

“The regular early morning yell of horror was the sound of Arthur Dent waking up and suddenly remembering where he was.”

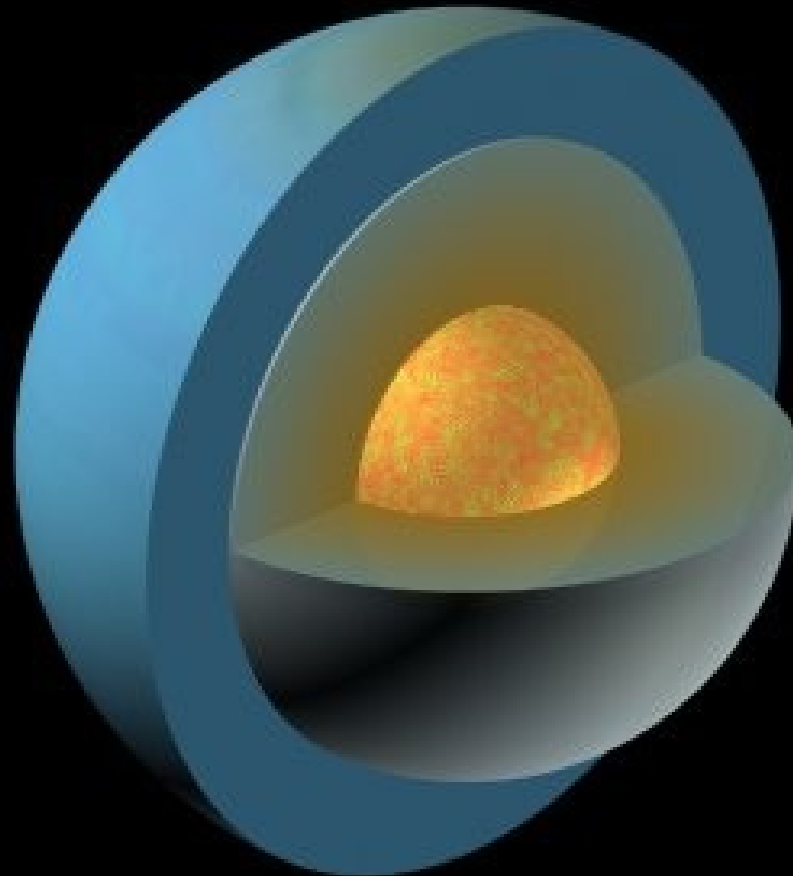
Life, the Universe and Everything.

Can I push next Friday's test back to the following Monday? (Feb 26)

Uranus & Neptune's structure **New for us!**

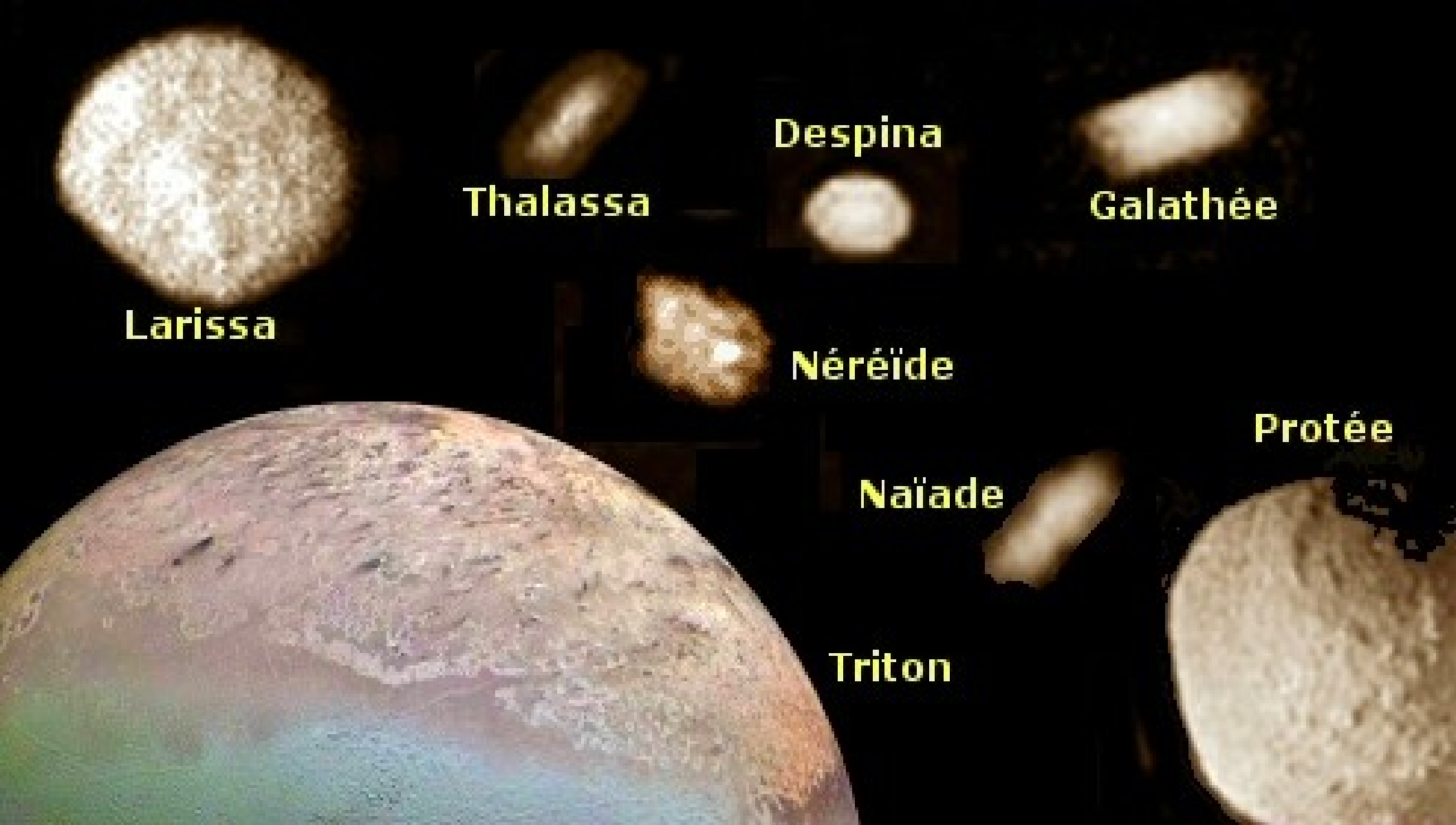
- * Mostly hydrogen atmosphere. Methane clouds
- * liquid/ice mantle made of water/ammonia/methane
- * rocky silicate core (like Earth's mantle)

5th (and last)
structure in our
solar system.
Neptunian



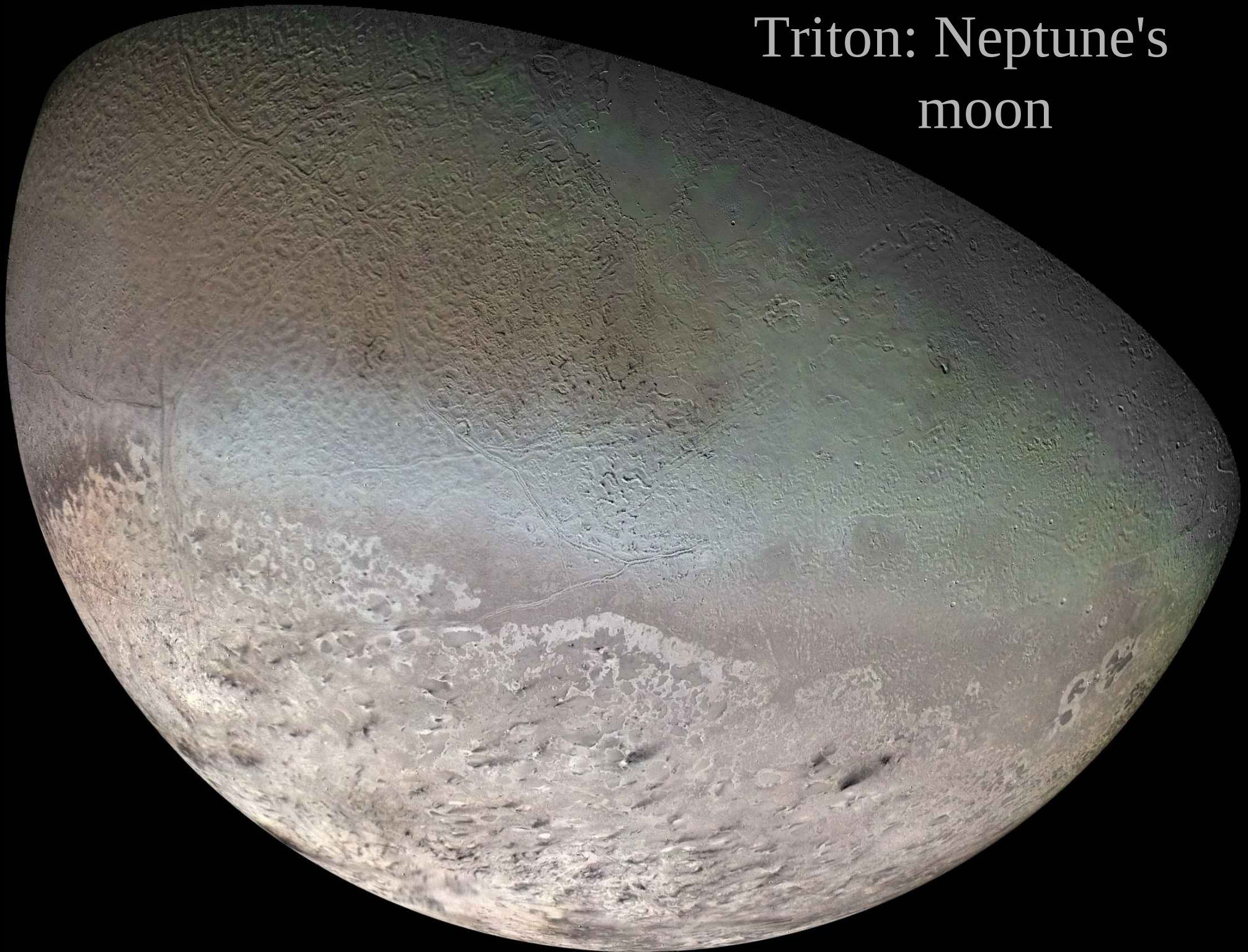
Both Neptune and
Uranus have rings
and tens of moons

