



# Summary:

- Objects in the solar system
- Formation of the solar system



# Solar System

Structure

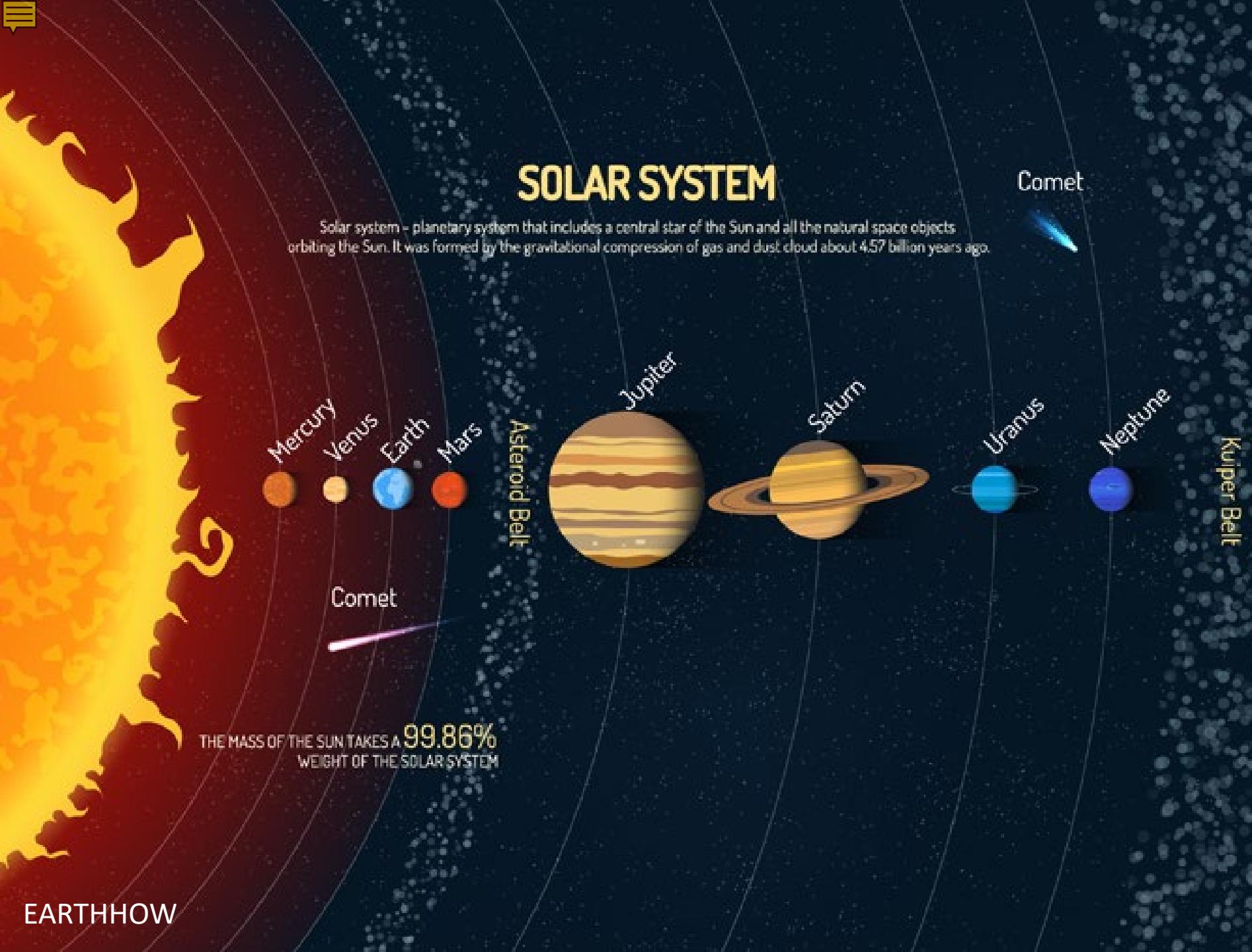


# Recap



1. Geocentric models of the Solar System were accepted based on what assumptions?
2. What evidence pointed towards Heliocentrism?
3. Give one example of how astronomy influenced ancient culture.

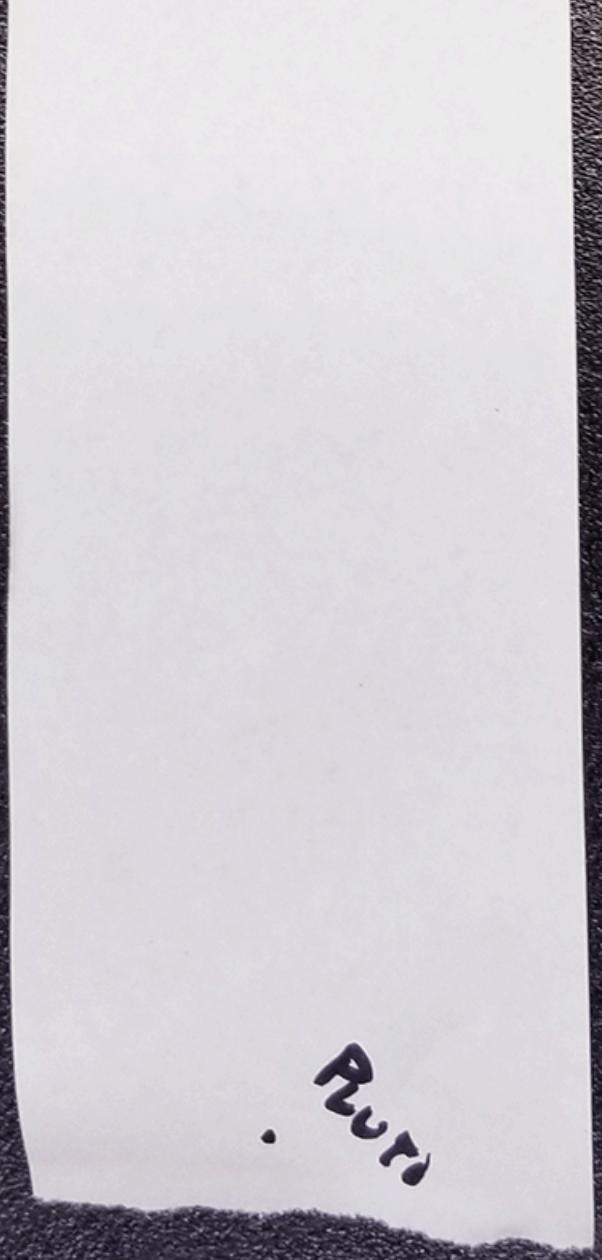
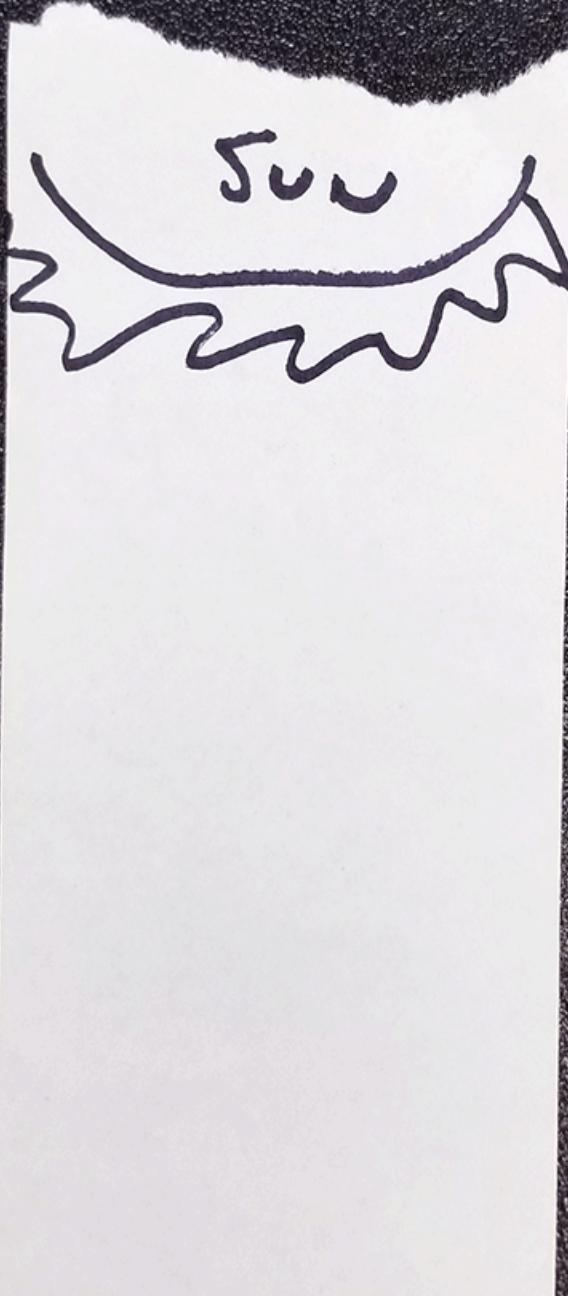




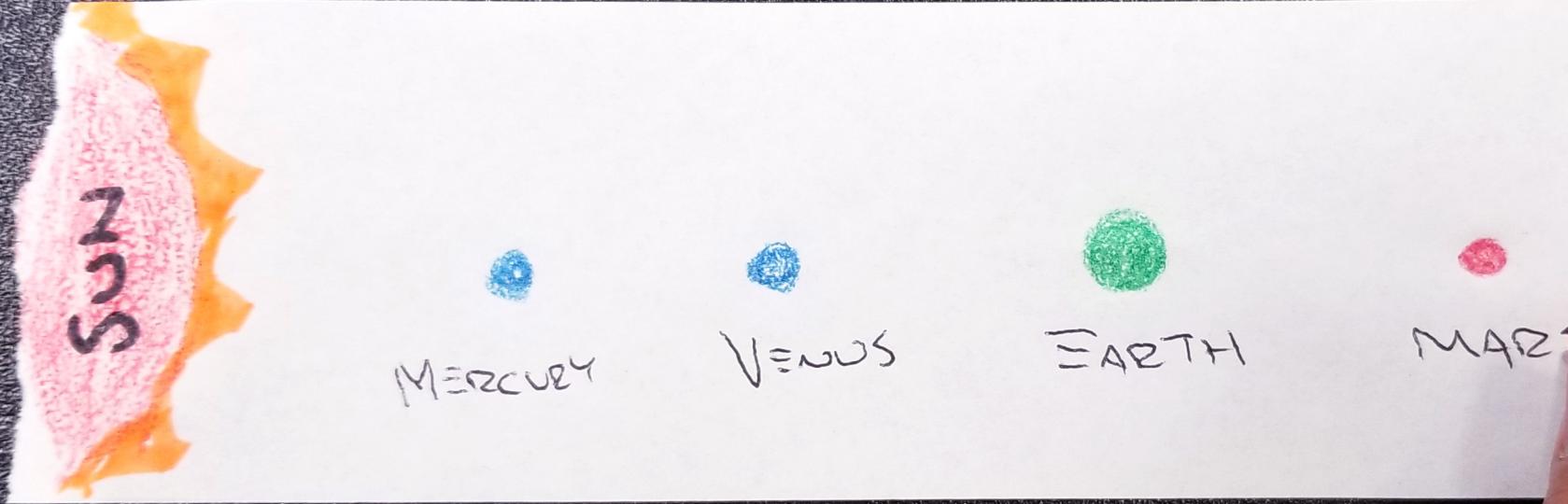
Not  
to  
Scale!



