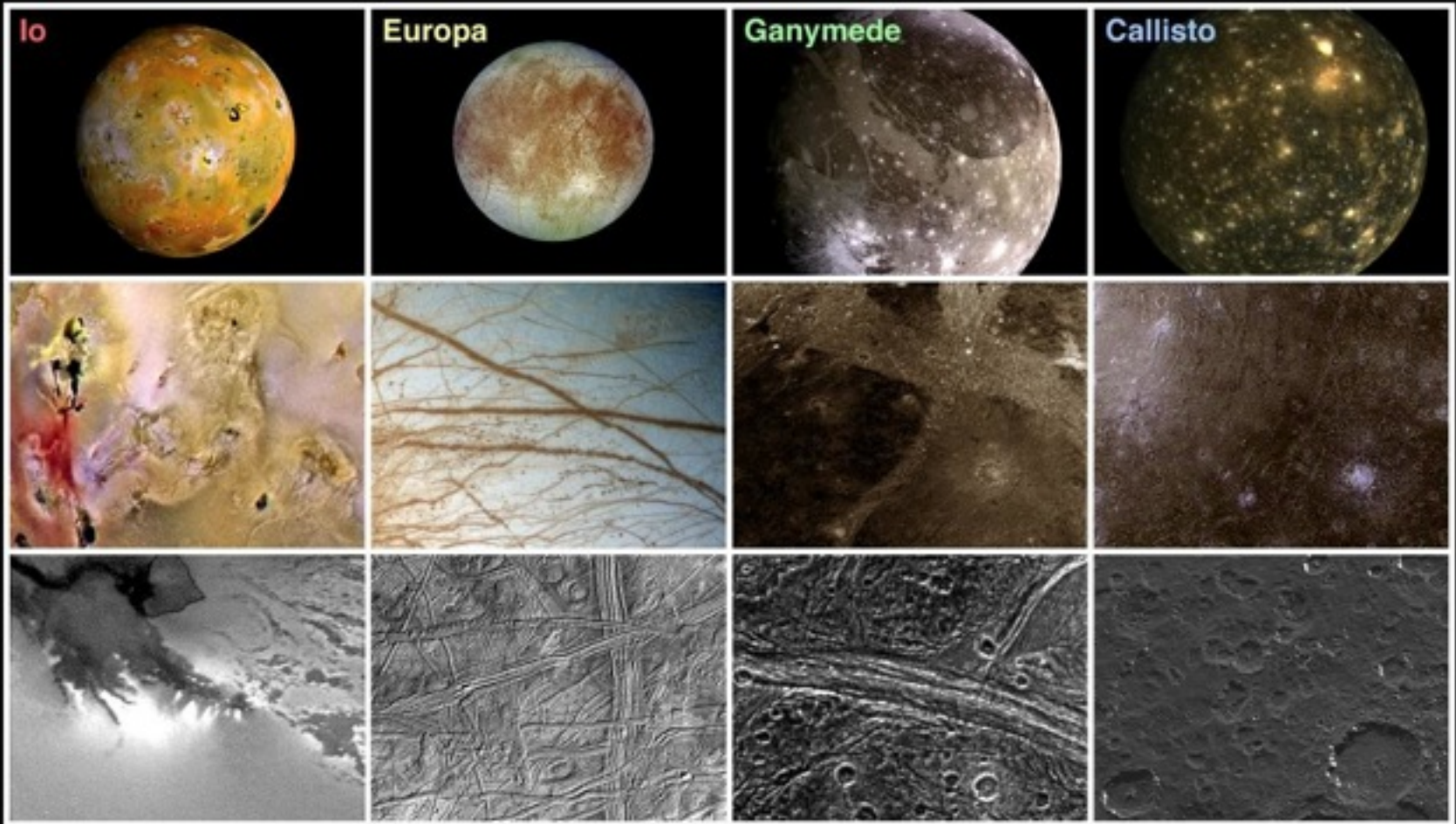


Big Moons of the Outer Solar System

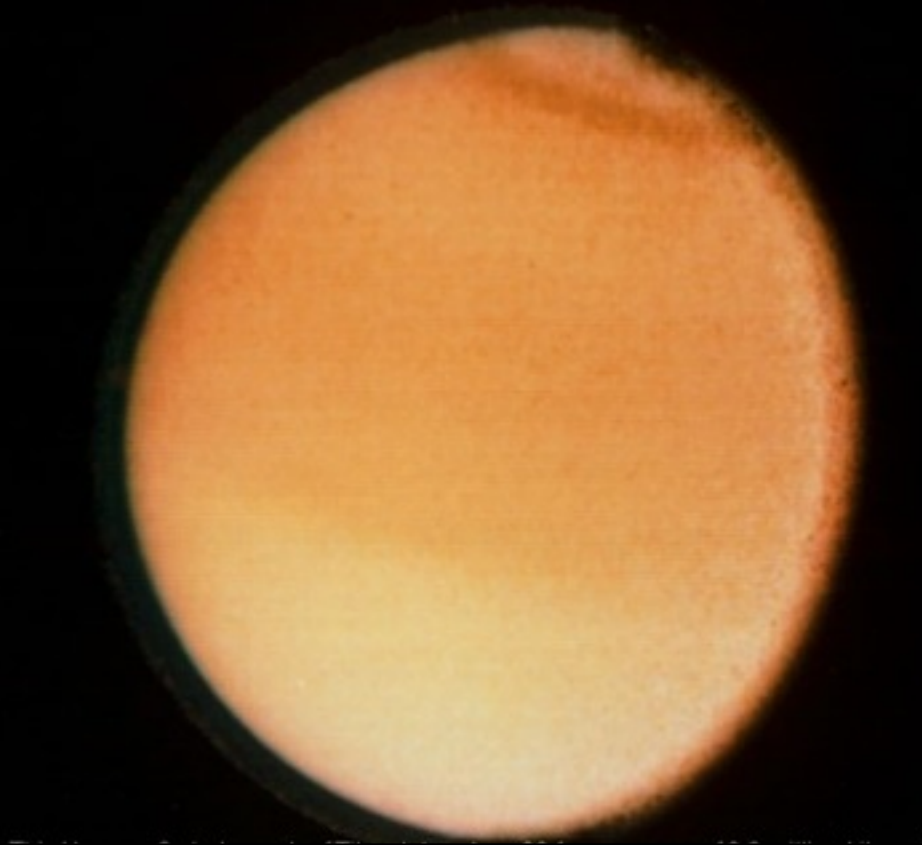
Six large moons exist in the outer solar system, which are as large or larger than Earth's Moon. Each displays unusual properties.