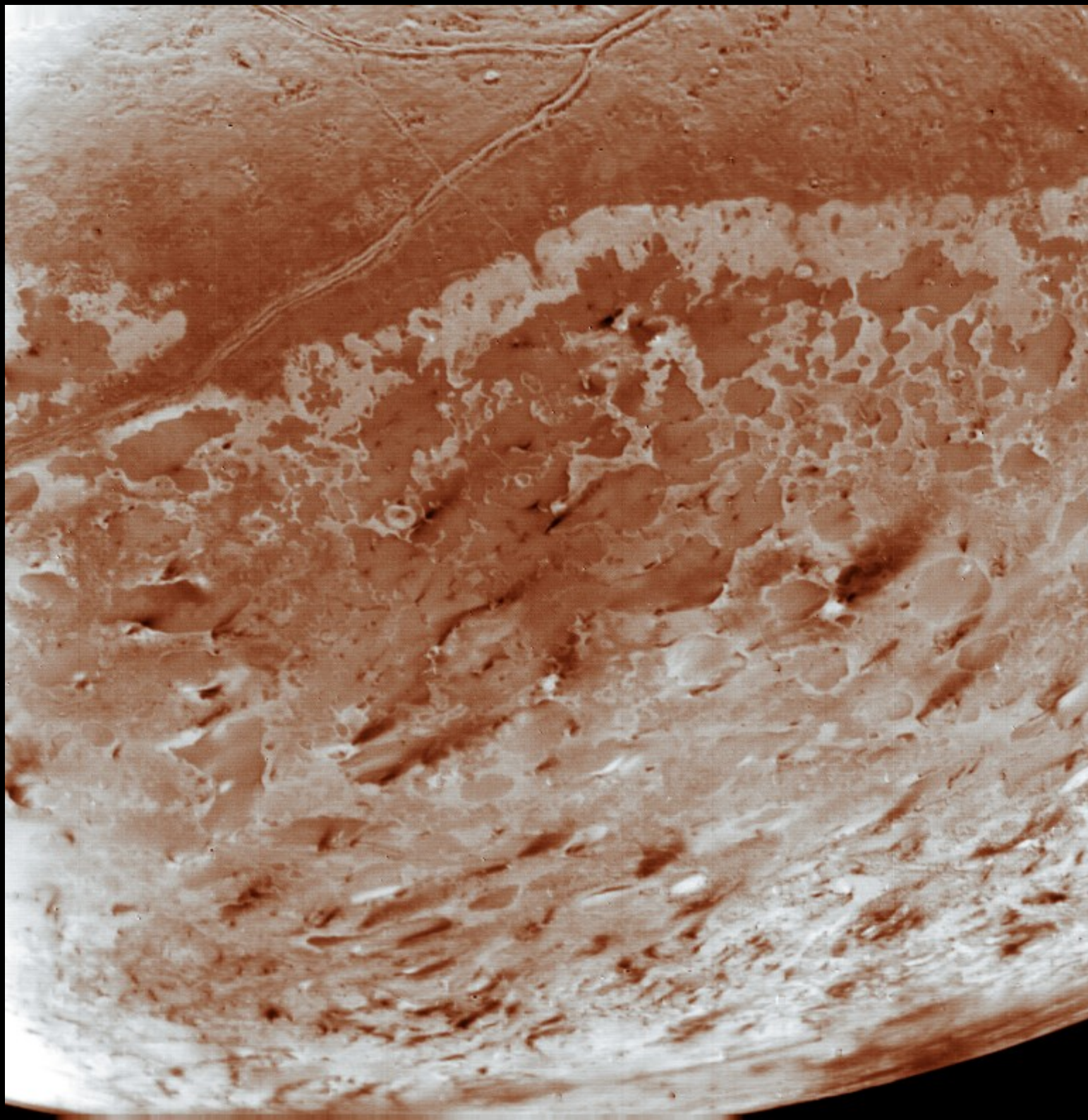




Neptune has 14 known moons.

