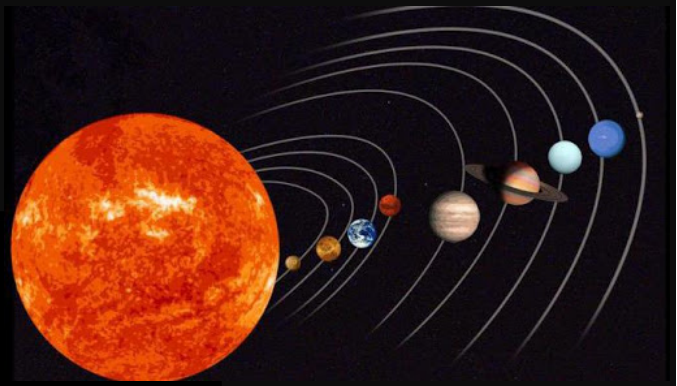
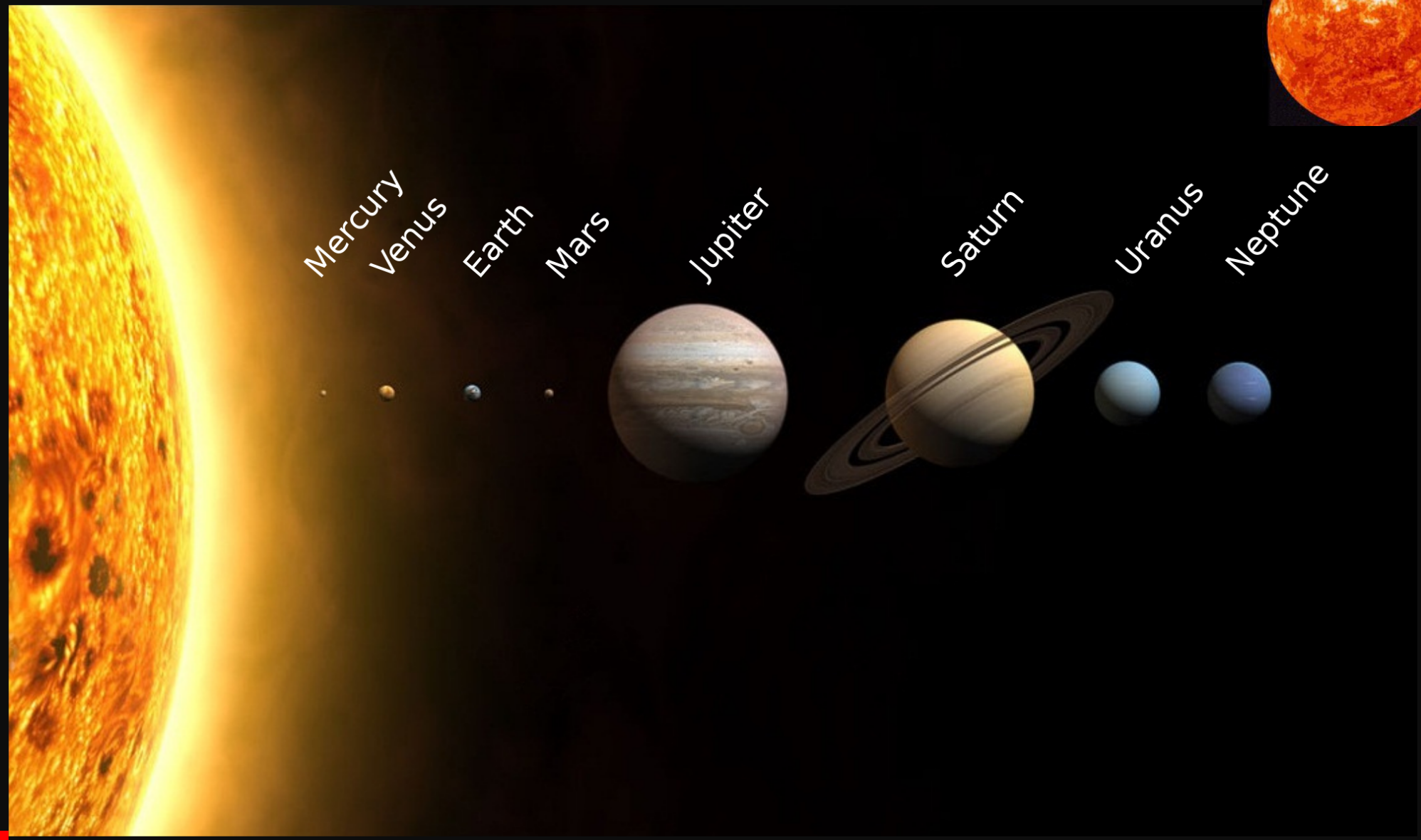
Planets in our Solar System ...

What are we looking at ?

Planets in the Solar System …

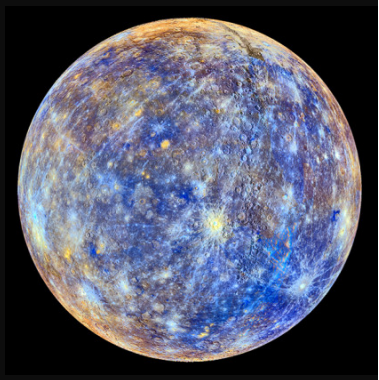


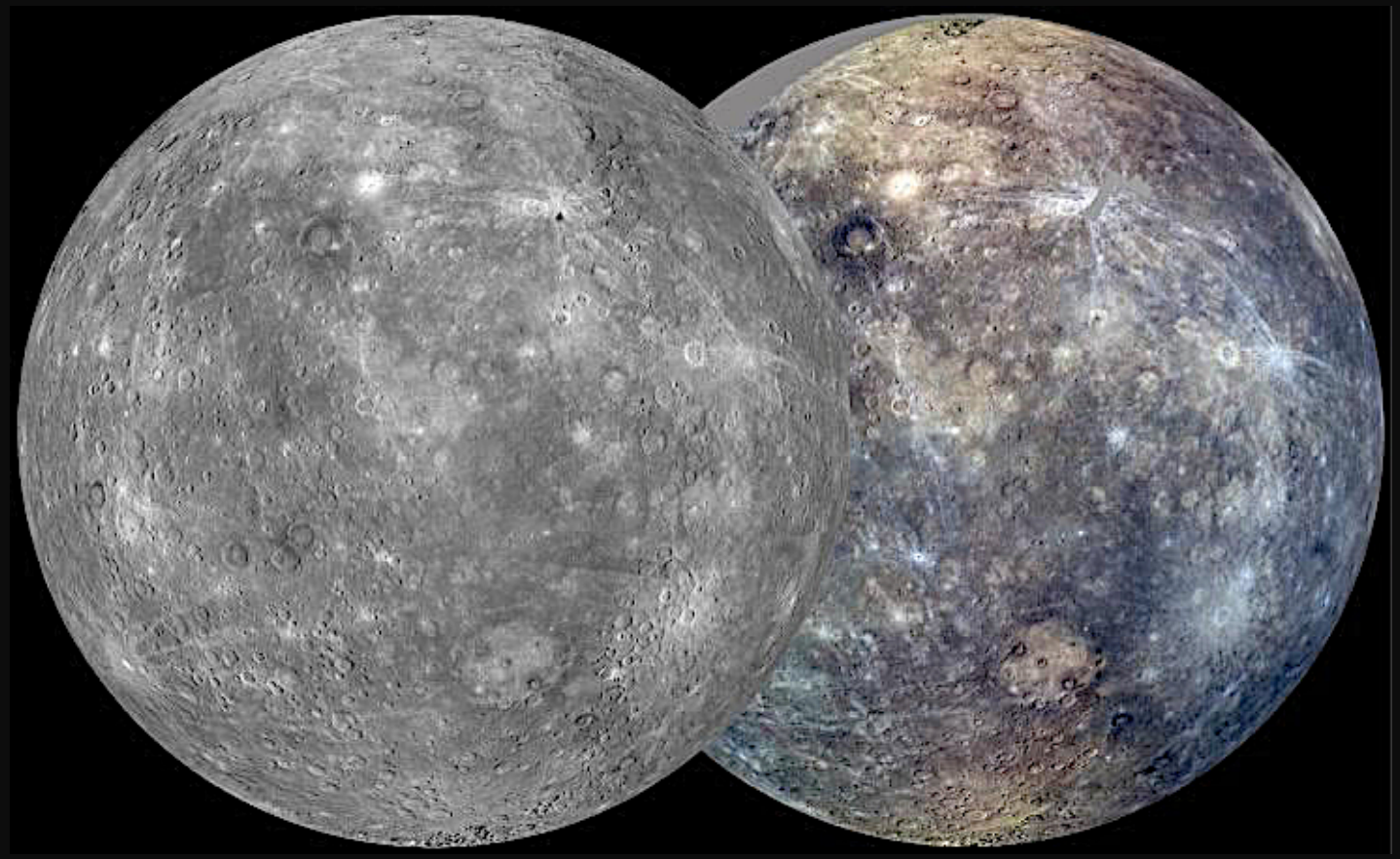


NASA

Mercury…

How did it form ? … and how do we know ?





