

Moon, Rings, Asteroids, and Comets

The other cool stuff in the
Solar System

Outline (with Reading)

- Moons (§14)
- Rings (§12.7)
- Asteroids (§15.3)
- Trans-Neptunian Objects (TNO's) (§13.3)
 - Kuiper Belt (§13.3)
 - Scattered Disk
 - Oort Cloud & Comets (§15.4-5)

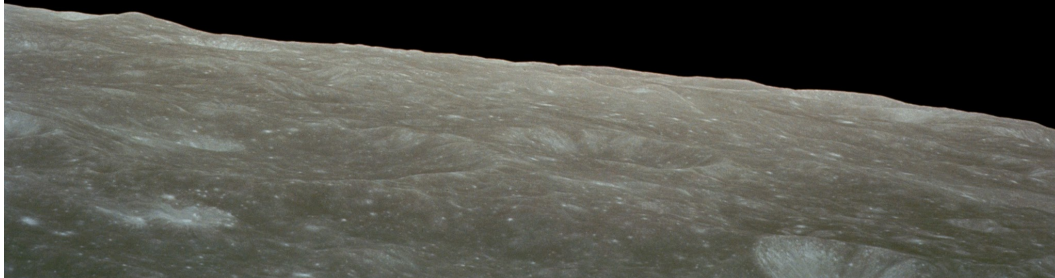
Moons



Phobos and Deimos (Mars)



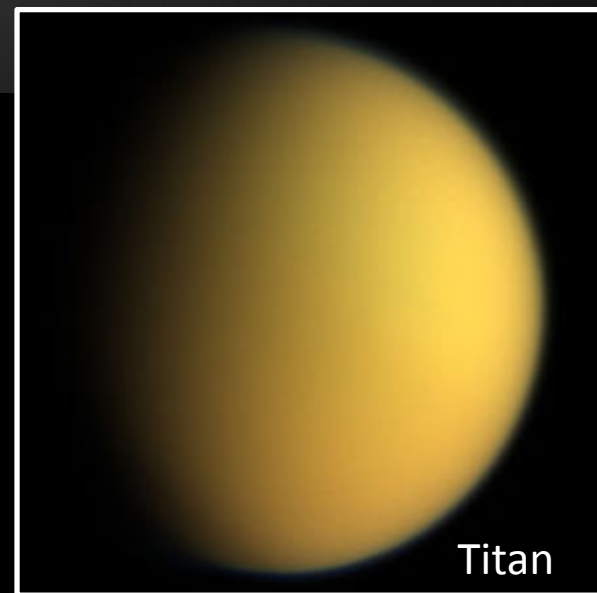
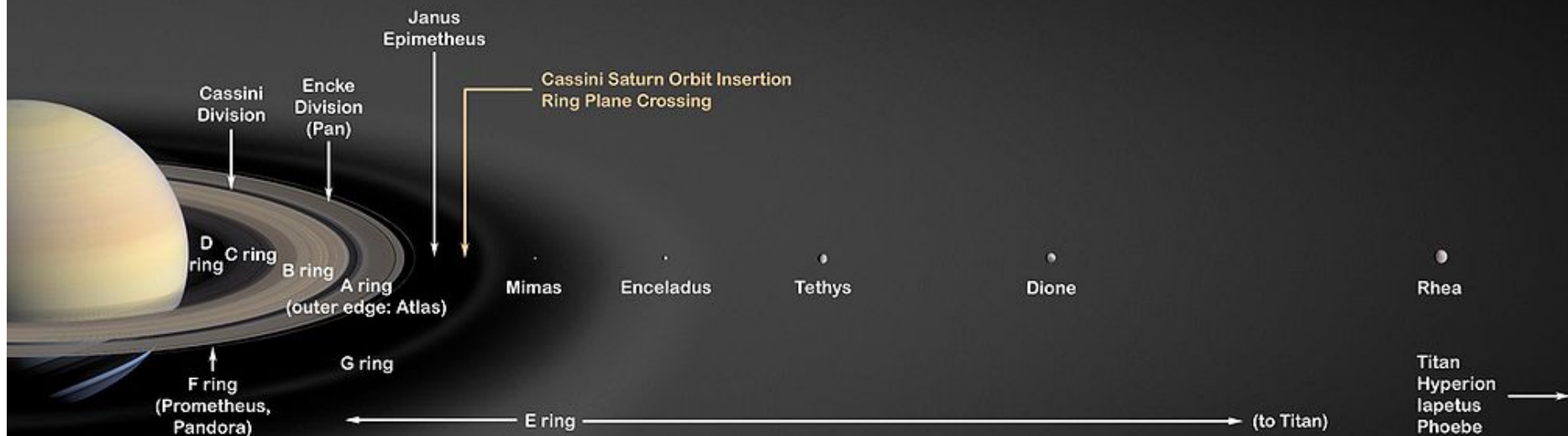
Rhea and Titan (Saturn)