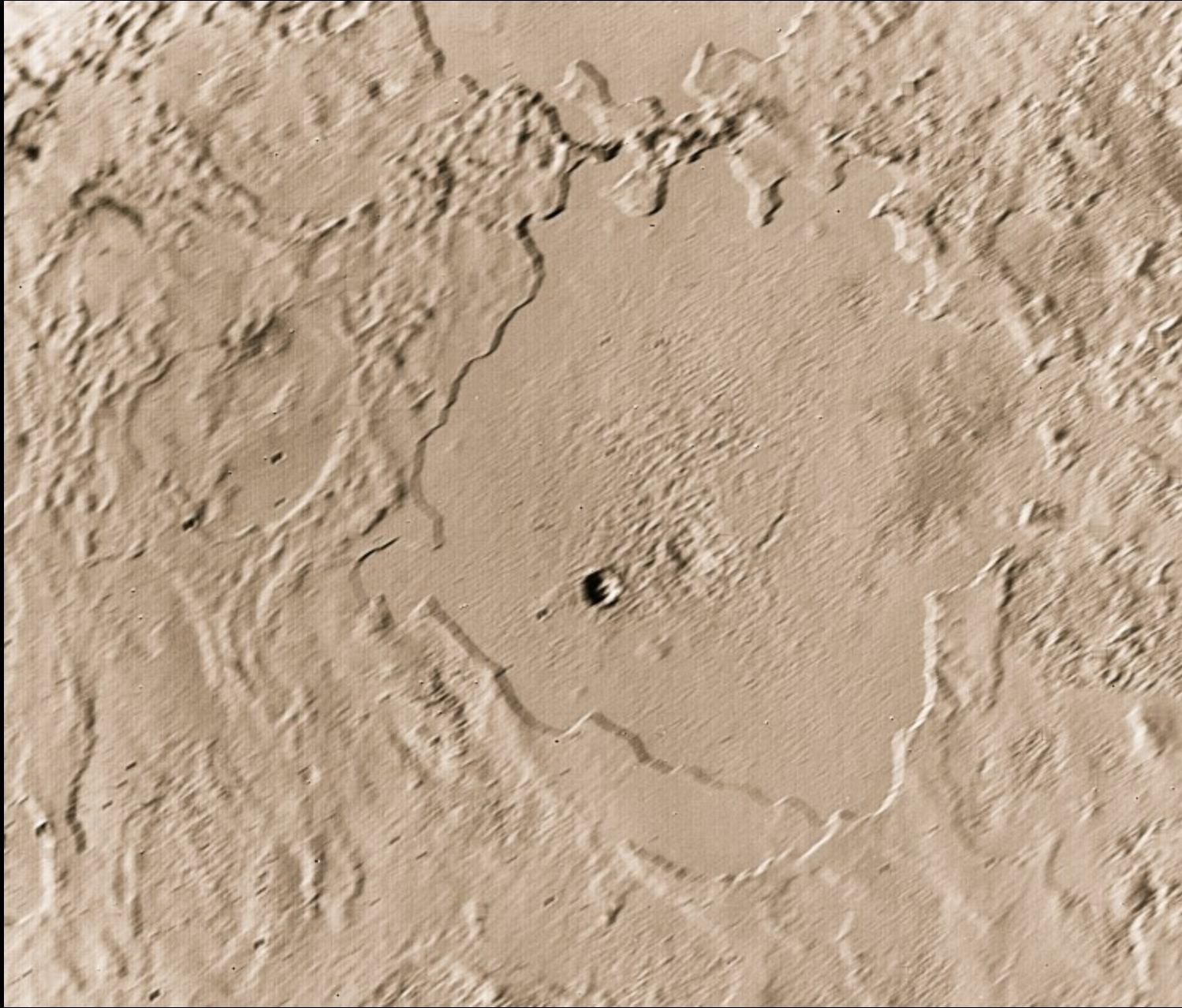
Triton: Neptune's
moon



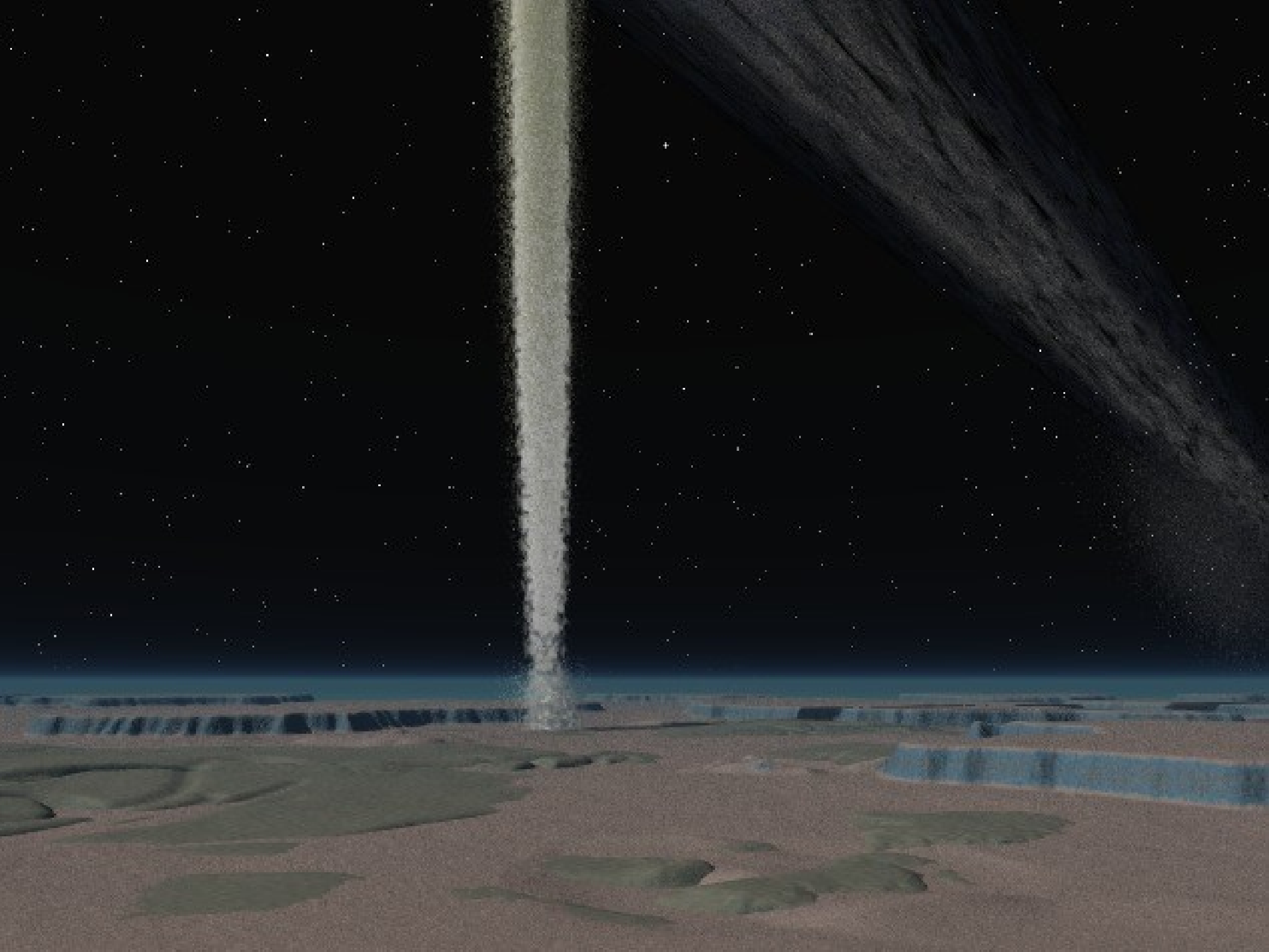


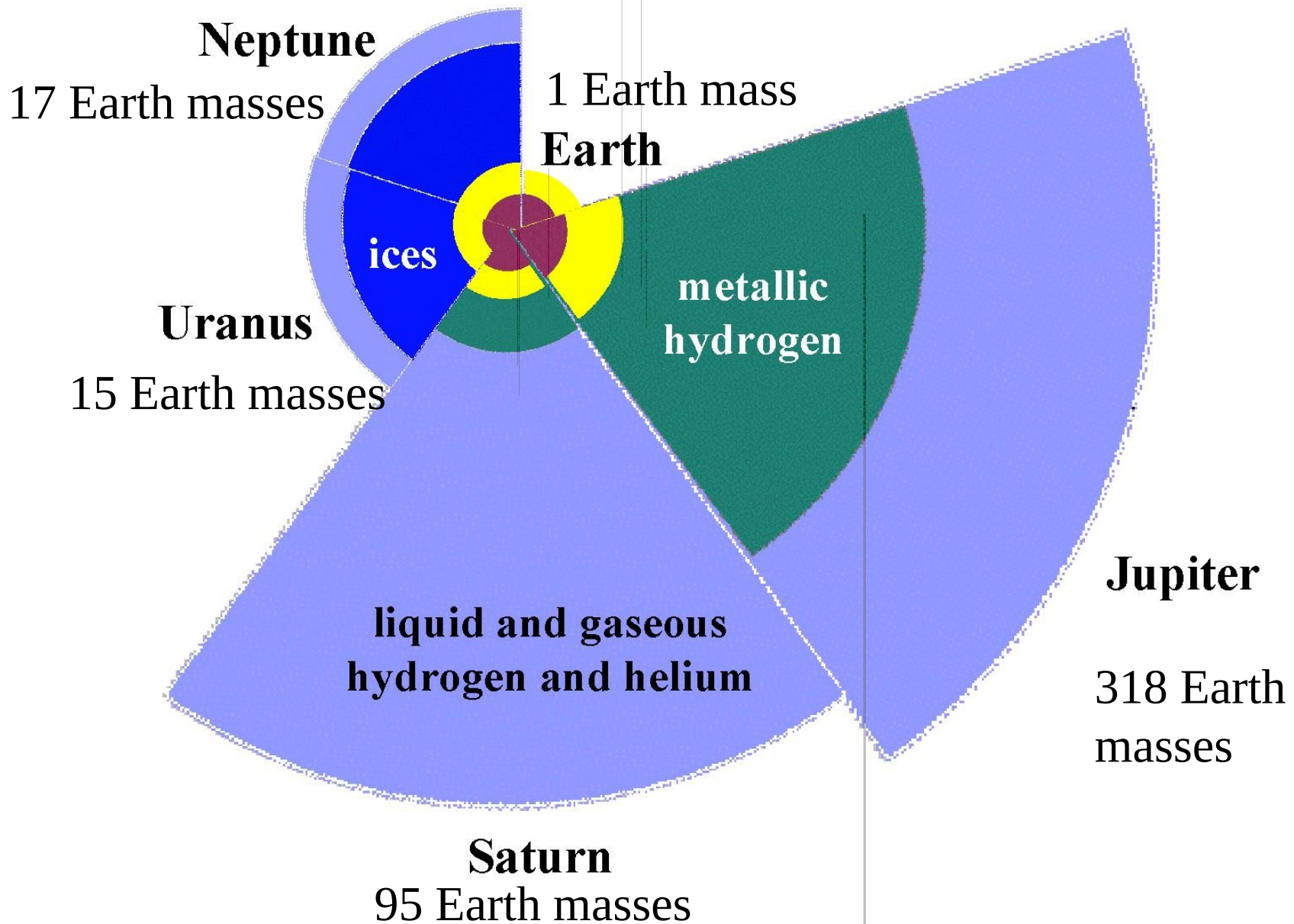
Triton- the largest moon of Neptune is 80% the size of our Moon.
*So cold that it has a nitrogen frost!
*Polar caps are methane ice.
*Black markings are from Nitrogen geysers!

Triton is ~25% water-ice with the rest being rocky (Density=2.0g/cc). Triton has a young surface w/ few craters.



Triton orbits Neptune retrograde and rotates at a highly inclined angle. This means it was a captured moon and will eventually fall into Neptune or break up.





Time for HW2.
Have it in front you to answer the multiple
choice questions.

No talking during the HW.

Question 1:

What do the outer moons have an abundance of that the inner moons do not?

- A) Rock
- B) Water/ice
- C) Hydrogen
- D) Helium
- E) No difference, they are the same.

Question 2:
Which has more impact craters?

- A) Io
- B) Callisto
- C) same

Question 3:

What direction will the Sun always be at noon?

- A) North
- B) South
- C) East
- D) West

Question 4:
About how old?

- A) Few Myrs
- B) 500Mys-1Gyr
- C) 2-3 Gyrs
- D) 4-4.5 Gyrs

Question 5 :
About how old?

- A) Few Myrs
- B) 500Mys-1Gyr
- C) 2-3 Gyrs
- D) 4-4.5 Gyrs

Question 6:

What is the density of rocky planets?

A) 1g/cc

B) 2g/cc

C) 5g/cc

Question 7 :
About how old?

- A) Few Myrs
- B) 500Mys-1Gyr
- C) 2-3 Gyrs
- D) 4-4.5 Gyrs

Question 8:

What element is Jupiter mostly made of?

- A) H
- B) He
- C) water
- D) rock

Question 9:
Why is Jupiter denser than water?

A) Just choose A

Question 10:
What is the source of heat for
Io's volcanoes?

- A) Cooling from formation
- B) Tidal force from Jupiter
- C) Meteorite impact heat
- D) there's no way to tell

.

Question 11:

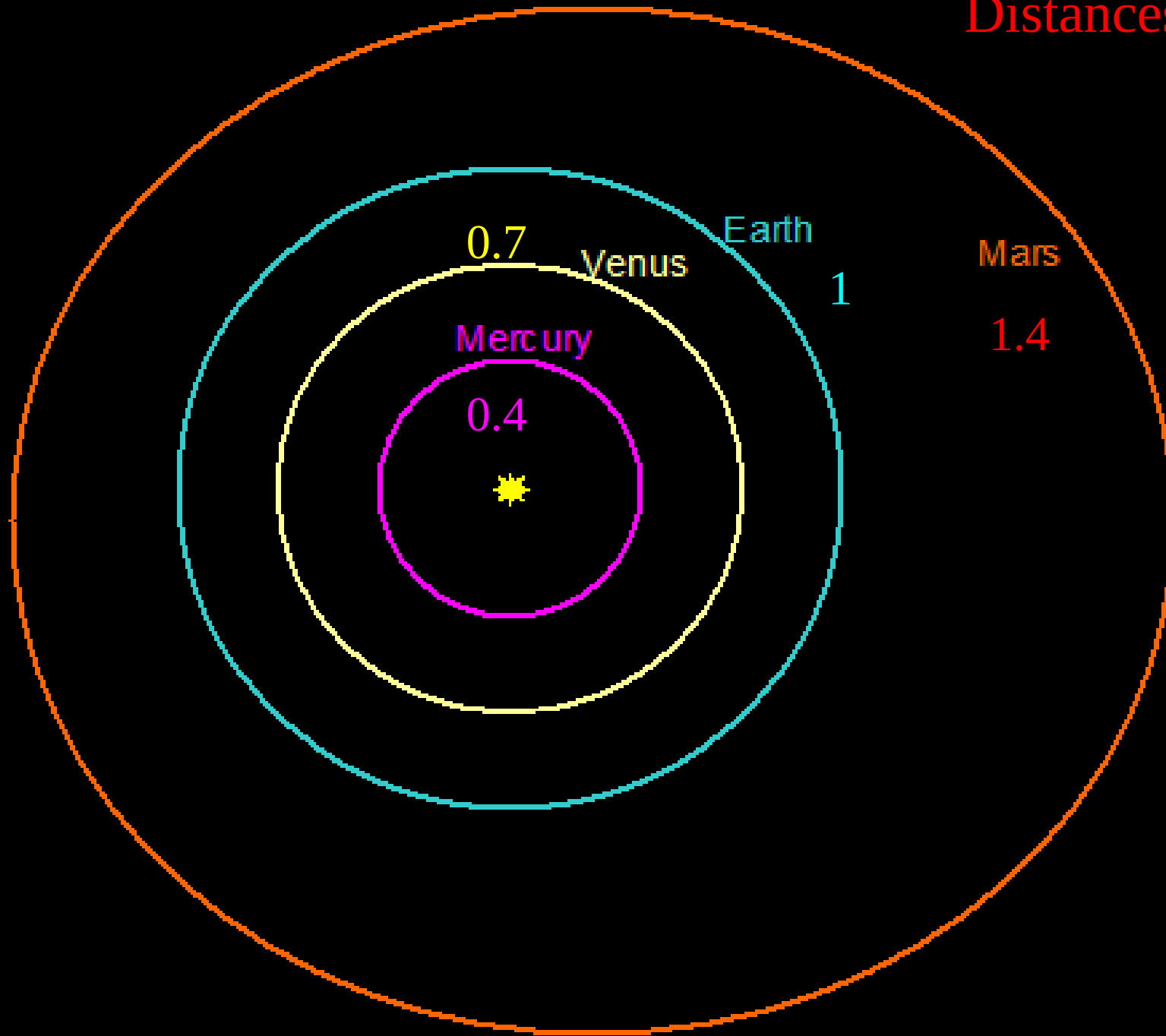
If a new planet is discovered at 39AU,
what's its orbital period?

