

Jupiter and Saturn

Jim Paradise

Lockheed Martin

Jupiter

- Distance From Sun:
483 Million Miles
- Average Temp: -166°F
- Diameter: 88,000 miles
- Orbital Period: 12 years
- Moons: 67



Galileo

Launch: 1989
Orbit Jupiter: 1995
Mission End: 2003



First two years focused on Jupiter.

**Extended mission (6 years) focused on Jupiter's moons,
with emphasis on Europa, Callisto, Ganymede, and Io.**

4 of Jupiter's 61 moons



Io (with active
volcanoes)

Europa

3 with Liquid Oceans?

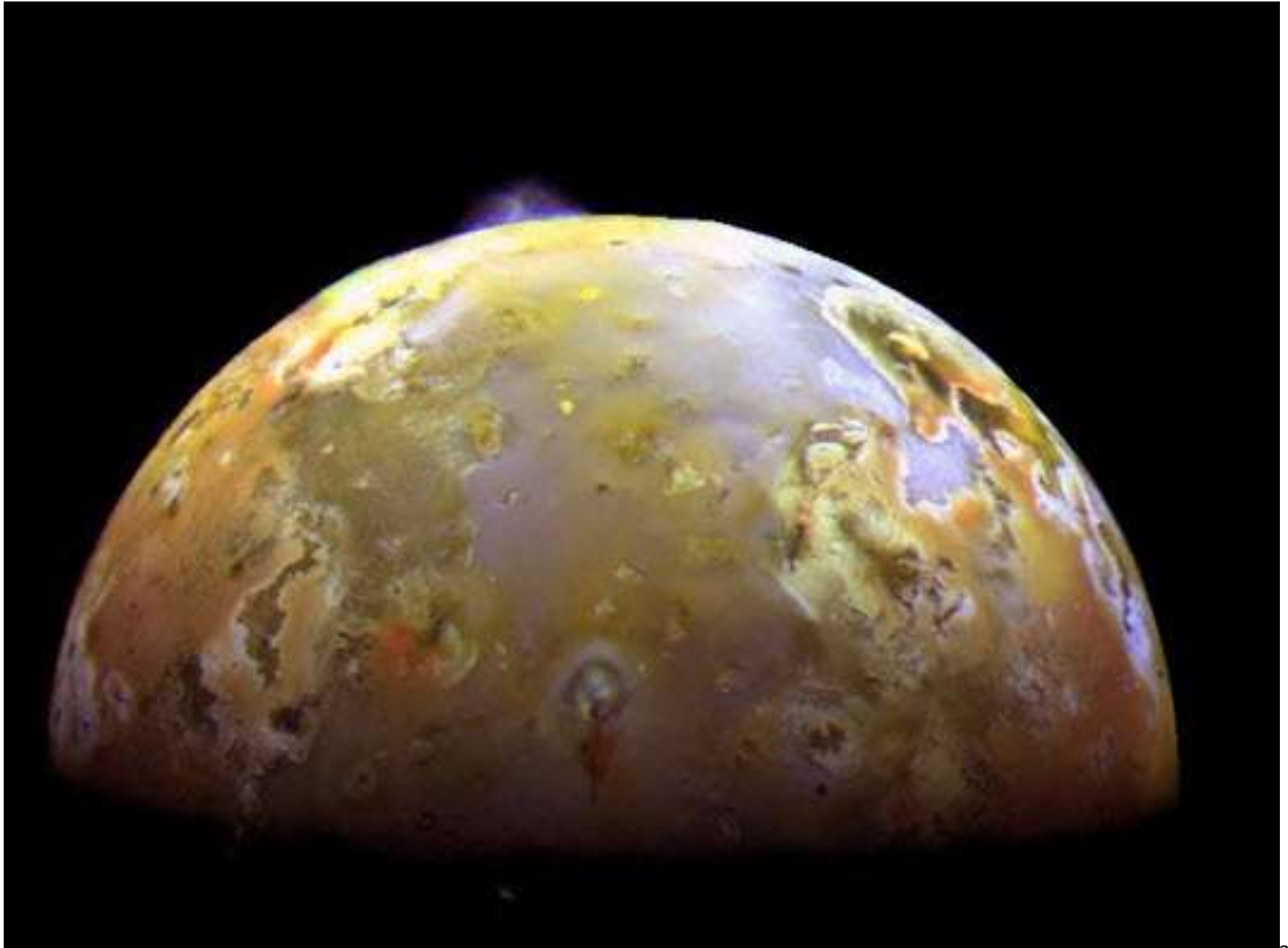
Ganymede

Callisto



Imagine if Earth had 61 moons

Volcanic Eruption on IO



Europa

Ice – 3 miles thick with liquid salt water ocean beneath

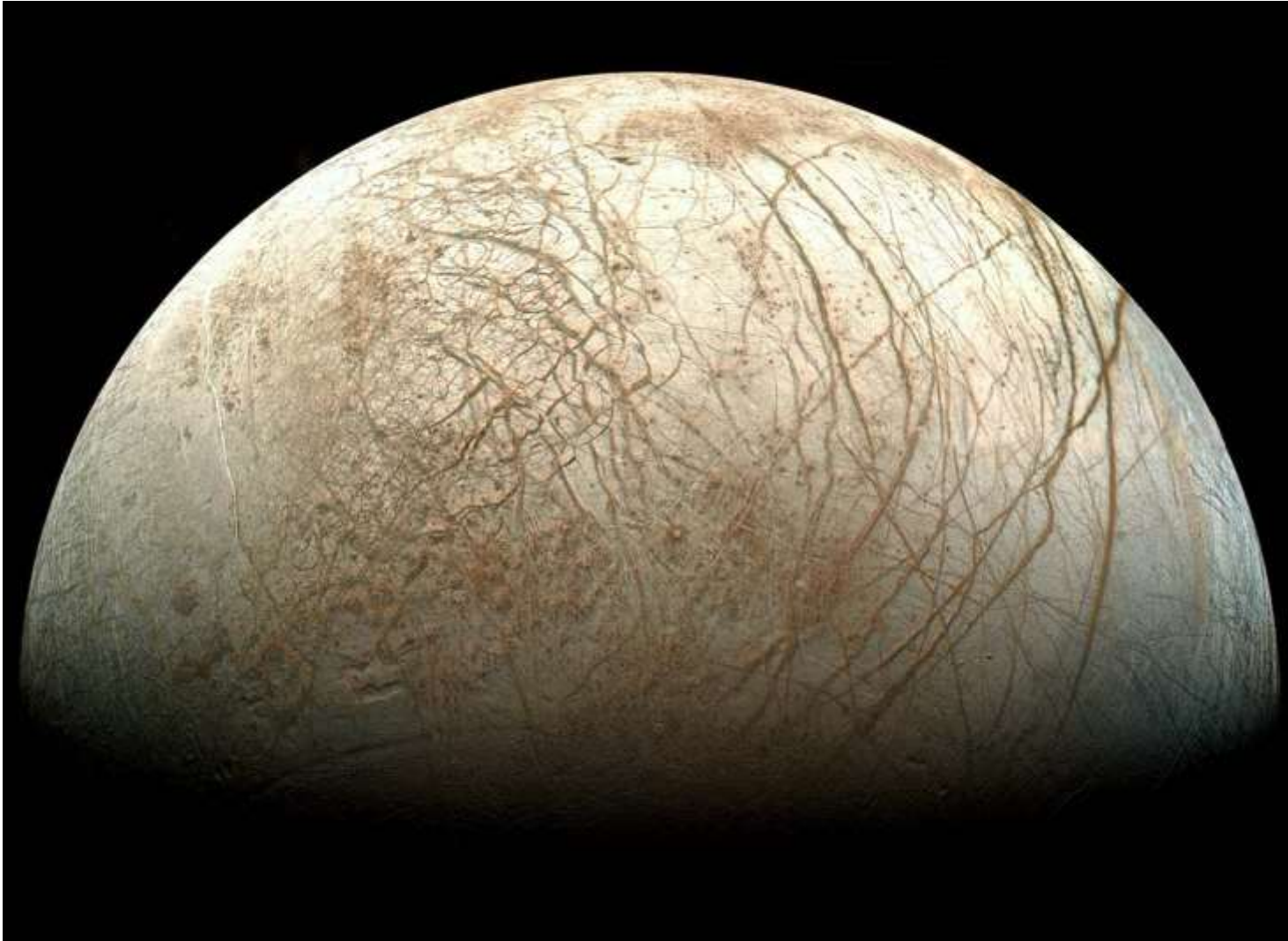


Image credit: NASA/JPL-Caltech

Deep Ocean

Europa

- Ice – 3 miles thick with
- Liquid salt water ocean beneath (40 – 100 miles deep)