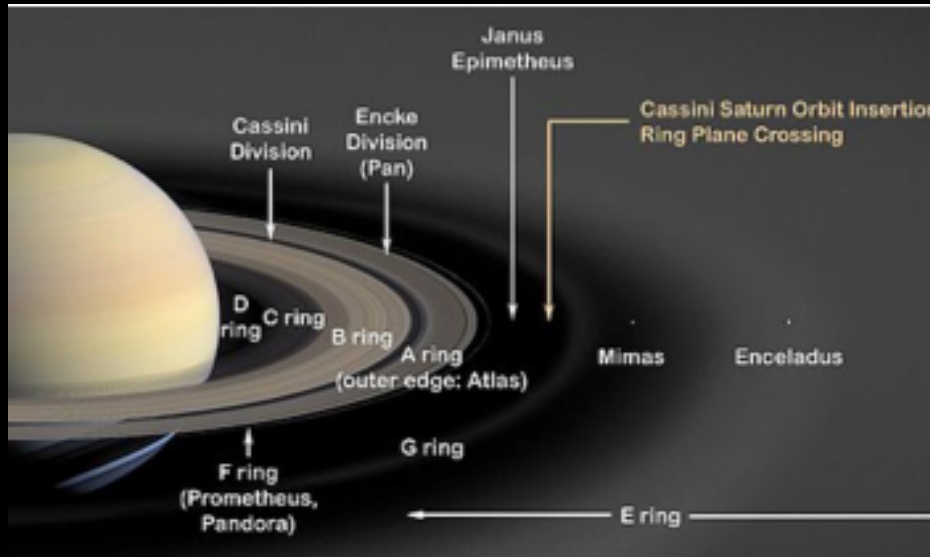
Moons

Planet	Regular	Irregular	Names (of note)
Mercury	0	0	
Venus	0	0	
Earth	1*	0	Luna, or "The Moon"
Mars	0	2	Phobos, Deimos (1871)
Jupiter	8	58	Io, Europa, Ganymede, Callisto (1610)
Saturn	24	38	Mimas, Enceladus, Tethys, Dione, Rhea, Titan, Hyperion, Iapetus, Pandora,
Uranus	18	9	Titania, Oberon (1787), Ariel, Umbriel (1851), Miranda (1948)
Neptune	6	7	Triton (1846), Naiad, Thalassa, Despina, Galatea, Larissa and Proteus.
Pluto	4		Charon, (1978), Hydra (2002), Nix (2002), S/2011 P1 (2011)