Planet-scale …

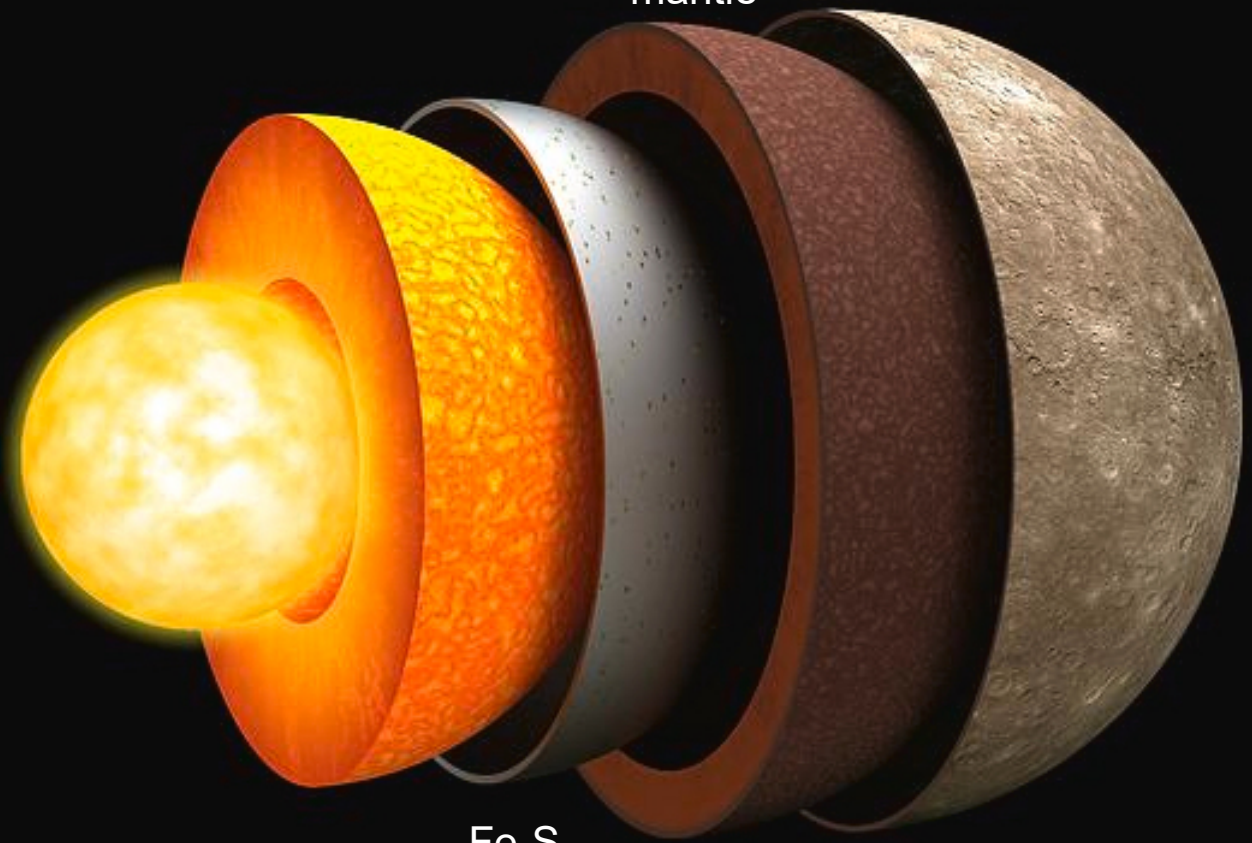
100m

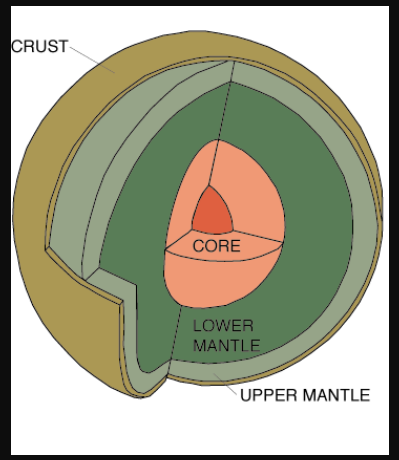
Raw and processed global views

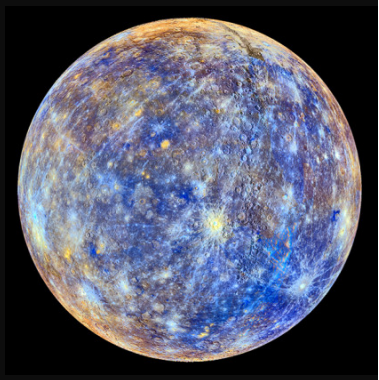
MESSENGER : MErcury Surface, Space ENvironment, GEochemistry, and Ranging

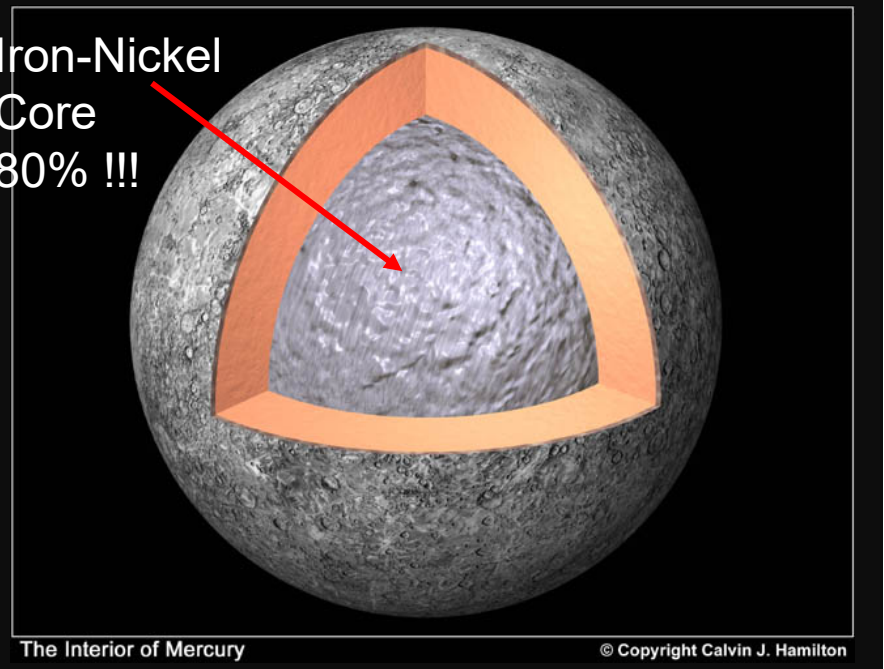
NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington

How did Mercury form ?



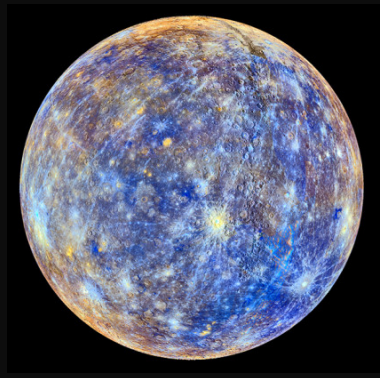


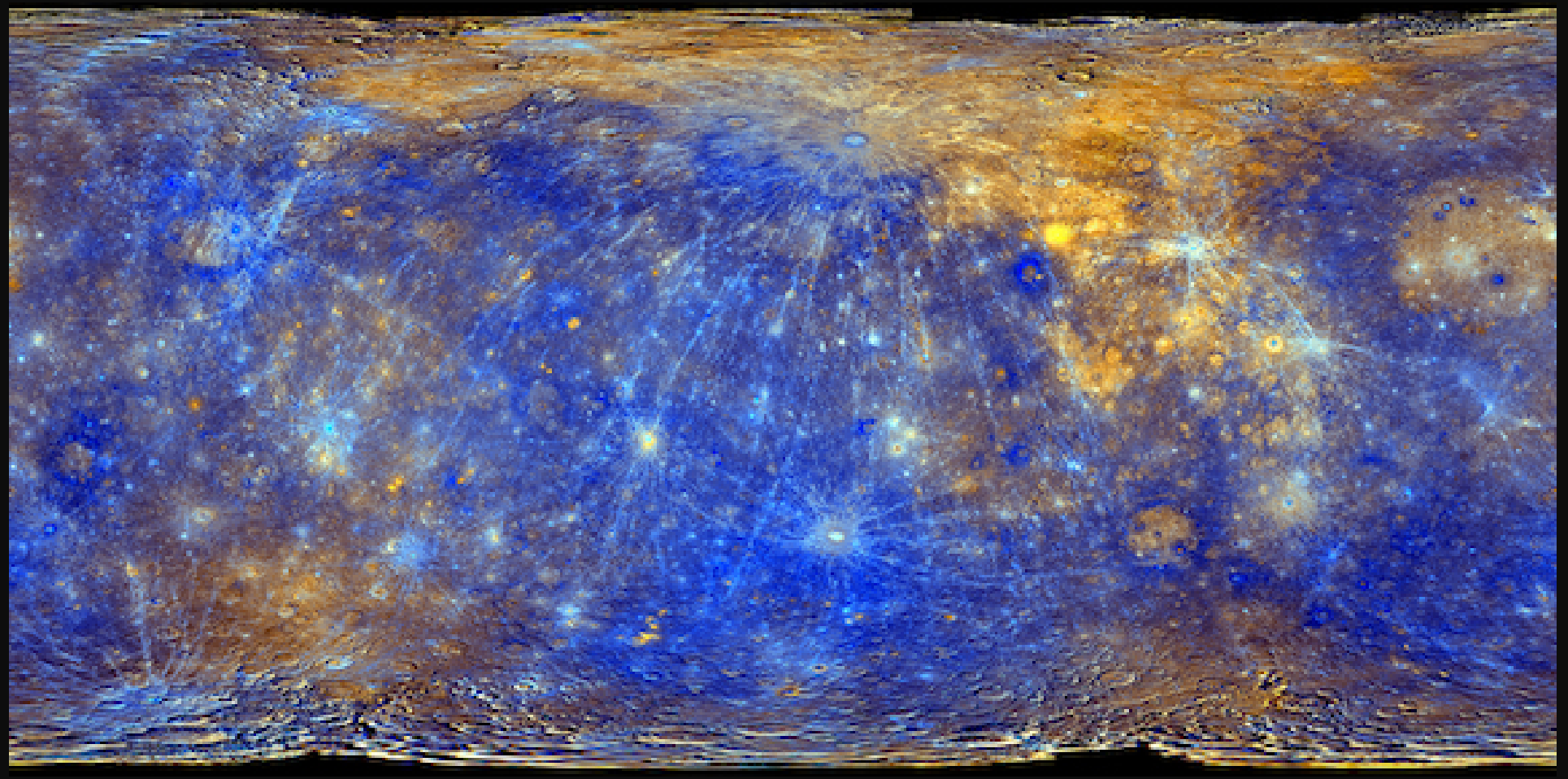




THE FUNDAMENTAL ISSUE

How did Mercury form ?





Carbon =

100m

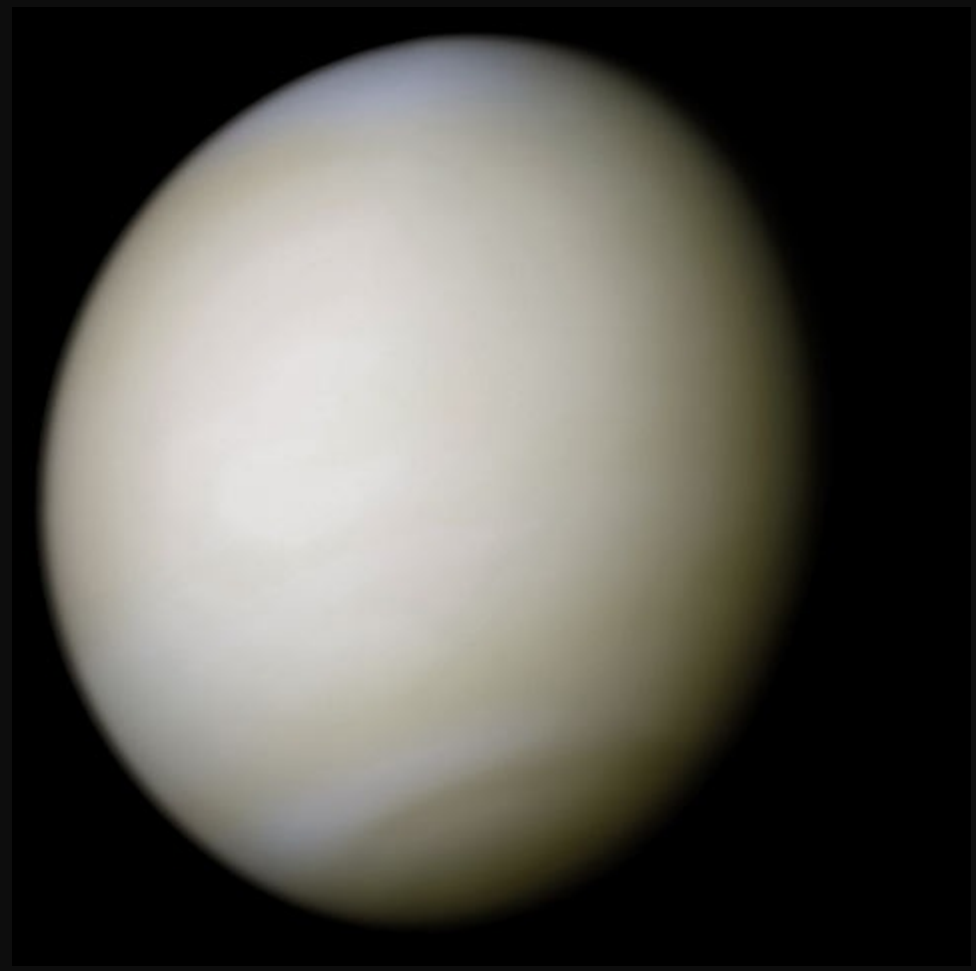
Graphite !!