# Scale of the Solar System



# Scale of the Solar System

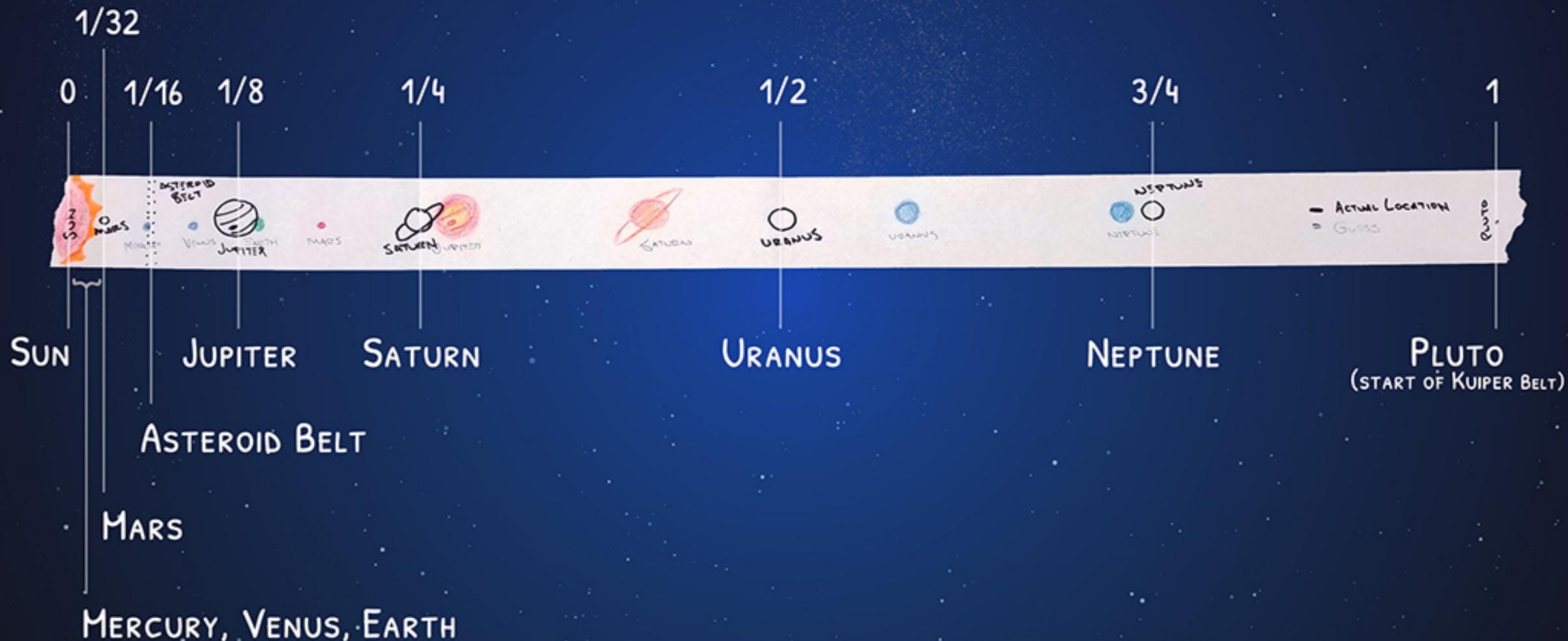


Awesome  
TO THE



Jet Propulsion Laboratory  
California Institute of Technology

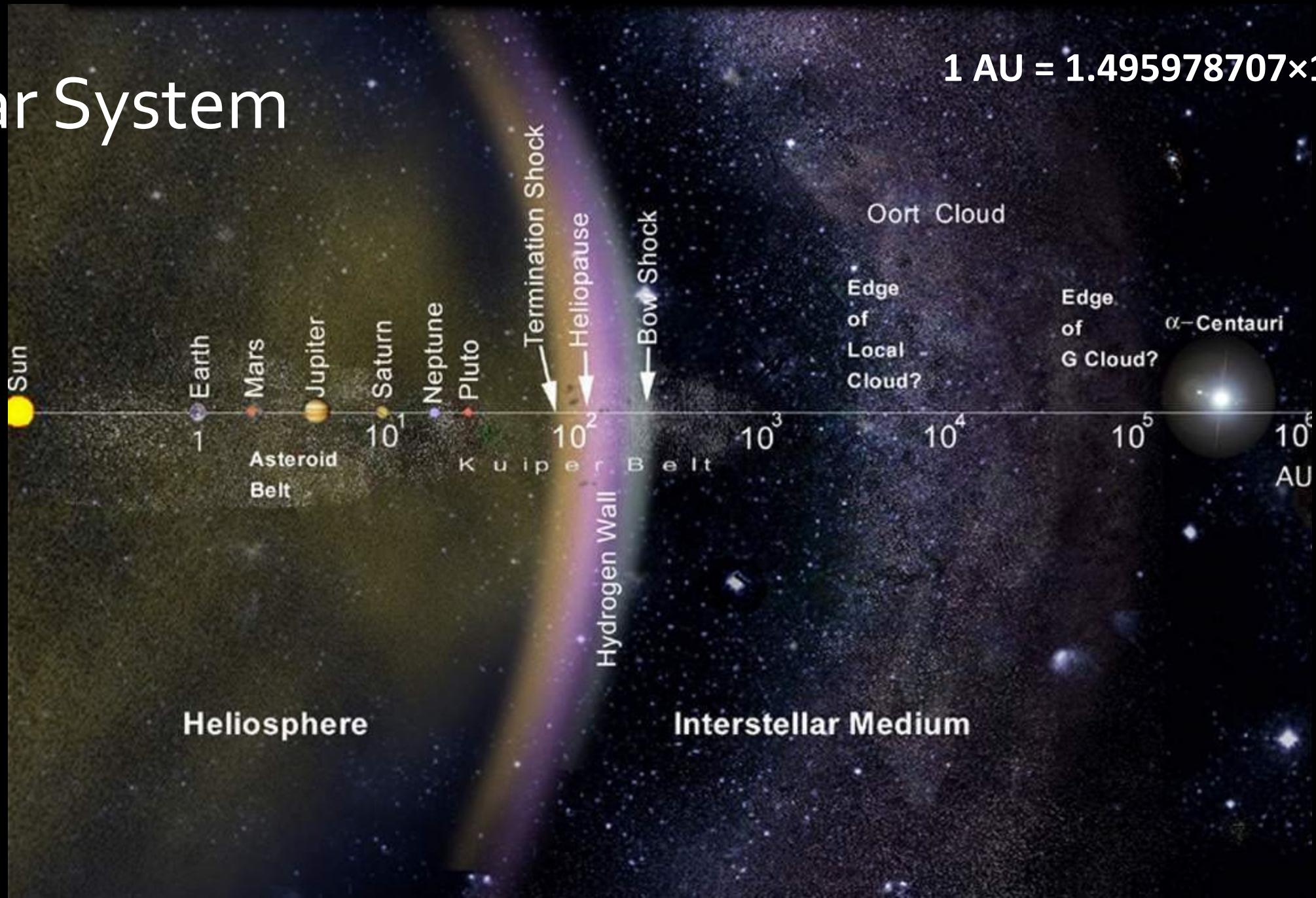
SOLAR SYSTEM SCROLL  
[JPL.NASA.GOV/EDU](http://JPL.NASA.GOV/EDU)