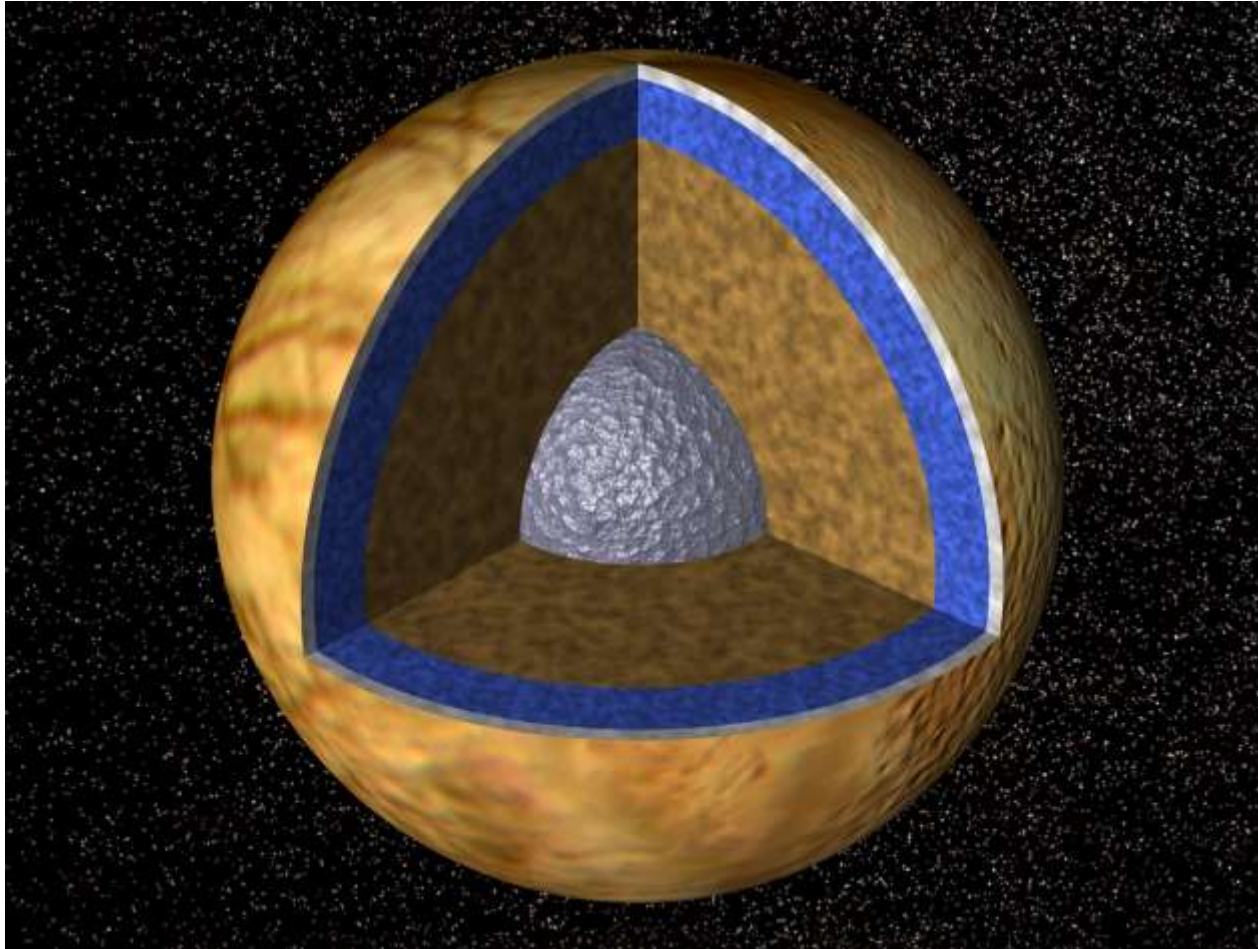


Image credit: NASA/JPL-Caltech

Lakes

Liquid lakes in the ice

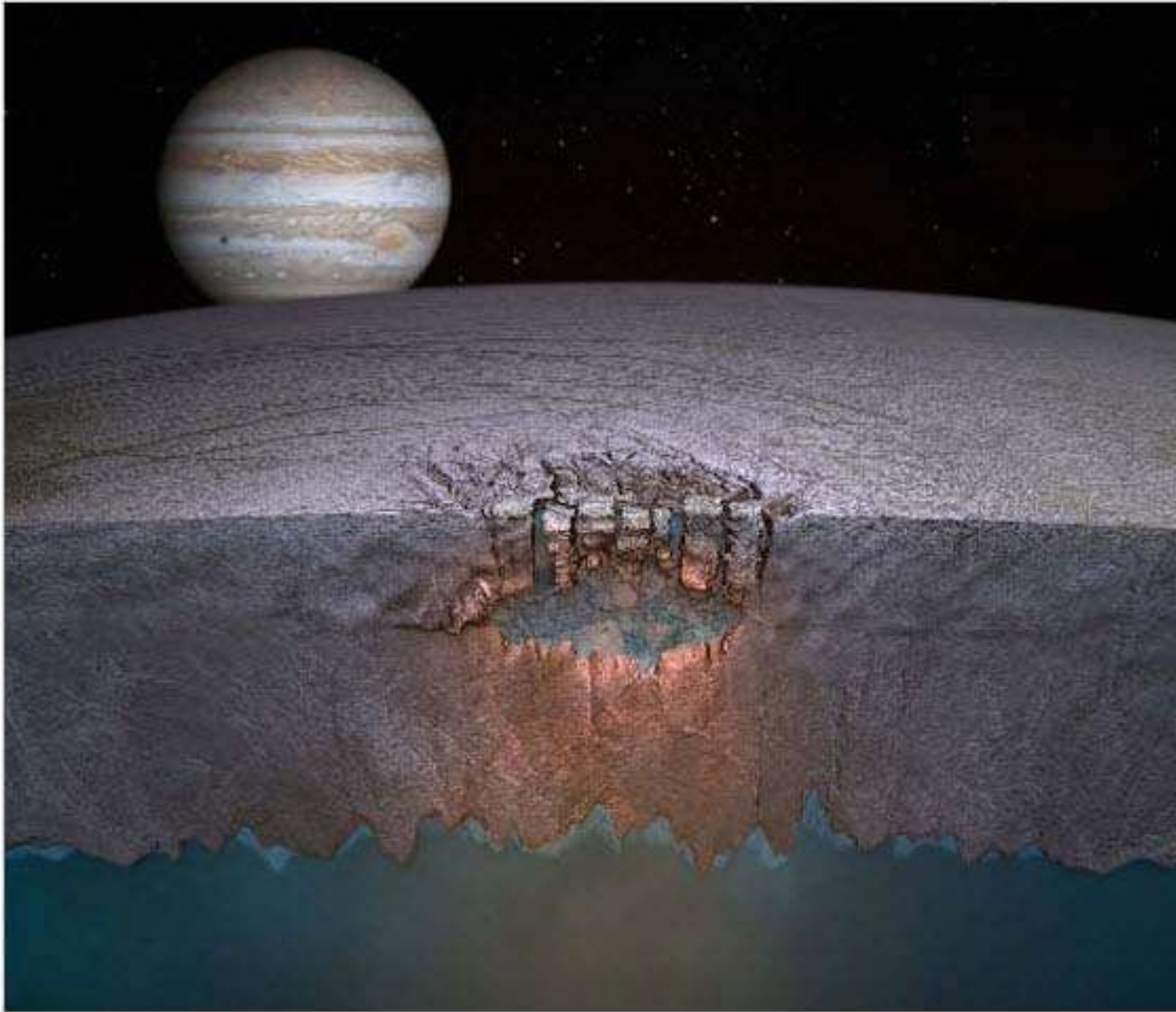


Image credit: NASA/JPL-Caltech

JUNO - Launched August 5, 2011

Polar Orbit of Jupiter

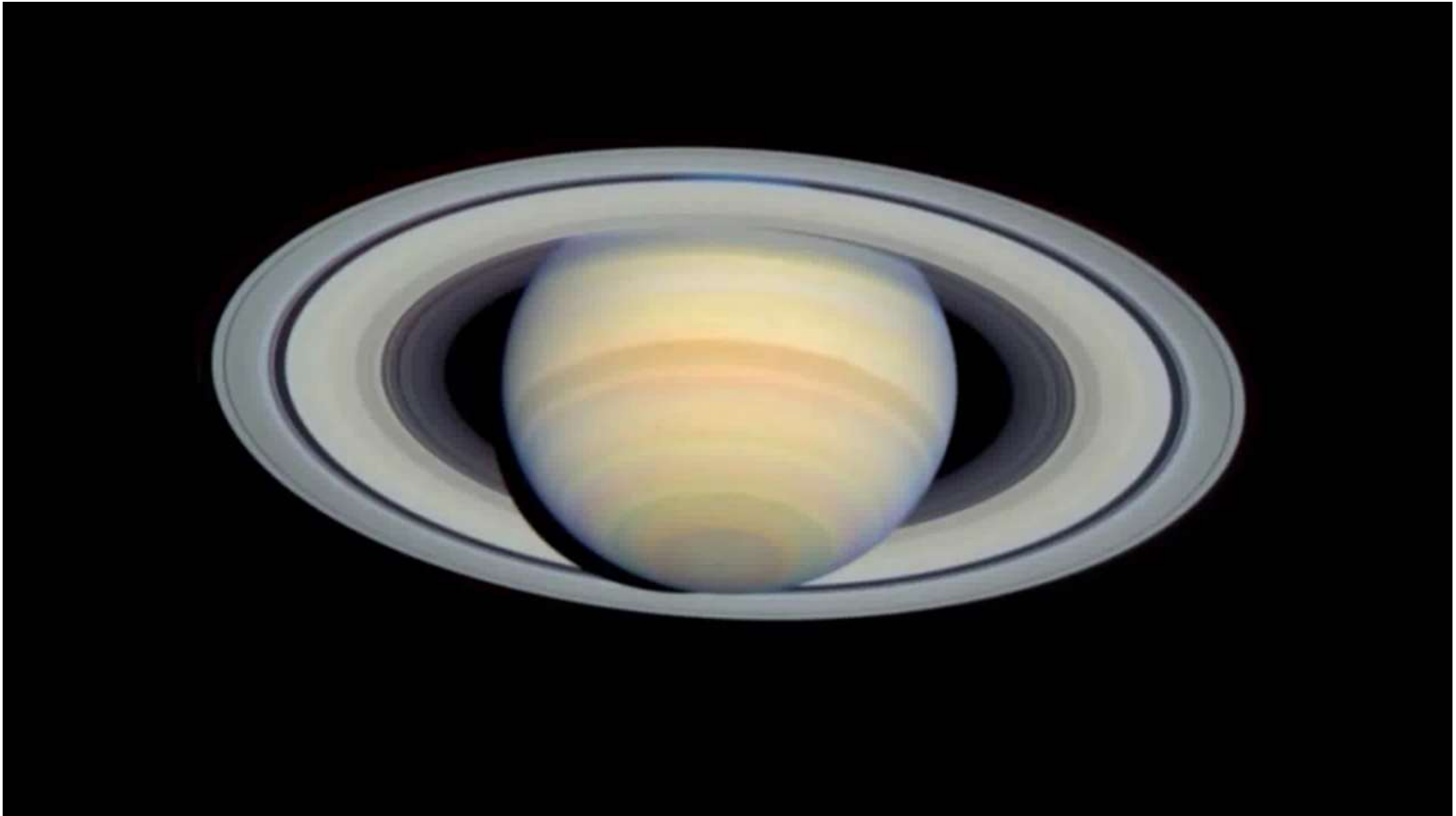
Solar Powered



Arrives at Jupiter: July 4, 2016

Saturn

- Distance From Sun: 888 Million Miles
- Average Temp: -220°F
- Diameter: 75,000 miles
- Orbital Period: 29 years
- Moons: 62



Cassini and Huygens

