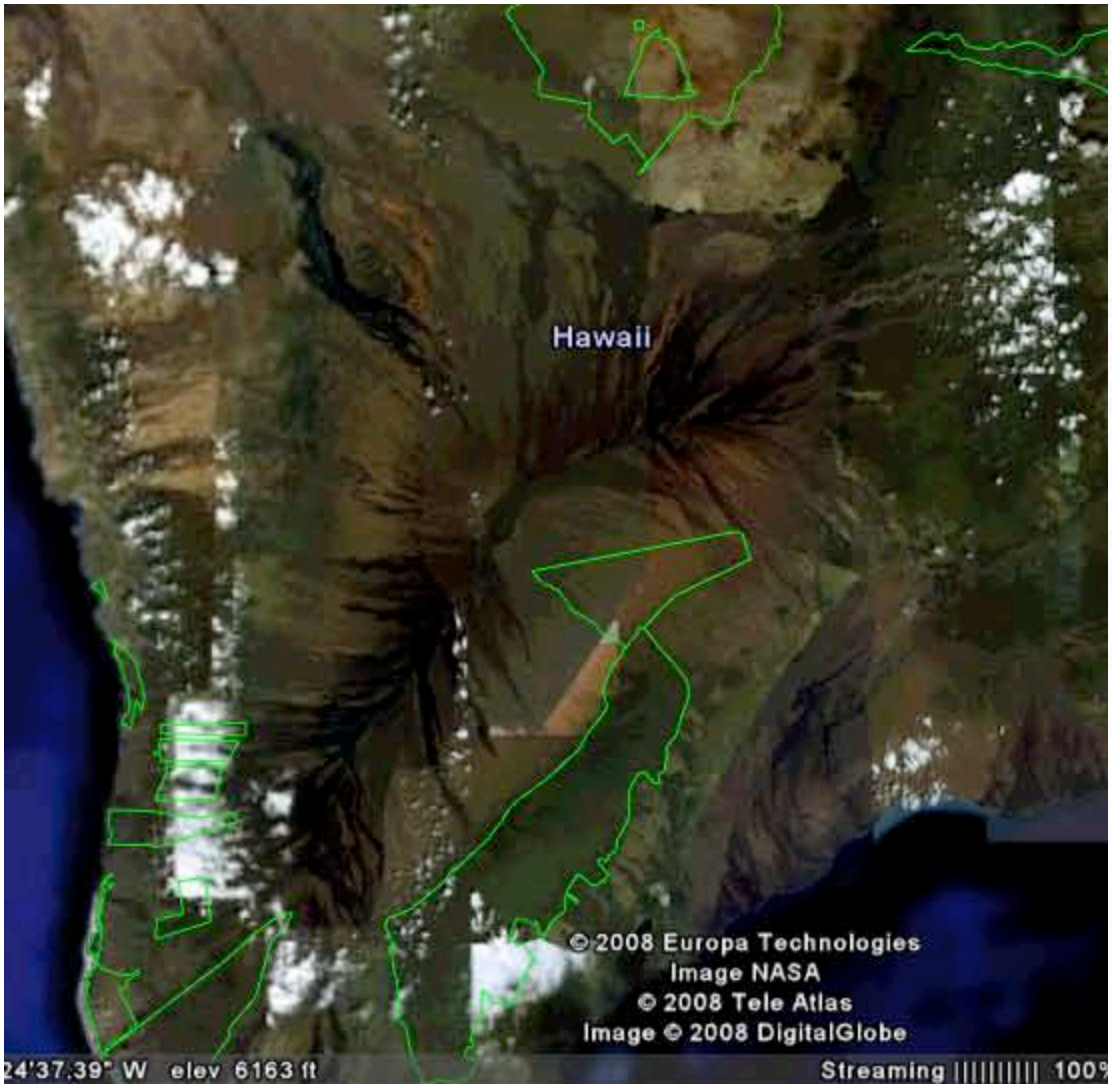


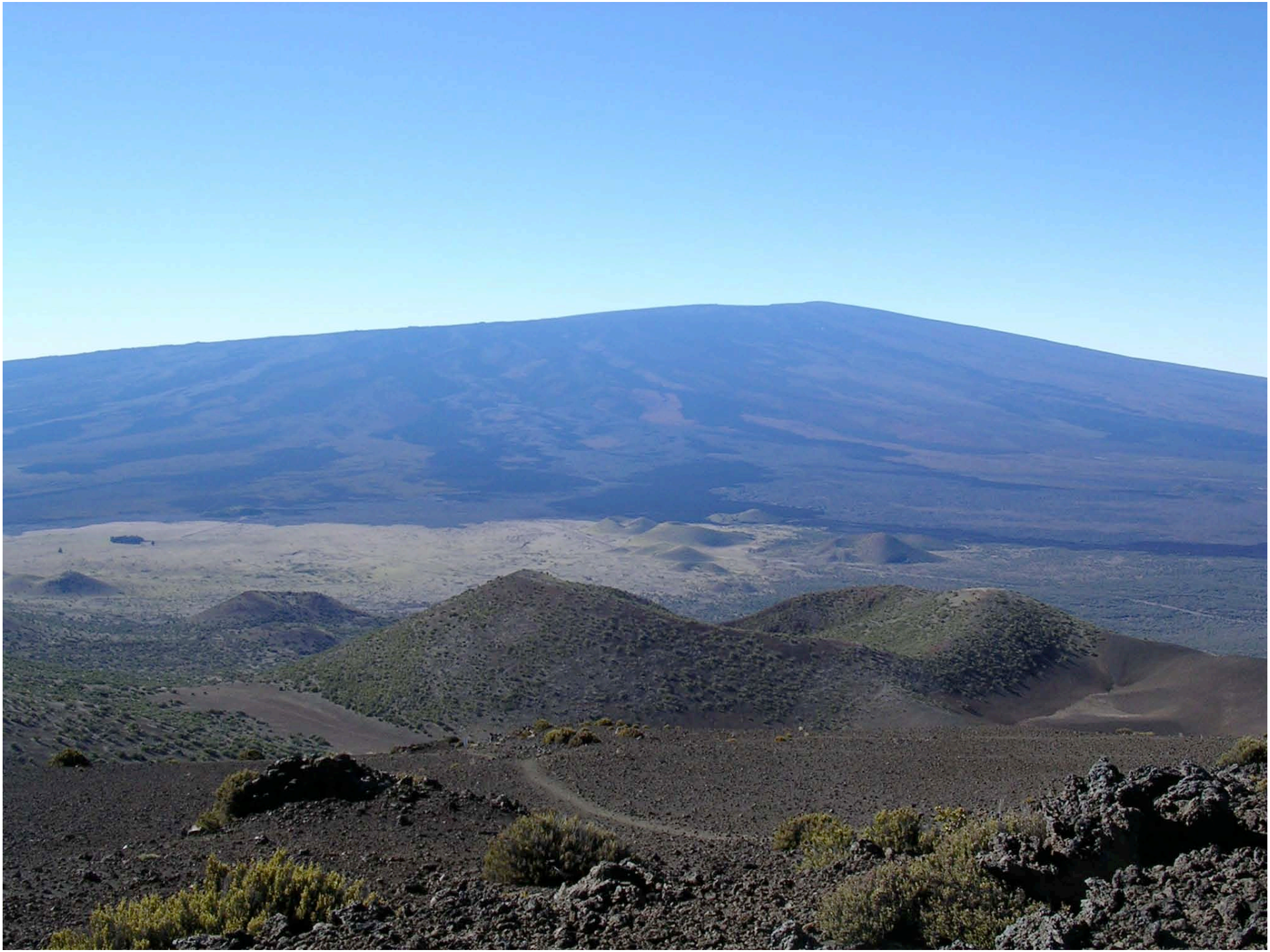
Shield volcanoes: Sapas Mons and Maat Mons