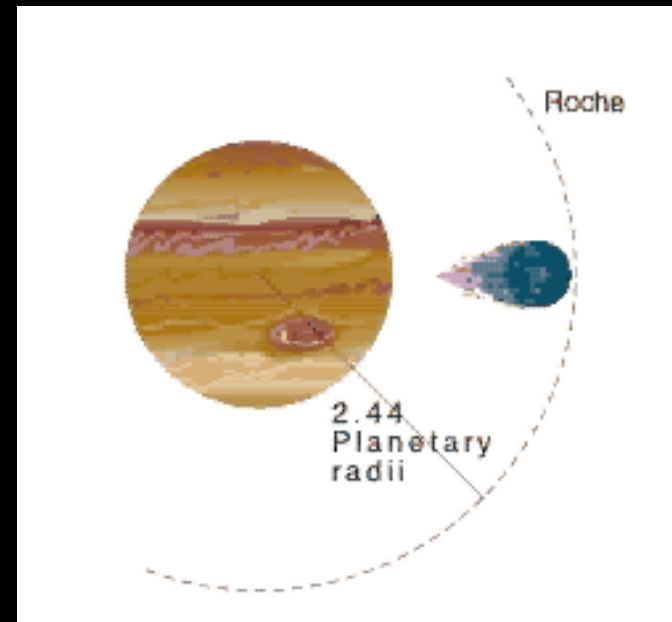
Saturn's Moons and Rings



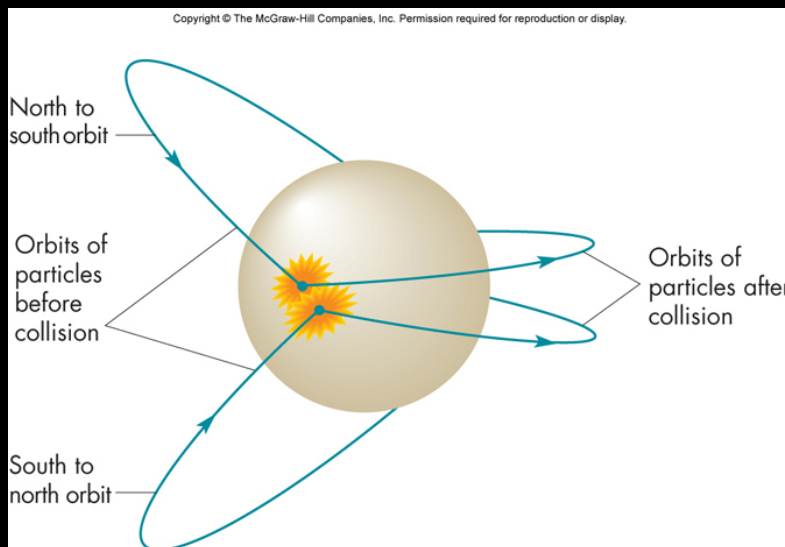
Rings



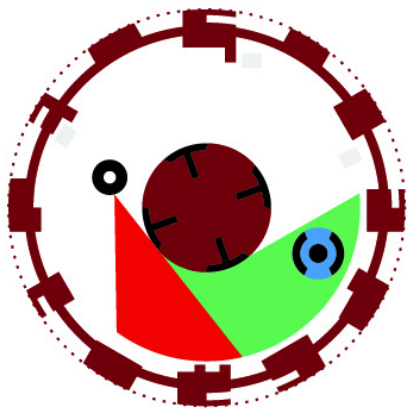
Roche Limit:



$$r_{\text{Roche}} = 2.44 R$$



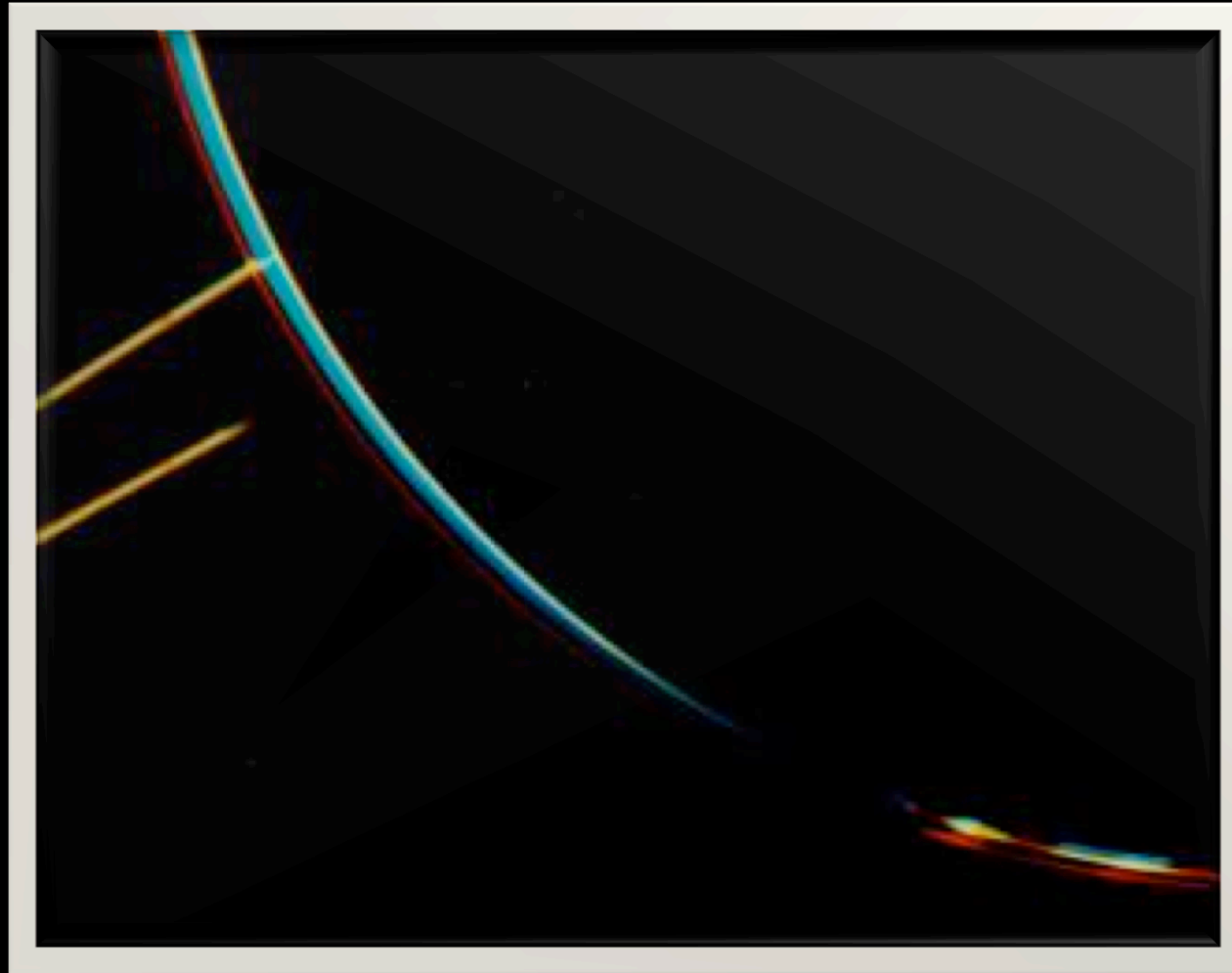
“That is no moon...”



It's within the
Roche limit!