Mission to Saturn and its largest moon Titan.

Launch: 10/15/1997

Orbit Saturn: 7/1/2004

Huygens Release: 12/2004

Landed on Titan: 1/12/2005



Rings in true color

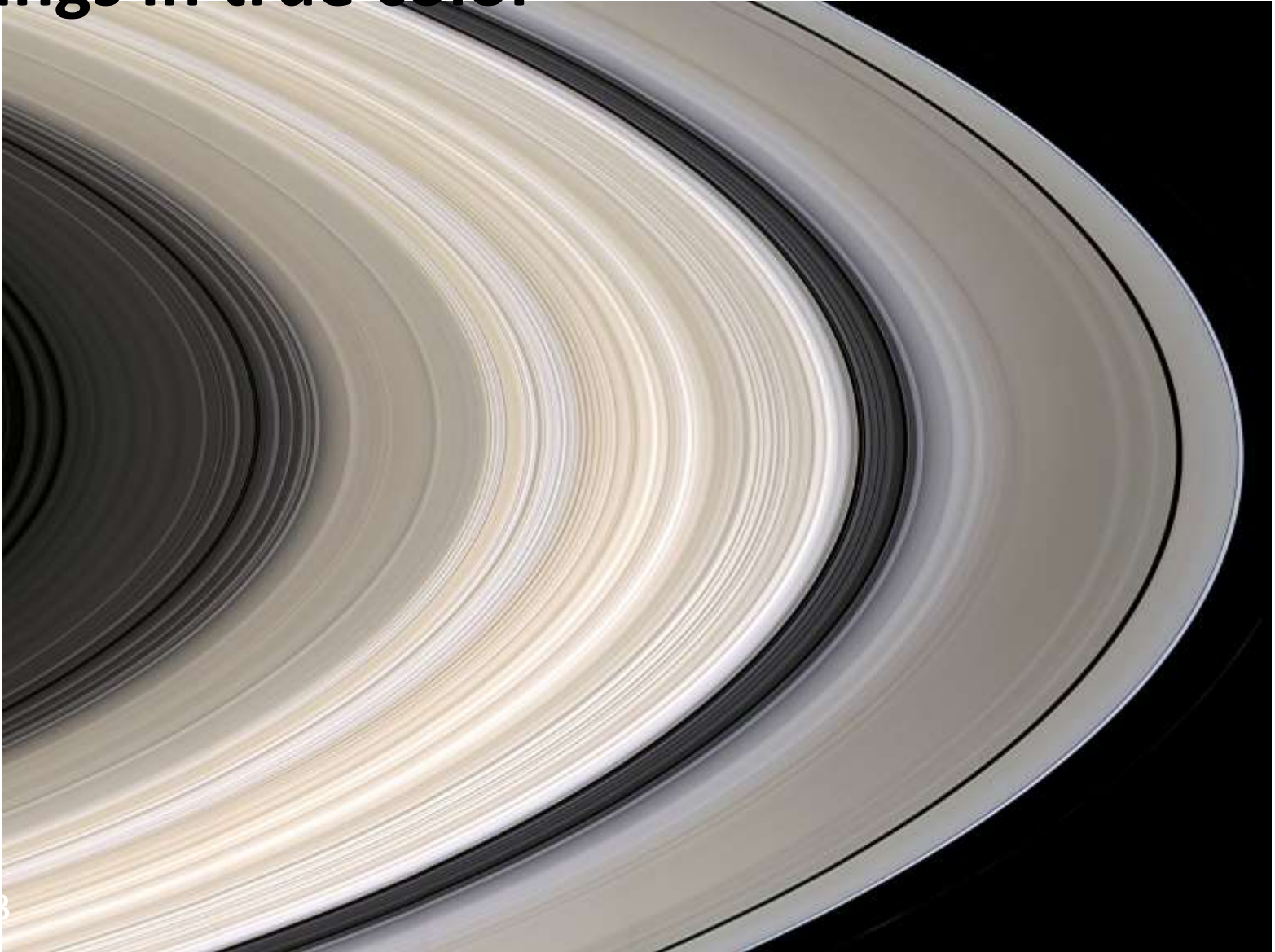


Image credit: NASA/JPL-Caltech

Cassini snaps a photo of Earth



On 7/19/2013, earthlings were told to go outside and wave at the sky.
Cassini took the photo. Shall we zoom in?

What causes the gaps in the Saturn rings?

A moon in the rings (where are the ripples?)