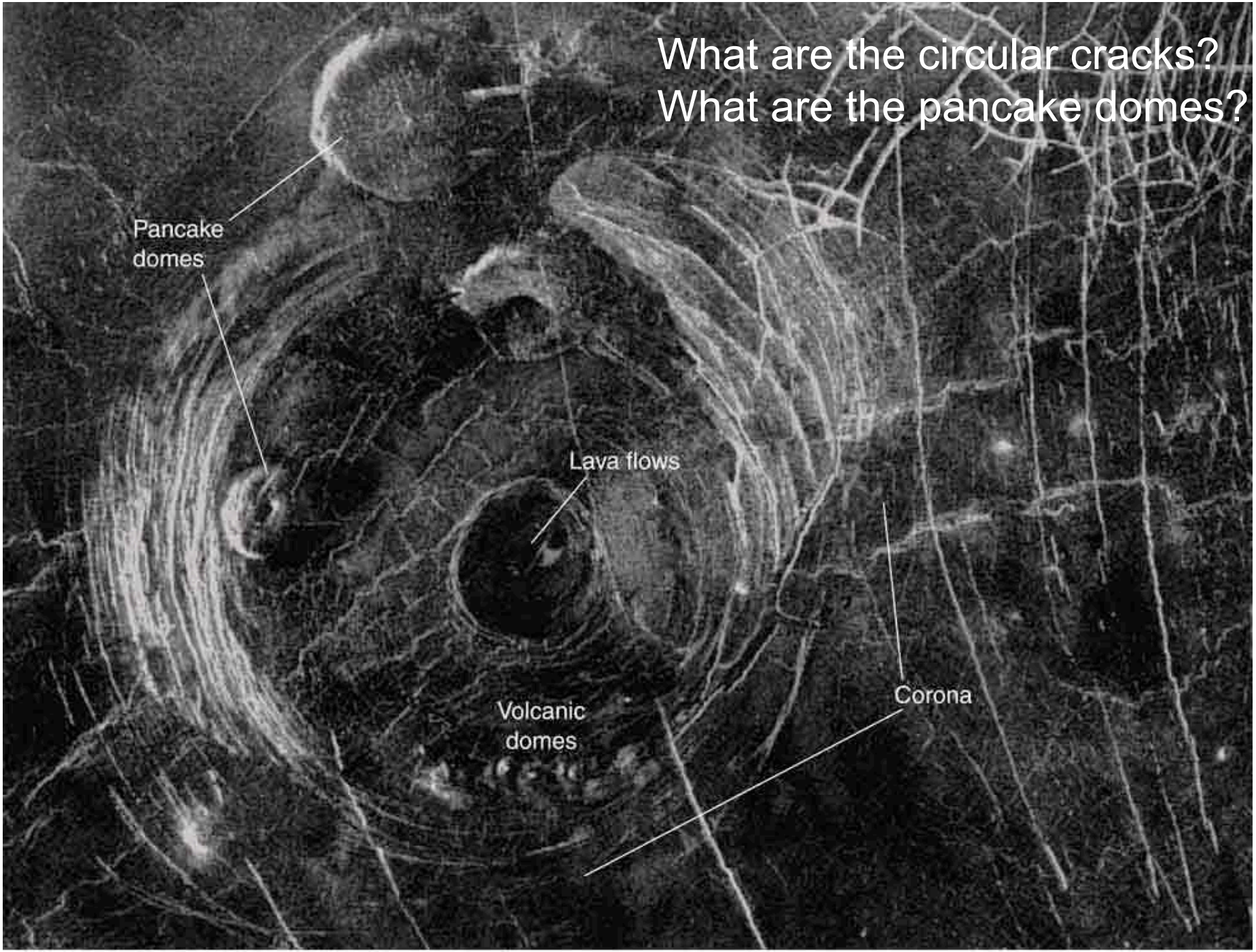




Mauna Loa
visible light and radar

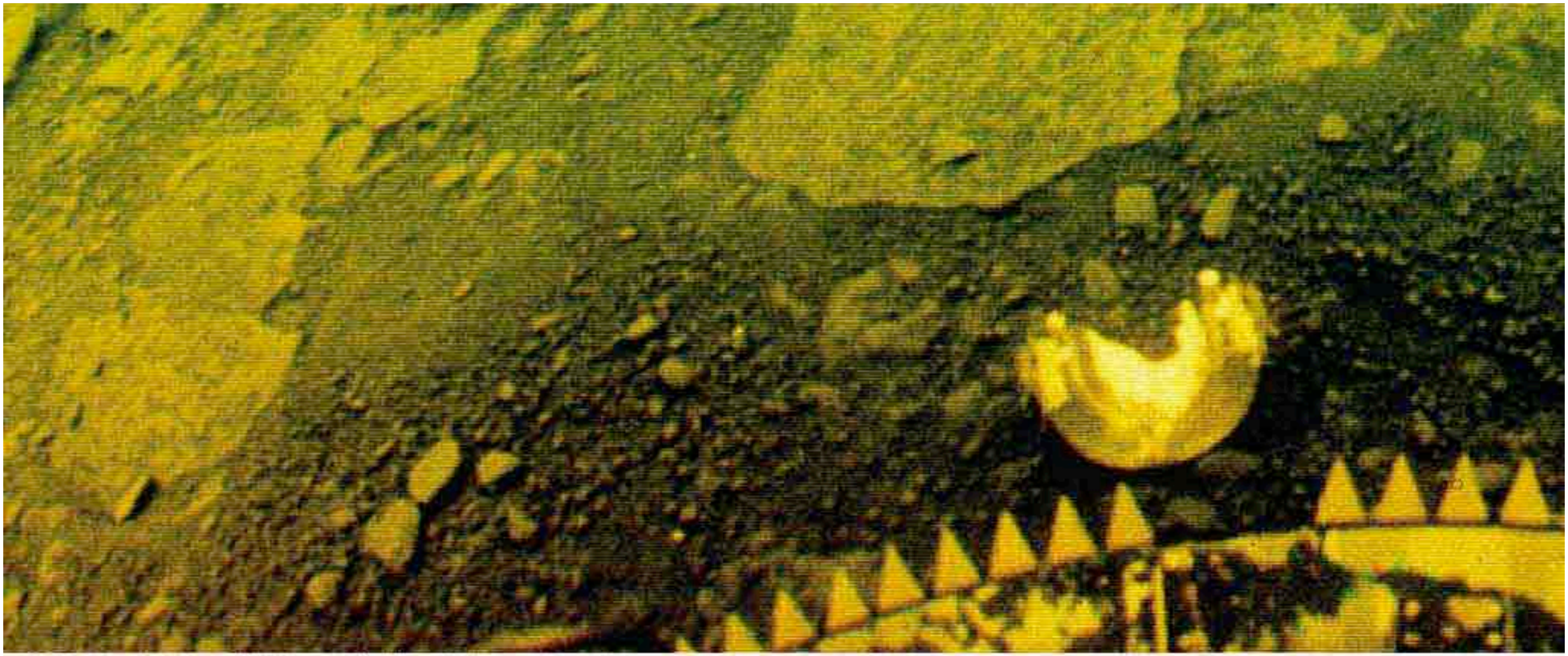






Russian Venera on the surface of Venus

Why haven't we been there?



Mars movie