Jupiter



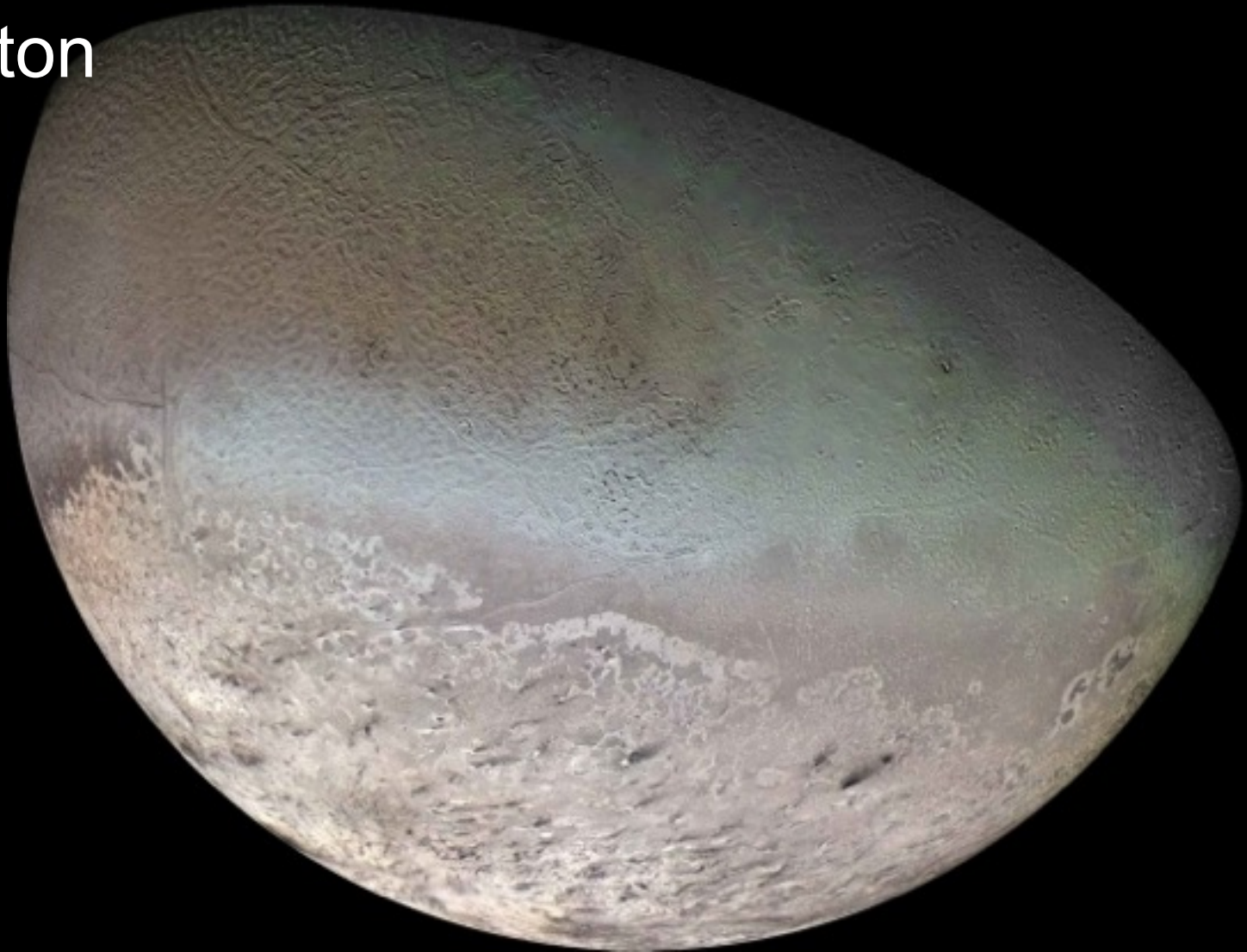
Saturn

- Titan



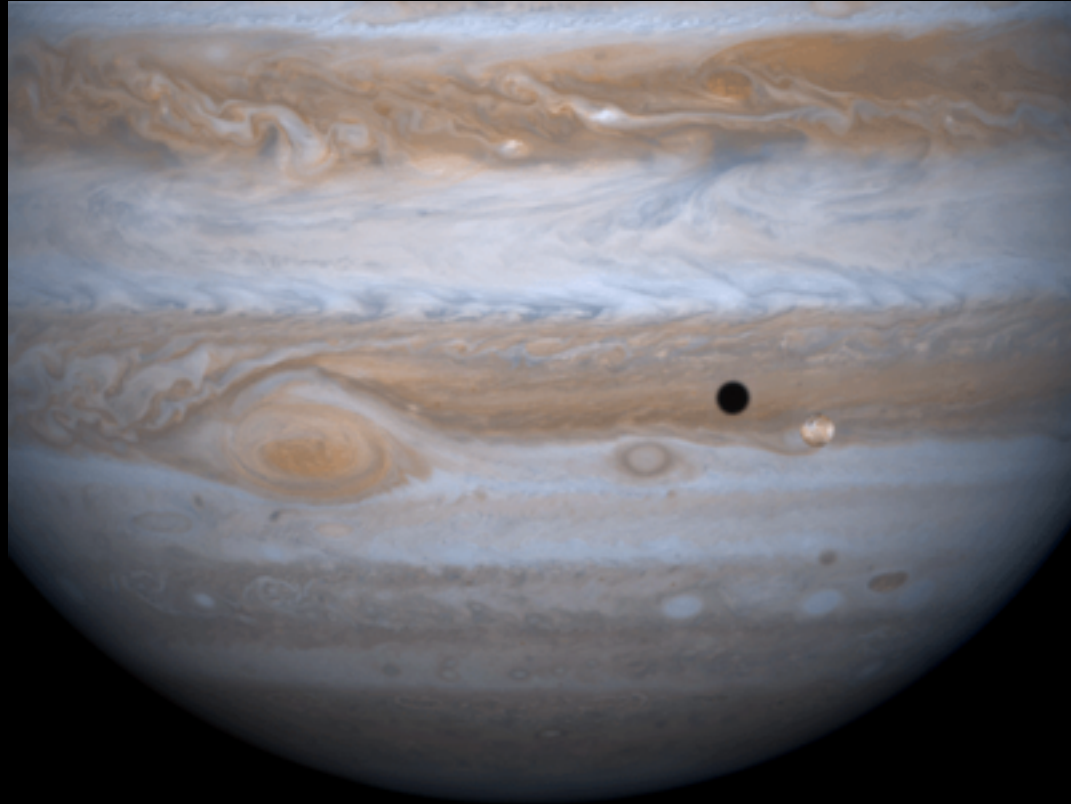
Neptune

- Triton



Outer Moons

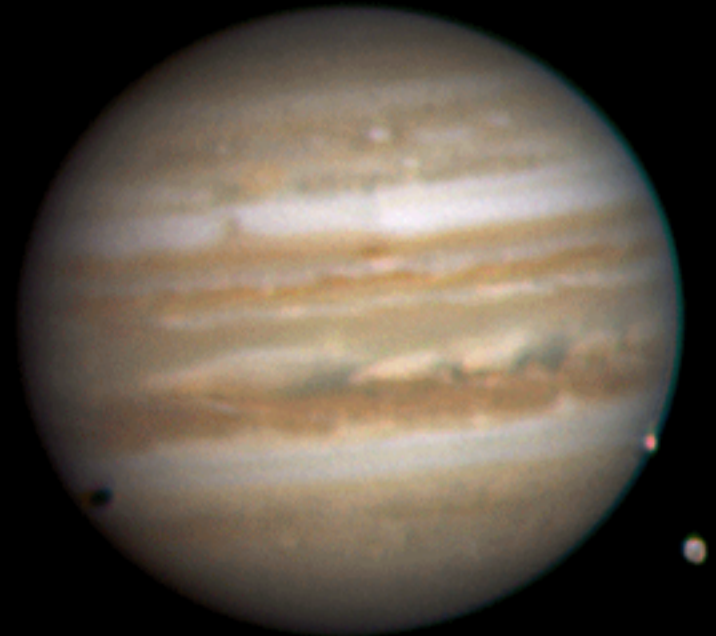
- Their properties are defined by their distance from the Sun and by their respective distances from their parent planet.



Jupiter:

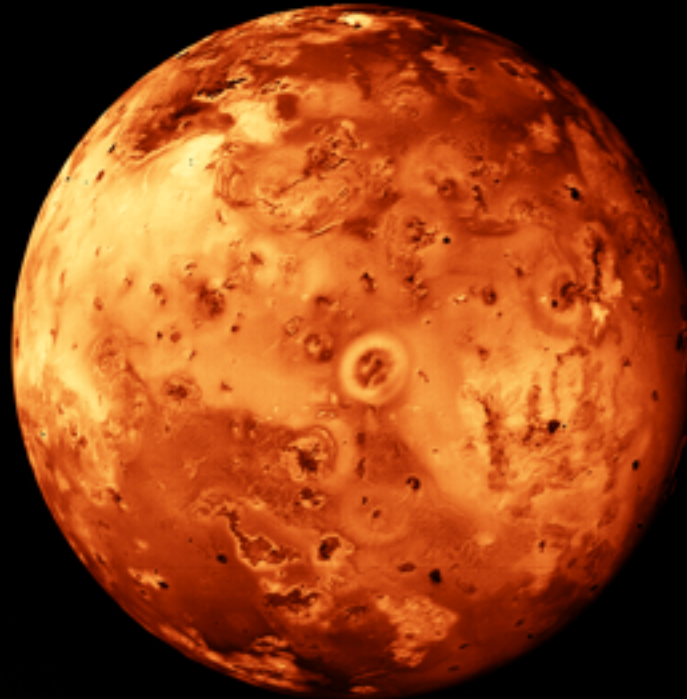
- Discovered by Galileo
- The average density of these 4 moons decrease with increasing distance from Jupiter; (Io is most dense, Callisto is least dense)