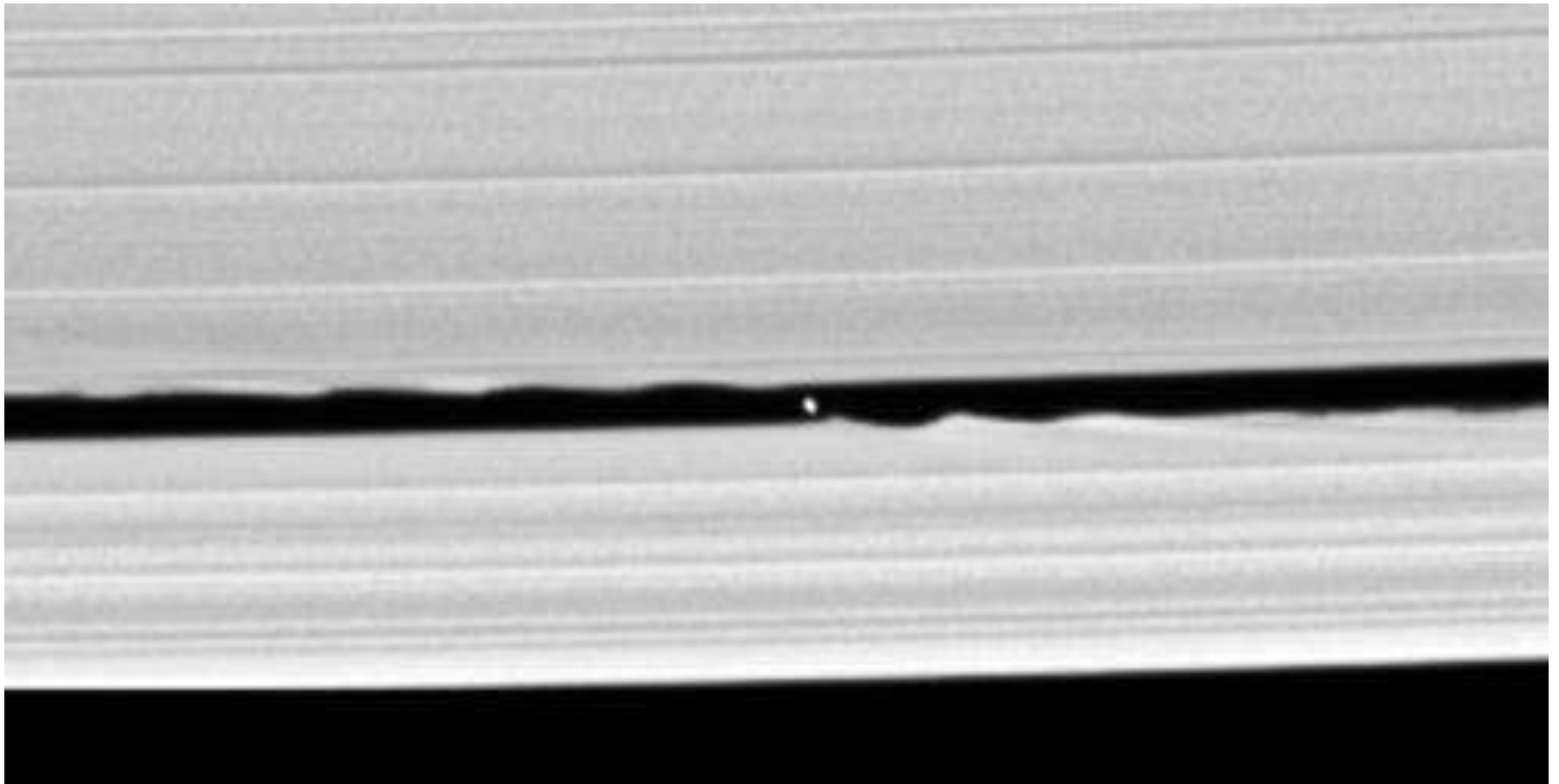
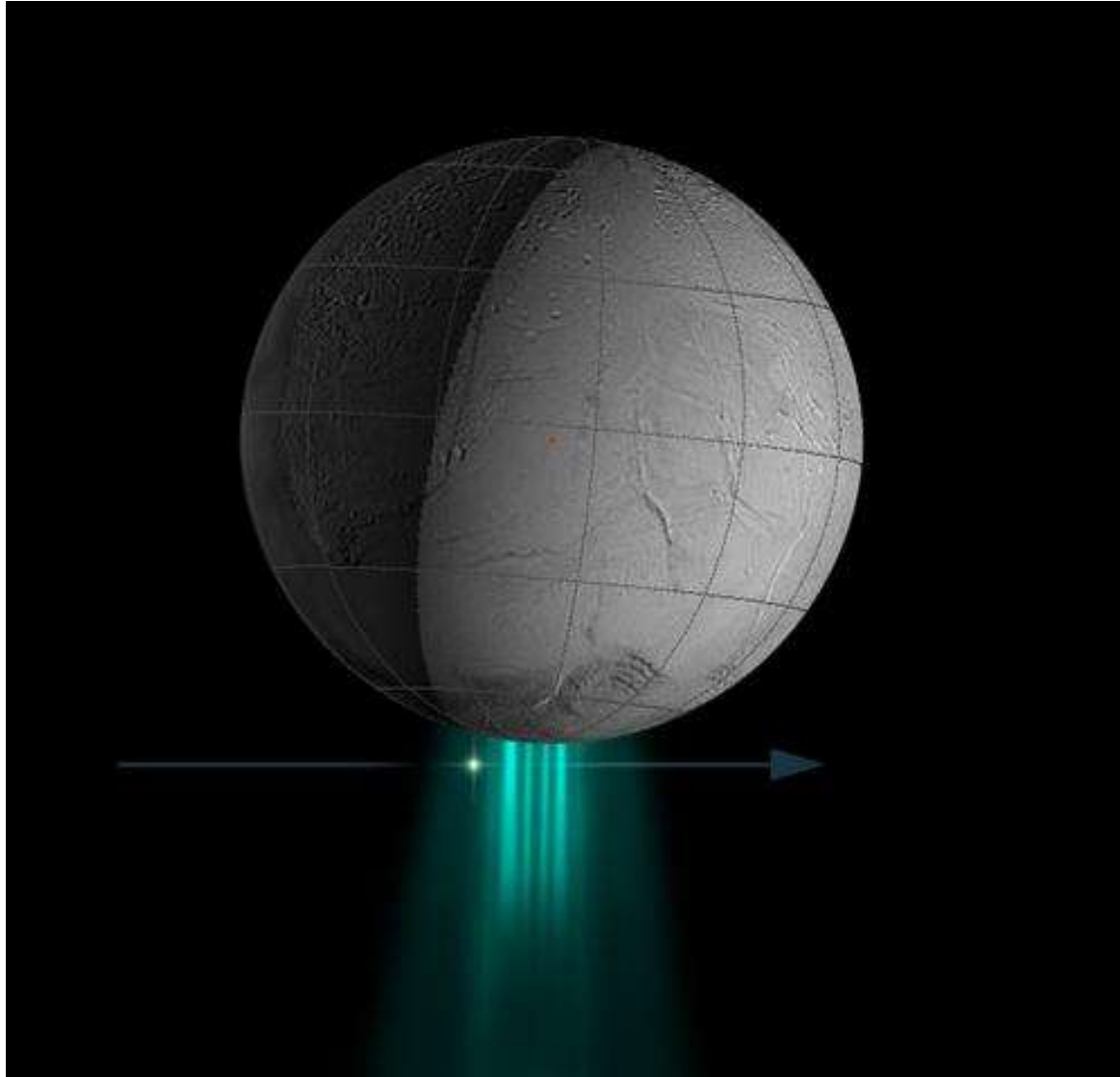