The data are from the Viking orbiters.

Vertical scale is exaggerated by a factor of 5.

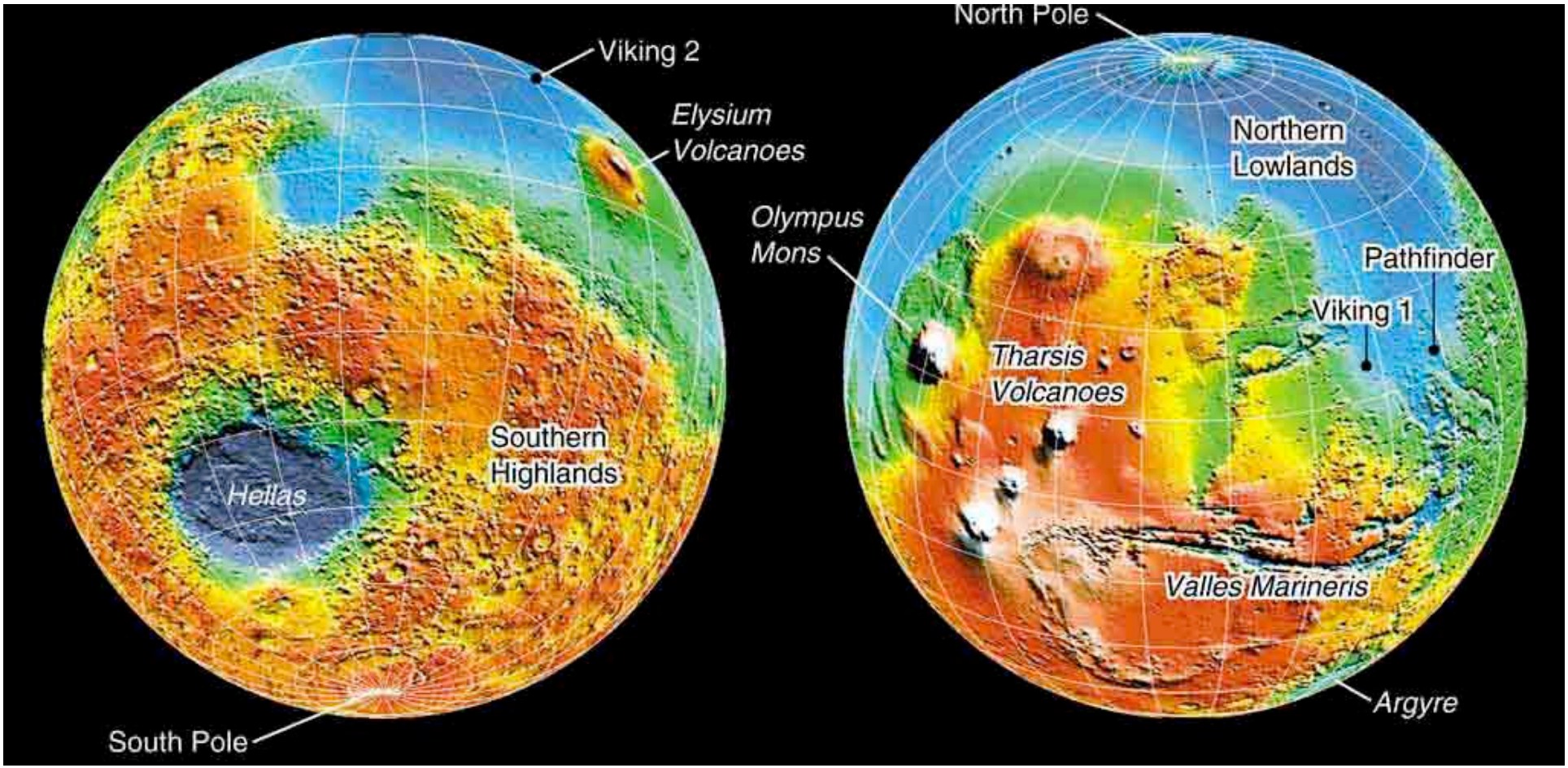
The “flight” goes over Valles Marineris, the Tharsis volcanoes, and Olympus Mons.