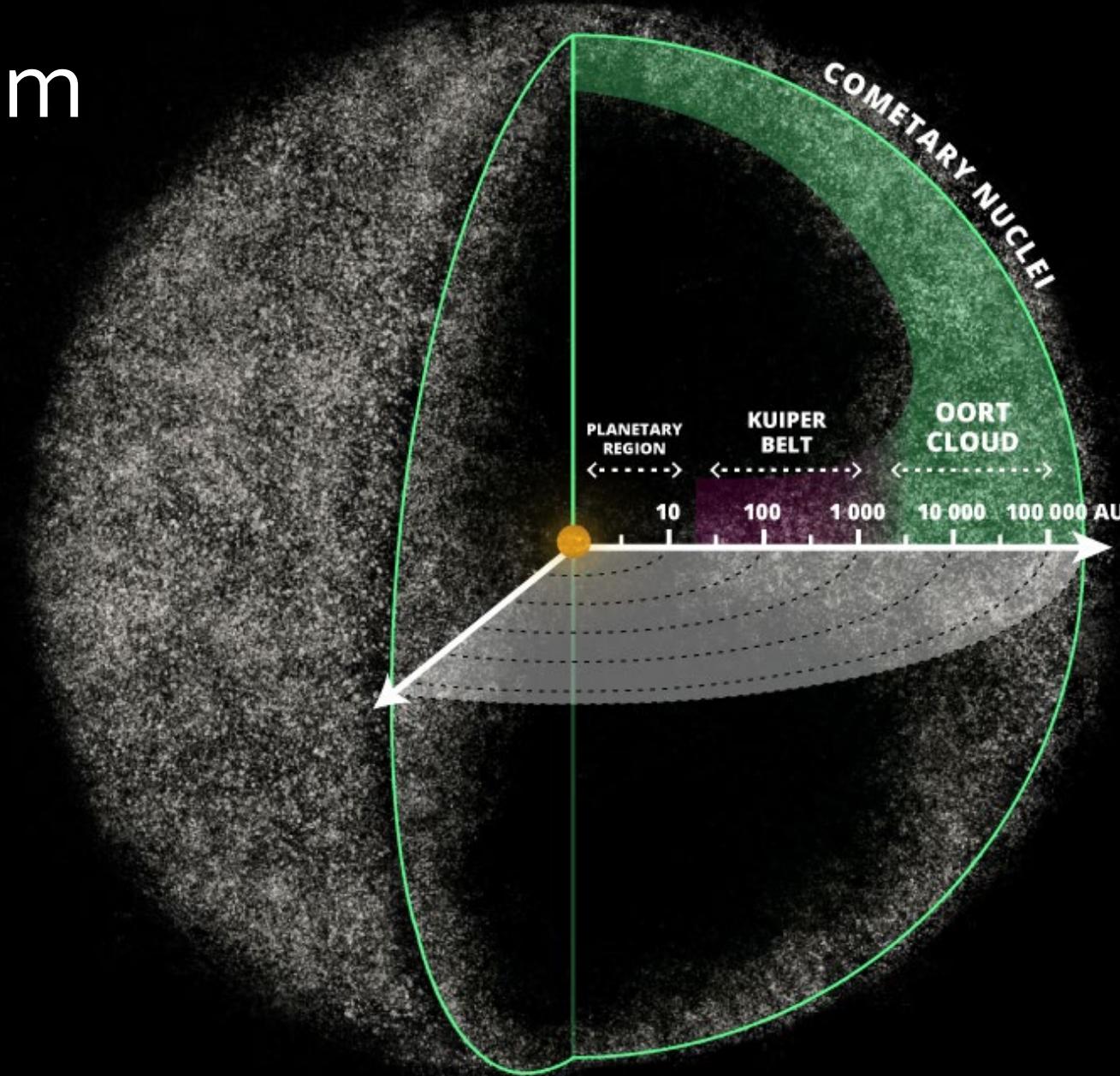
# Solar System

$$1 \text{ AU} = 1.495978707 \times 10^{11} \text{ m}$$

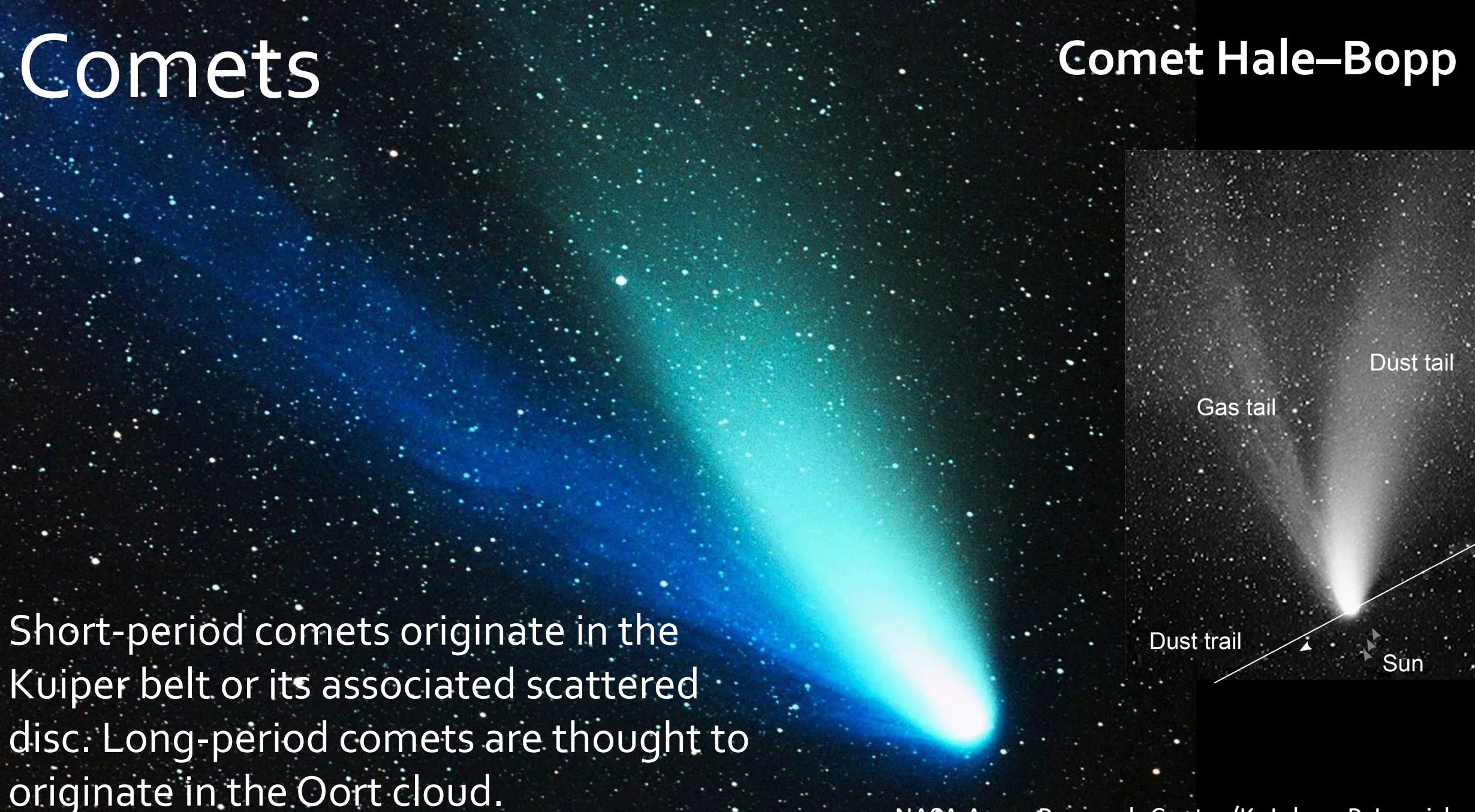




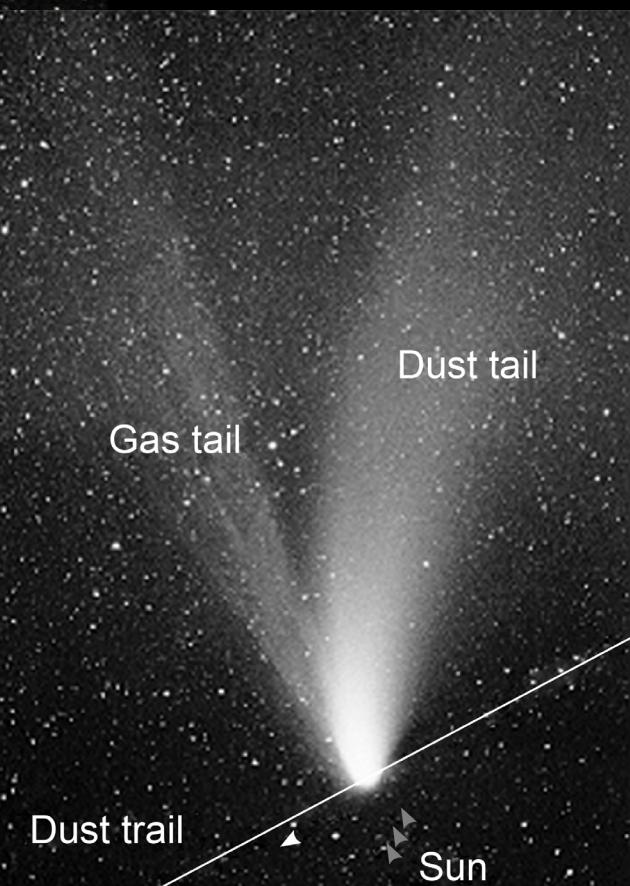
# Solar System



# Comets



## Comet Hale–Bopp



There are 8 planets!



Can you name them?

Mercury

Venus

Earth

Mars

Jupiter

Saturn

Uranus

Neptune

My

Vicious

Earthworm

Might

Just

Swallow

Us

Now





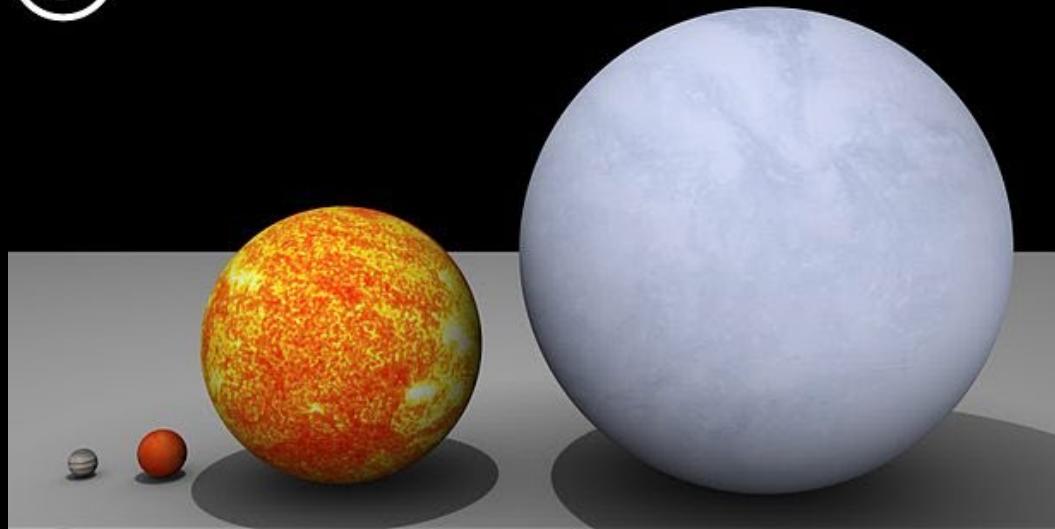
① Mercury < Mars < Venus < Earth



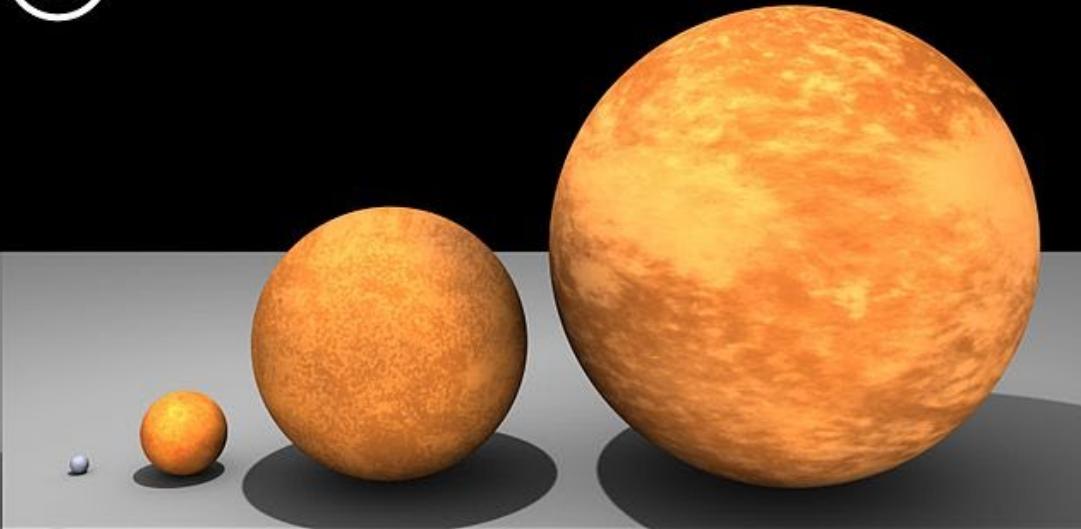
② Earth < Neptune < Uranus < Saturn < Jupiter