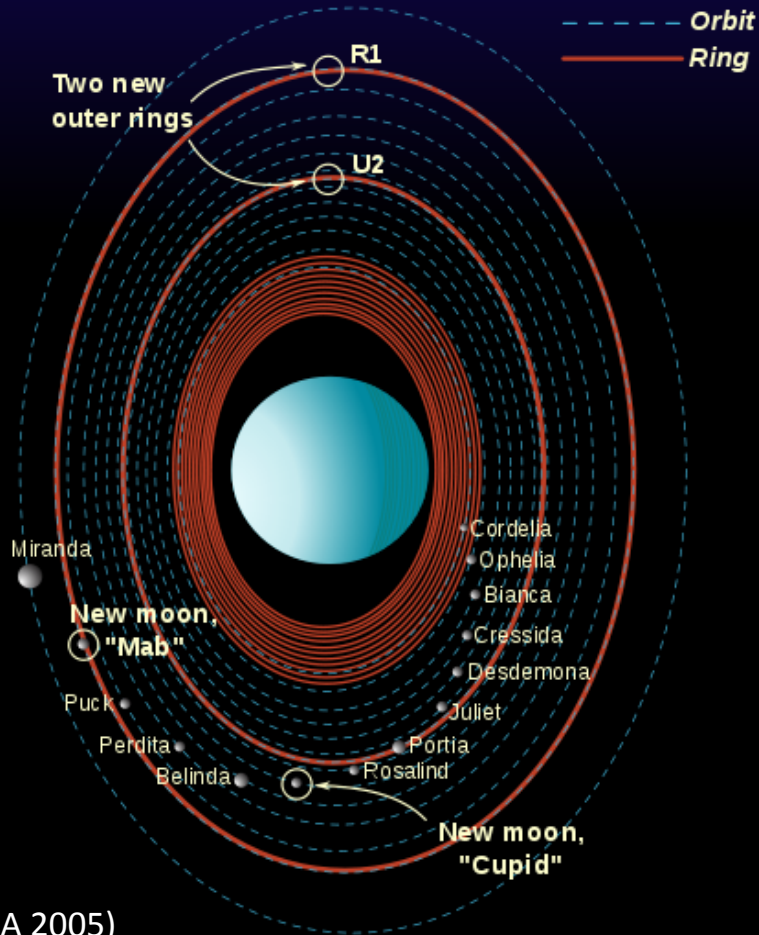
Jupiter has Rings!



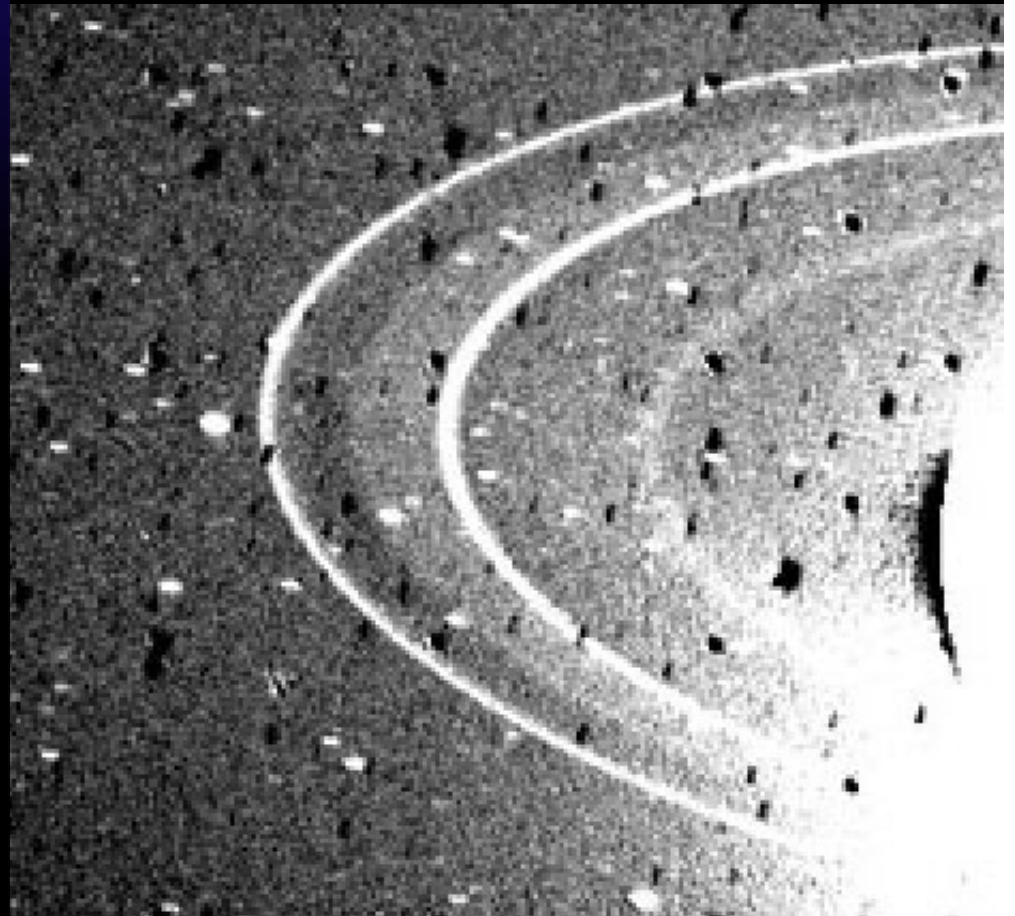
Jupiter's faint ring system is shown in this color composite as two light orange lines protruding from the left toward Jupiter's limb. This picture was taken in Jupiter's shadow through orange and violet filters. The colorful images of Jupiter's bright limb are evidence of the spacecraft motion during these long exposures. The Voyager 2 spacecraft was at a range of 1,450,000 kilometers (900,000 miles) about two degrees below the plane of the ring. The lower ring image was cut short by Jupiter's shadow on the ring. (NASA/JPL 1999-05-08)