Valles Marineris may have been cut by water, and is 1800 miles long.

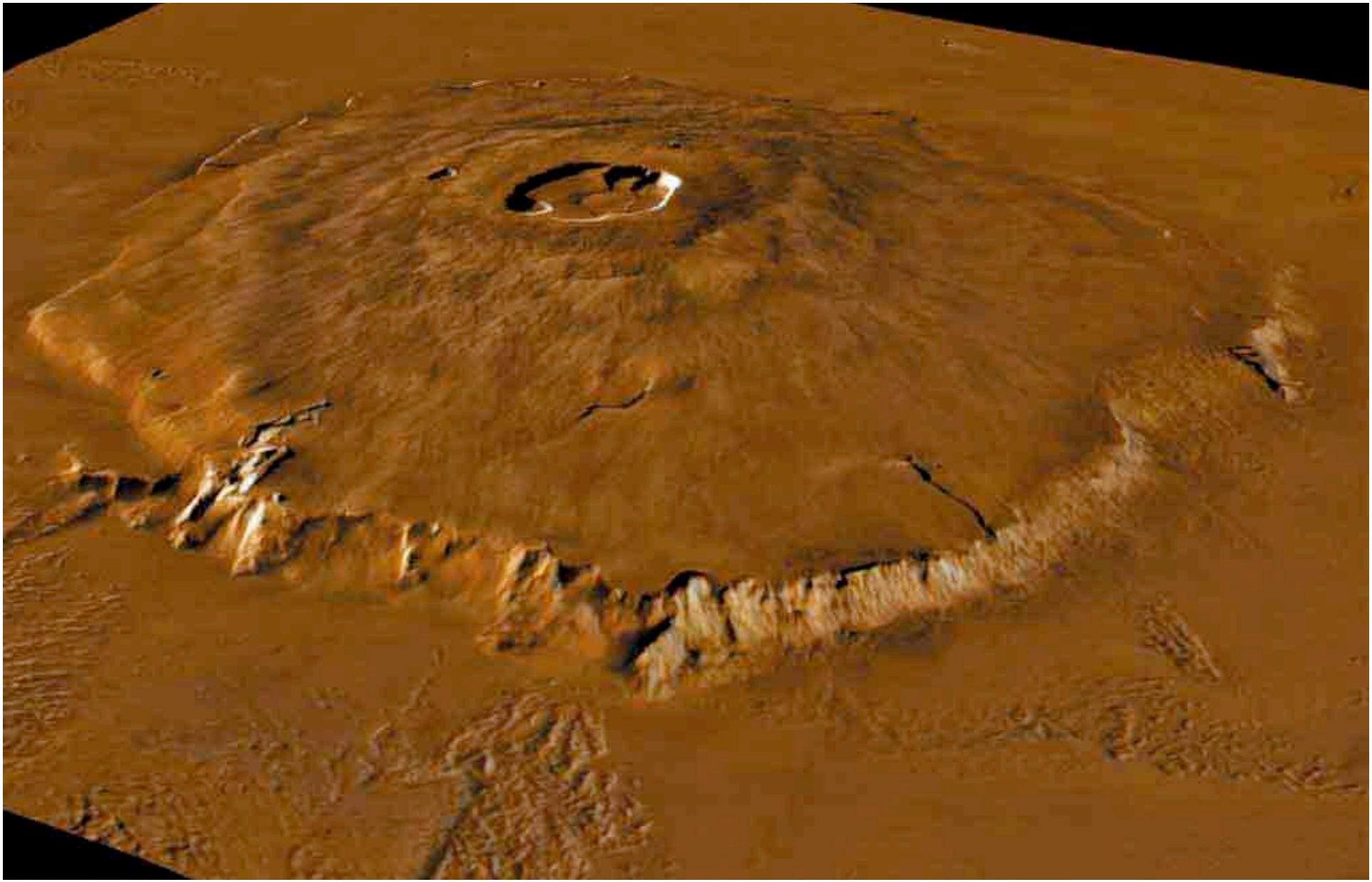
Olympus Mons is 15 miles (75,000 ft) high and as wide as Missouri.