Image credit: NASA/JPL-Caltech

Aurora

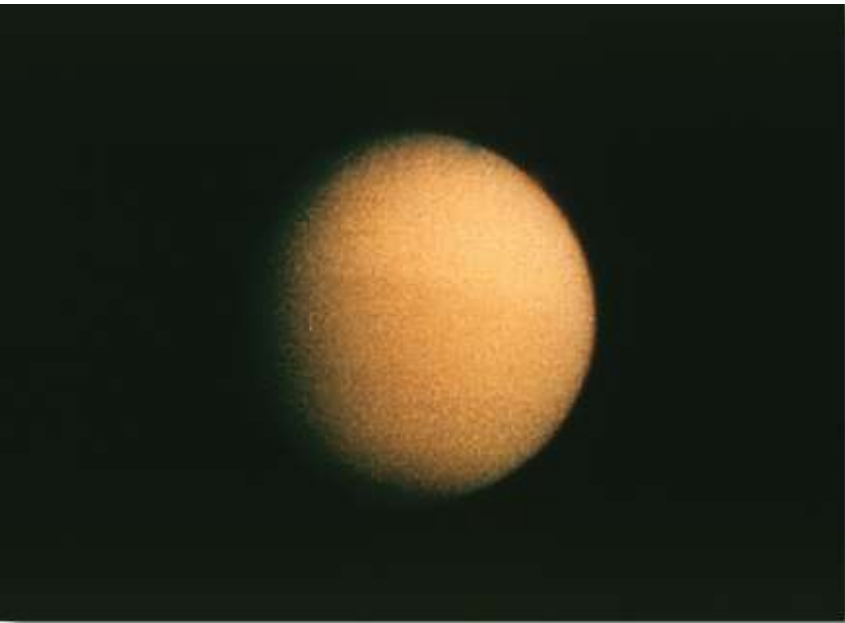
Water plumes shooting from Enceladus south pole



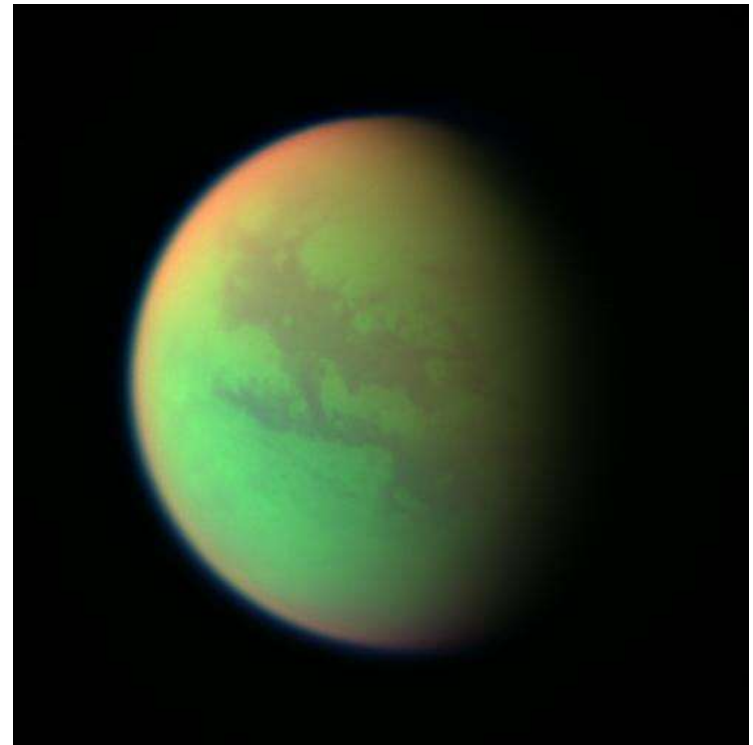
Images of Saturn's moon Titan

Dense atmosphere

Continents/Oceans visible?

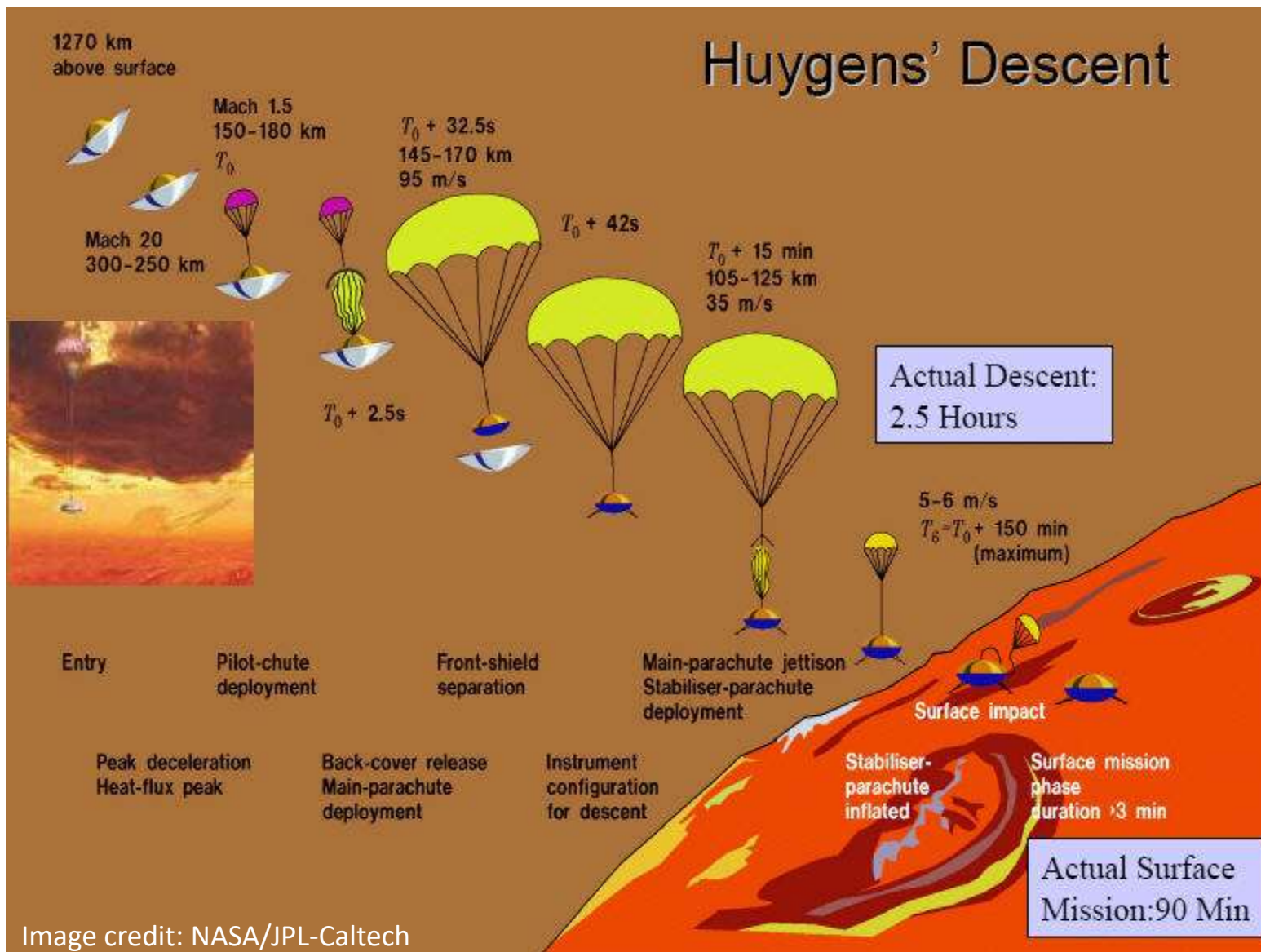


Hubble Image



Cassini Image

Huygens' Descent



Cassini images of Saturn's moon Titan

Lake Shore?