22/03/2007 16:29:50 UT



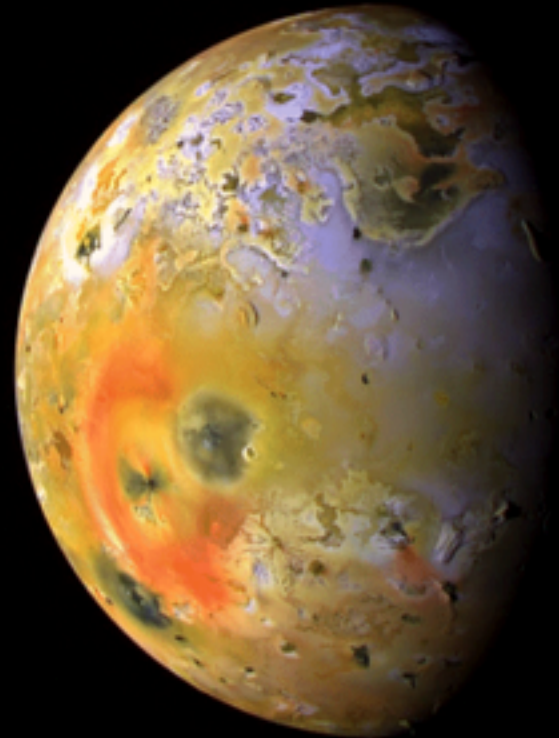
Io

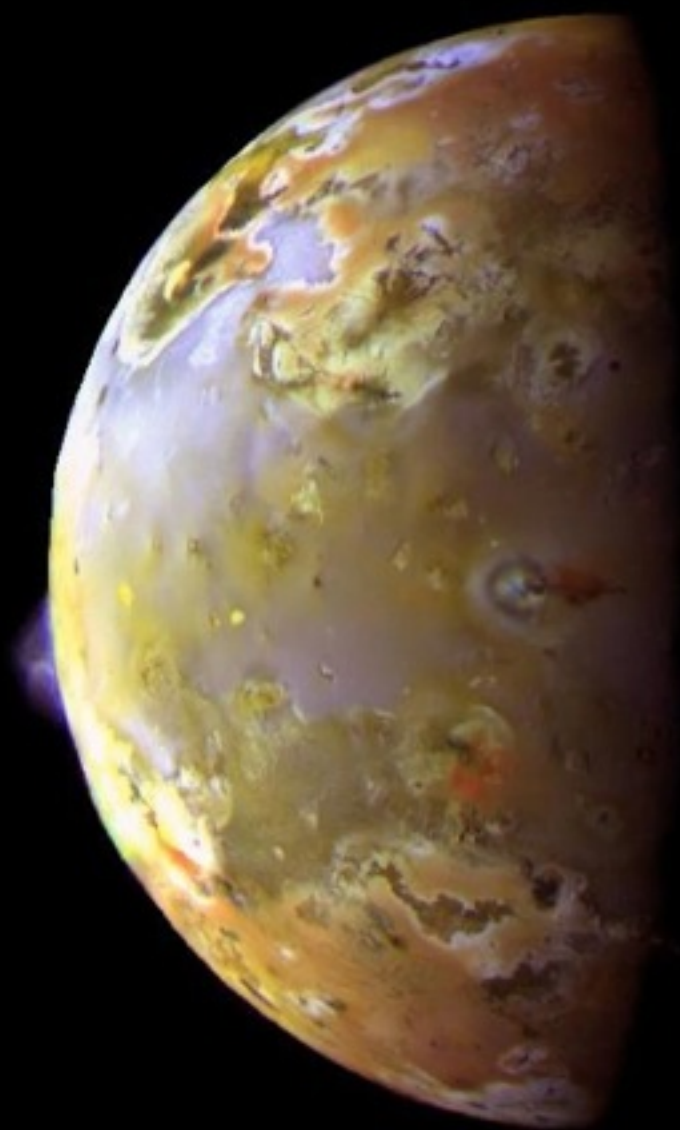
- Innermost large satellite of Jupiter, and is one of the oddest worlds in the solar system.
- Orbits Jupiter in 1.8 days.
- Most geologically active object within the solar system.
- Io possesses the youngest surface of any large body in the solar system.