Rings of Uranus and Neptune

Hubble detects two large outer rings,
two new moons orbiting Uranus



(NASA 2005)

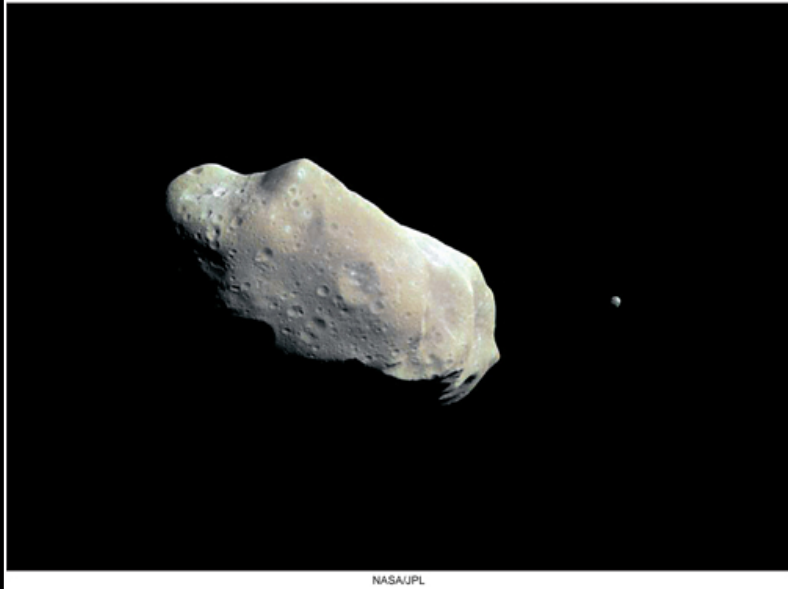


Voyager 2 image of Neptune's rings, 26 August 1989

(NASA/JPL)

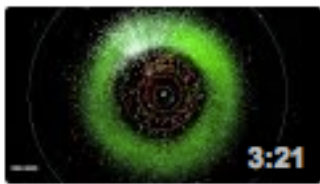
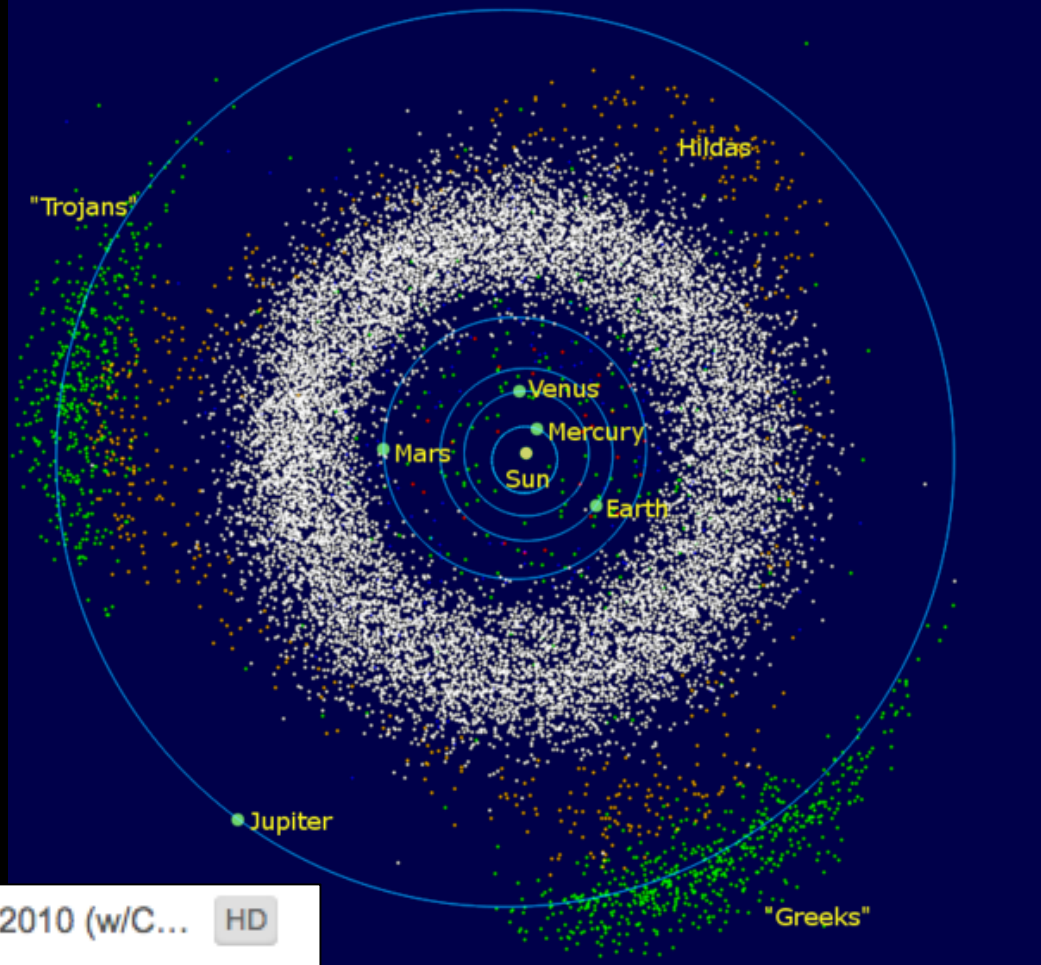
Asteroids