Mars elevation map

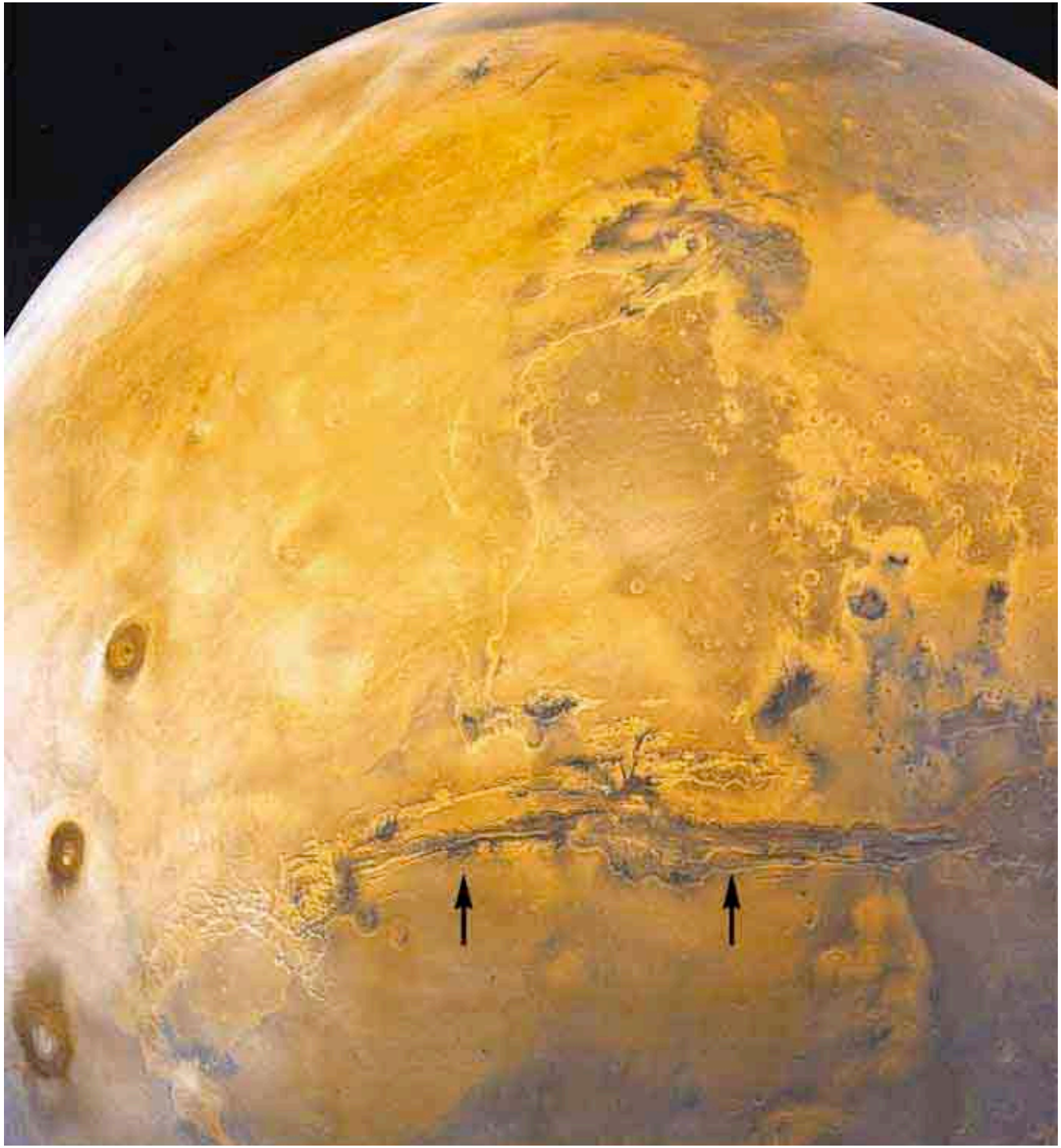
Why is the southern hemisphere higher and rougher?