Io

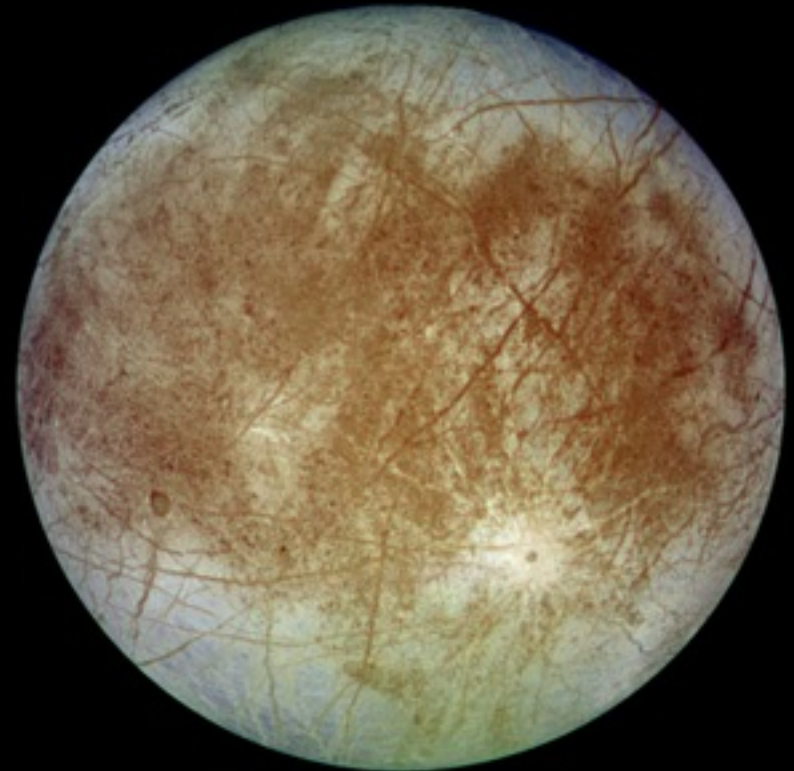
- Due to its lack of an atmosphere, and low gravity, volcanic material spews tens of kilometers above the surface, and rains back down over a wide area.
- The active geology of Io is driven by *tidal stresses*.

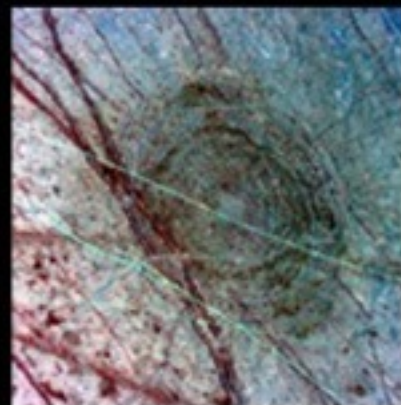
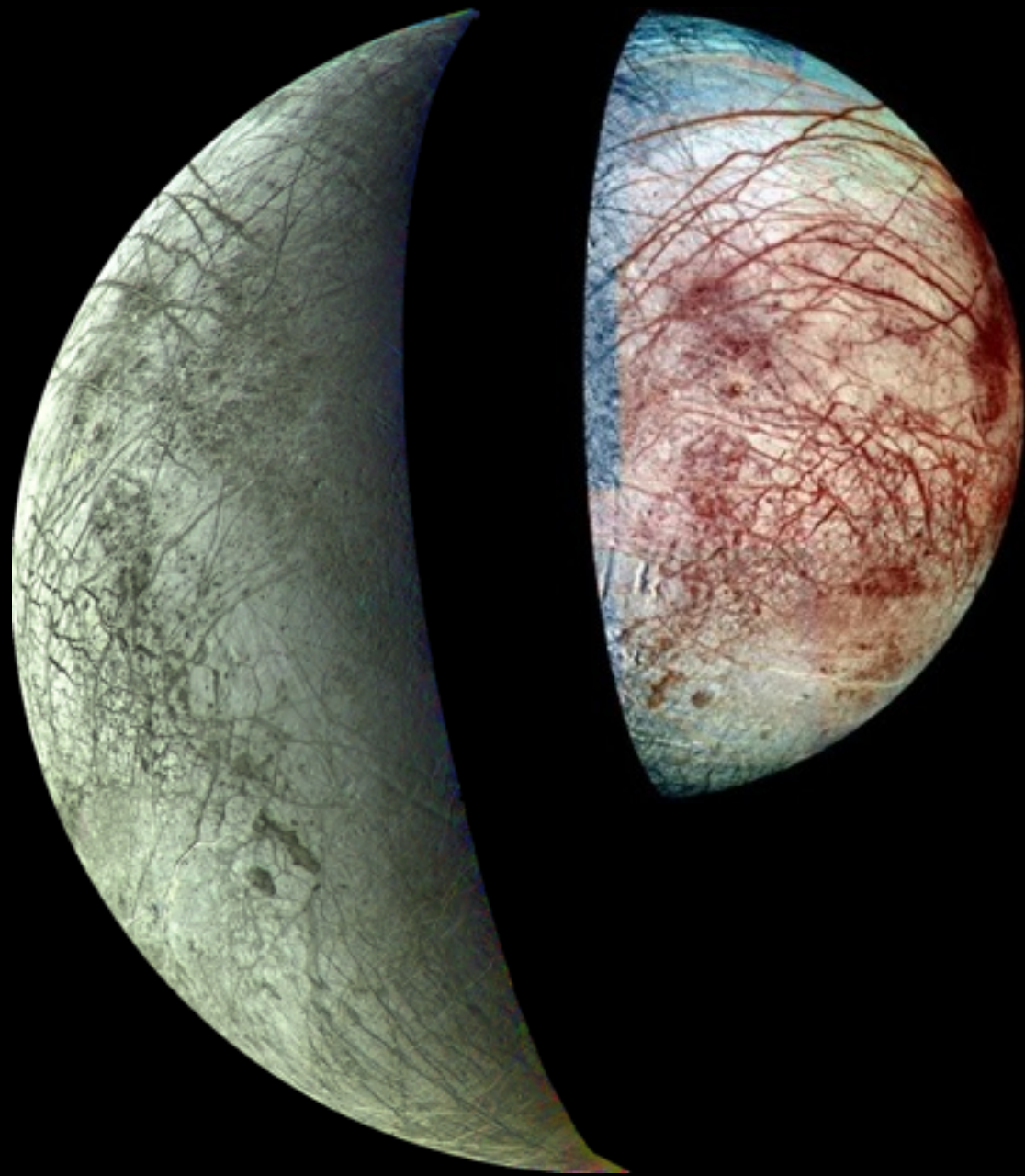