Image credit: NASA/JPL-Caltech

Liquid flow erosion on Titan

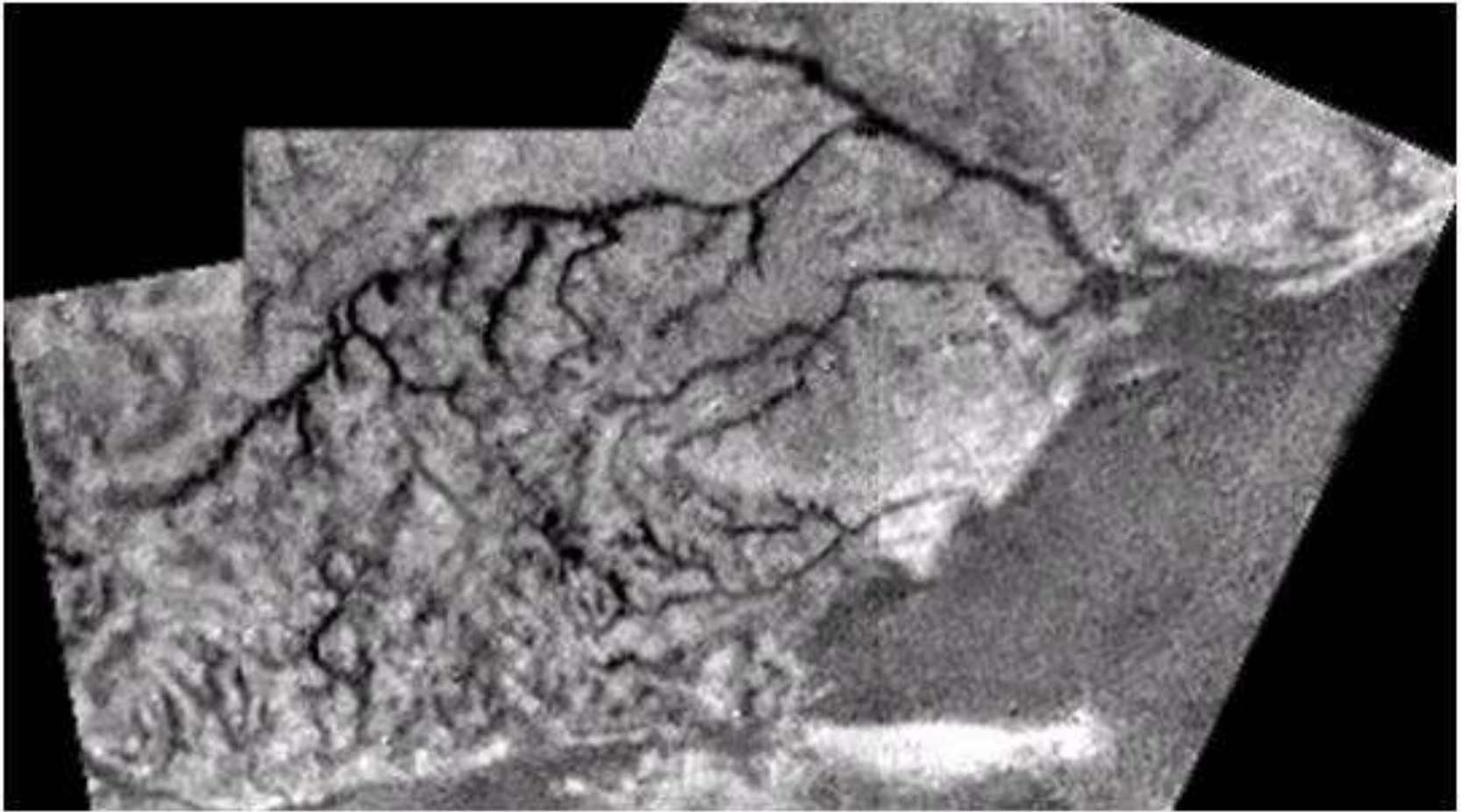


Image credit: NASA/JPL-Caltech

Huygens Probe image from the Surface of Titan

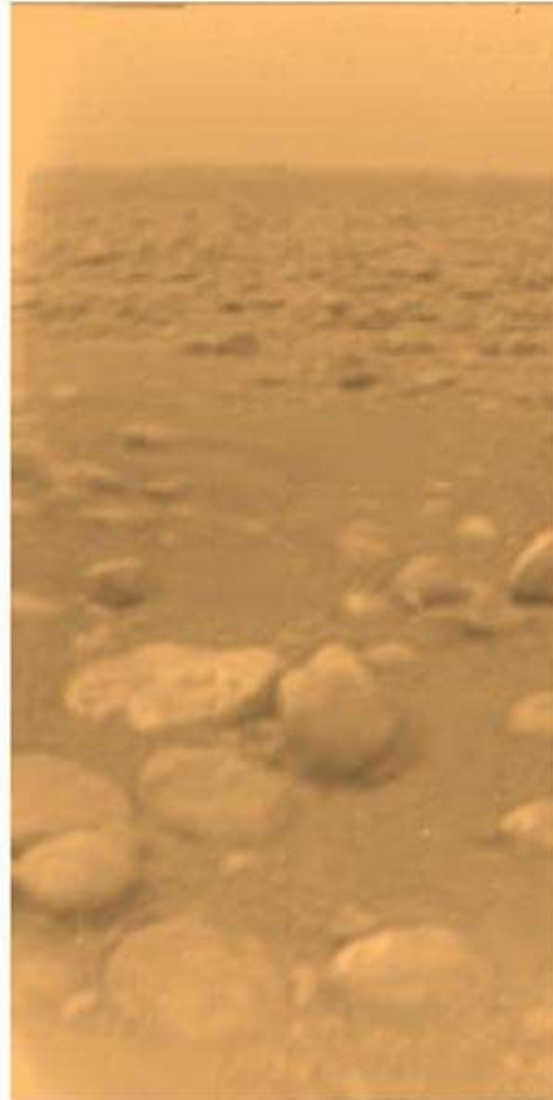