Impact excavated “low reflectance material”

NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington

Venus … what do we know and how ?

Venus ... bedrock

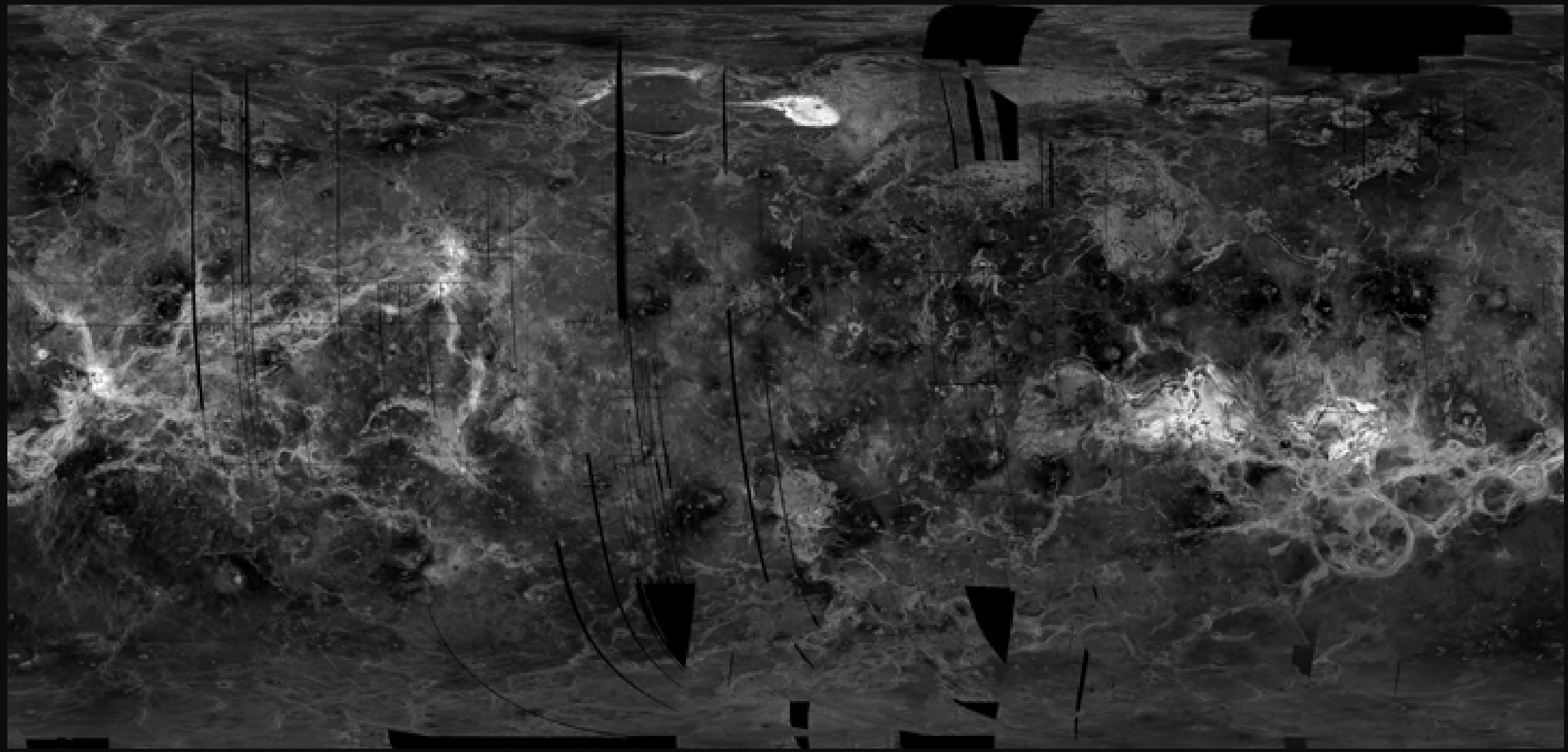


Venus ... cloud tops

NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington

NASA

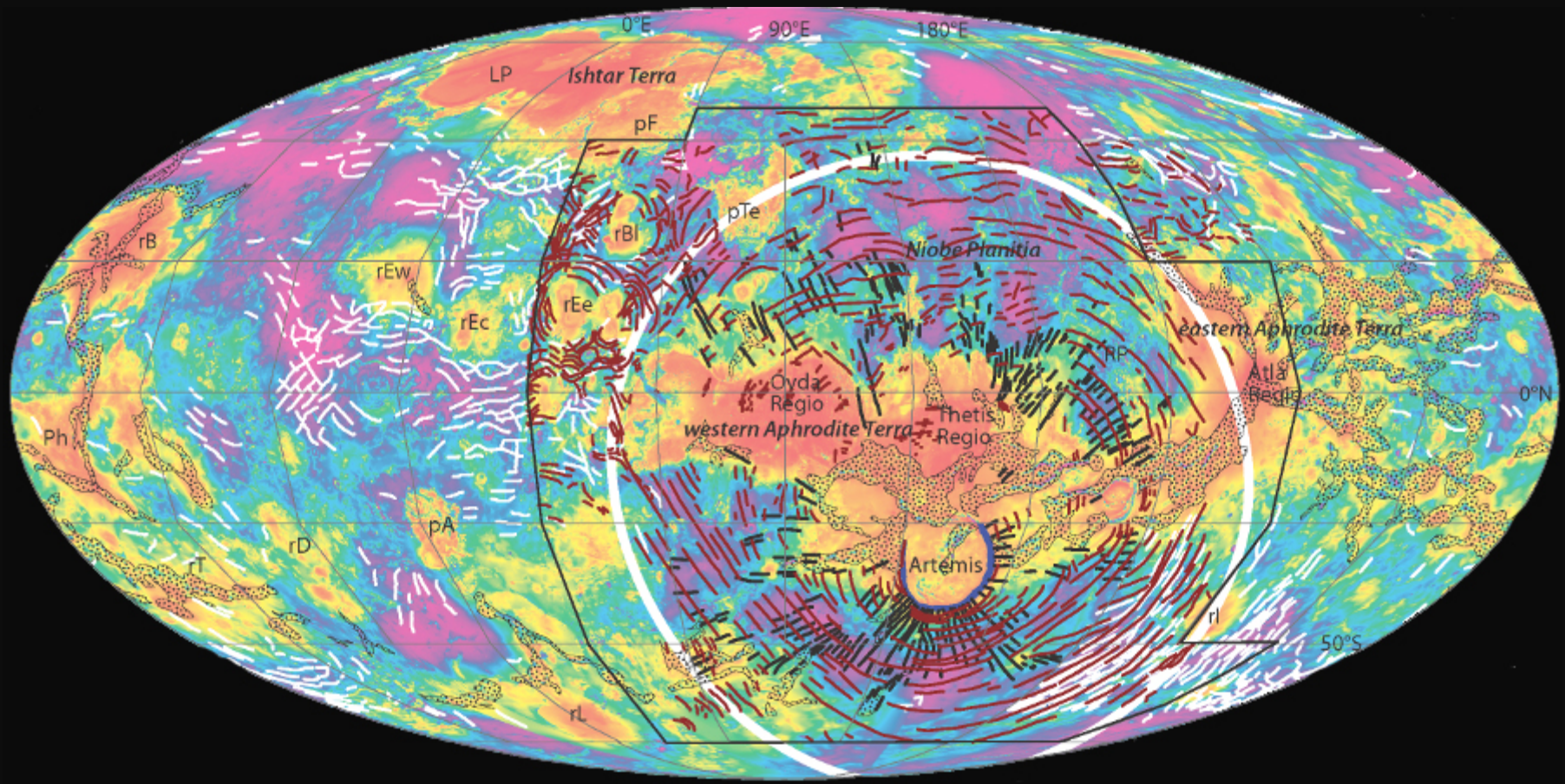
What does Venus' surface look like … in radar ?



NASA/JPL

Greater Artemis …

Outer trough – 5,000 km across
Radial dyke swarm – 12,000 km
Concentric ridges – 13,000 km