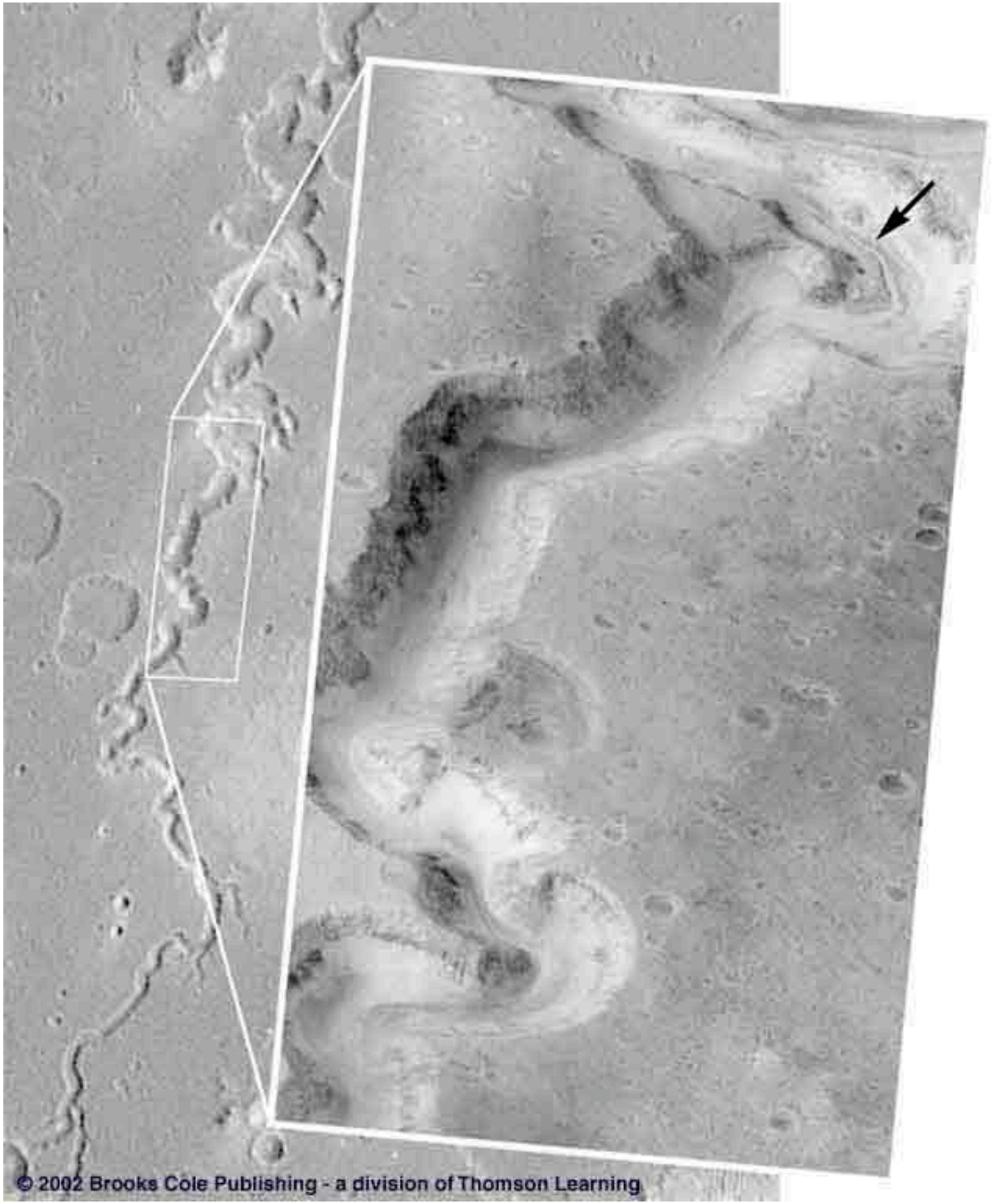
Olympus Mons

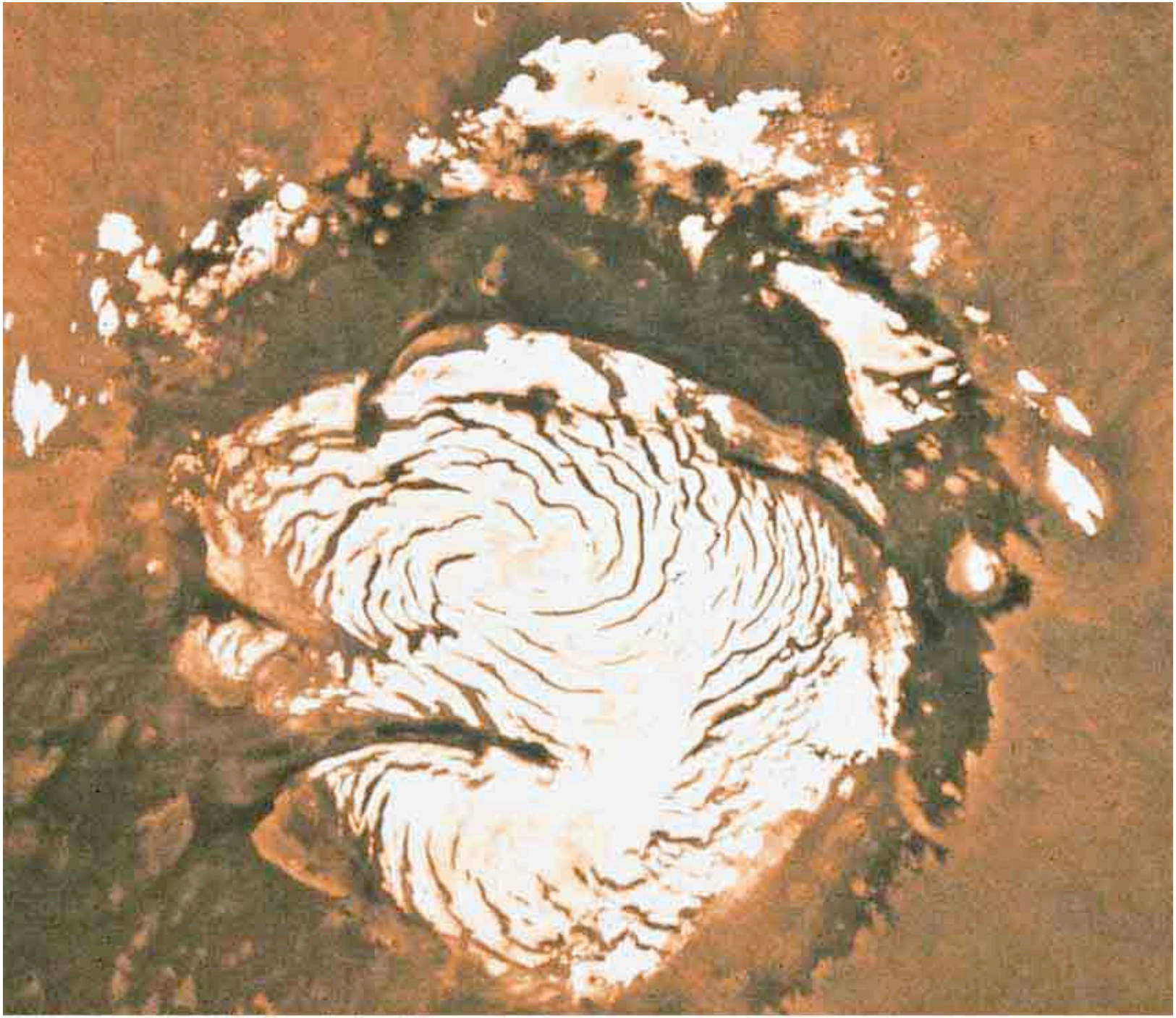


Valles Marineris and Tharsis volcanoes



Valles Marineris





A Question

Why are the volcanoes of Mars so much larger than volcanoes on Earth?

What is different about Mars that might cause its volcanoes to be larger?

Ask your neighbors and come up with some guesses.