Europa

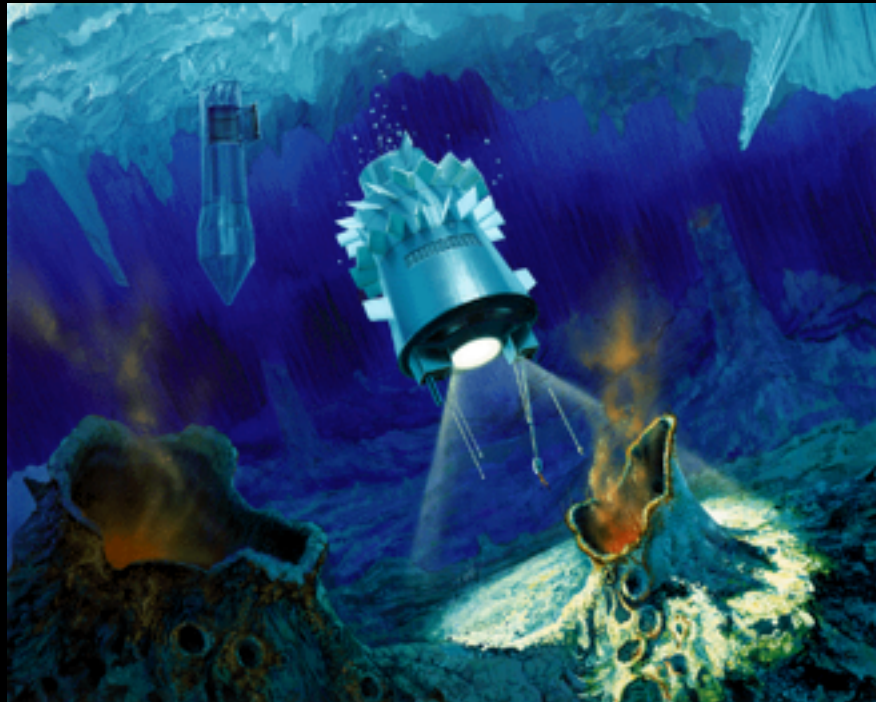
- Displays an extremely smooth surface with few craters, and is covered with multitudes of crisscross “cracks”.
- The lack of impact craters suggests that the surface is young, and is renewing itself.
- Europa is highly reflective, indicating that the surface is composed largely of water ice.





Europa

- The Galileo probe has found evidence that Europa may conceal a subsurface H₂O ocean.
- The possibility of life in this ocean is considered good, especially if hydrothermal vents exist at the bottom of the ocean.
- Exploring these oceans poses a major challenge for the 21st century.



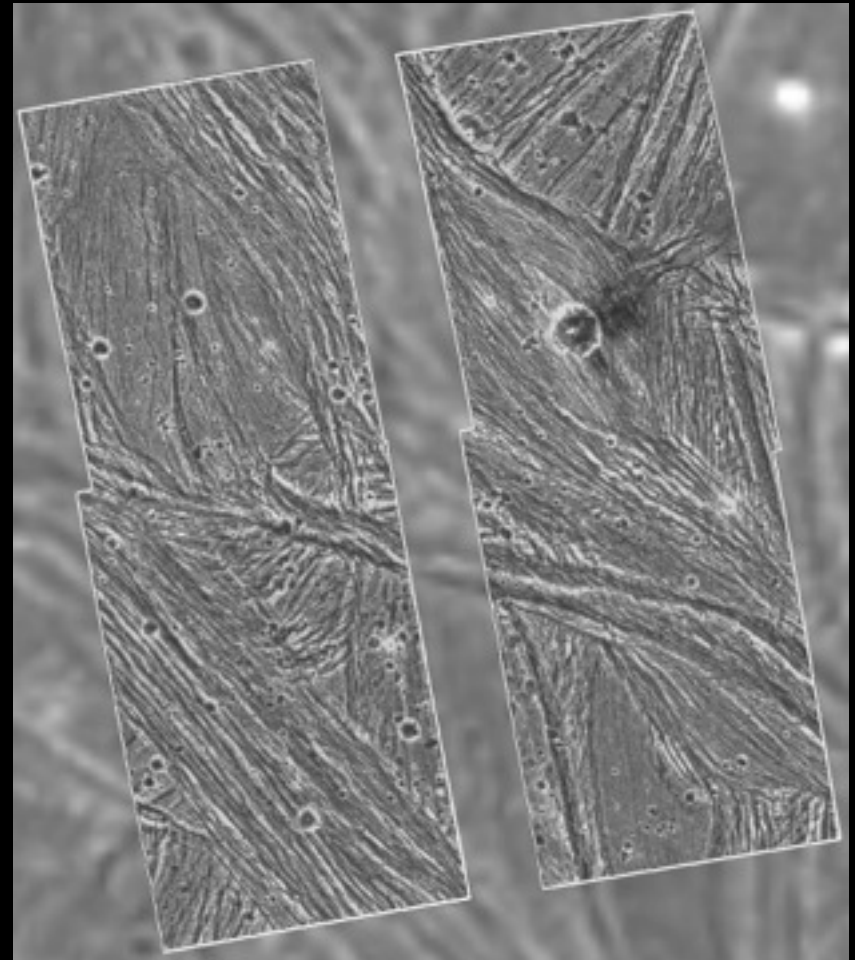
Ganymede

- Largest moon in the solar system, larger than Mercury and Pluto.
- Has a much lower density than Jupiter's inner moons suggesting it is made of more ice than rock.
- The surface is composed of water ice like Europa