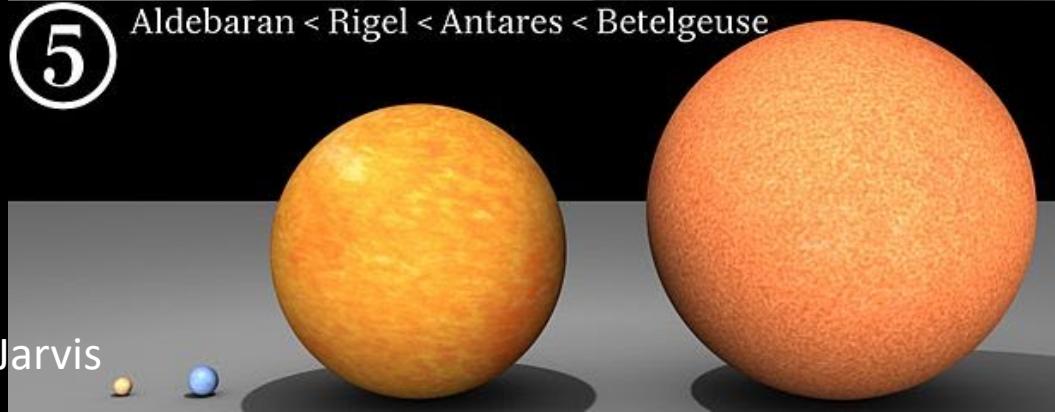
③ Jupiter < Wolf 359 < Sun < Sirius



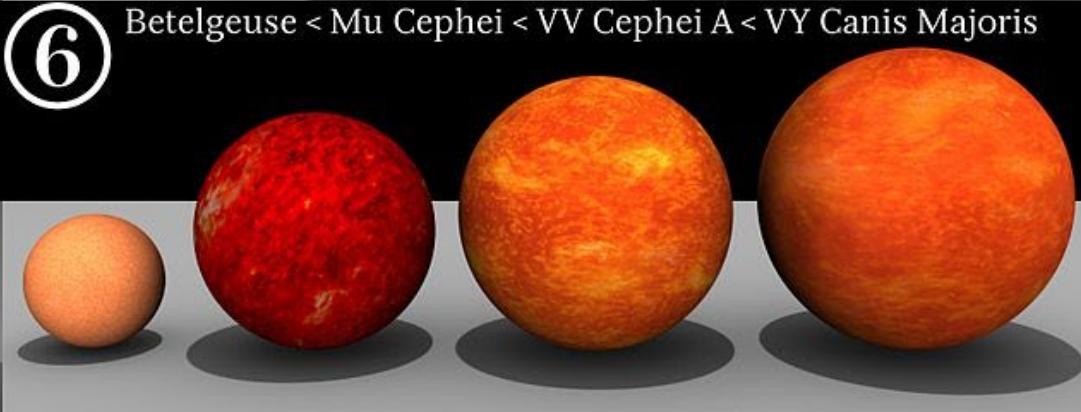
④ Sirius < Pollux < Arcturus < Aldebaran



⑤ Aldebaran < Rigel < Antares < Betelgeuse

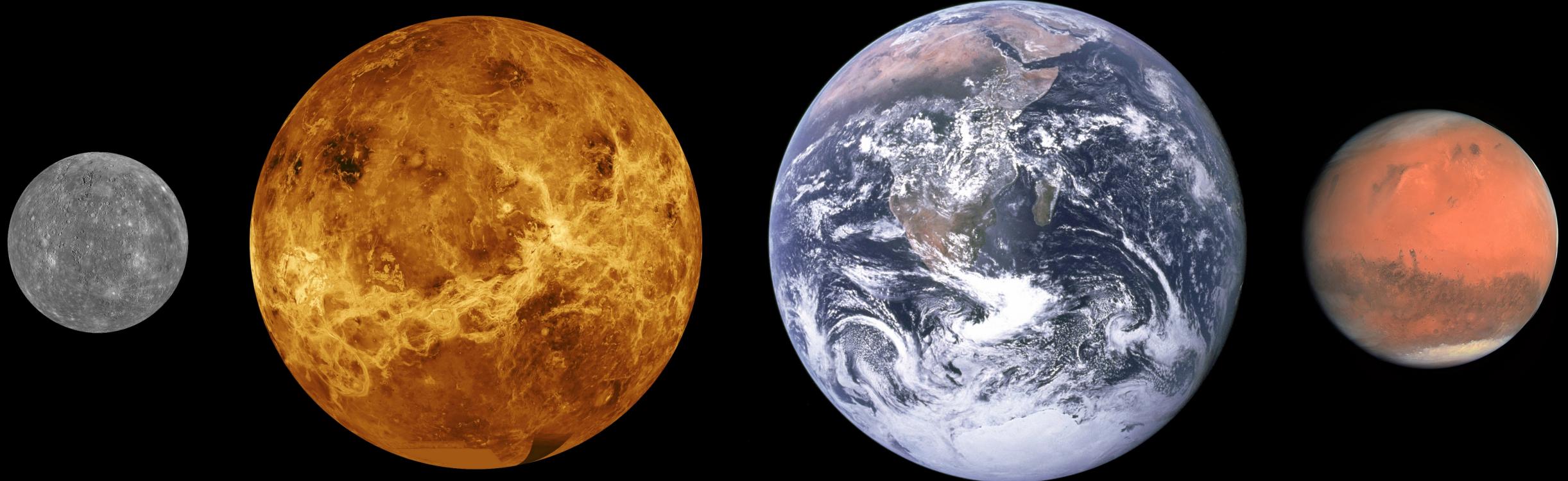


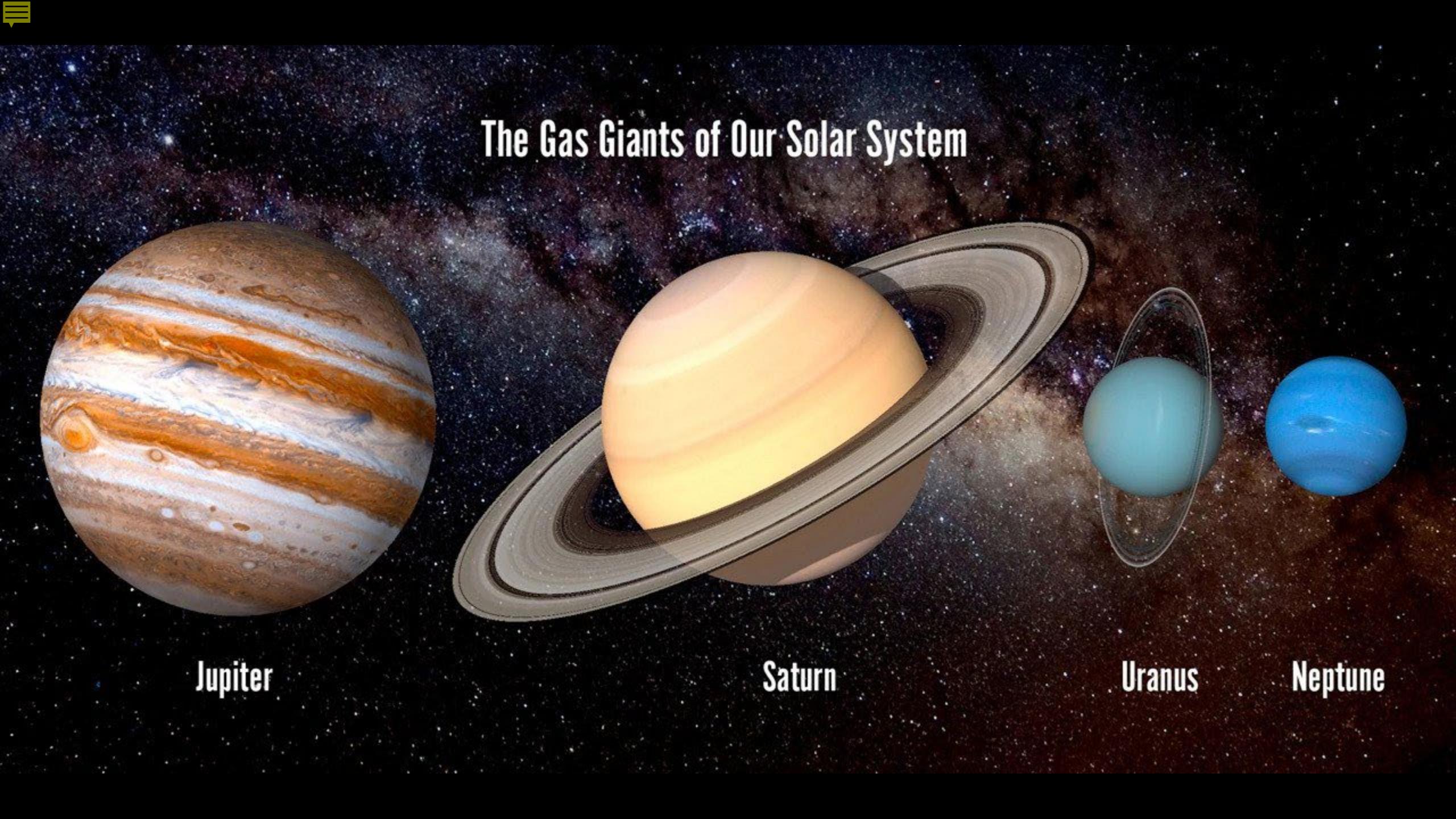
⑥ Betelgeuse < Mu Cephei < VV Cephei A < VY Canis Majoris