Size gives new perspective on origin …

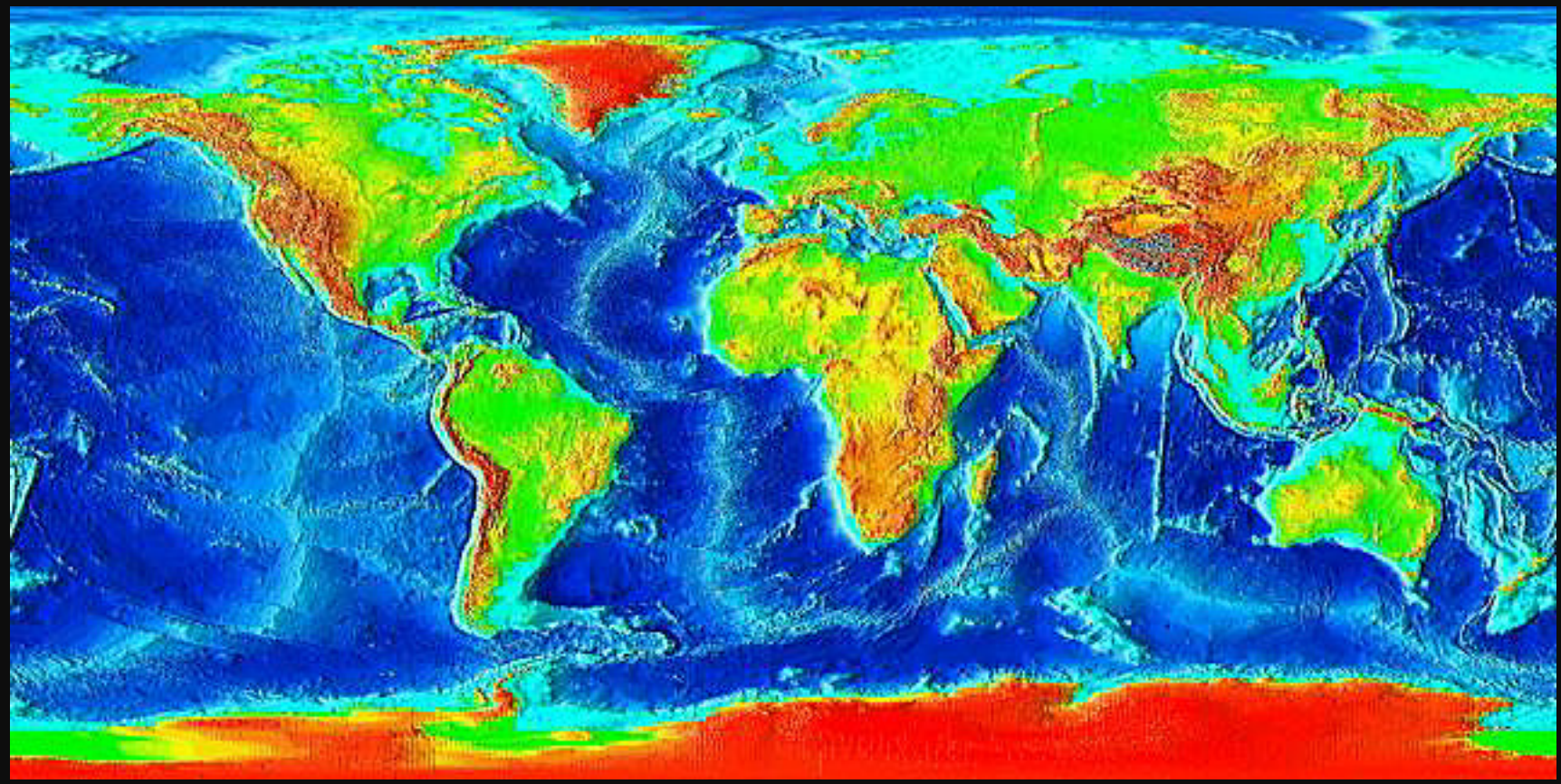
Hansen 2011

Hansen & Olive, Geology, 2010

Earth-Moon System

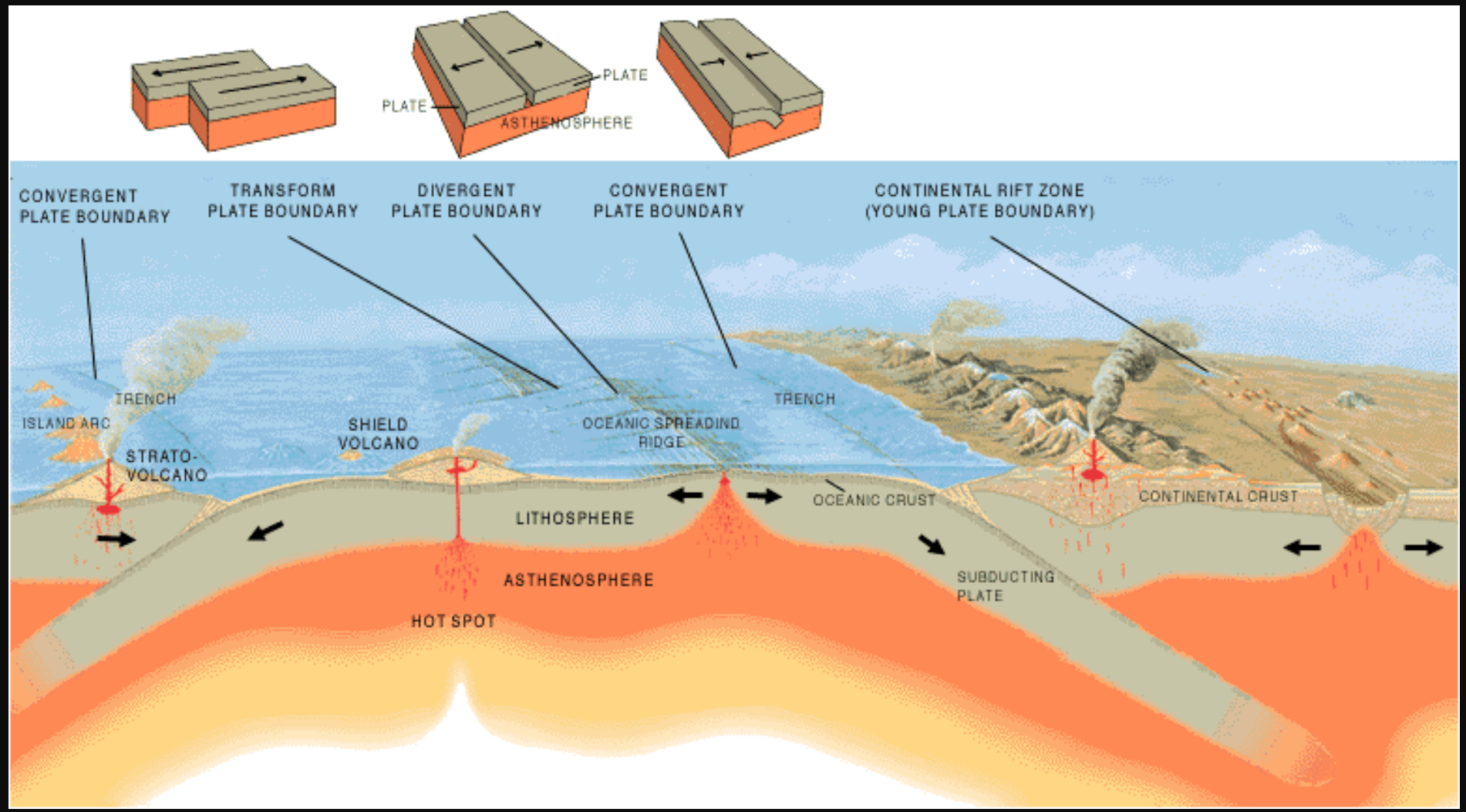
NASA

Continents, ocean basins, mid-ocean ridges, volcanic arcs and mountain belts …



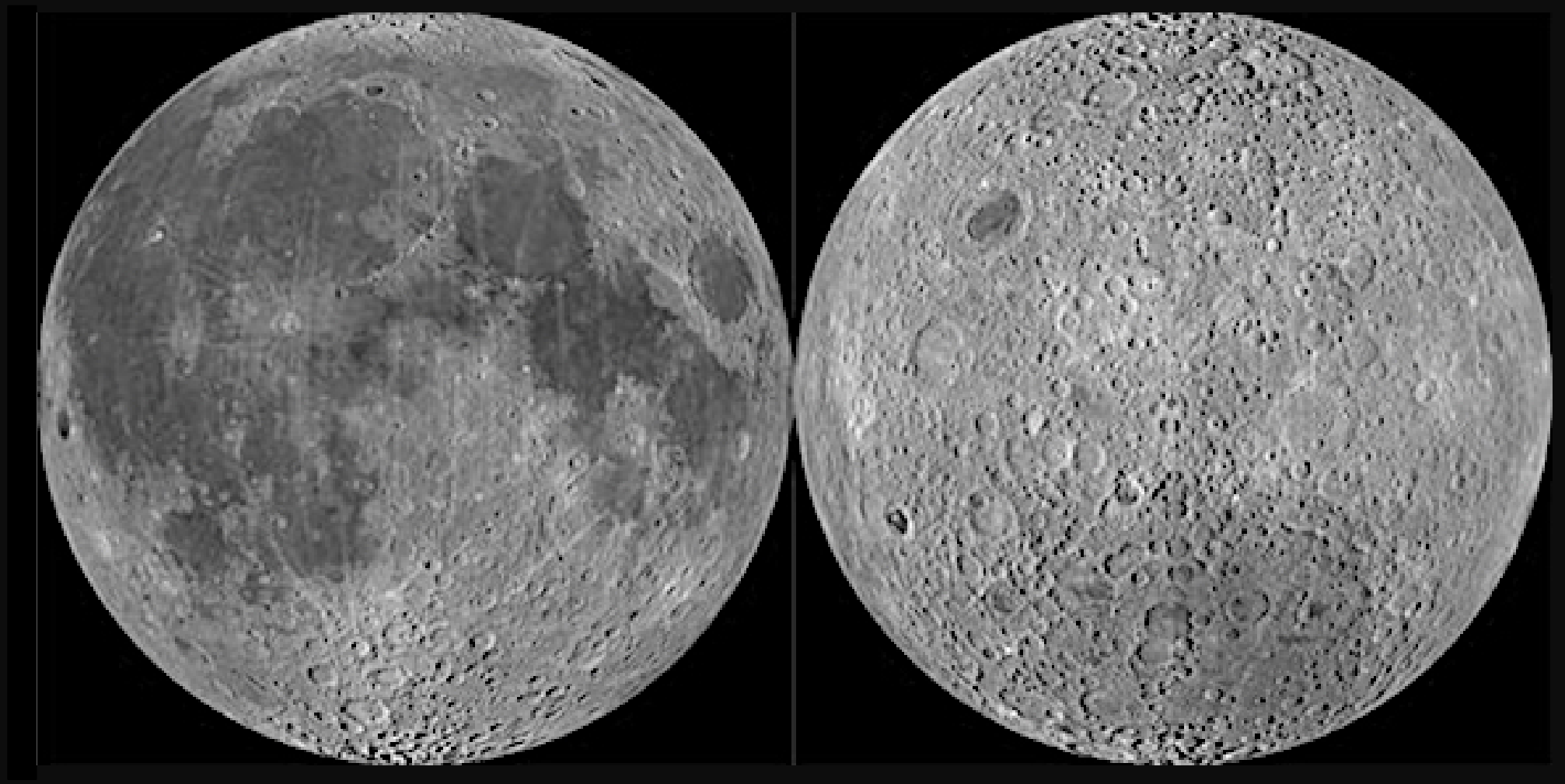
This is the "signature" of **plate tectonics** today … and the way heat escapes from the planetary interior

Plate tectonics - spreading and subduction - allows the Earth's interior to cool down



Earth's Moon …

Two-faced Moon … product magma ocean crystallisation + mare volcanism



NASA

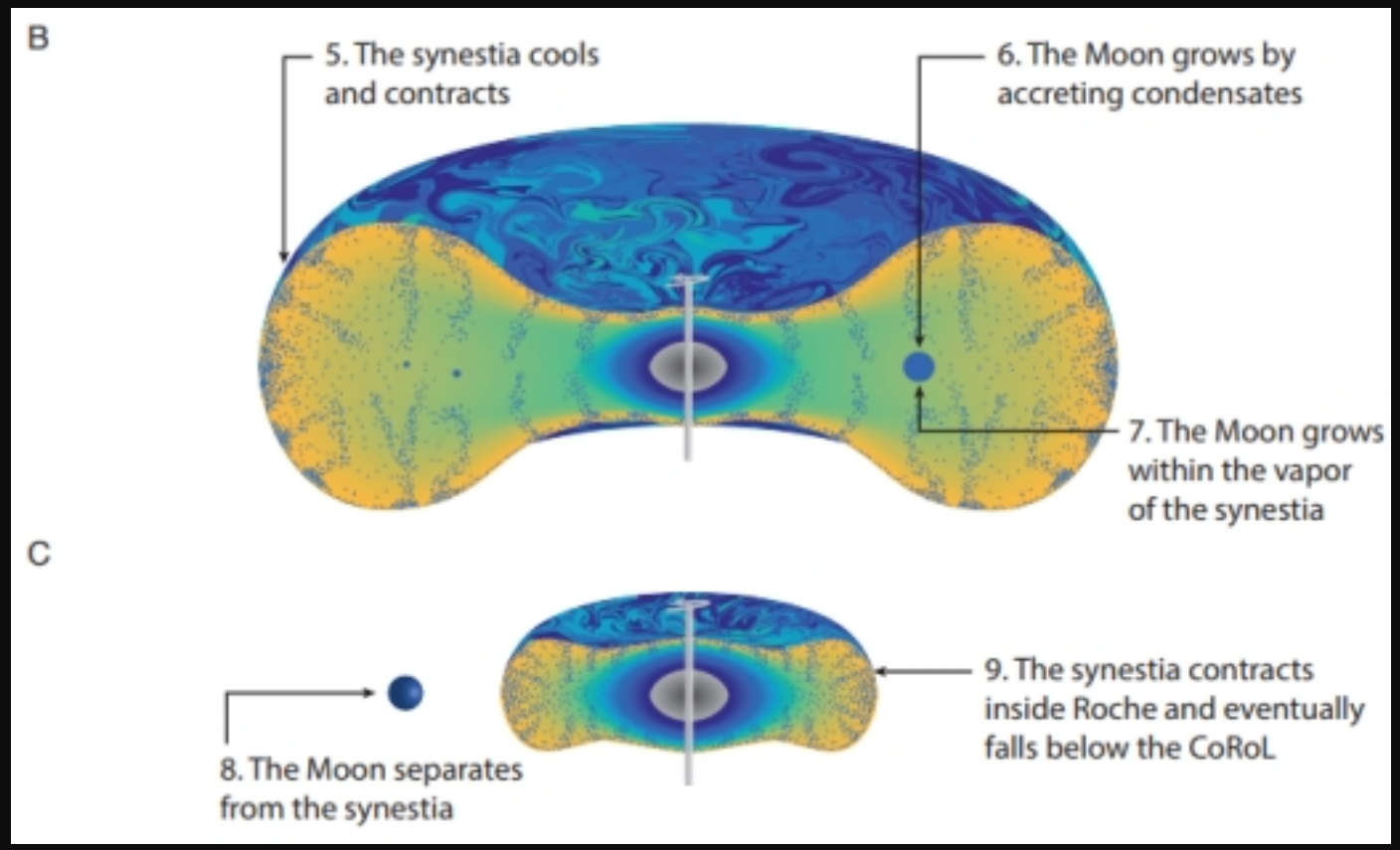
Imaginative Collisional Earth+Theia => Moon model …