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NASA/JPL

The Asteroid Ida and Its Satellite, Dactyl (NASA/JPL)



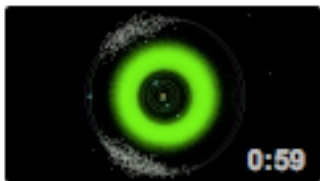
3:21

Asteroid Discovery From 1980 - 2010 (w/C... HD)

Identical to the original, but with a credit card attached and...

1 year ago

[szyzyg](#)



0:59

Asteroids In Resonance With Jupiter HD

This video highlights 2 groups of asteroids that have orbits i...

1 year ago

[szyzyg](#)

Comets

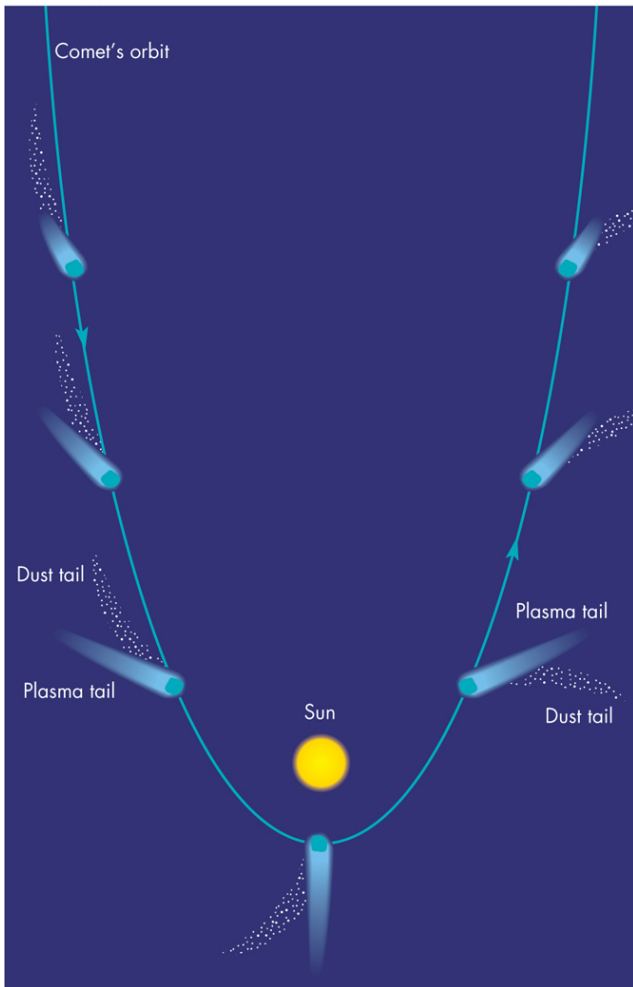
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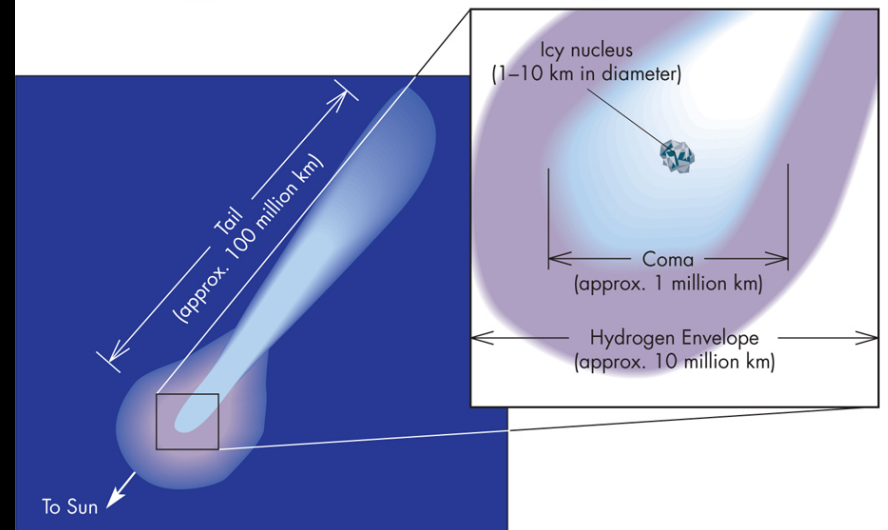
Comet West
(1975)
2 tails!