# The Rocky Planets





# The Gas Giants of Our Solar System

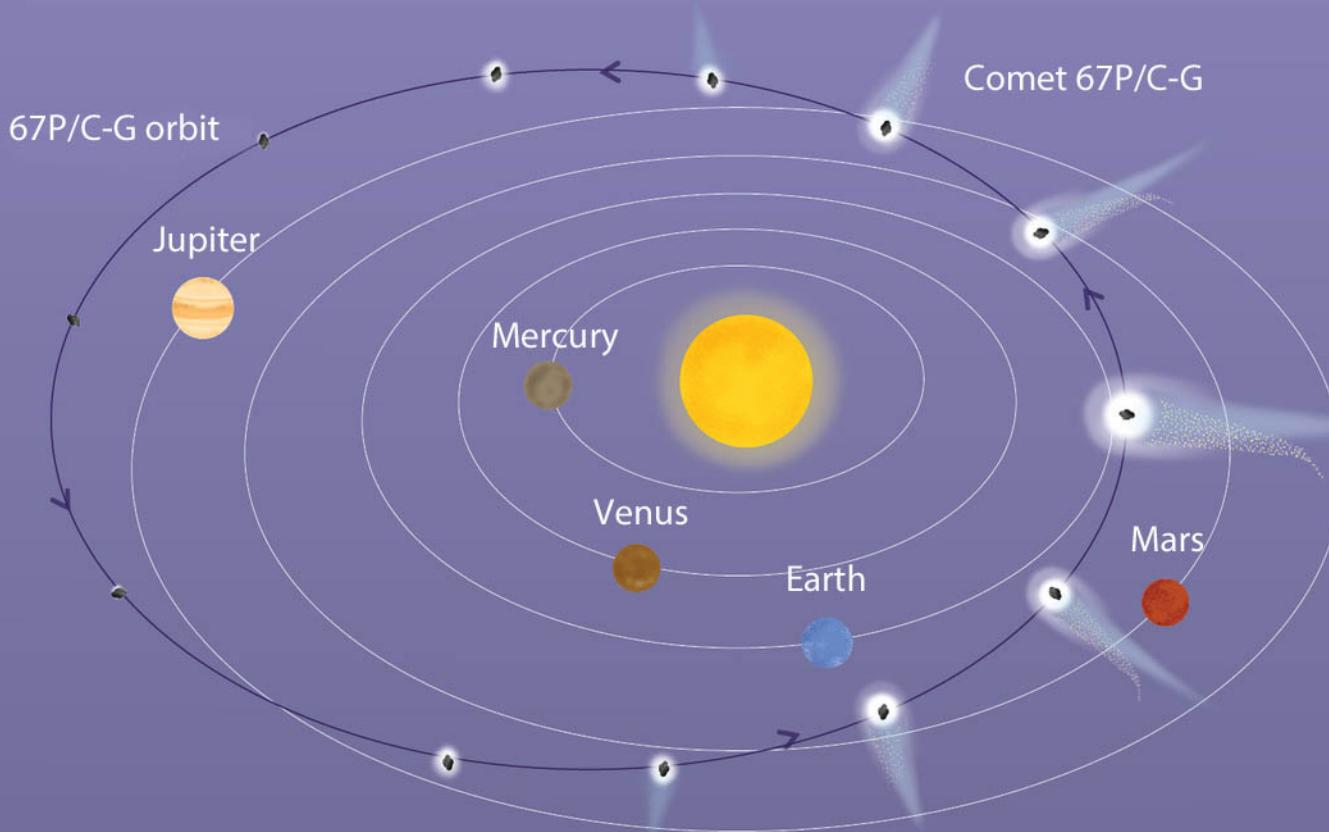
Jupiter

Saturn

Uranus

Neptune

# Jupiter Family Comets



These originate from the Kuiper belt. They are often collisional fragments thrown towards Jupiter by Neptune's gravity. Jupiter then traps them in orbit.

Beyond  
Neptune



Yeah, what's  
out there?



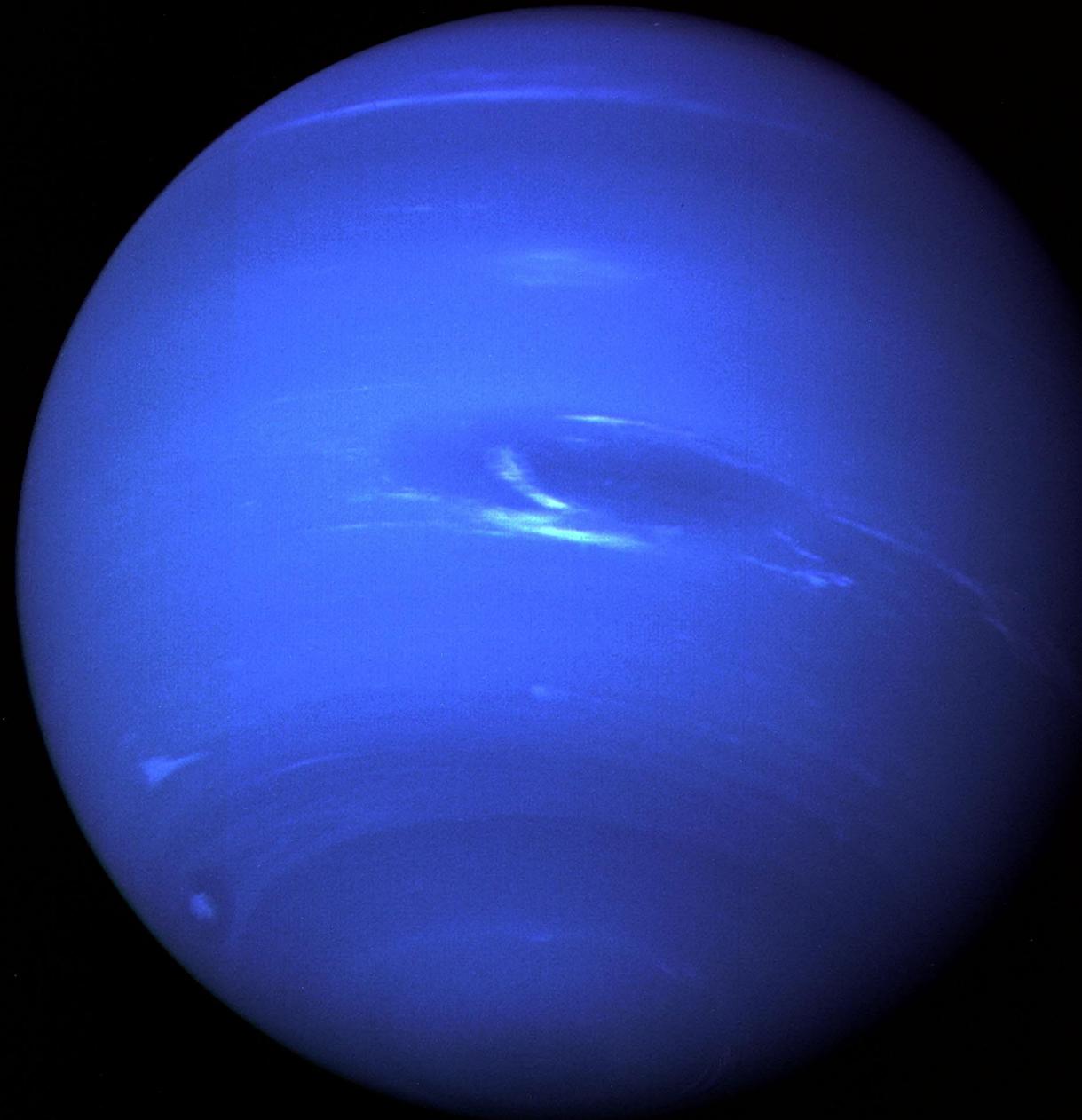
# TNO's

Trans-Neptunian Objects

Minor planets/small solar system bodies.

Orbit with semi major axis  
(a) greater than Neptune's  
– 30 AU.

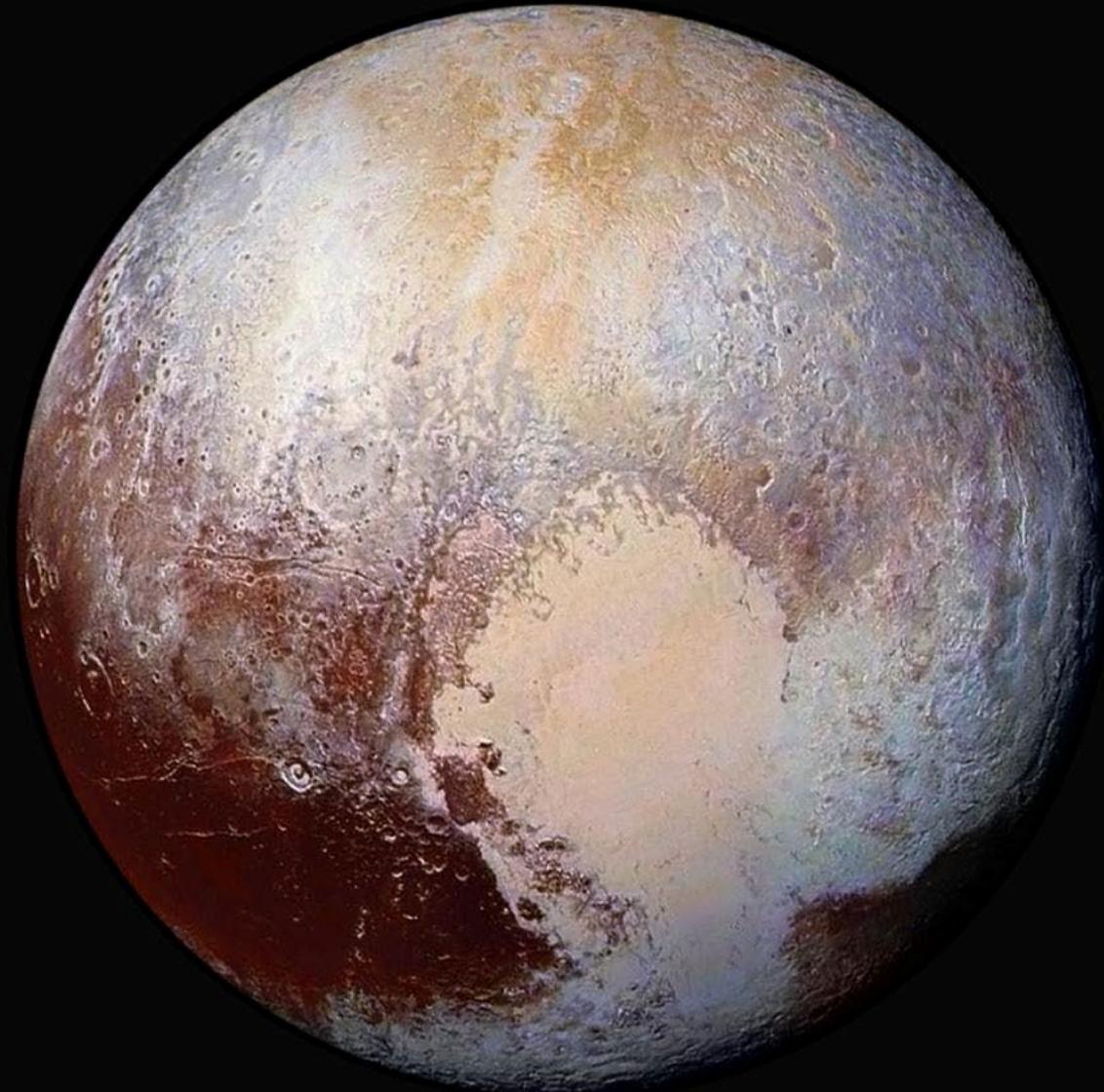
These make up the Kuiper Belt and Oort Cloud