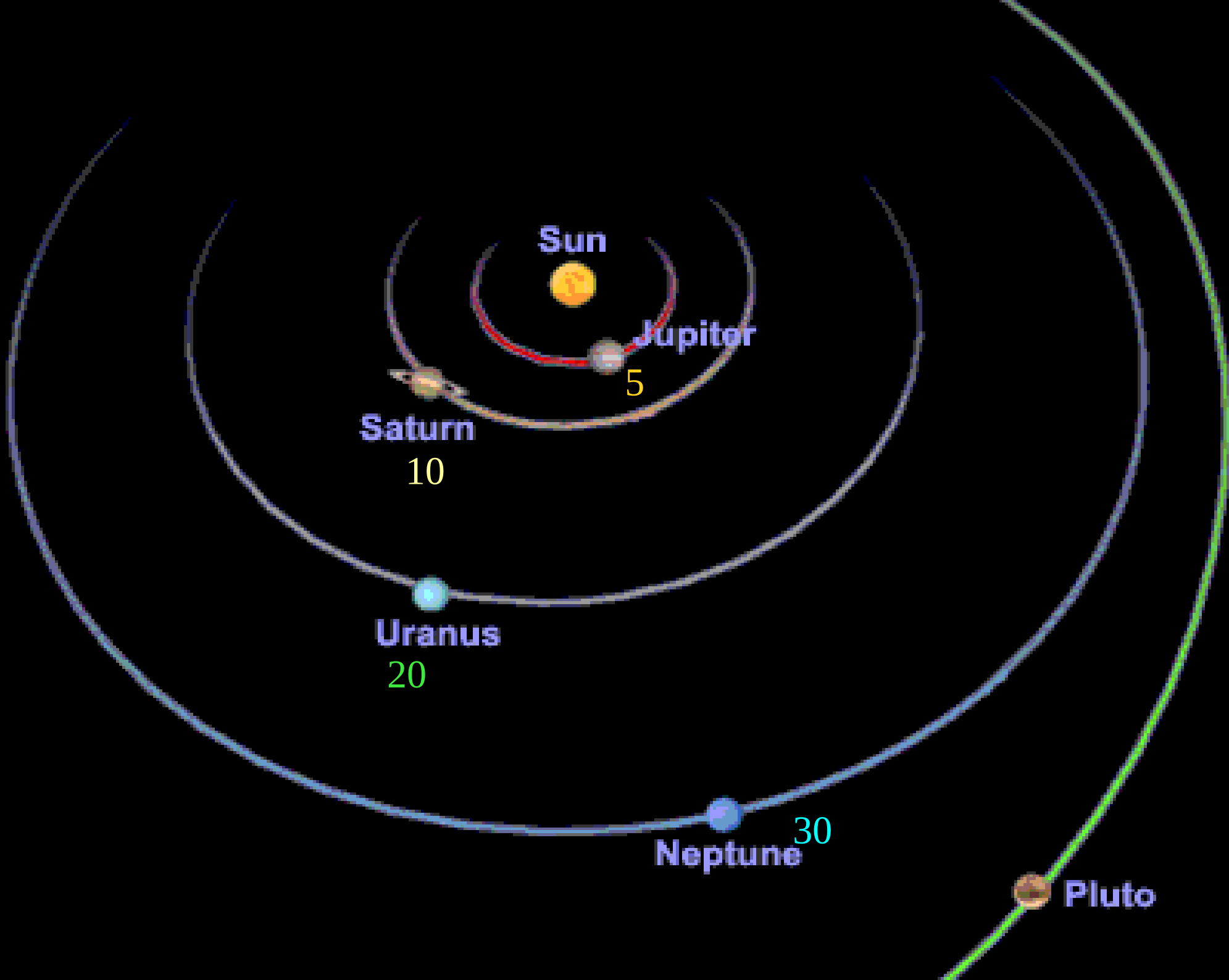
- A) 39 years
- B) 100 years
- C) 245 years
- D) 2,000 years

Turn it in!
Pass it to your left.

Be sure your row letter is on it
And your name!

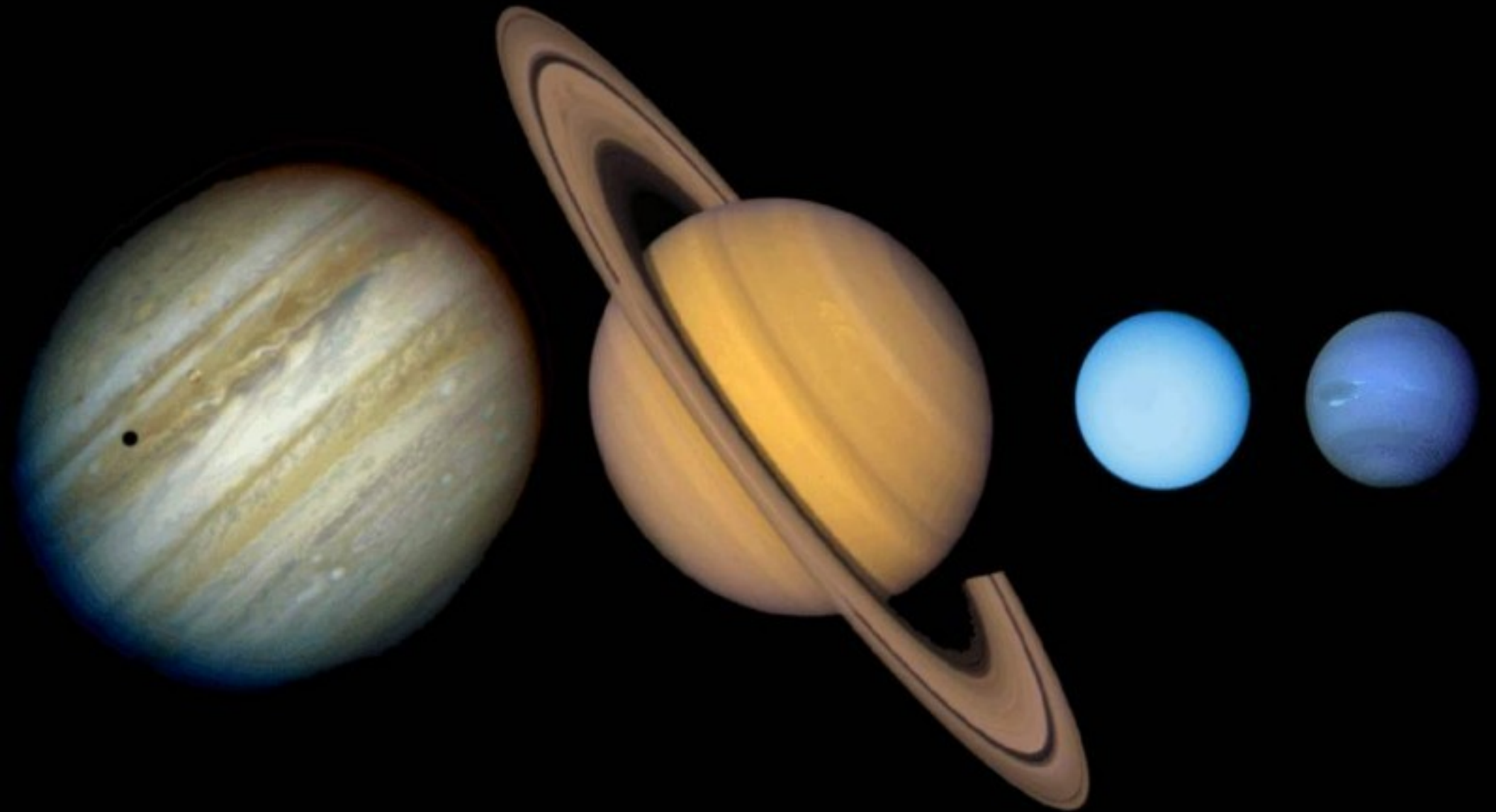
Distances reminder





The Jovian Planets.

What are their common features in contrast to the Terrestrial planets?

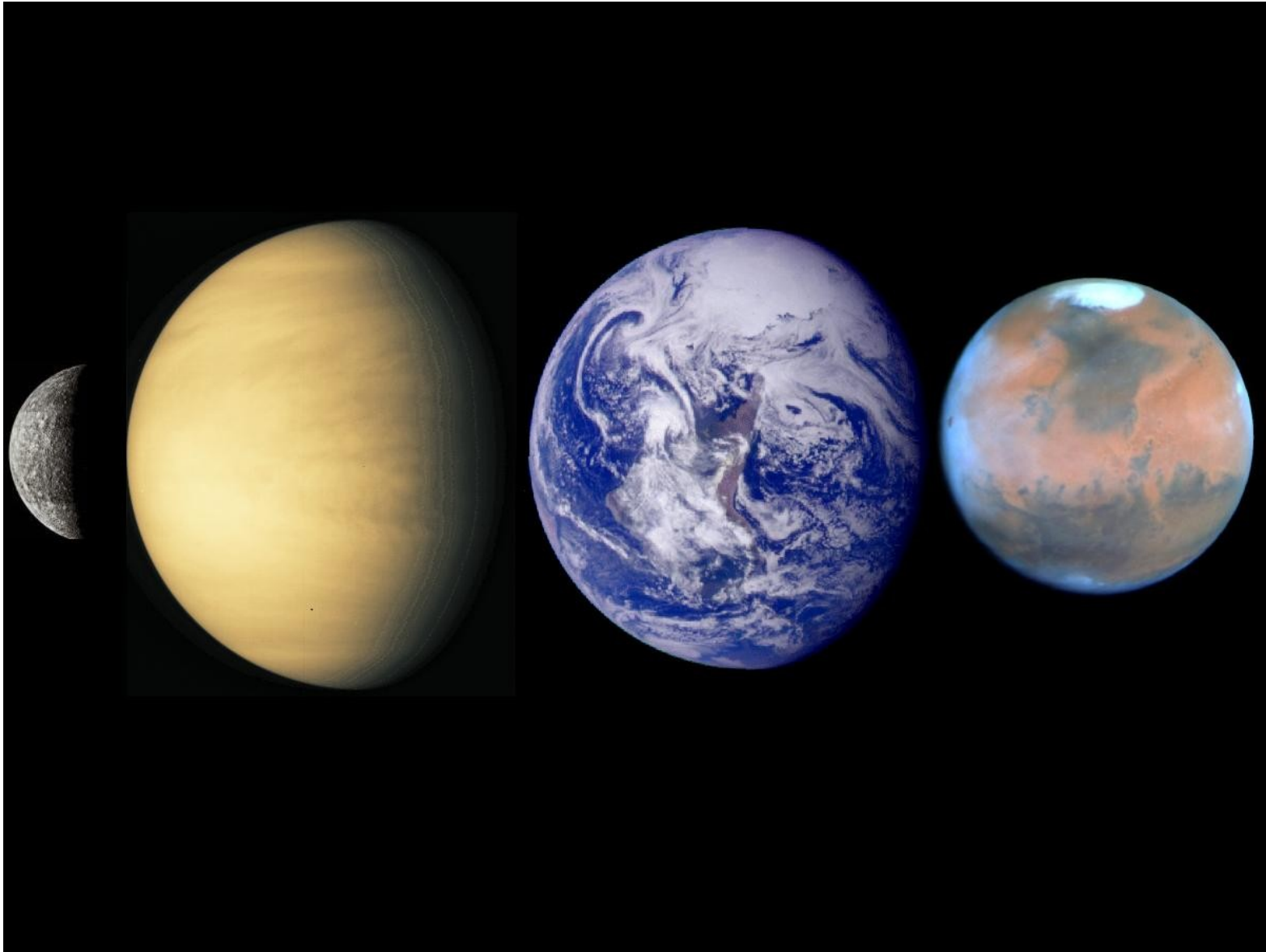


The Jovian Planets.