Image credit: NASA/JPL-Caltech

Liquid lakes

Liquid Hydrocarbon Lakes on Titan

Image credit: NASA/JPL-Caltech

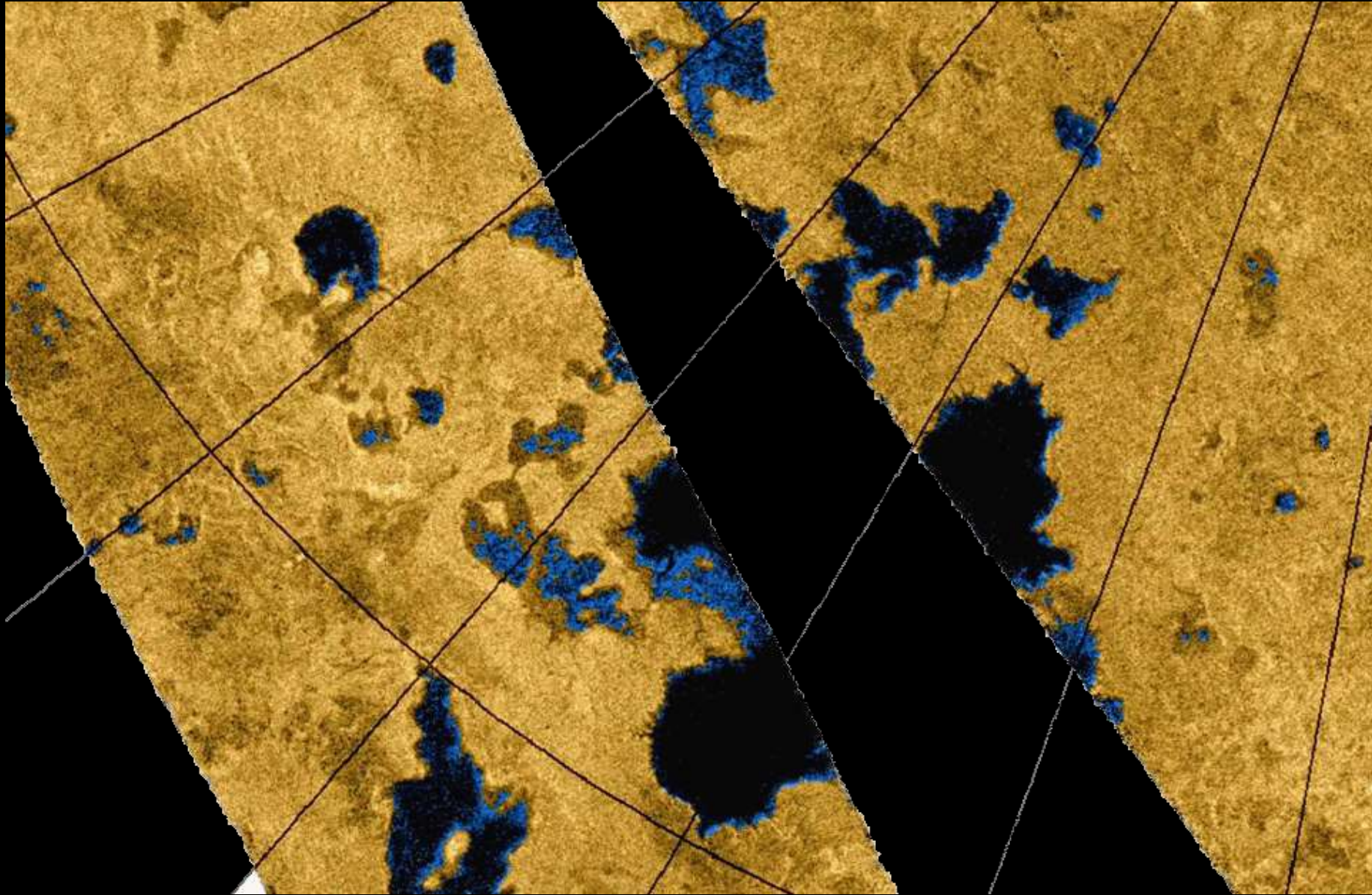
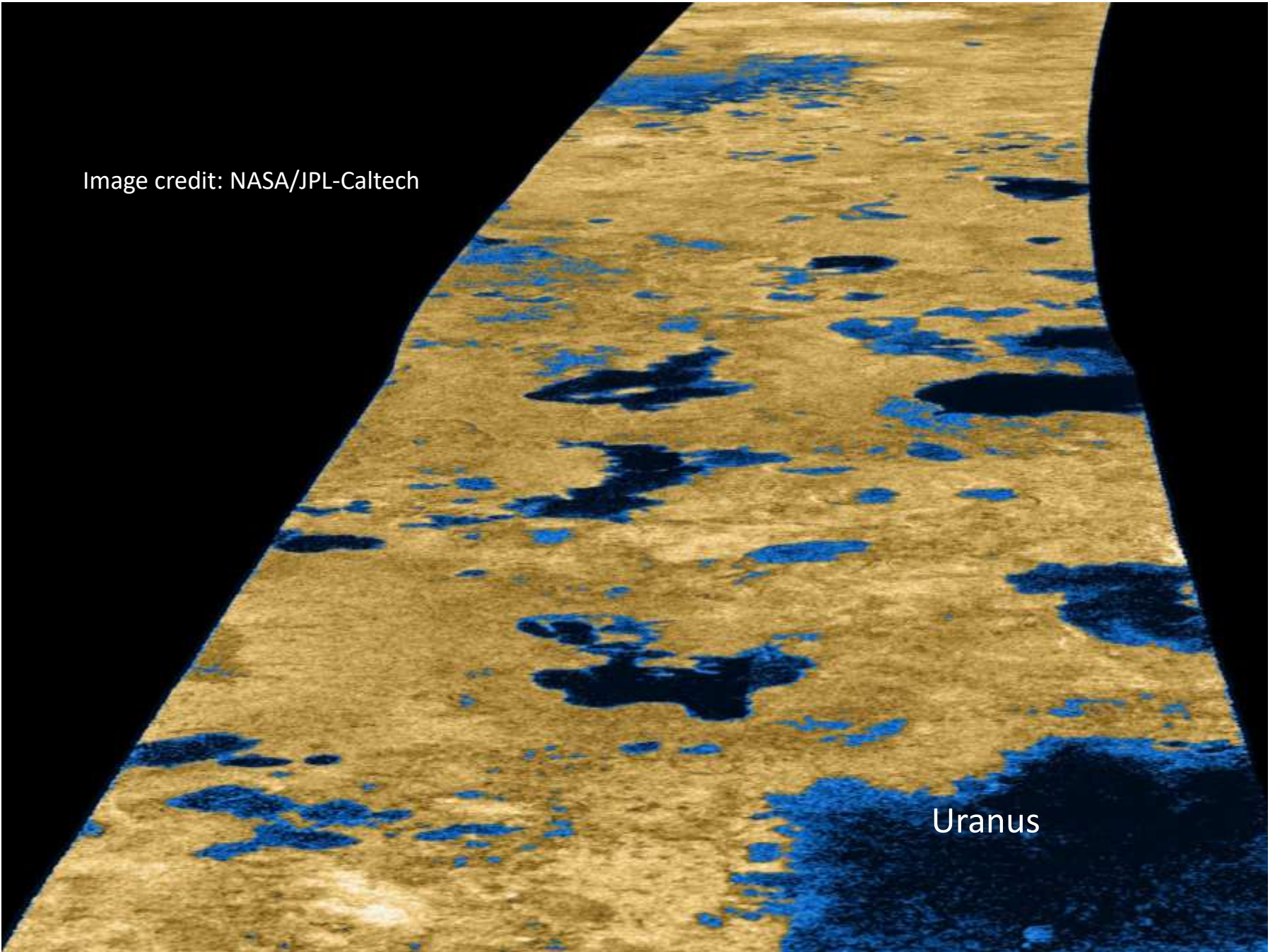