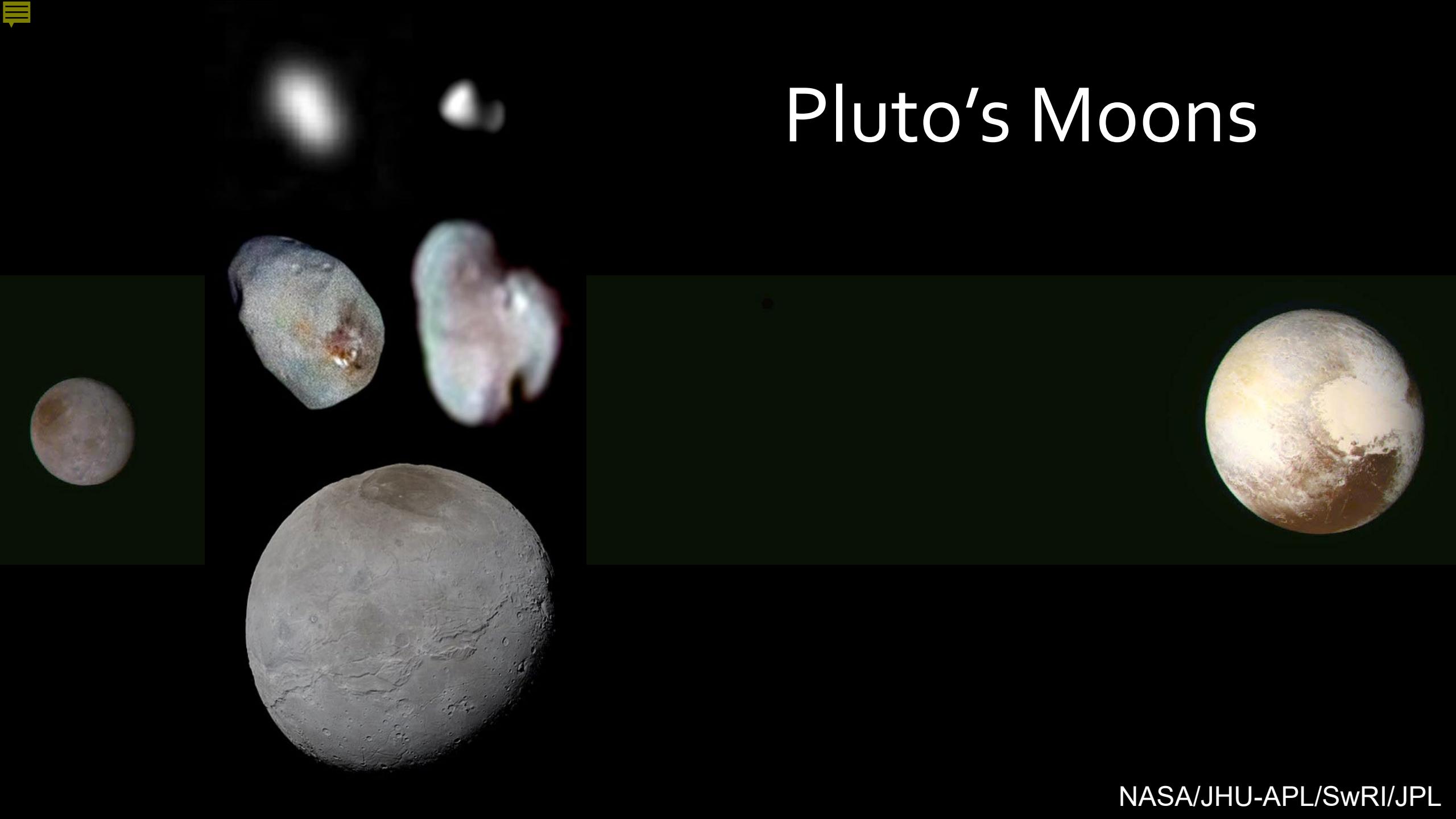


NASA/JPL

# Pluto

The first TNO





# Pluto's Moons

NASA/JHU-APL/SwRI/JPL



2010 Jan 01 00:00:00 UT  
Location: Hovering over P-C Barycenter (70481.1 km)  
Field: 32.37° x 21.26°



# From Planet to Dwarf Planet

IAU Resolution 5B

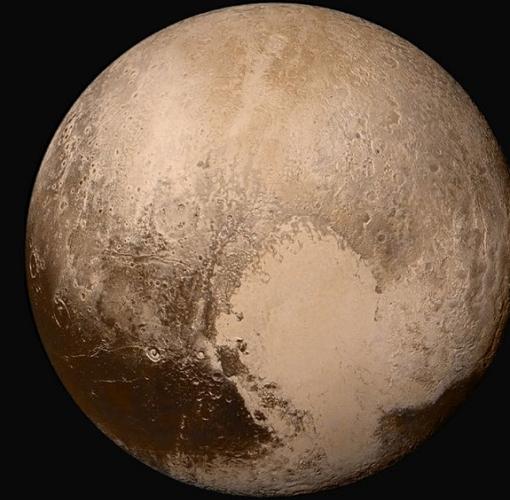
*"A celestial body that (a) is in orbit around the Sun, (b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, and (c) has cleared the neighbourhood around its orbit."*



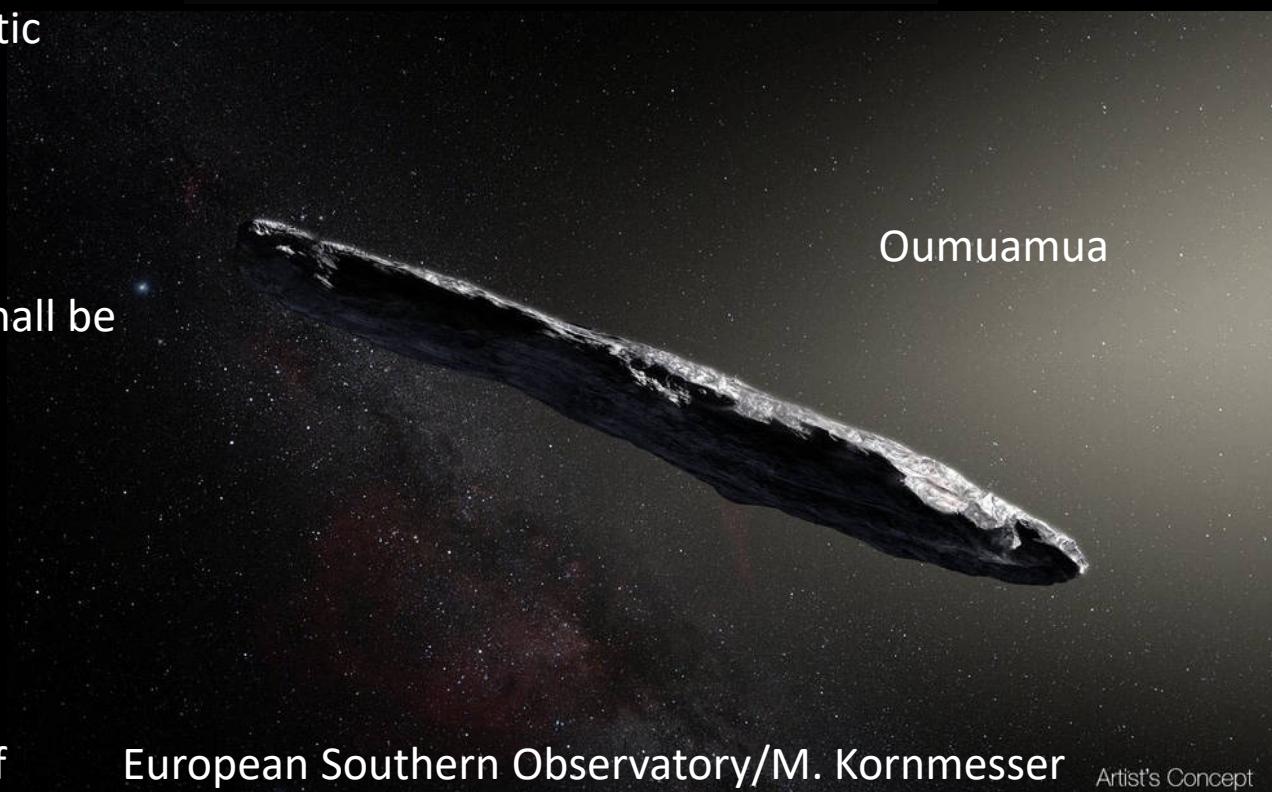


# New Definitions

"(2) A "dwarf planet" is a celestial body that (a) is in orbit around the Sun, (b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, (c) has not cleared the neighbourhood around its orbit, and (d) is not a satellite.

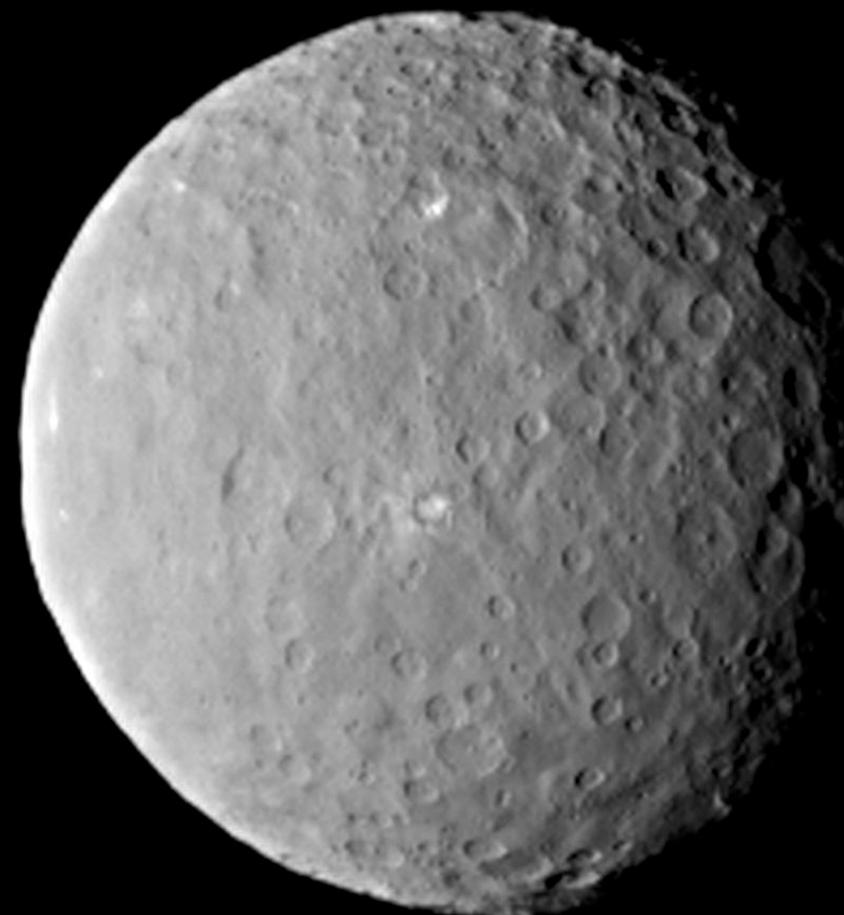
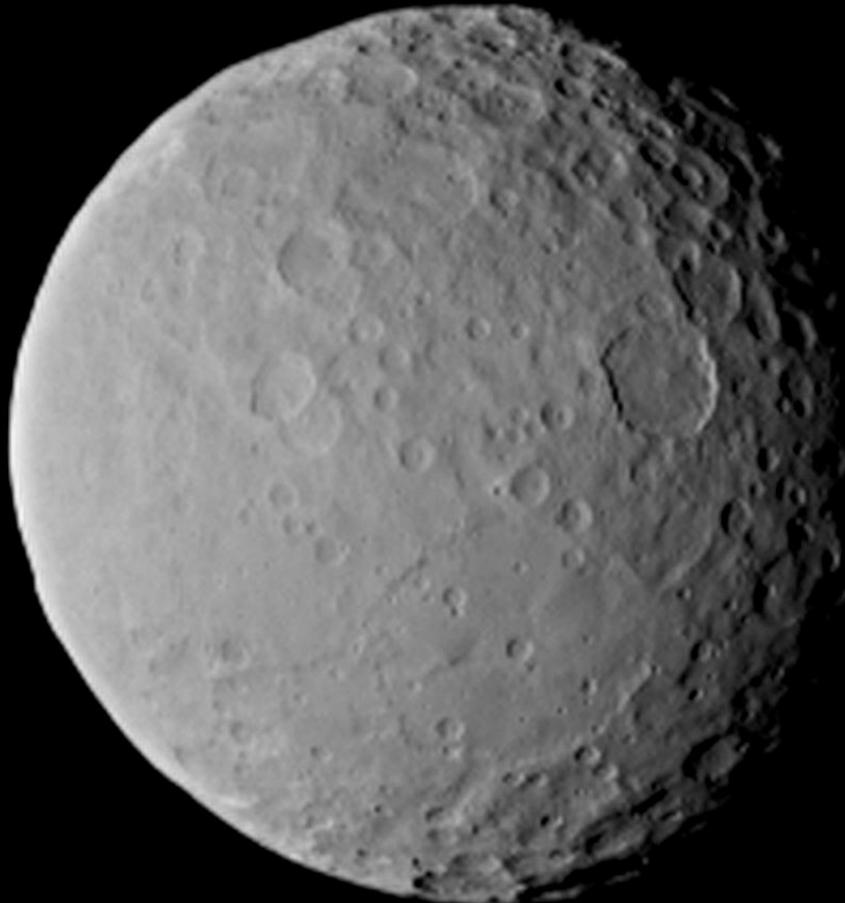