© Ronald Royer/SPL/Photo Researchers

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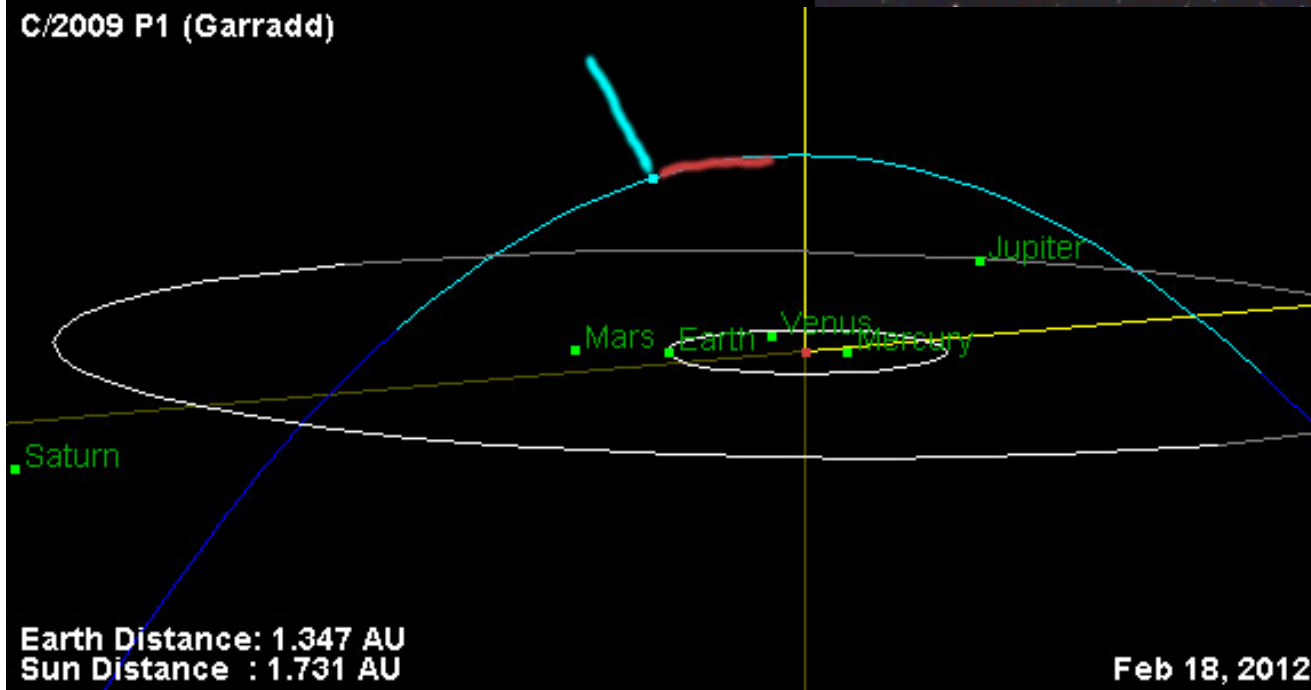
Halley's Comet, April 1986, taken just before dawn from the south shore of Long Island, NY, by E. Myers

Two tails, opposite directions!



C/2009 P1 (Garradd)

Photo of Comet Garradd by César Cantú (2012)



Earth Distance: 1.347 AU
Sun Distance : 1.731 AU

Orbit simulation created on
JPL web site by Philip Plait for
the *Bad Astronomy* blog