Ganymede

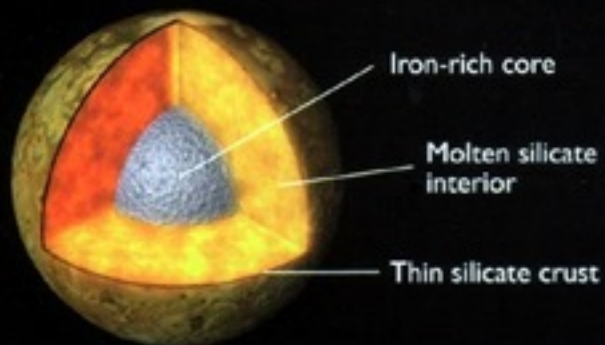
- Shows evidence for early geological activity, perhaps ice plate tectonics, but now appears to be a geologically dead world.



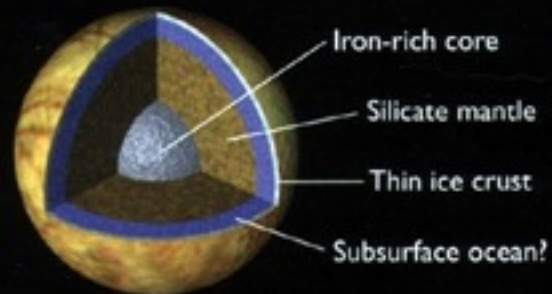
Callisto

- Similar to Ganymede but with almost 10 times the number of visible craters.
- Crater counts suggest an old surface with little overall geological activity.
- Appears to be a largely undifferentiated ball of rock and ice, essentially a cratered ice ball.