(3) All other objects, except satellites, orbiting the Sun shall be referred to collectively as "Small Solar System Bodies".



Oumuamua

# Ceres



Top Left: JPL/NASA

Bottom Right: <http://backalleyastronomy.blogspot.co.uk/2015/07>

Ceres  
 $r = 469 \text{ km}$

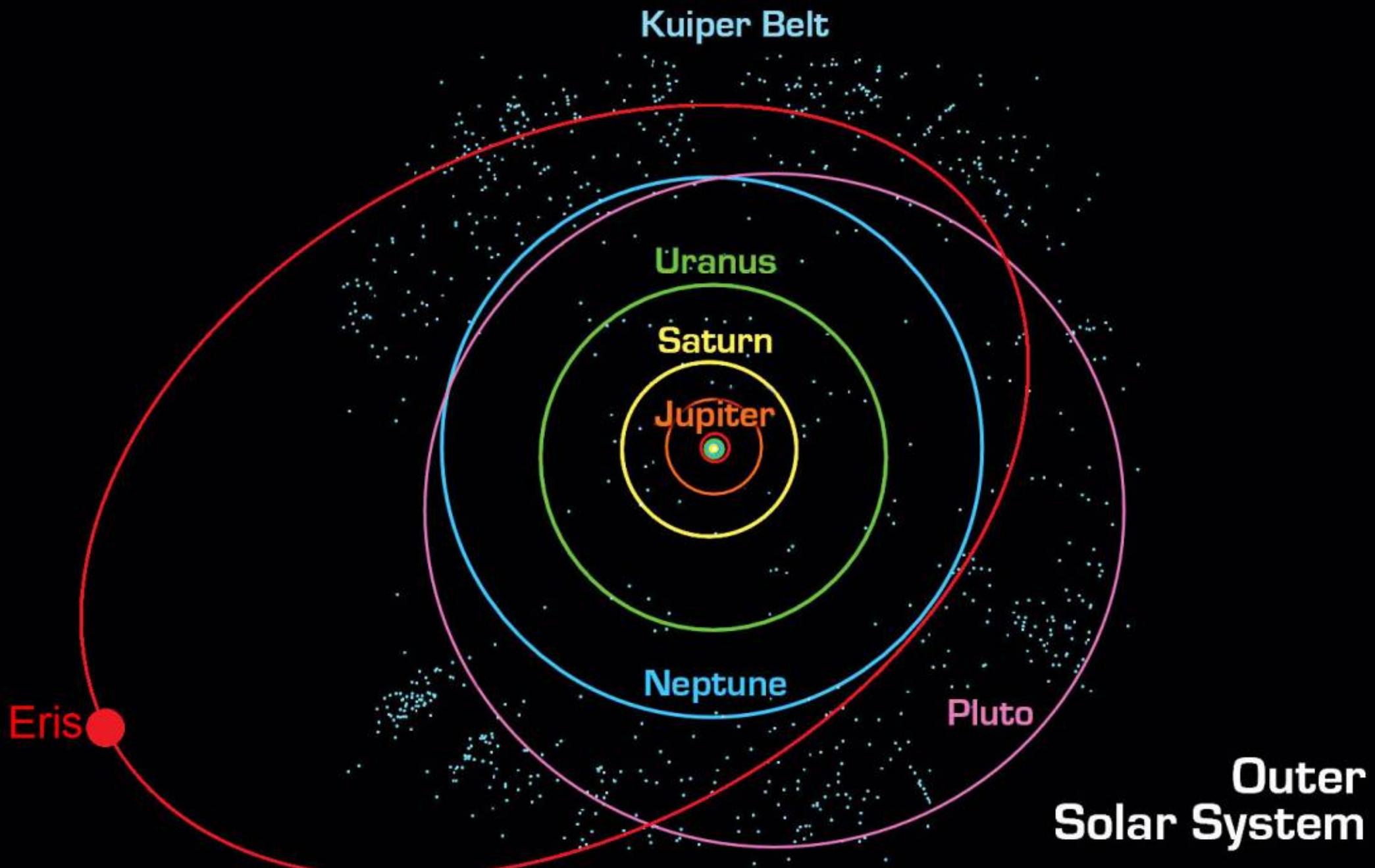
Charon  
 $r = 604 \text{ km}$

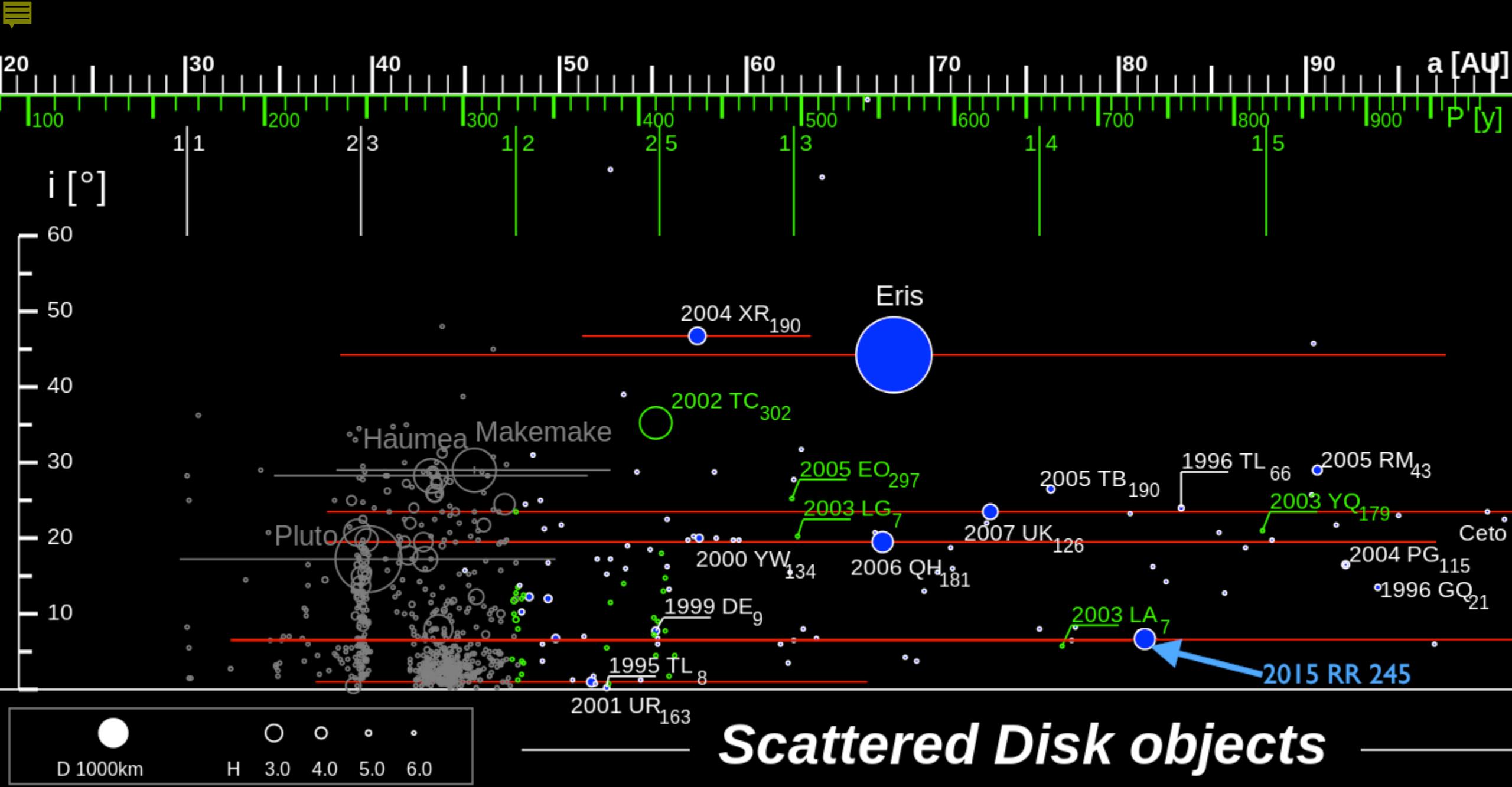
Pluto  
 $r = 1185 \text{ km}$

# Largest Known TNOs



Lexicon/Wikipedia  
adapted from work by  
NASA, ESA, and A. Feild (STScI)