What are their common features in contrast to the Terrestrial planets?

- * All very massive- gas giants.
(318, 95, 15, & 15 Earth masses)
- * No solid, observable surfaces
 - * All have rings
 - * All have many moons.
- * All are past the asteroid belt. (Where it is colder.)

What are the common features of the Terrestrial planets in contrast to the Jovian ones?



Terrestrial Planets

Large massive rocks in space with relatively thin (in height) atmospheres.

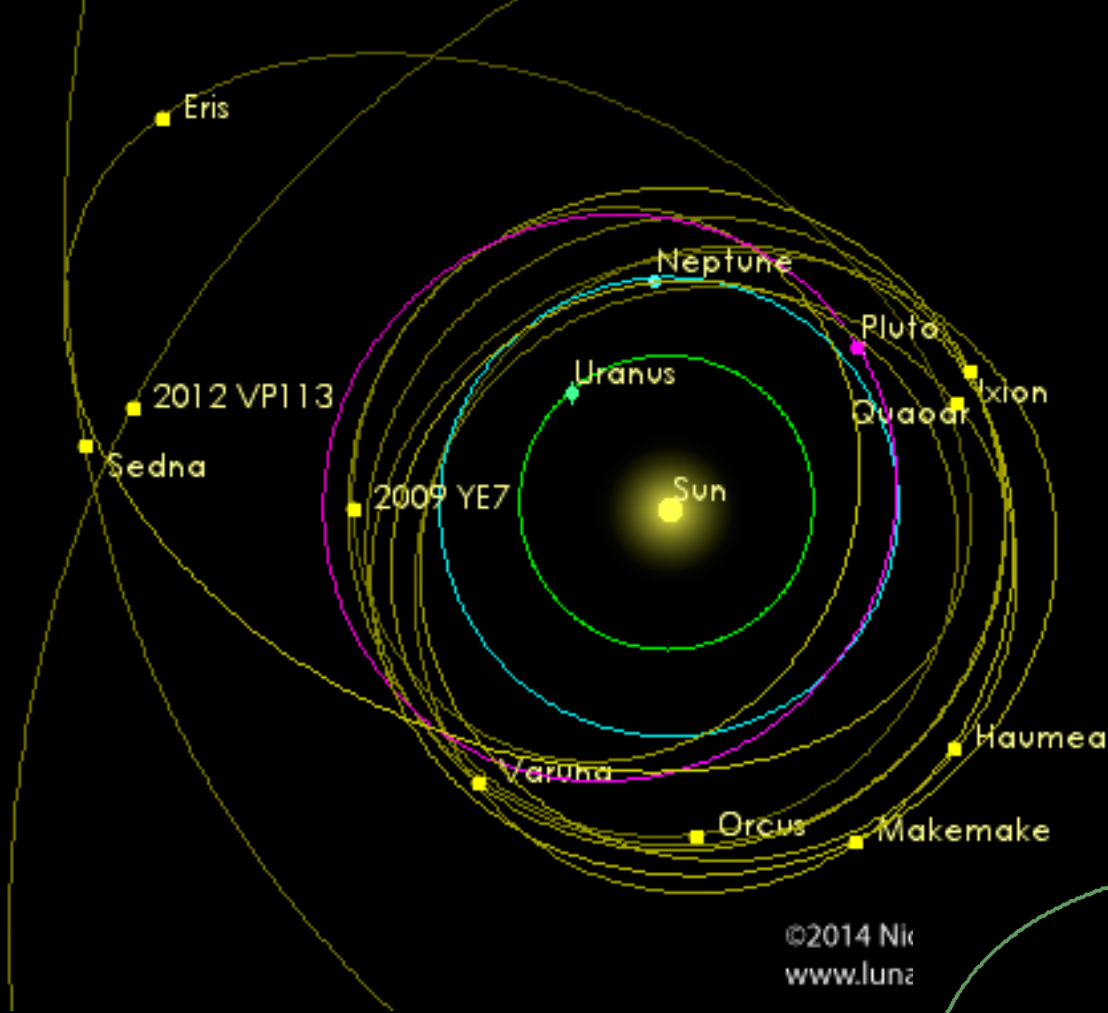
Common structure: thin atmosphere over rocky crust, mantle, and core.

The 4 closest planets to the Sun (where it is warmer)

No rings and few moons

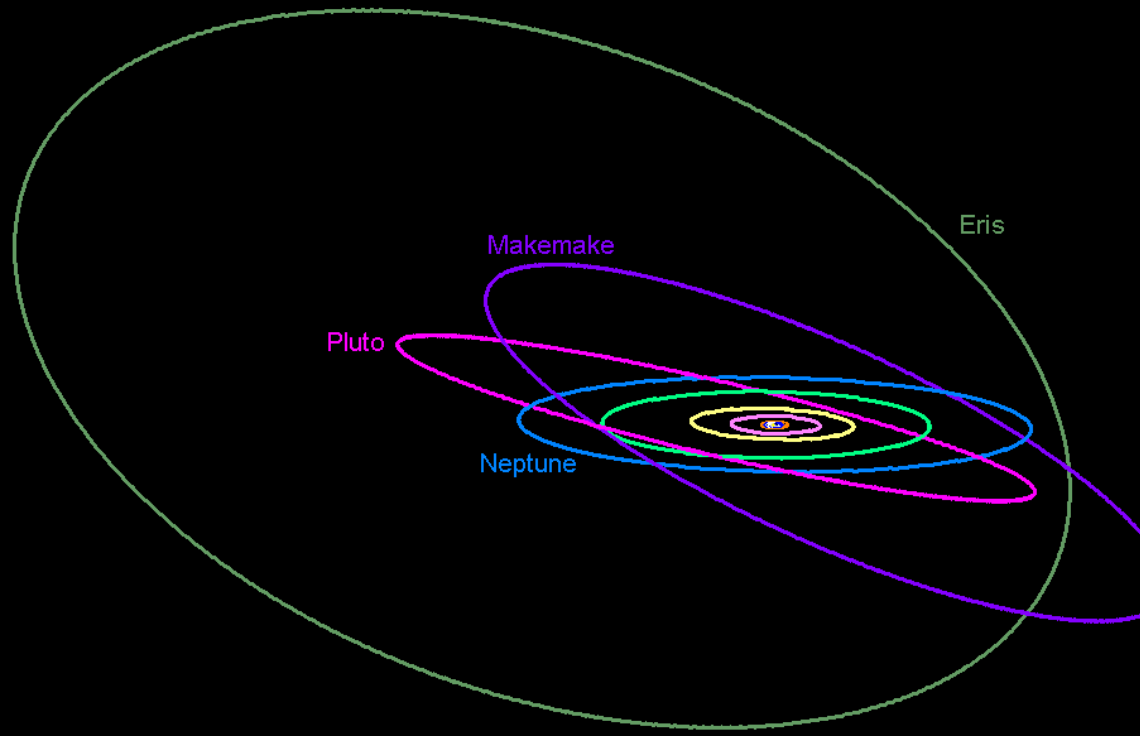
Dwarf Planets

Why do we need this category?



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There are too many other Pluto-like objects out there. Either we have 8 planets, or we have 20-100.



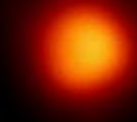
Dwarf Planets

A dwarf planet is defined as: 1) It is in direct orbit of the Sun; 2) is near-spherical (has enough self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium shape); 3) **has not cleared the neighborhood around its orbit (it's not the biggest gravity thing in its region!)**; and 4) is not a satellite.

*Pluto has 1 moon- Charon. Charon is about half the size of Pluto. Both have a density=2g/cc and are thought to be about 70% rock and 30% ice.

*Pluto has a highly eccentric orbit, with a 3:2 resonance with Neptune. As such, they will never collide though Pluto's orbit actually goes inside Neptune's at times.

*Pluto rotates retrograde and is tidally locked with Charon: that is, they both only show 1 side to each other.

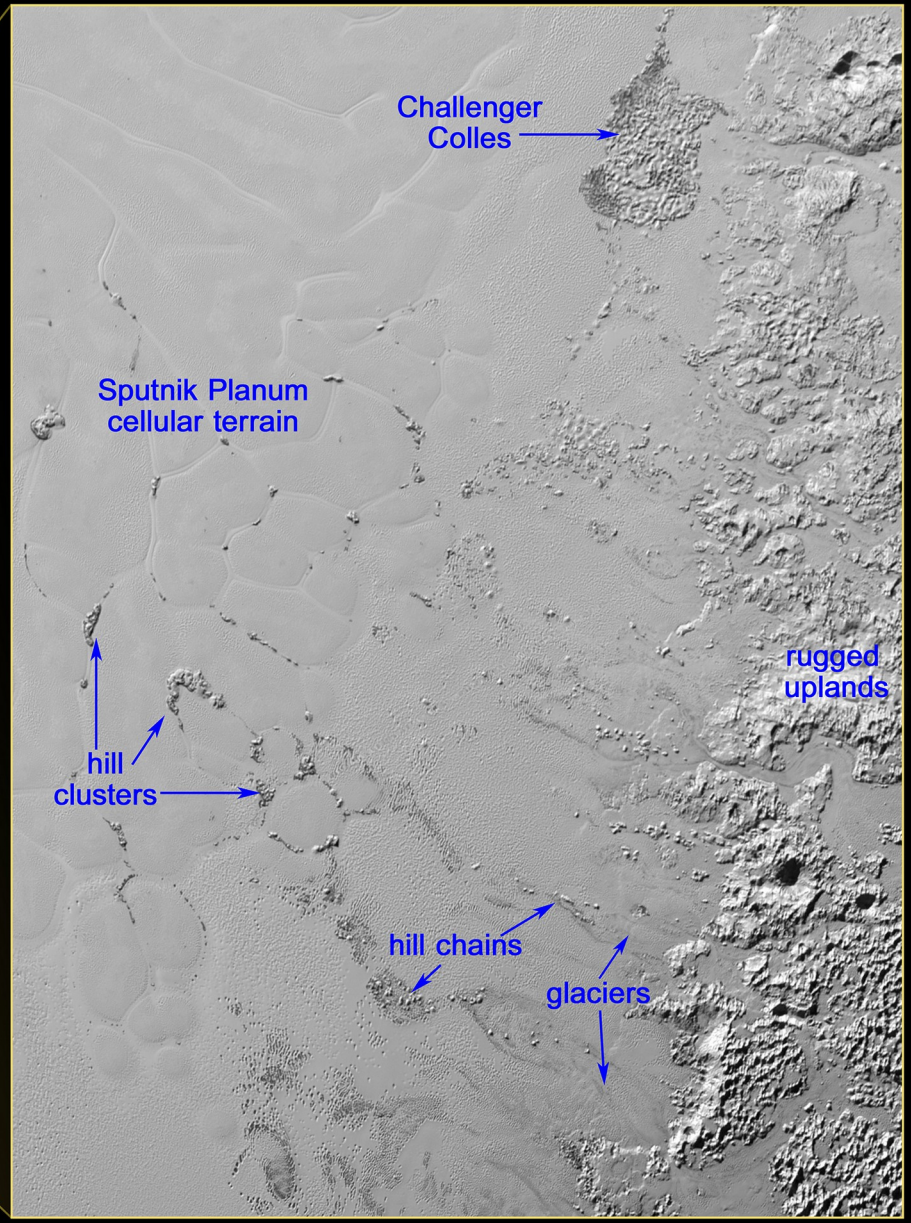
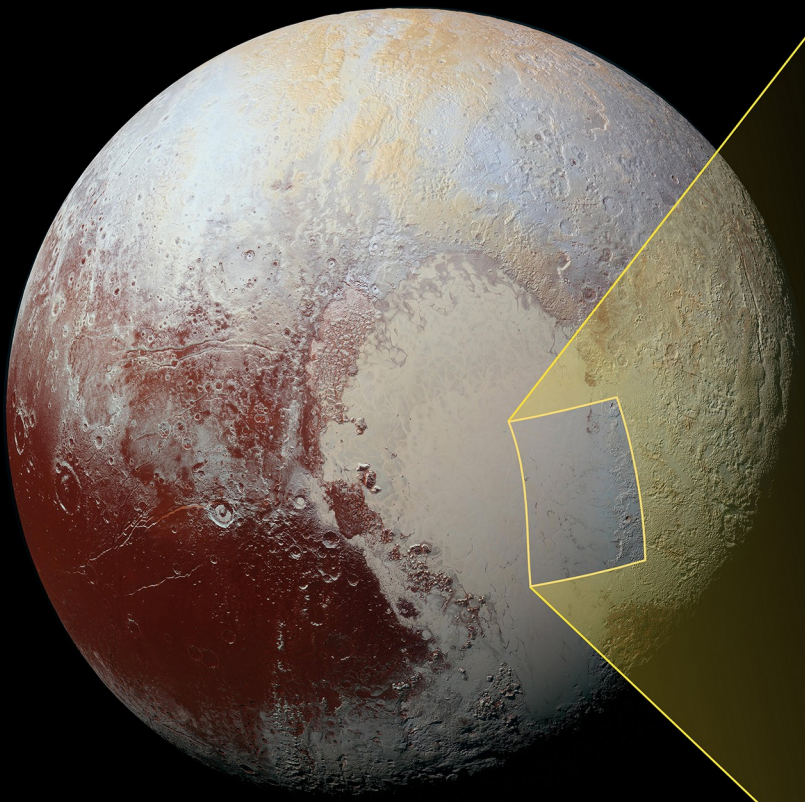