For illustration only …

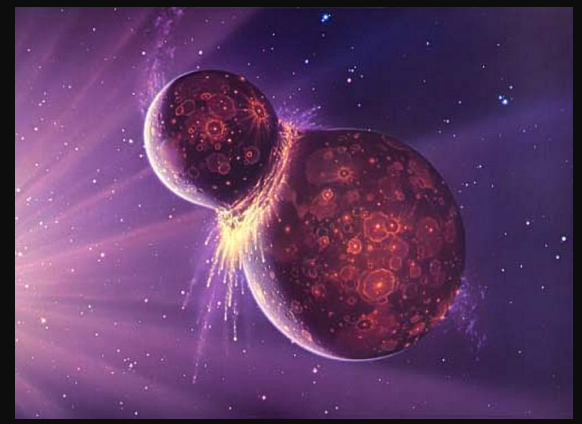
DAVID A. HARDY/SCIENCE PHOTO LIBRARY

Earth's Moon …

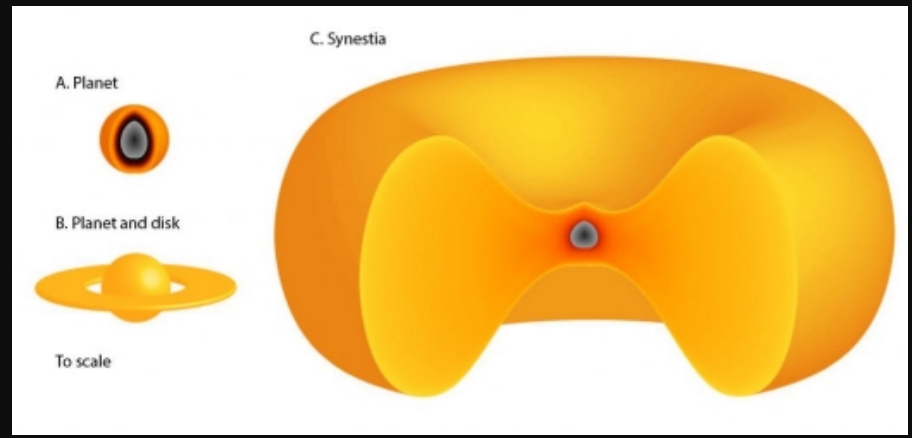
The lunar composition paradox solved ? …