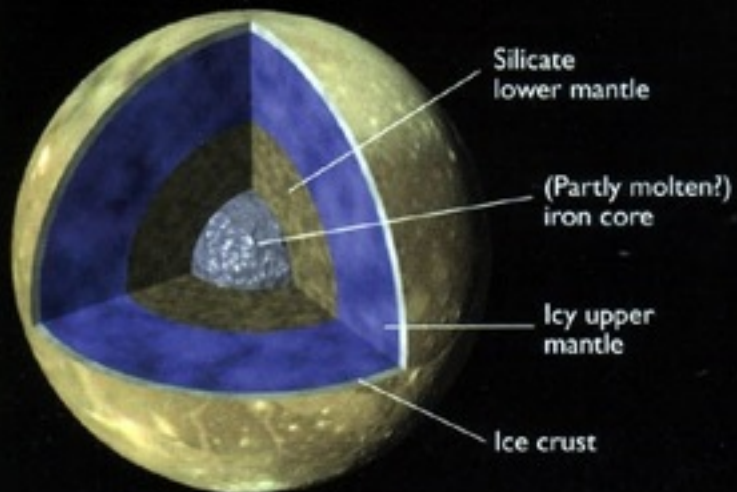




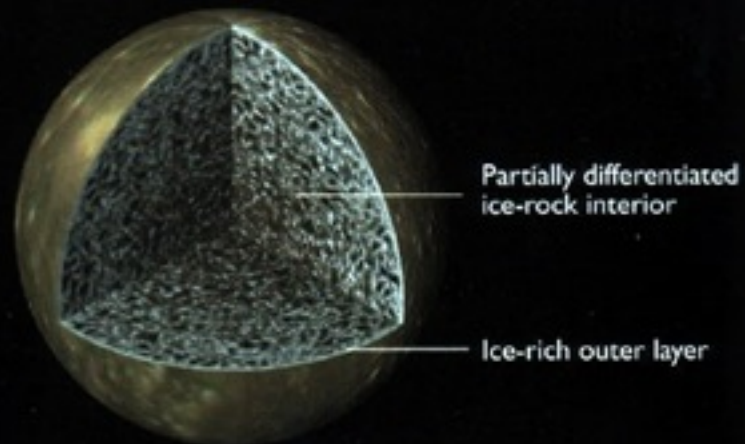
Io



Europa



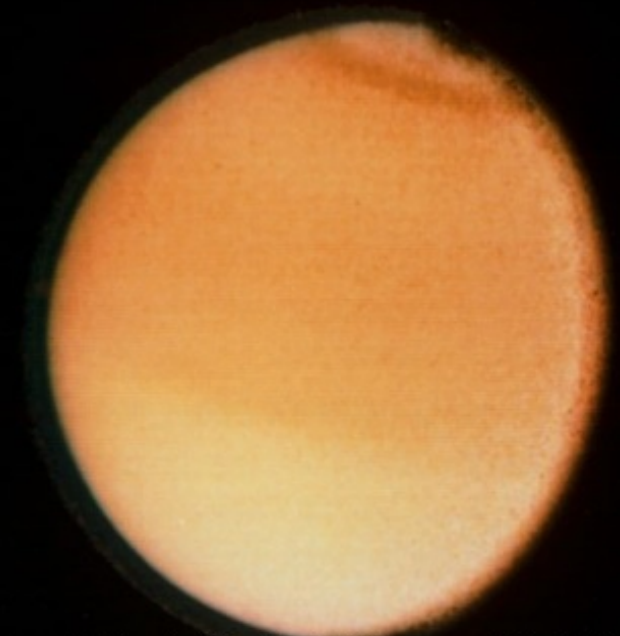
Ganymede



Callisto

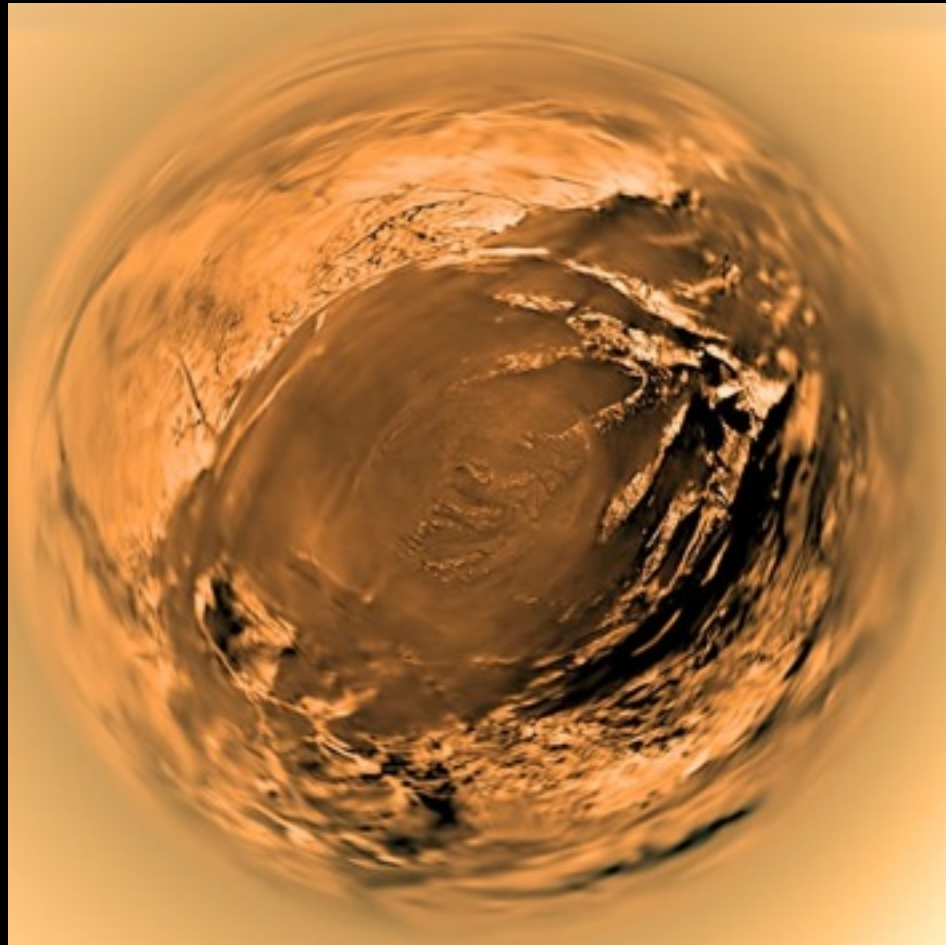
Titan

- Second largest moon in solar system, larger than Mercury and Pluto.
- Only moon with a substantial atmosphere.
- The atmosphere is composed of:
 - 90% Nitrogen
 - 10% Argon
 - Traces of Methane, CO_2 , and Ethane