Image credit: NASA/JPL-Caltech

Uranus

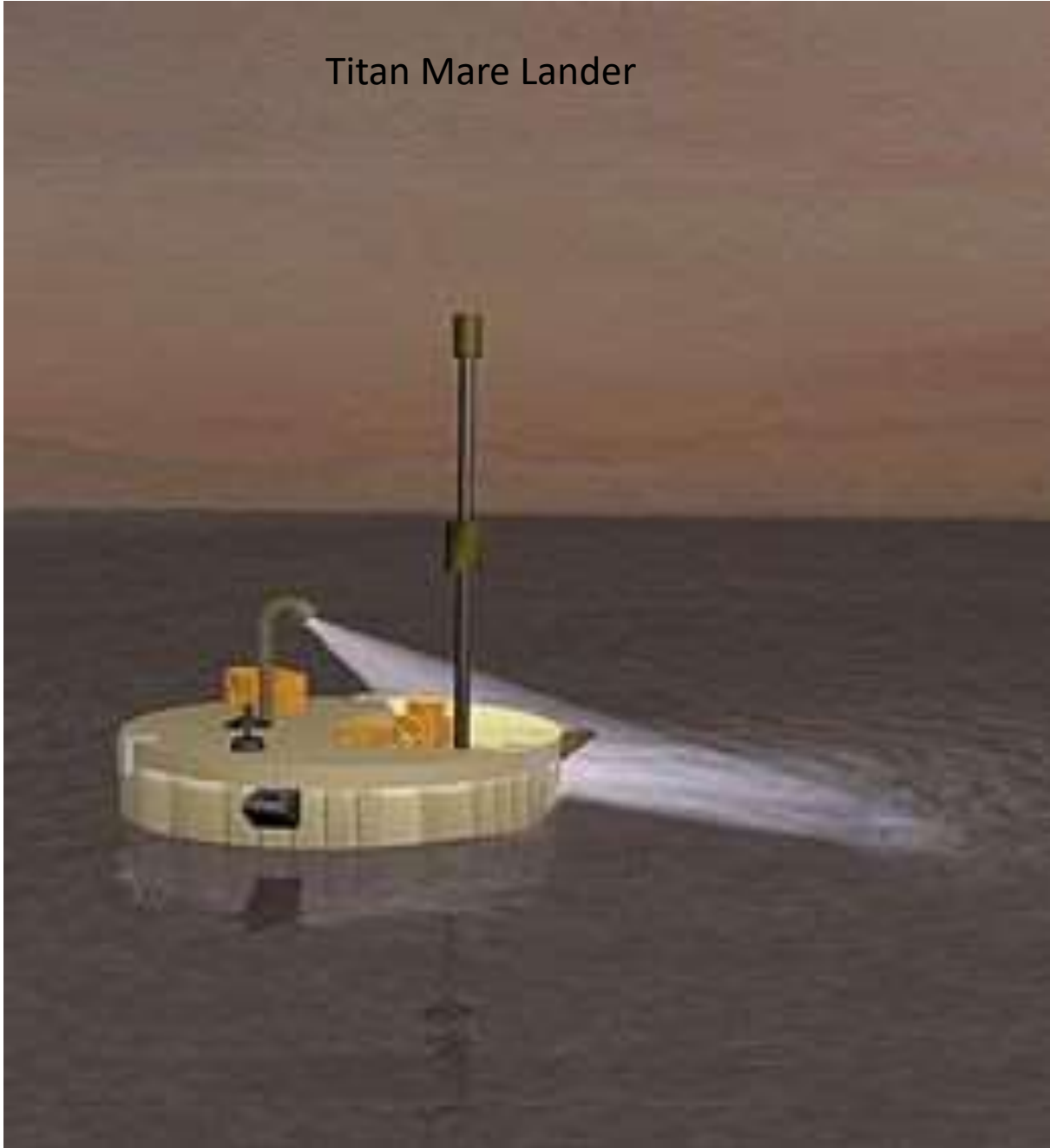


Size: Titan Sea vs. Earth's Lake Superior



Image credit: NASA/JPL-Caltech

Titan Mare Lander

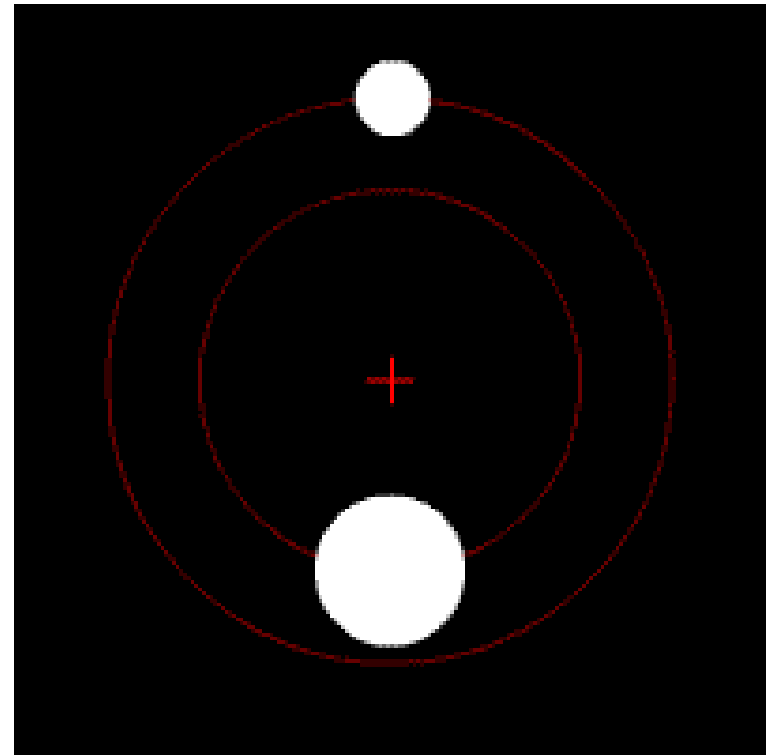
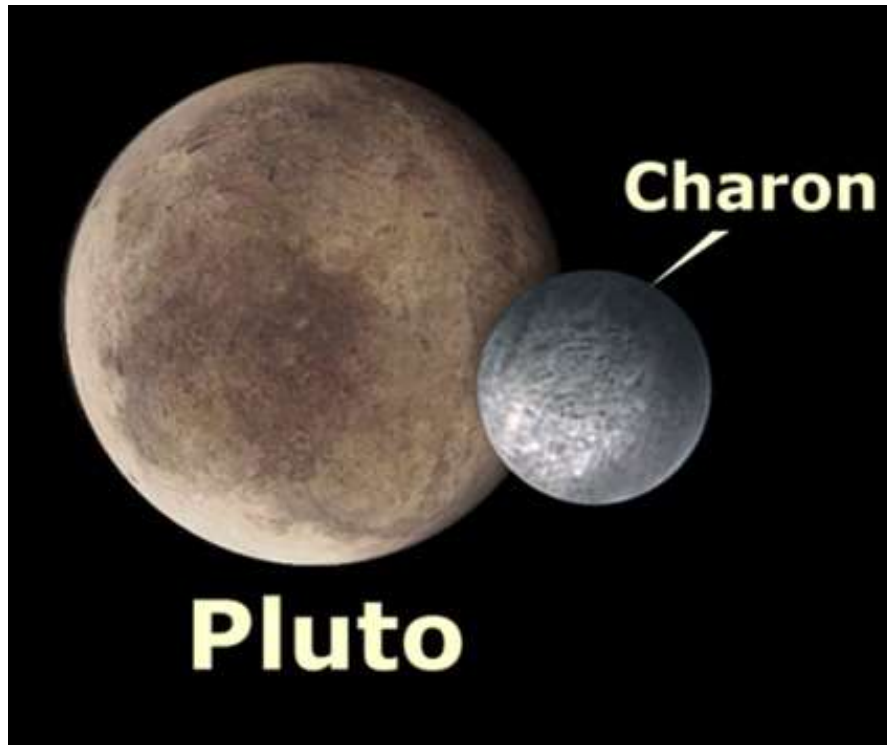


Mission to land a boat
on the seas of Titan

Uranus

Pluto (1978)

- Distance From Sun: 3.7 Billion Miles
- Average Temp: -400°F
- Pluto diameter: 1,500 miles, Charon diameter: 750 miles
- Orbital Period: 248 years
- Moons: 1 (known in 1978)
 - Charon found in 1978



Hubble Best View



Image credit: NASA/JPL-Caltech

Pluto (7/1/2013)

Introducing: **Styx** and **Kerberos**

Pluto Moons: Now at **5**

- Charon found in 1978
- Nix and Hydra found in 2005
- Kerberos found in 2011
- Styx found in 2012

Pluto System

Hubble Space Telescope • WFC3/UVIS



NASA, ESA, and M. Showalter (SETI Institute)

STScI-PRC12-32

New Horizons (Pluto - Kuiper Belt Mission)

Launched: Jan 17, 2006

Pluto Flyby: July 14, 2015

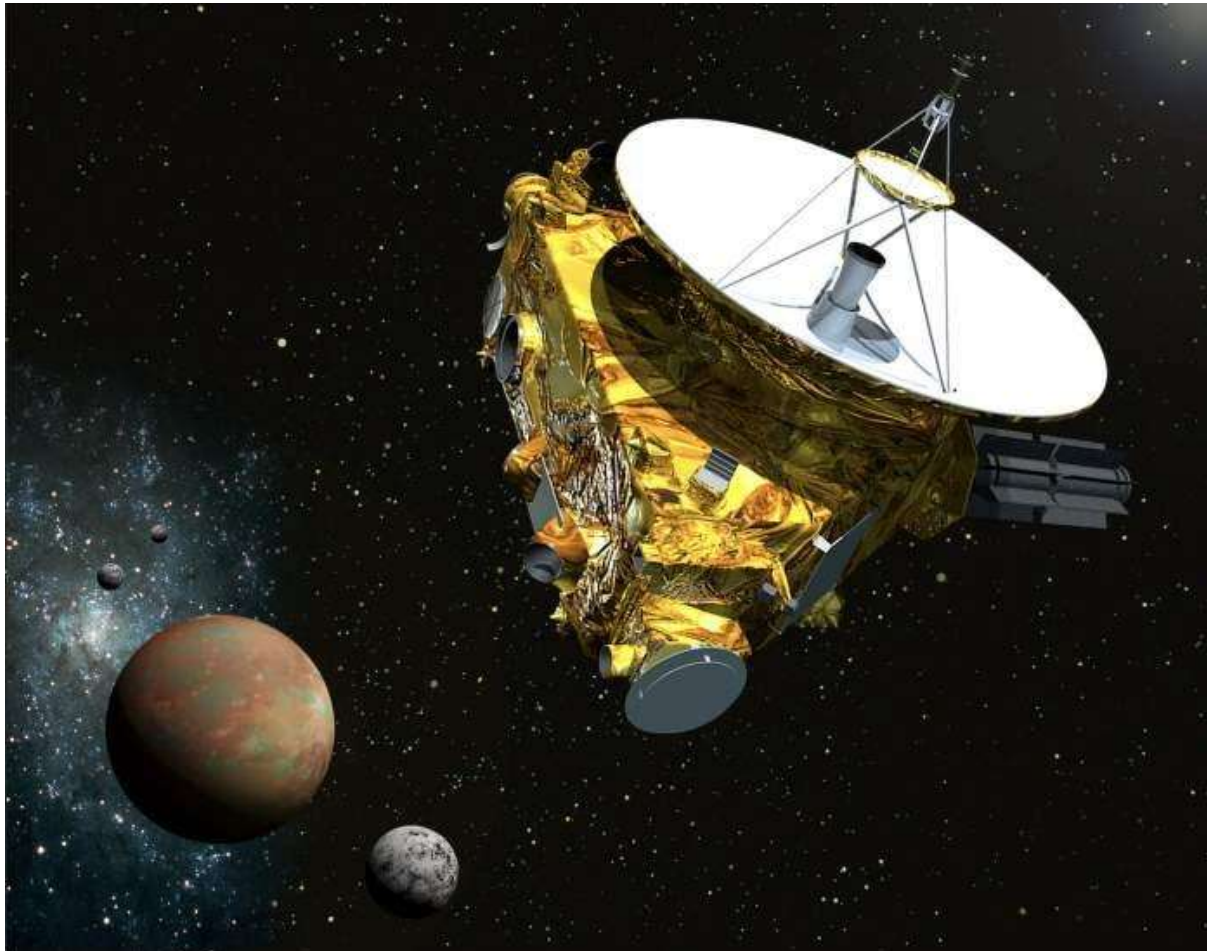


Image credit: NASA/JPL-Caltech