https://www.centauri-dreams.org/2018/03/06/a-new-theory-of-lunar-formation/



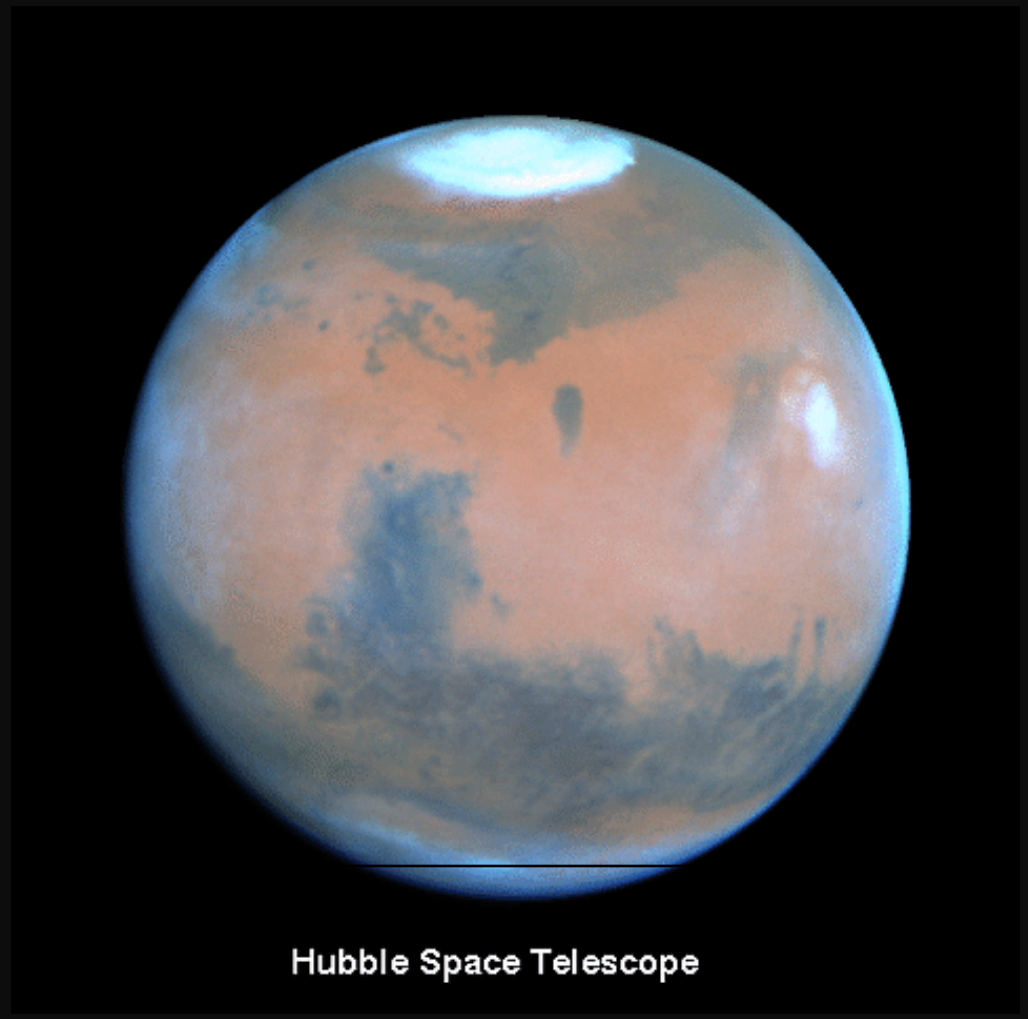
universetoday.com

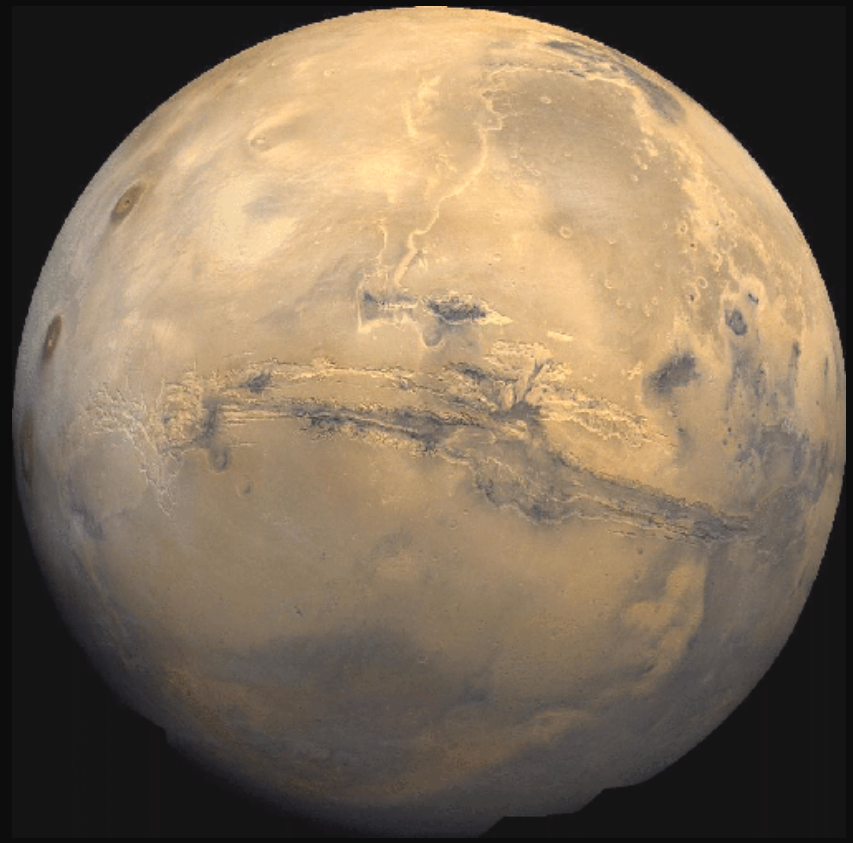


Simon Lock, Harvard University

Planets in bubbles (Synestias) …

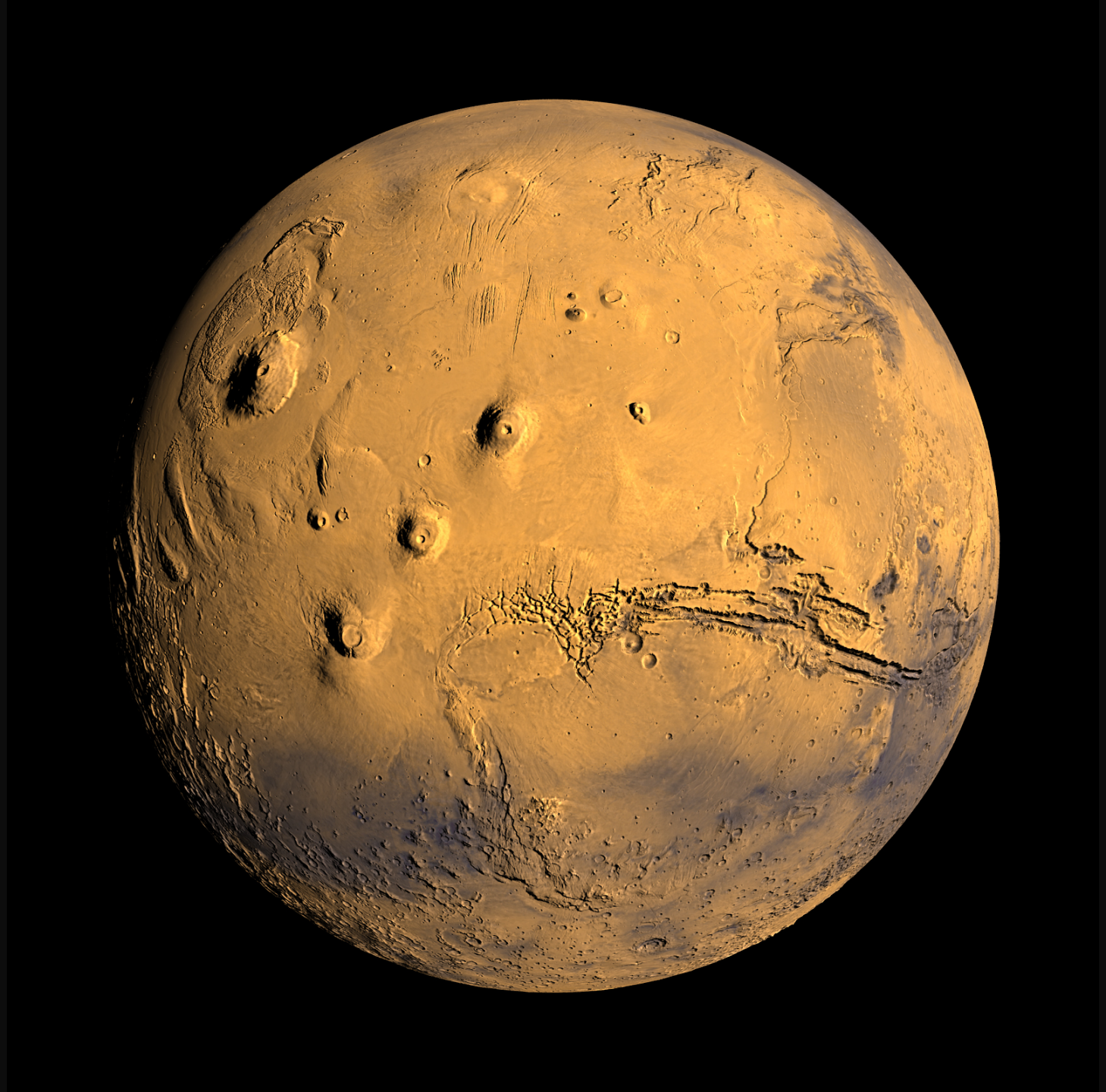
Mars ... by Hubble ... by orbiting probe





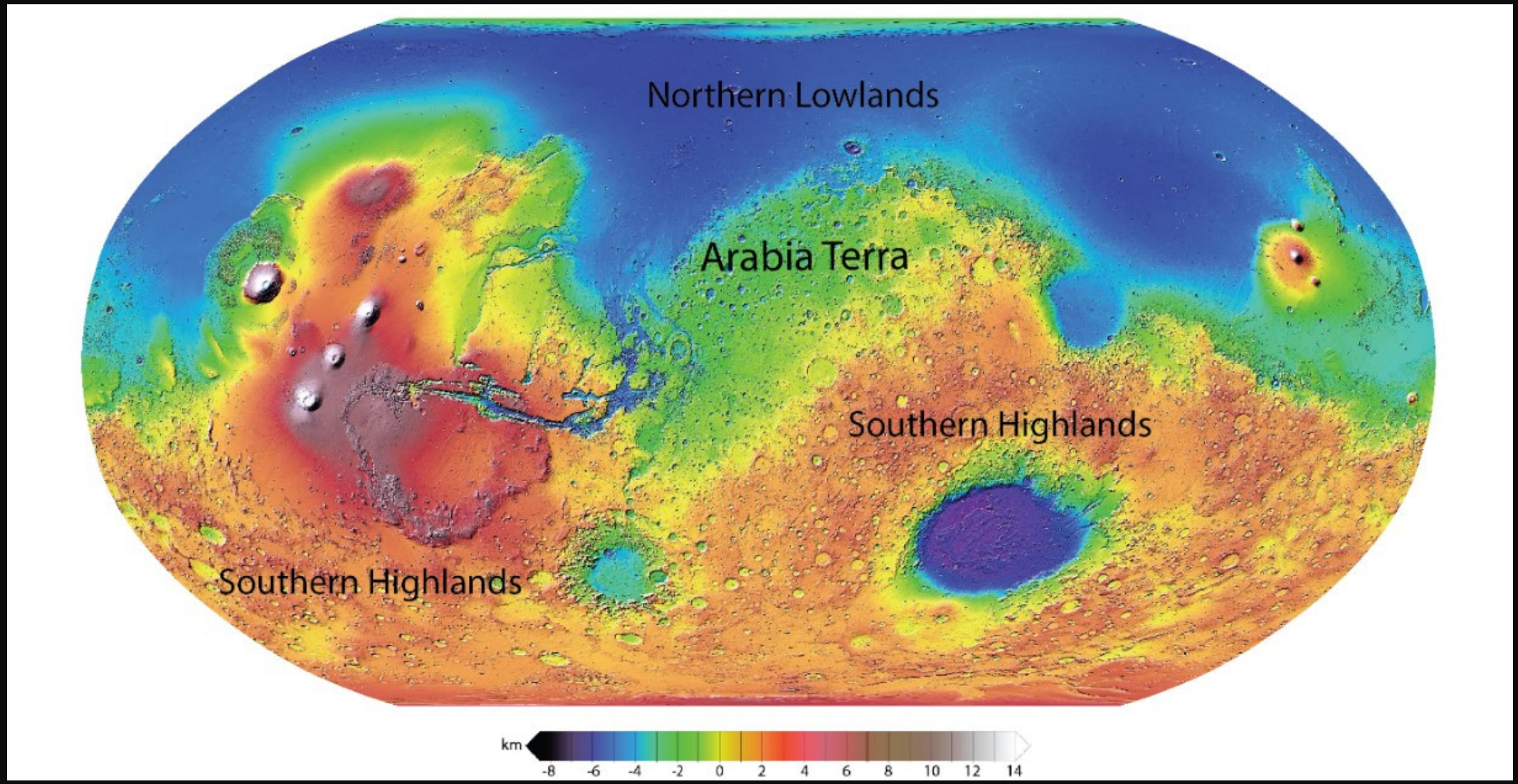
NASA

Mars 3D … with vertical exaggeration



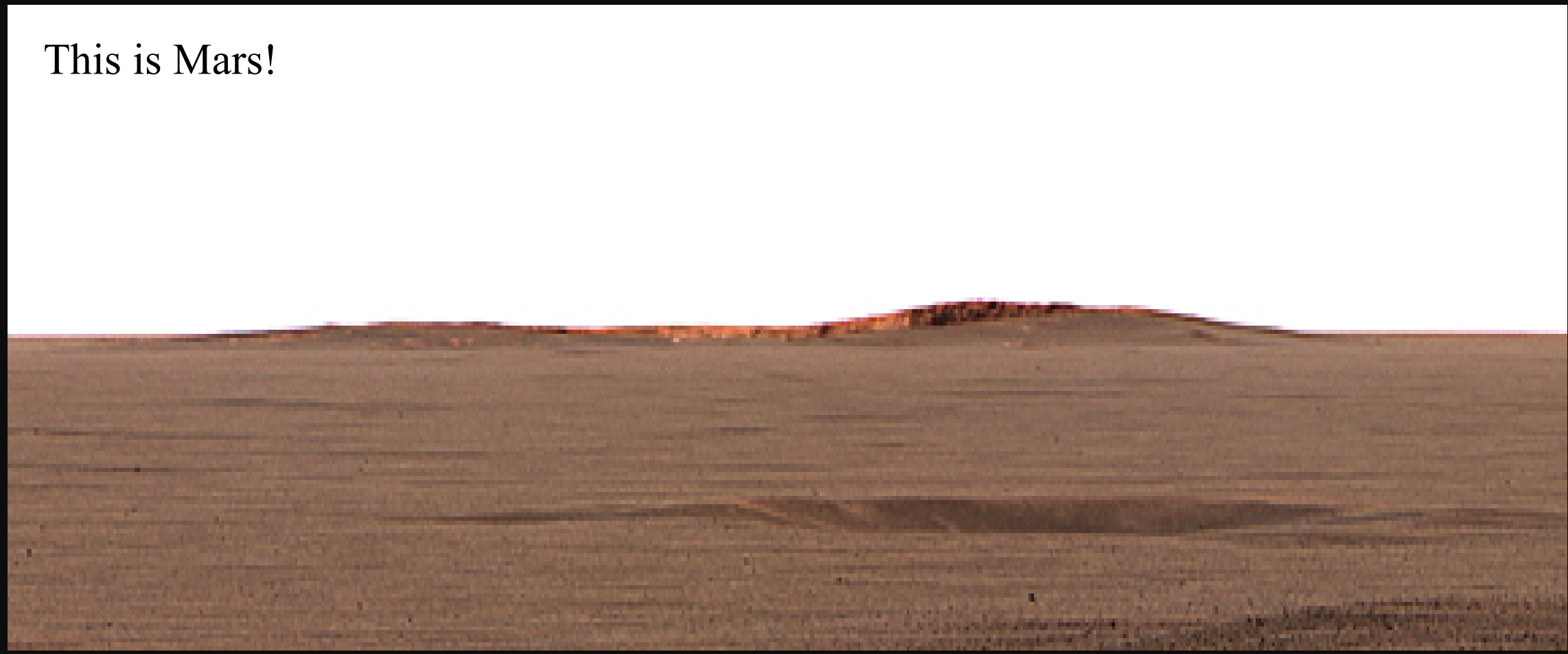
NASA Odyssey

Mars …



NASA MOLA

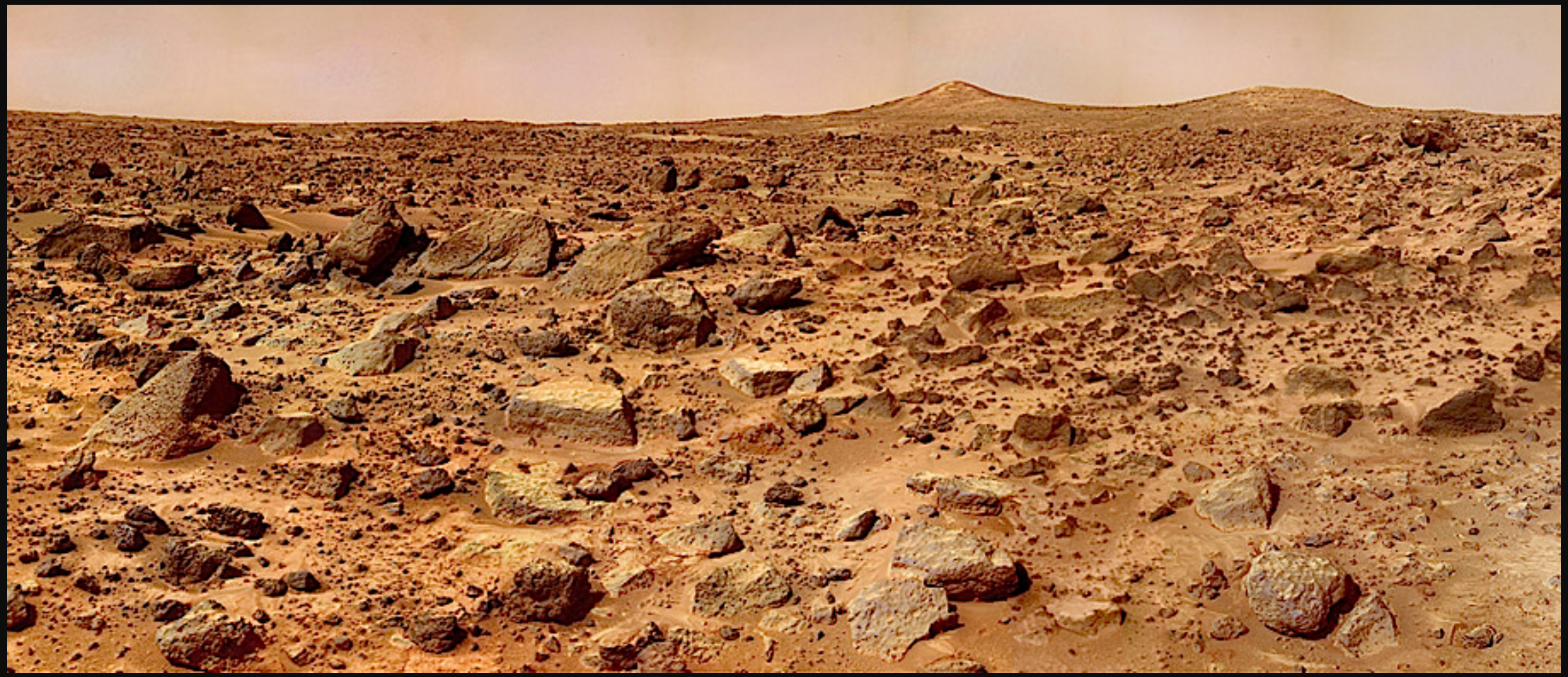
Astounding images …



… as though you were standing there!