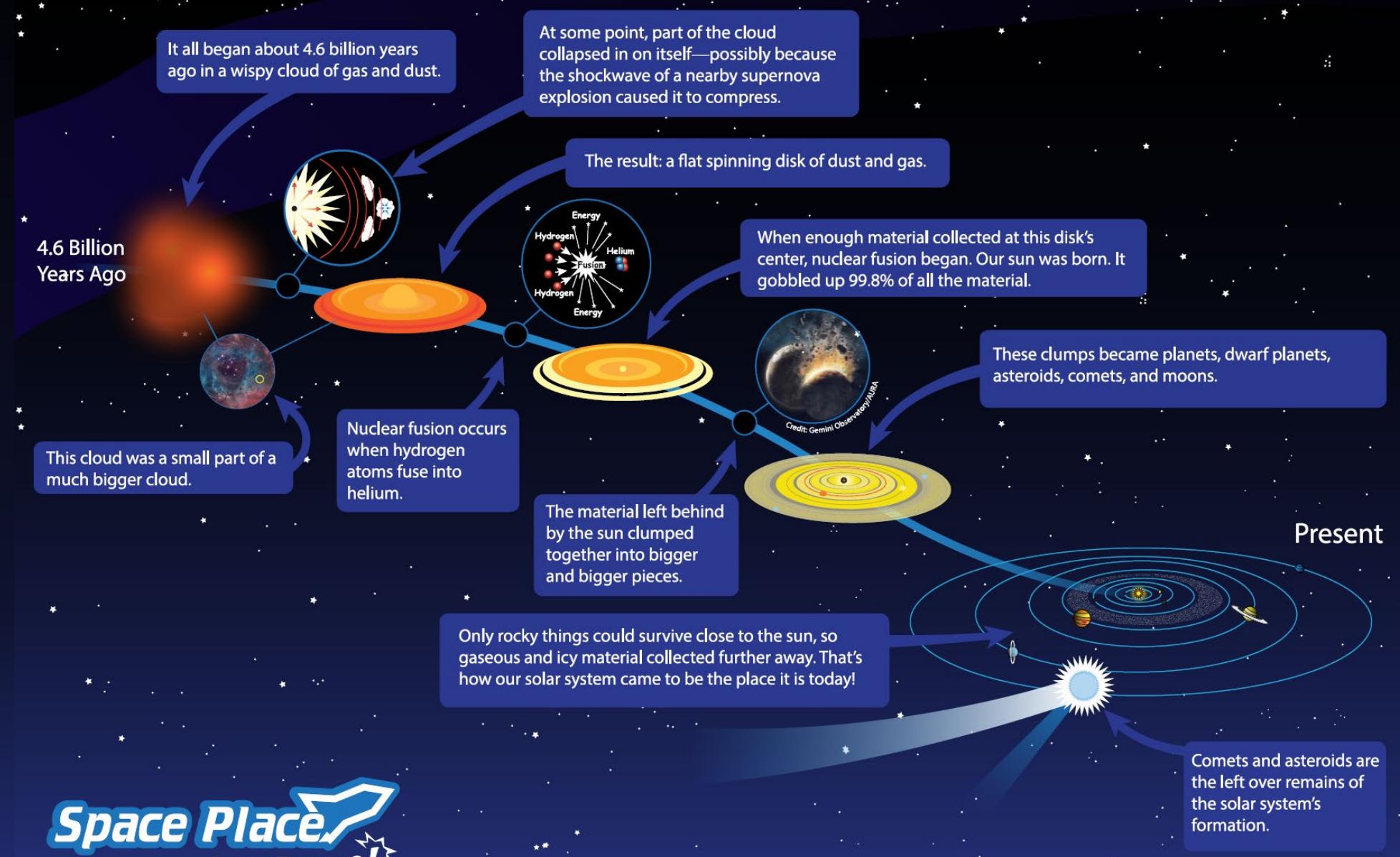
# Why is the Solar System structured this way?

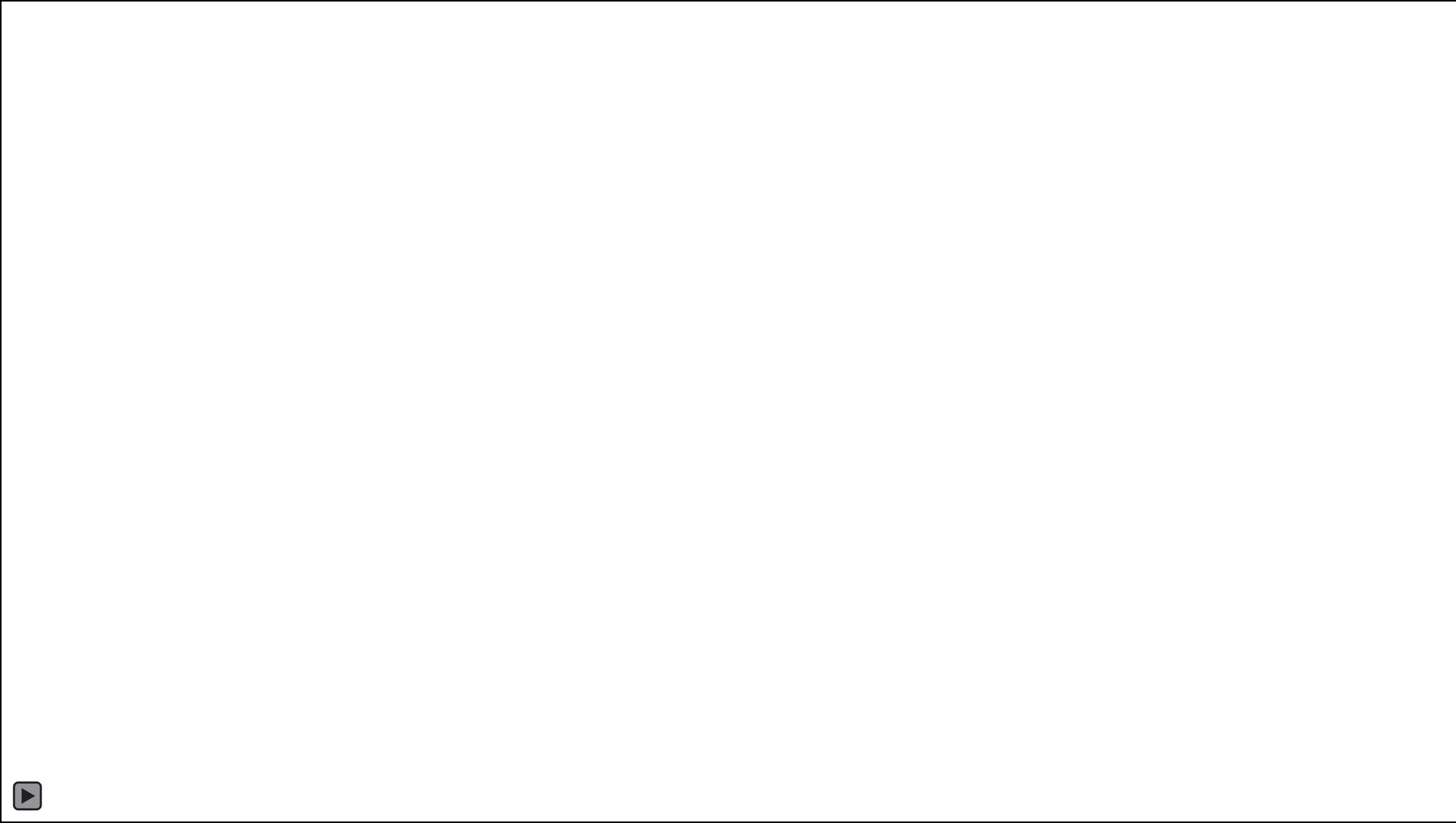


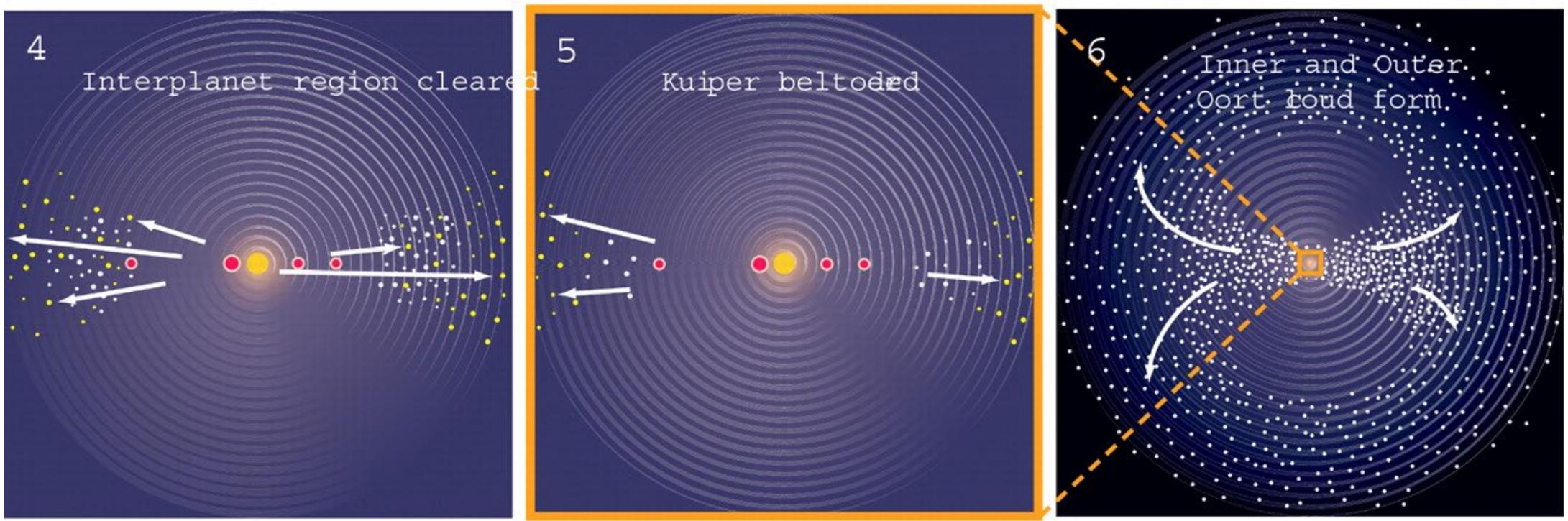


# How did our solar system come to be?

National Aeronautics and Space Administration









Up next:

# The Planets



Name	Diameter	Distance from Sun	Length of Year:
Mercury	4,879 km	57,909,227 km	88 Earth days
Venus	12,104 km	108,209,475 km	225 Earth days
Earth	12,742 km	149,598,262 km	365.24 days
Mars	6,779 km	227,943,824 km	1.9 Earth years
Jupiter	139,822 km	778,340,821 km	11.9 Earth years
Saturn	116,464 km	1,426,666,422 km	29.5 Earth years
Uranus	50,724 km	2,870,658,186 km	84.0 Earth years
Neptune	49,244 km	4,498,396,441 km	164.8 Earth years

[https://joshworth.com/dev/pixelspace/pixelspace\\_solarsystem.html](https://joshworth.com/dev/pixelspace/pixelspace_solarsystem.html)