Our view prior to New Horizons

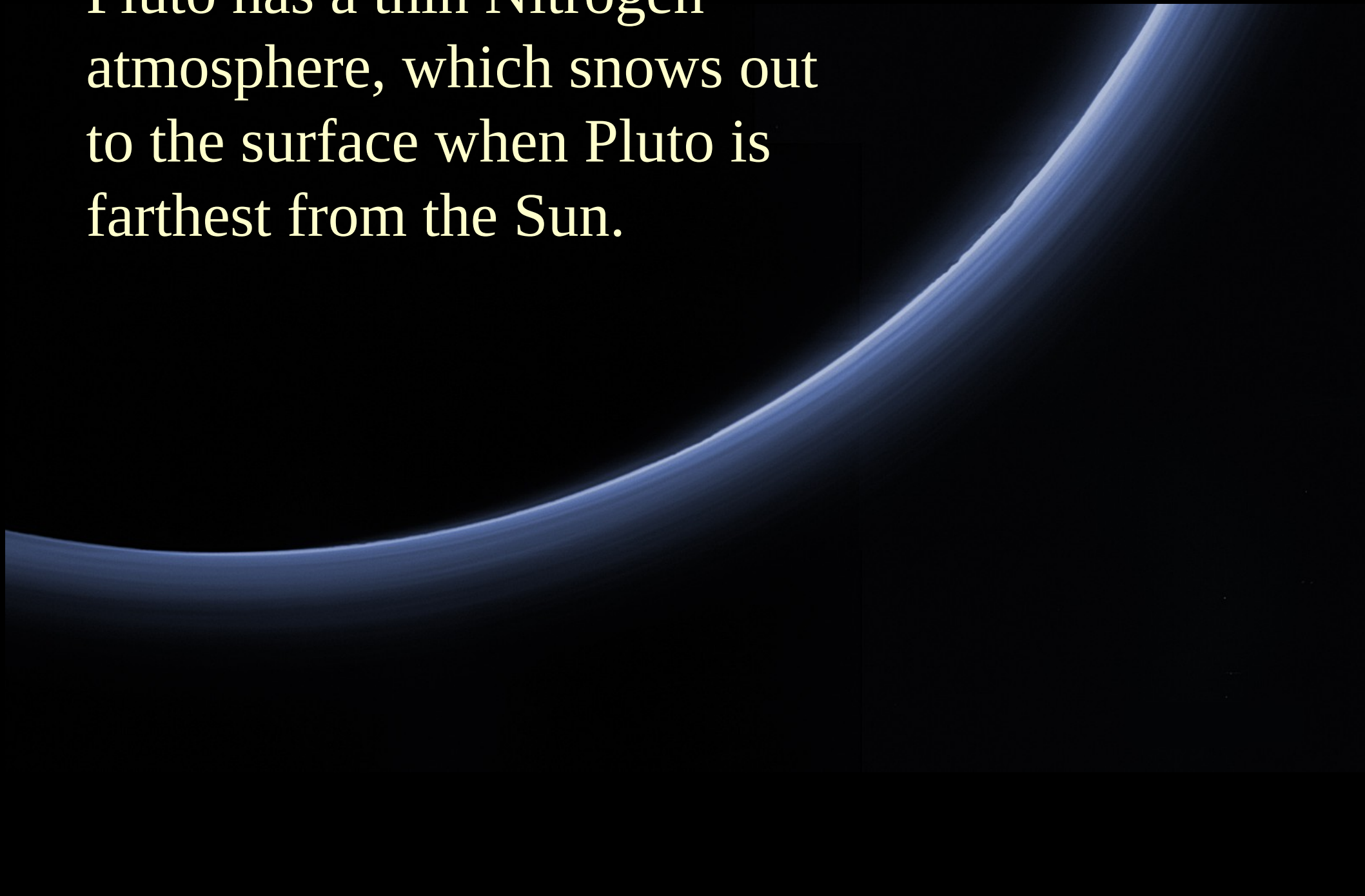
Our view now!



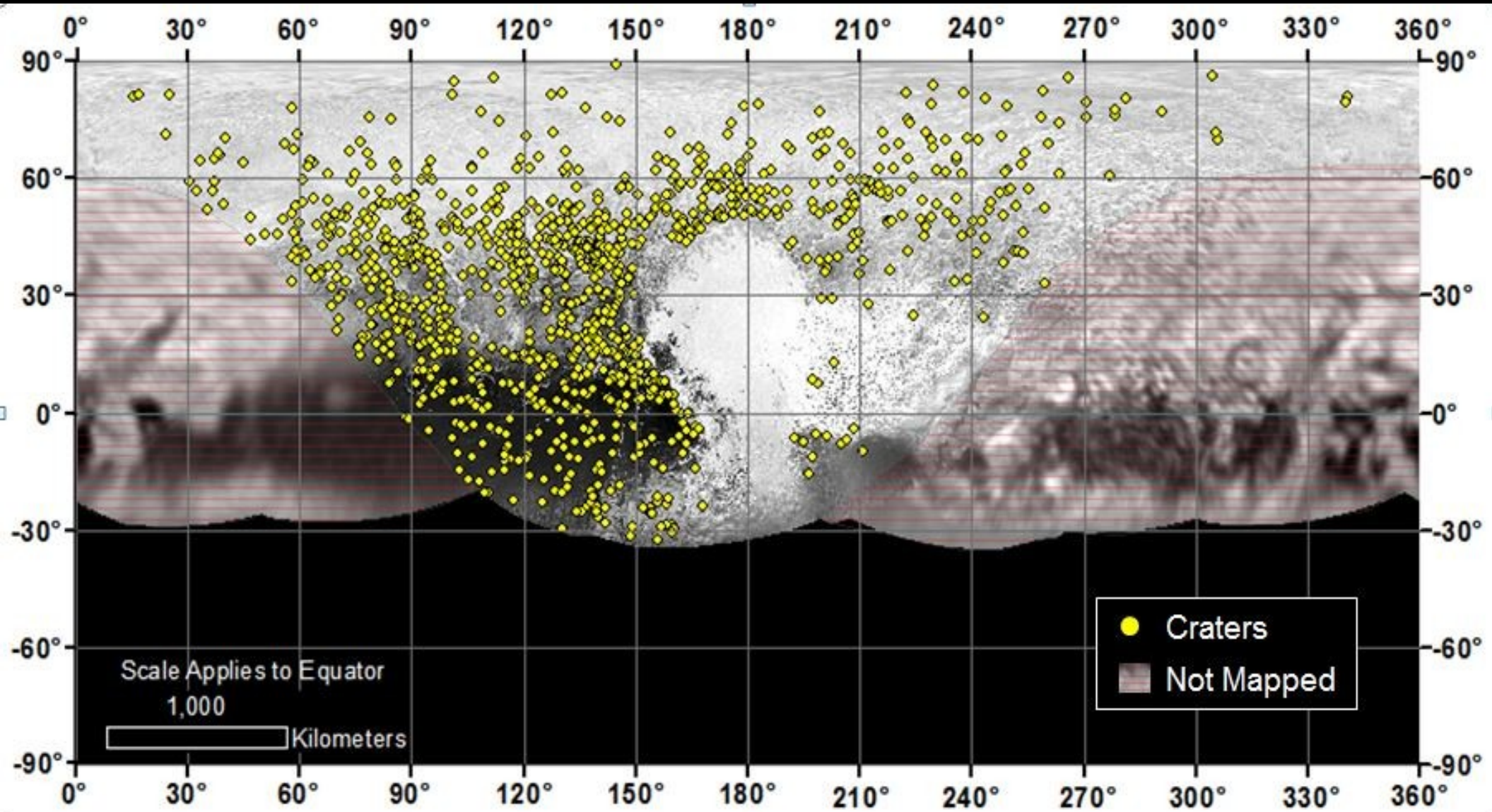
Water ice floats on nitrogen ice.