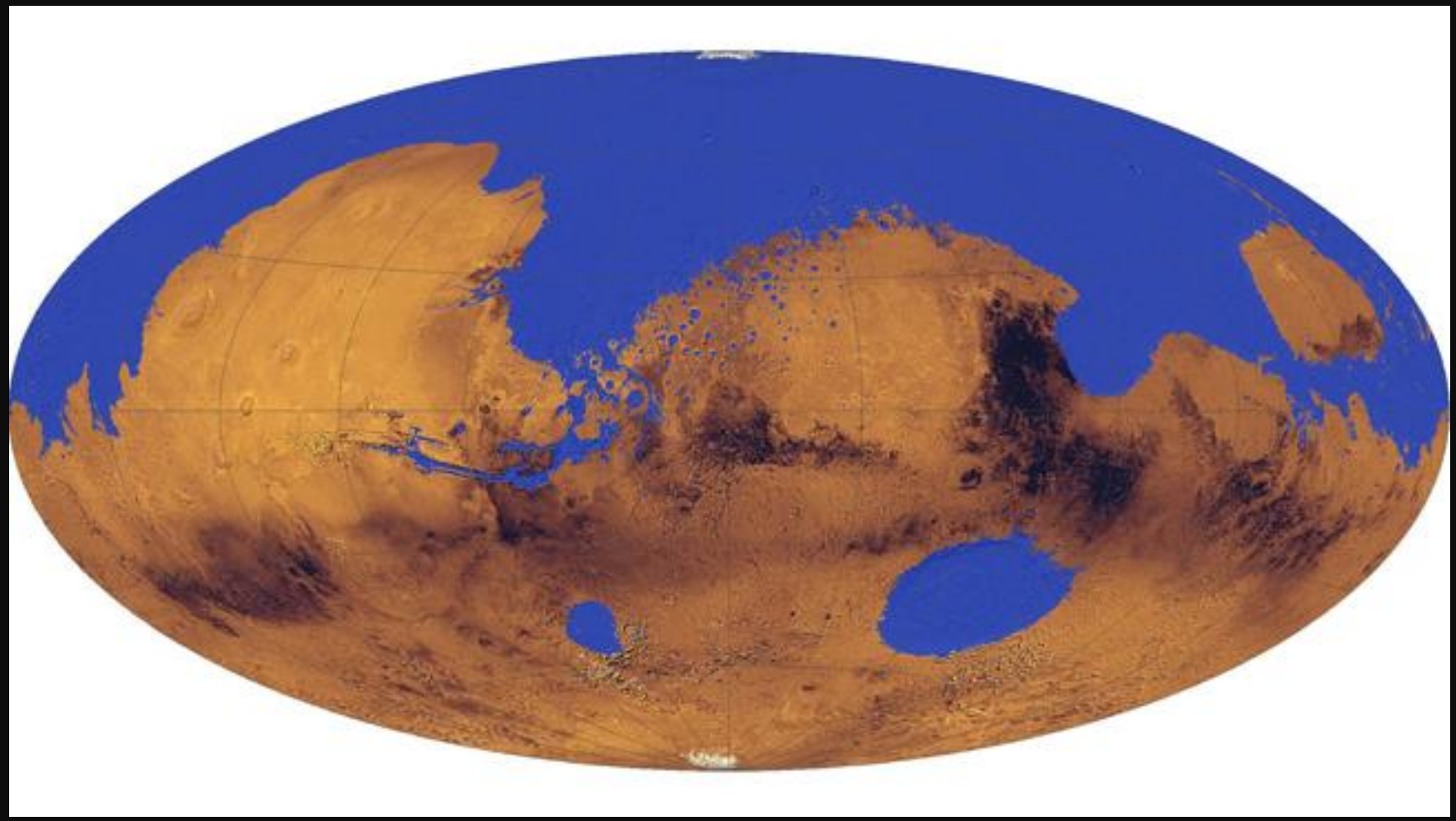
NASA

Mars … cold, dry rock desert - today !

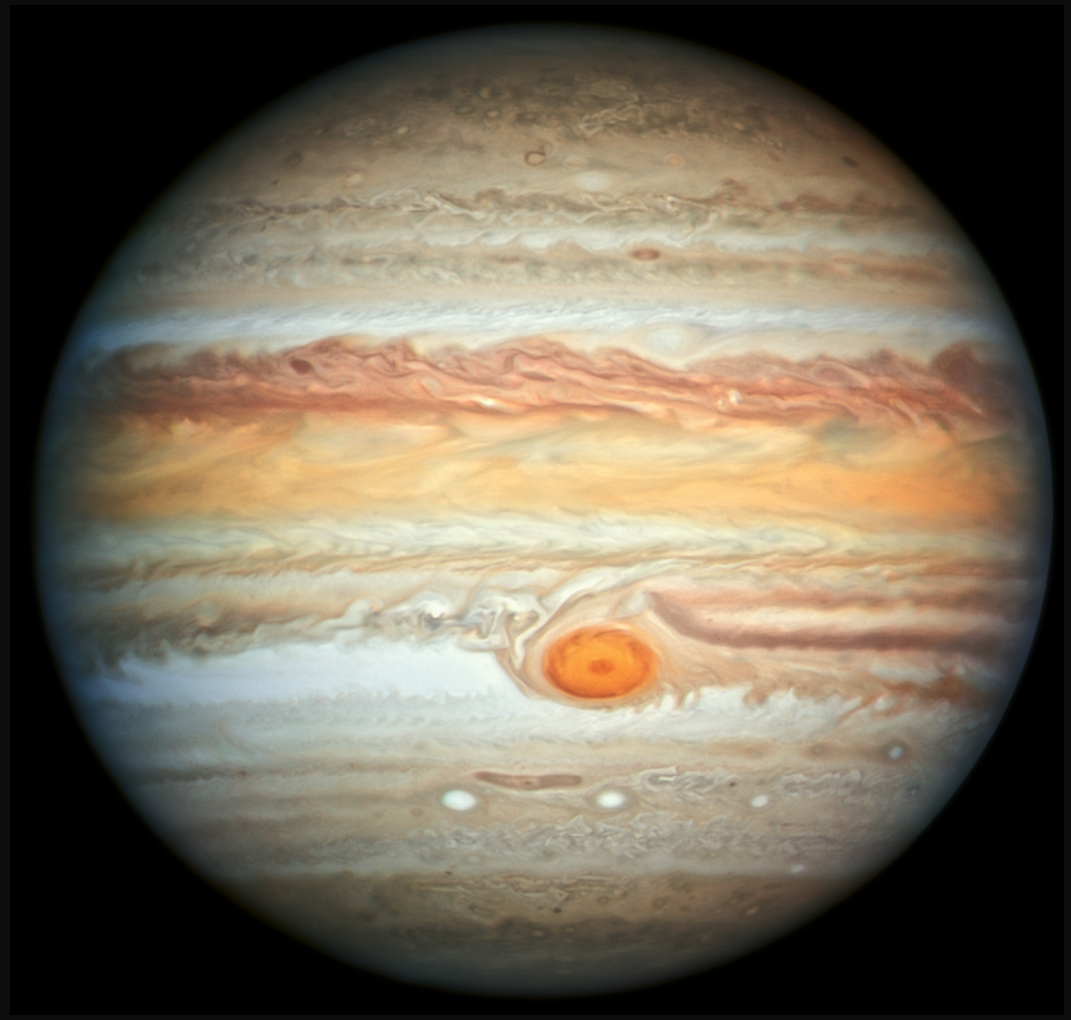


NASA JPL

Was there long-term standing water on Mars … ?