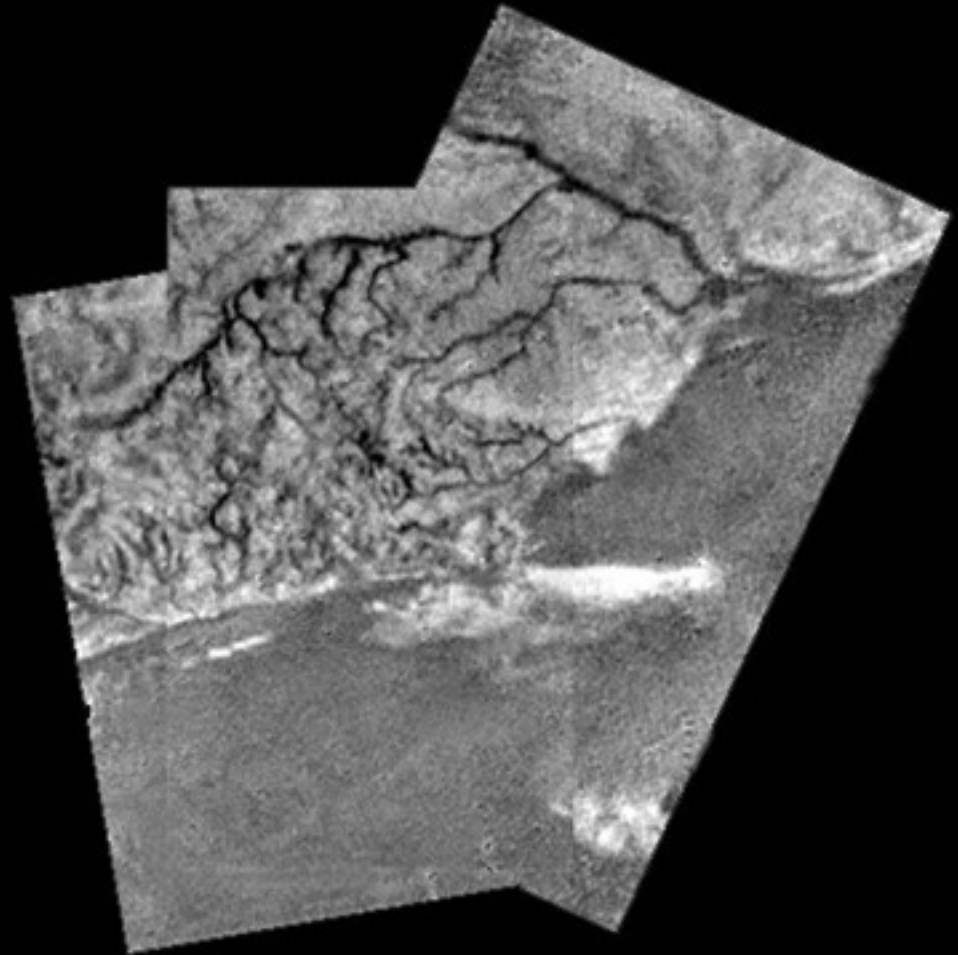
Titan

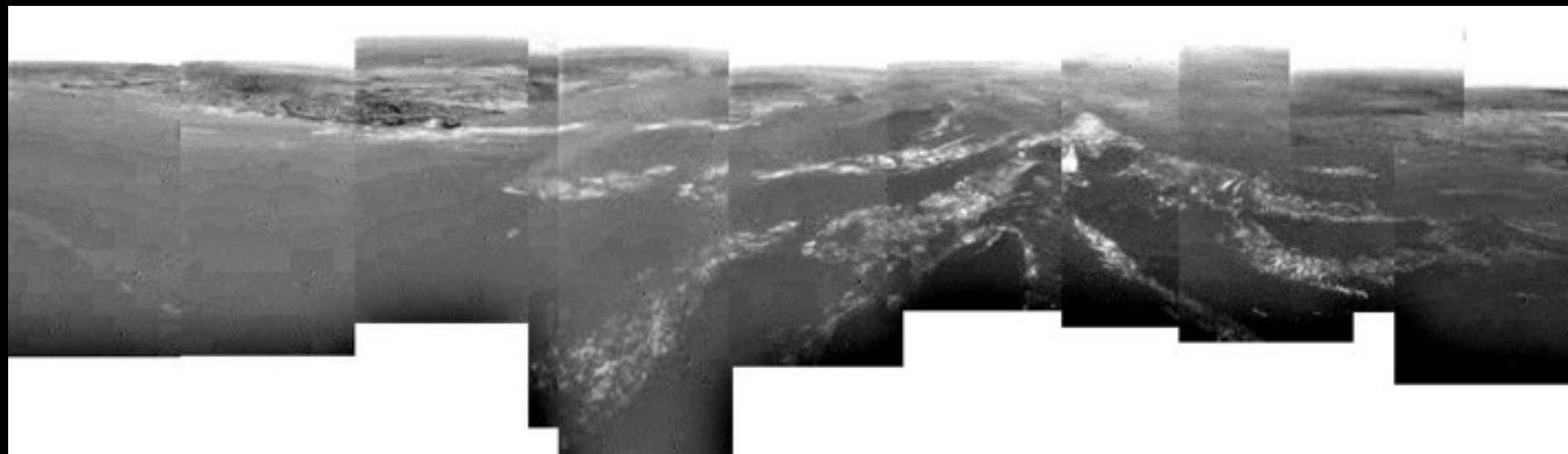
- Cold: 94 K at the surface
- Conditions possibly like the early Earth, except for temperature.



Titan

- The Huygens probe landed on Titan in January 2005, producing the first image from the surface of a moon other than Earth's.





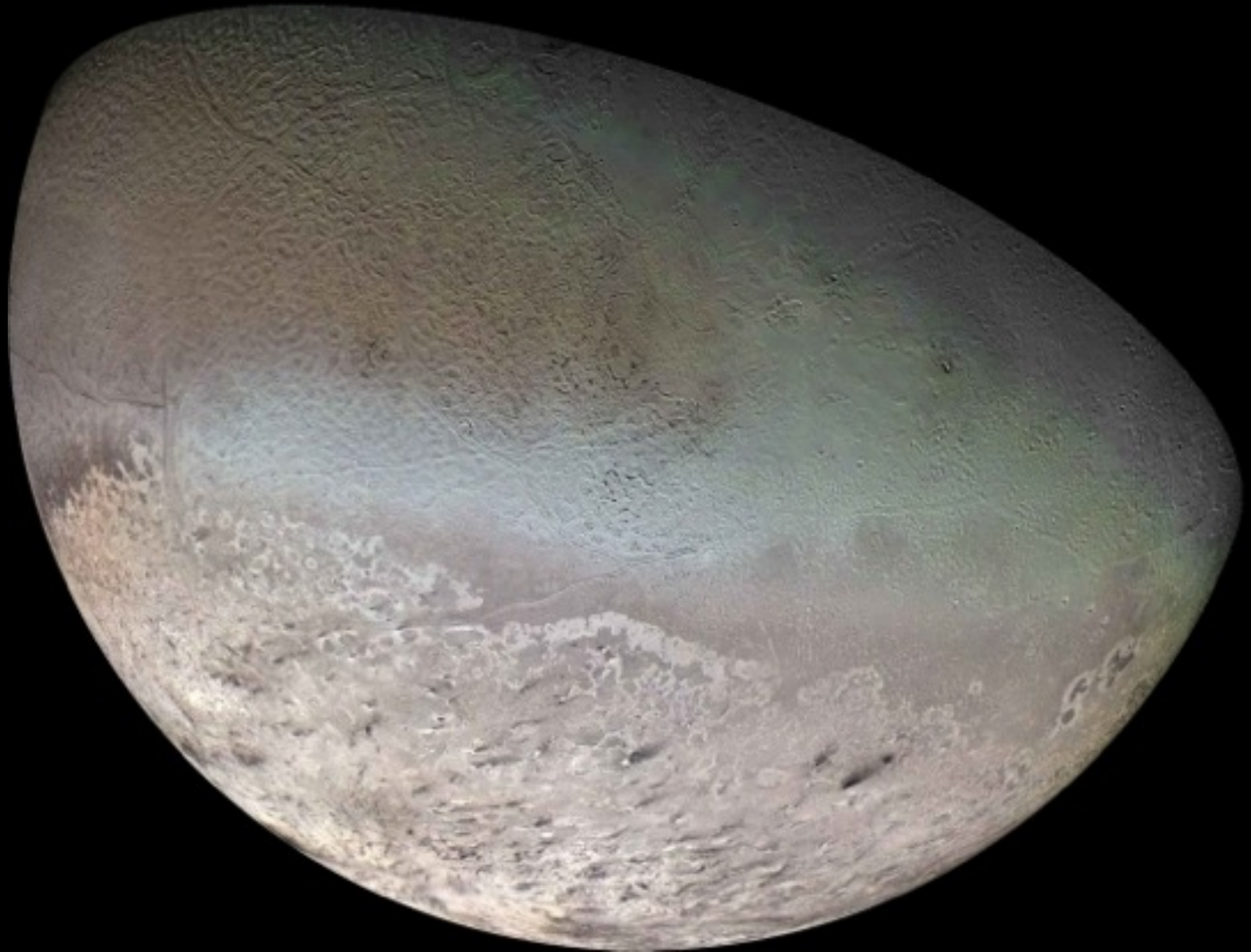
Titan

- The Huygens probe lasted for about 20 minutes on the surface and found oceans of Ammonia.



Neptune

- Triton



Triton

- Smallest of the big moons.
- Orbits in retrograde direction (i.e. backwards) unlike every other large object in our solar system.
- Really Cold – 40K on surface
- Surface appears to be water ice, with nitrogen frost.
- Impact craters as well as many ridges are visible on the surface, suggesting some geologic activity.

Triton

- Possible explanations for retrograde orbit.
 - Collision:
 - A large object struck the planet and caused it to reverse directions.
 - Unlikely, as this would have destroyed both objects.
 - Capture:
 - Was not originally a moon of Neptune.
 - Came from somewhere else in space.