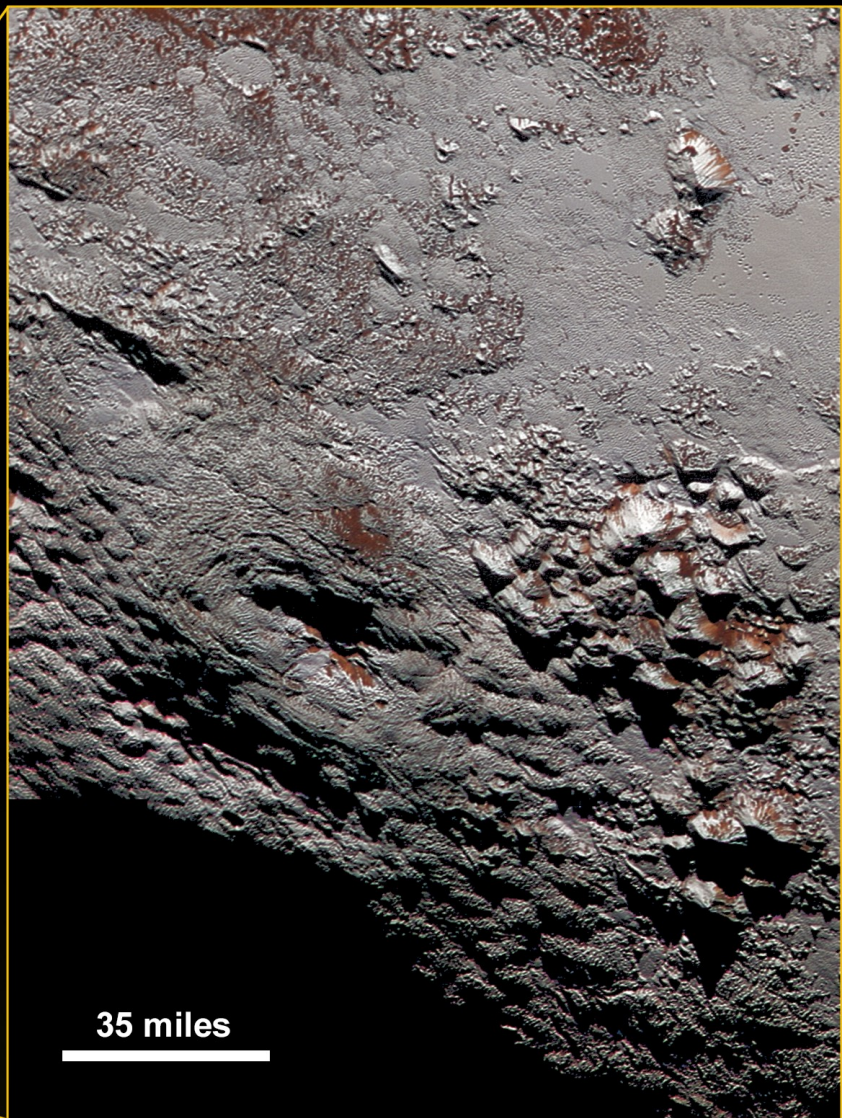
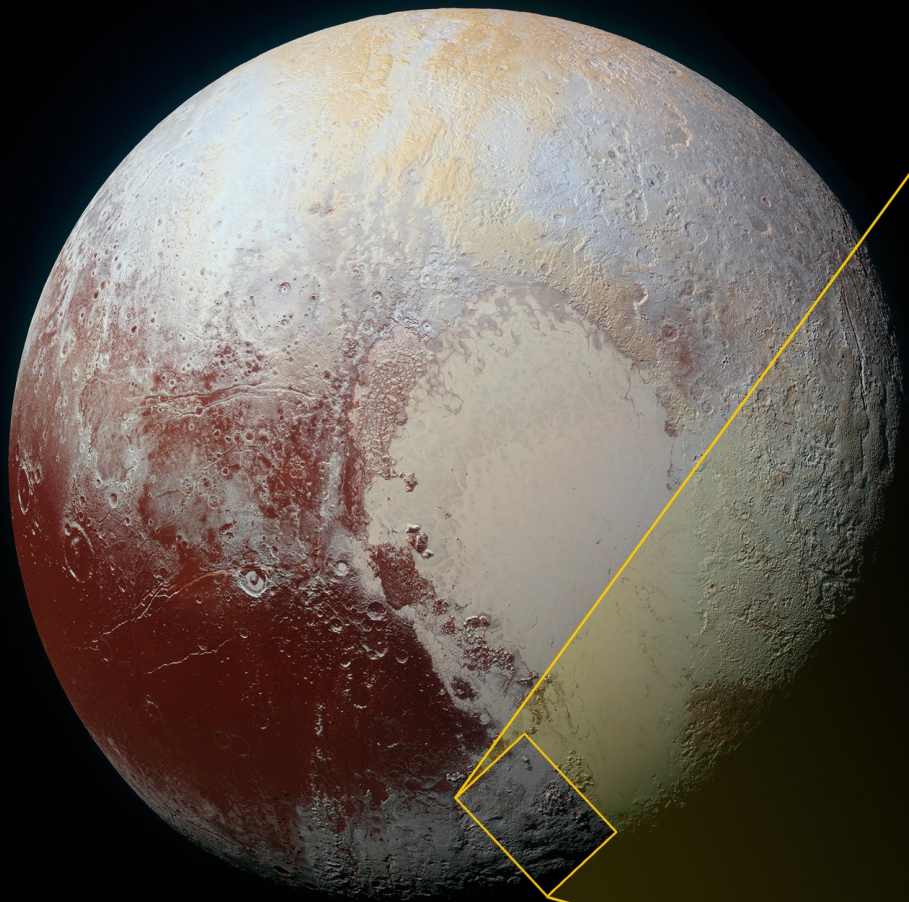


Pluto has a thin Nitrogen atmosphere, which snows out to the surface when Pluto is farthest from the Sun.

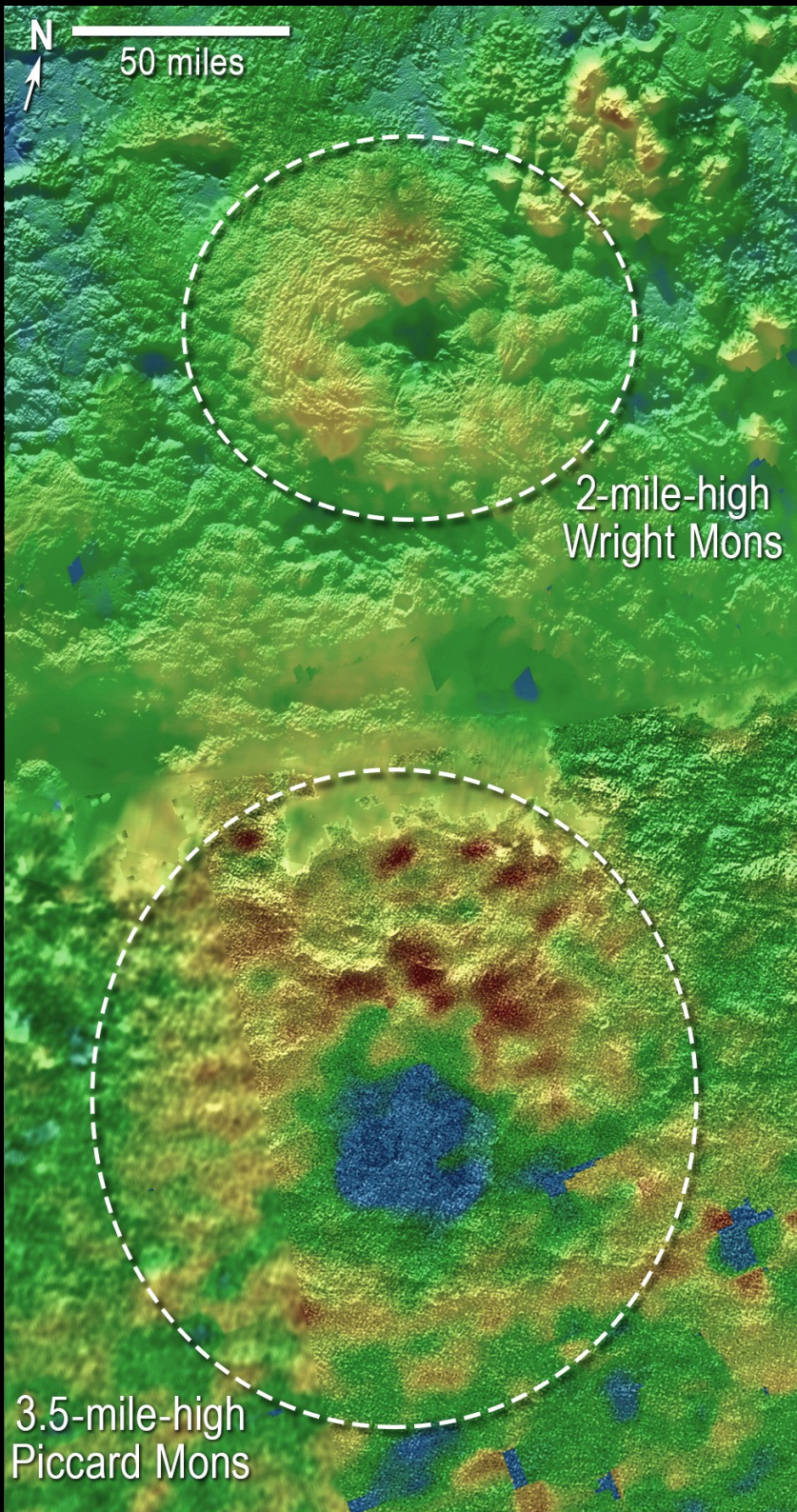


Old and young surfaces.