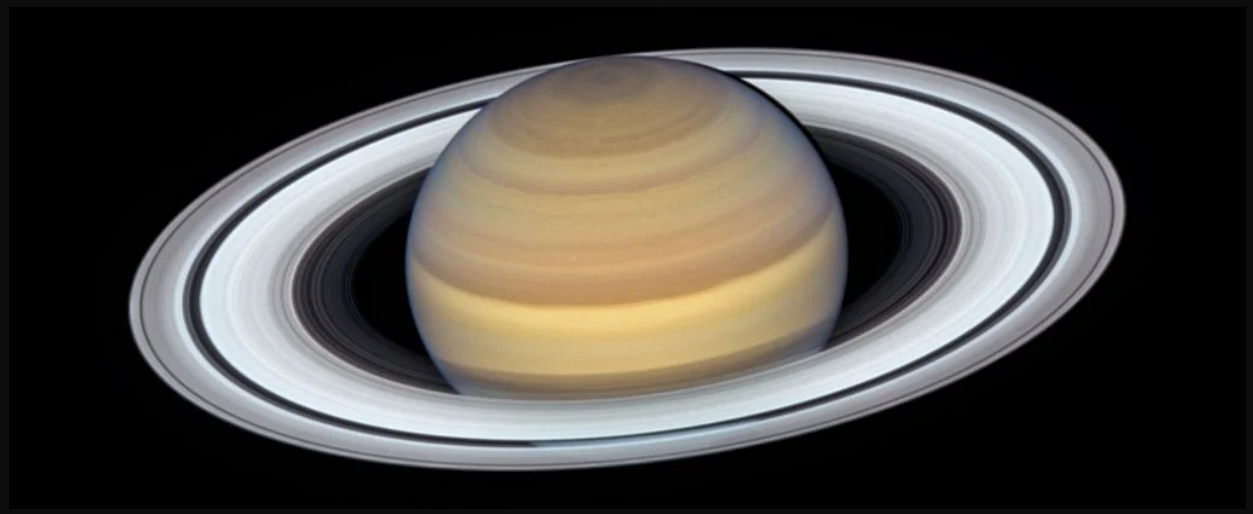


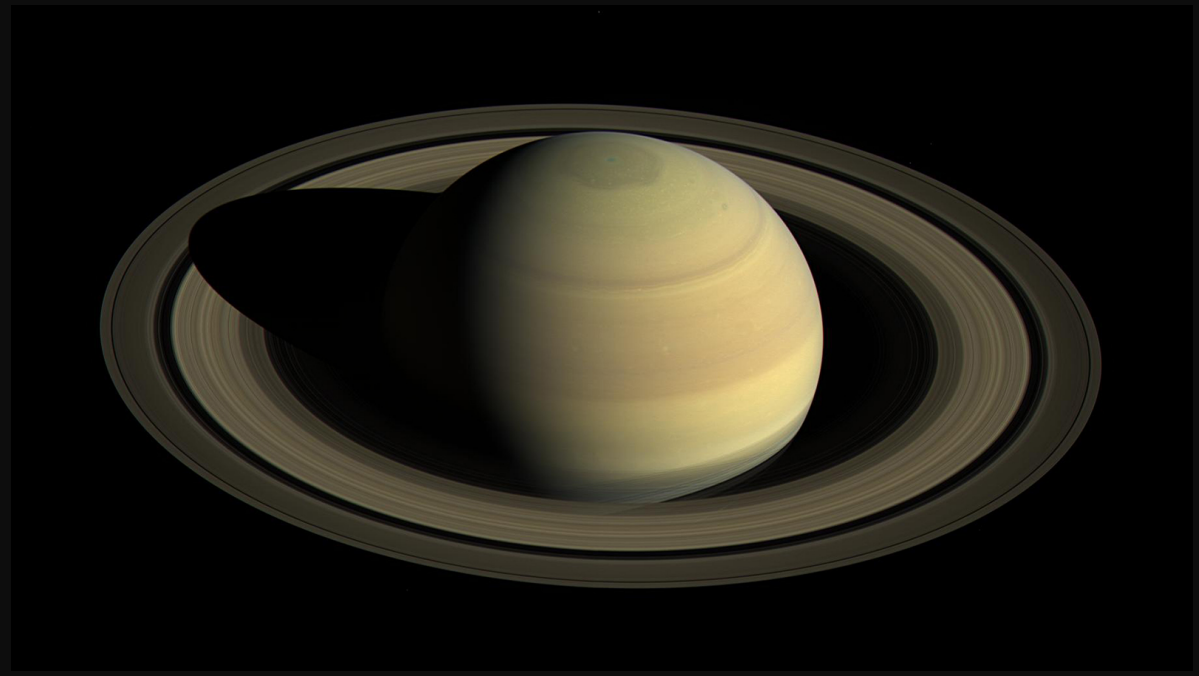
Gas & Ice Giants … in the outer Solar System : Jupiter



NASA

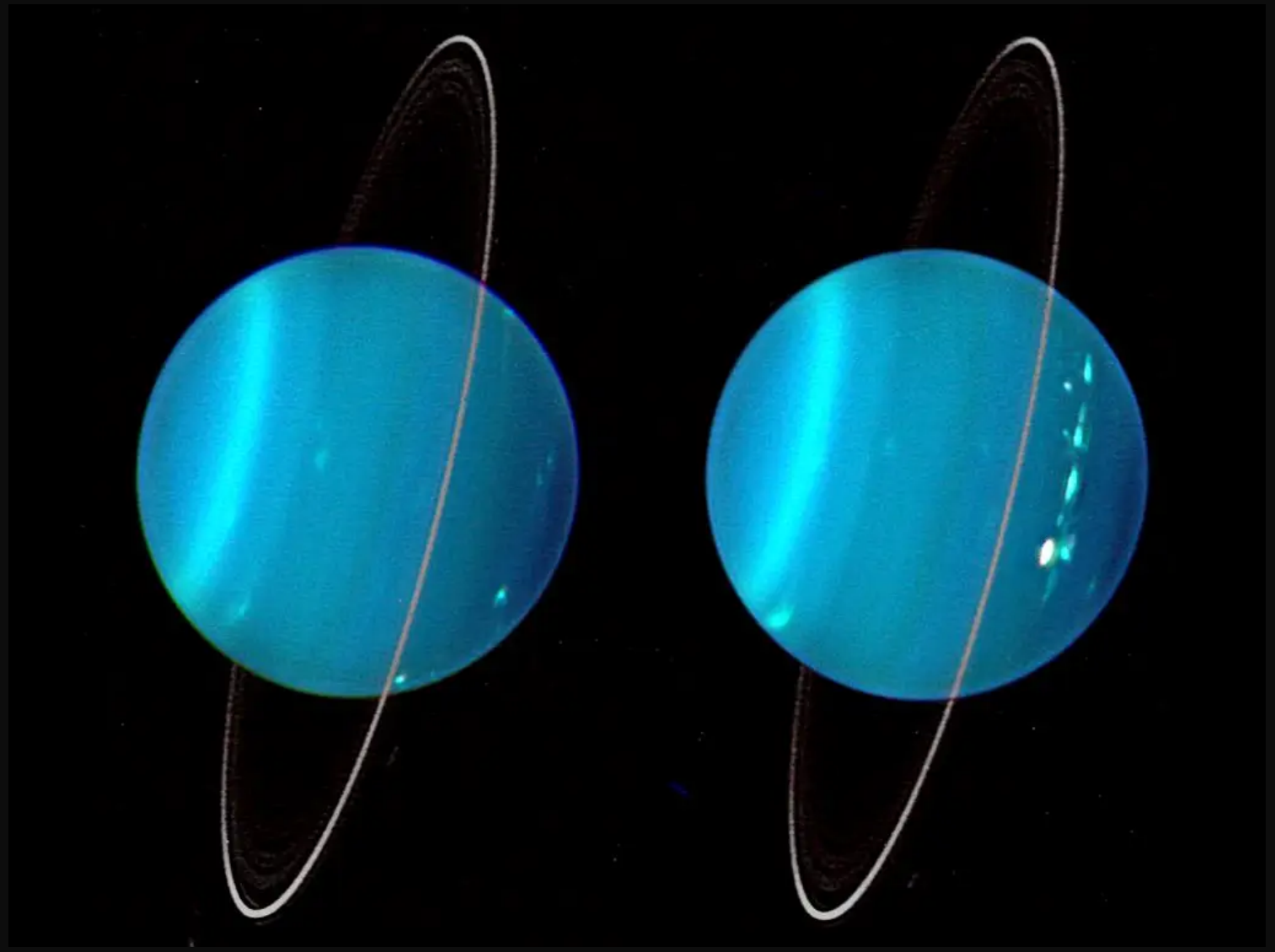
Gas & Ice Giants … in the outer Solar System : Saturn





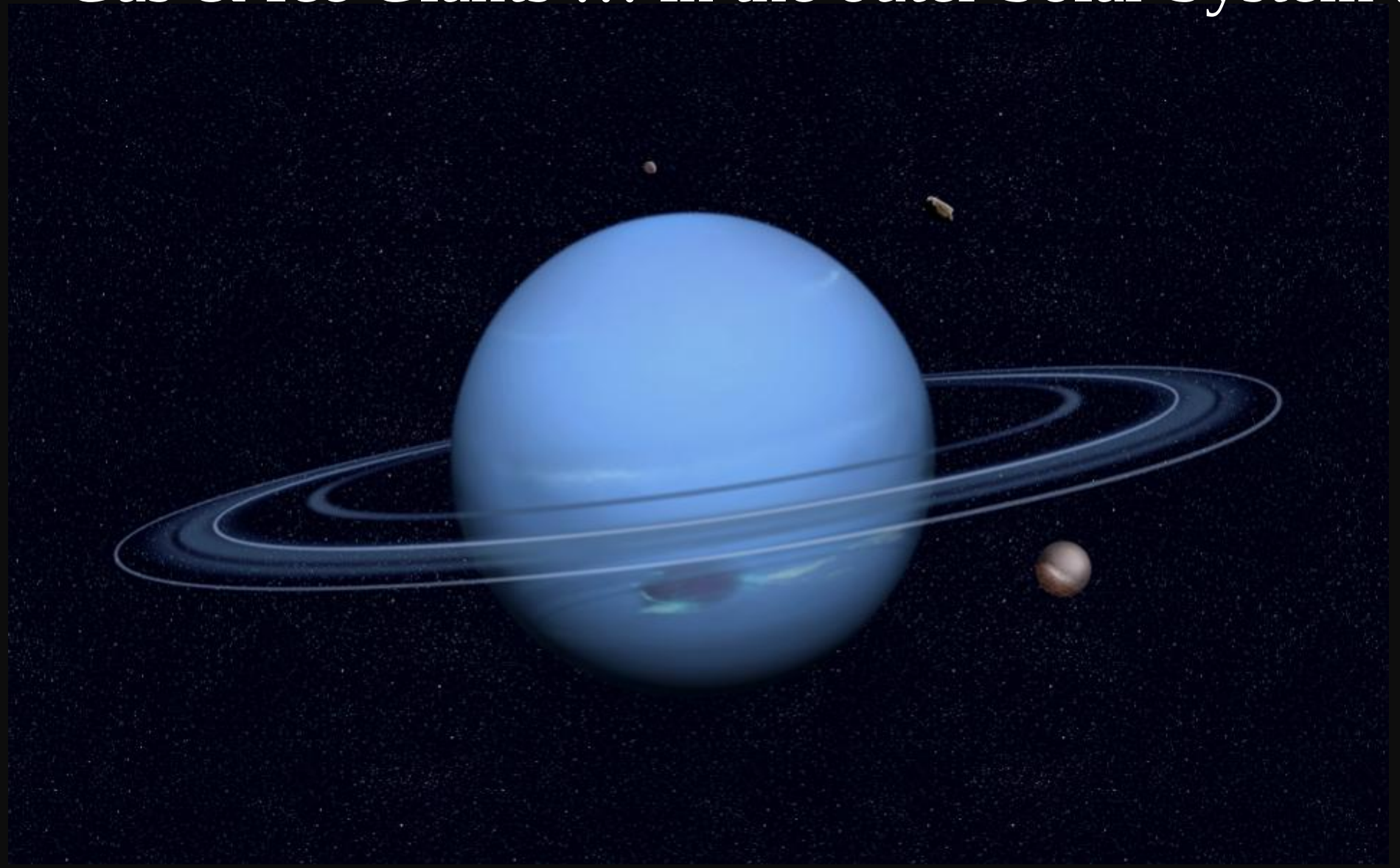
NASA

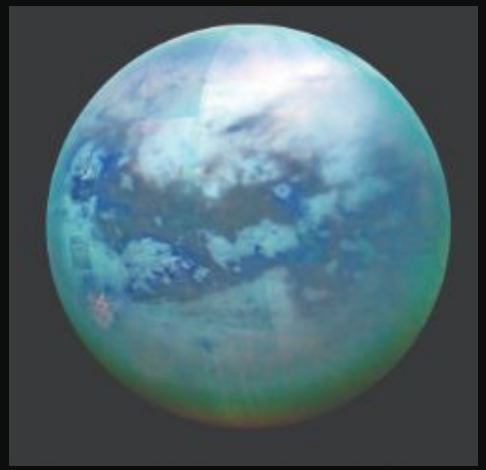
Gas & Ice Giants … in the outer Solar System : Uranus



NASA

Gas & Ice Giants … in the outer Solar System : Neptune





NASA

How far have we looked beyond our backyard?

Now up to 6,000+ light years