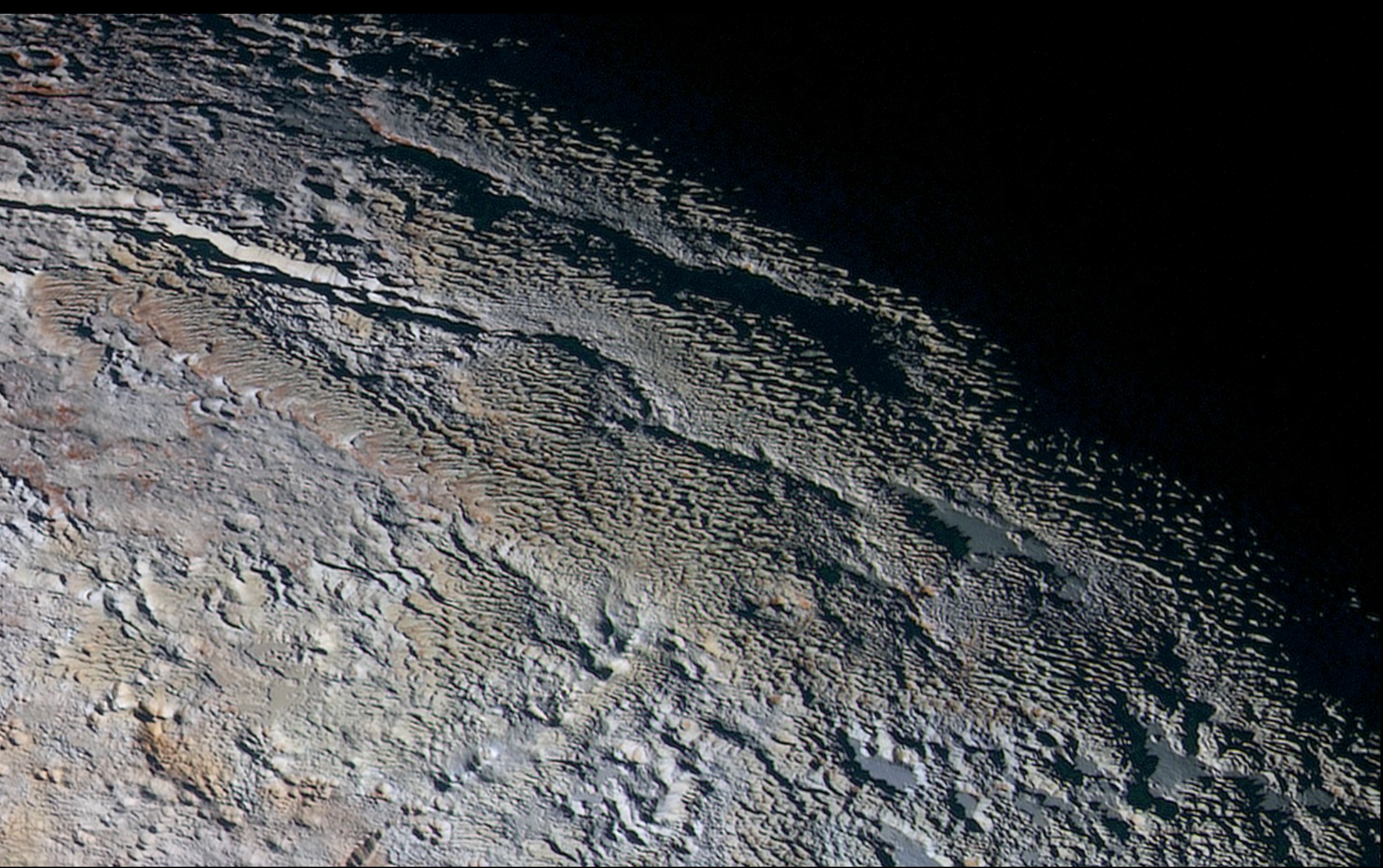
35 miles



Cryovolcanoes

3.5-mile-high
Piccard Mons

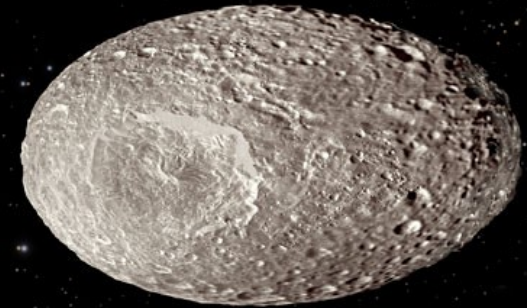
2-mile-high
Wright Mons



Snakeskin

Pluto's moons

Hydra
59 x 35 km



Kerberos
Diameter = 30 km



Nix
57 X 27 km



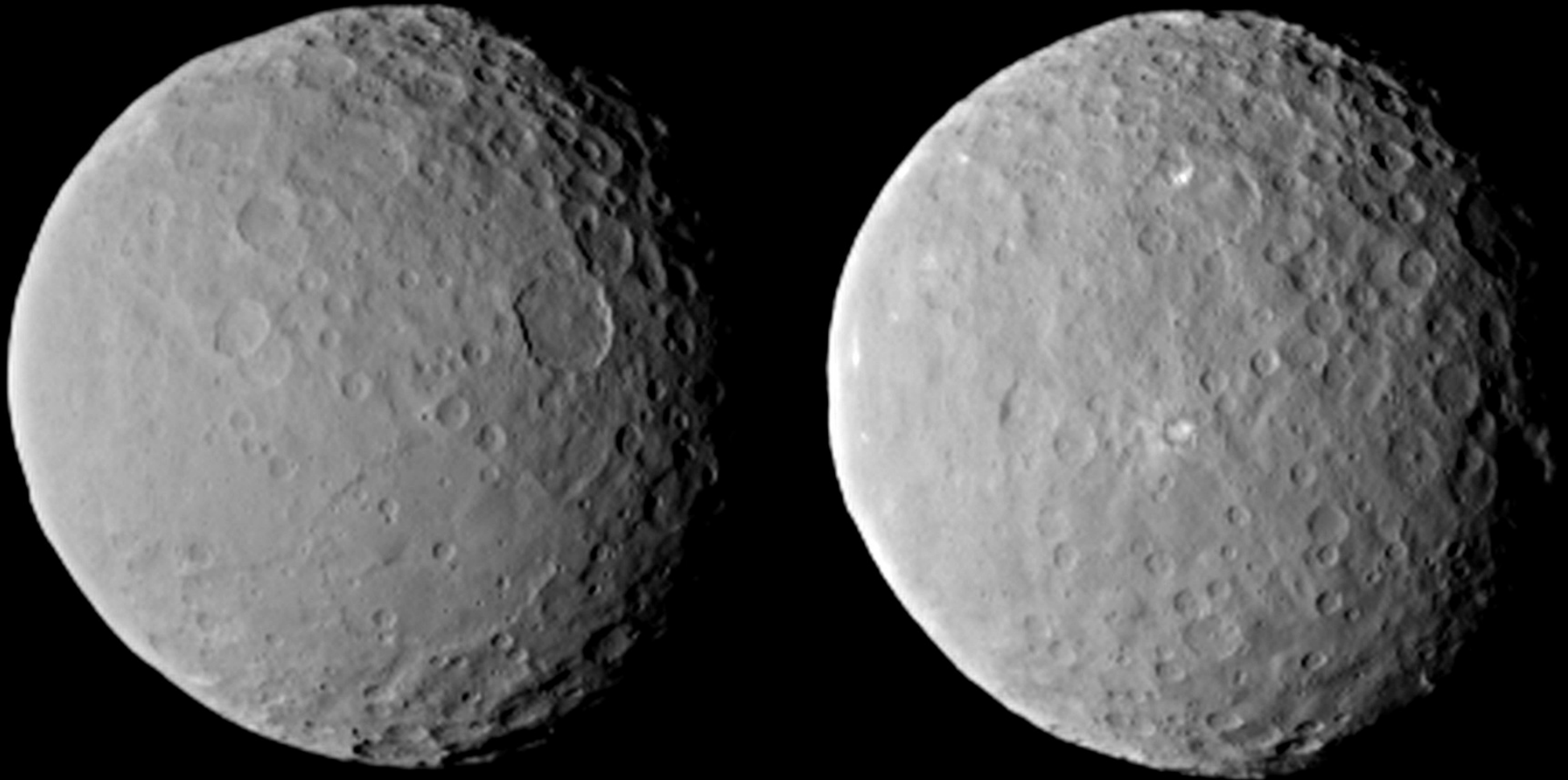
Charon
Diameter = 1207 km

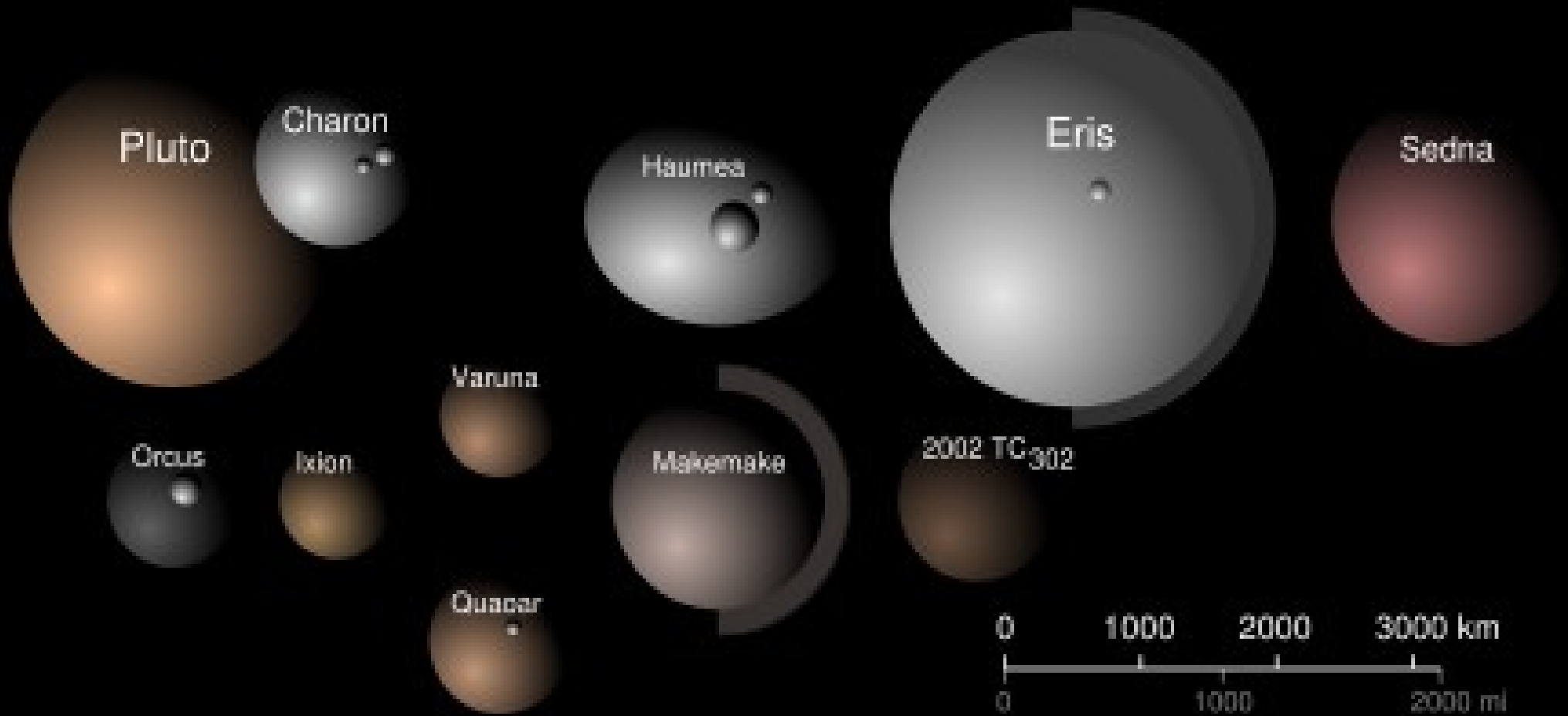


Styx
Diameter = 7 km?



Ceres: First a planet, then an asteroid, now a dwarf planet.





Dwarf planets