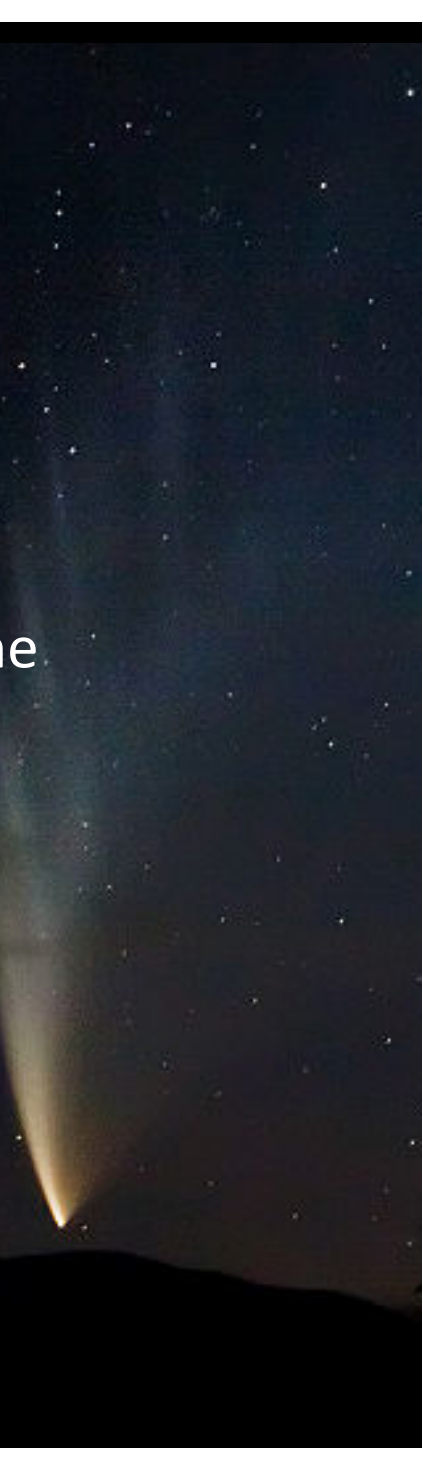
Feb 18, 2012



Bad Astronomy

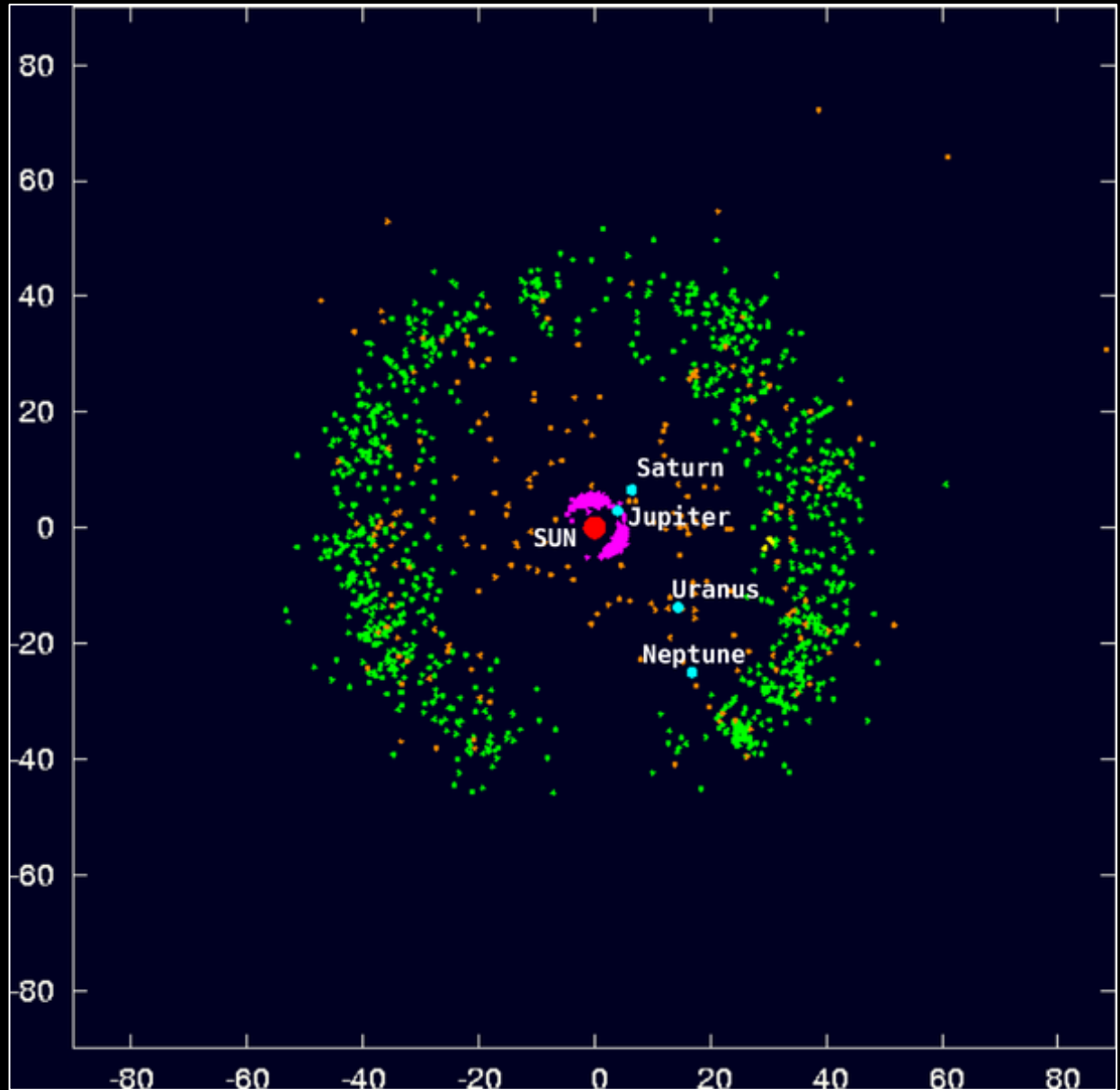
Two kinds of comets

- “*Short period*” comets have orbital periods less than 200 years,
- “*Long period*” comets have periods greater than 200 years.
- Short period comets have orbits that lie close to the ecliptic plane
- So short period comets are thought to come from the *Kuiper belt*
- Long period comets have orbits that are more evenly distributed in all directions.
- So long period comets are thought to come from the *Oort cloud*

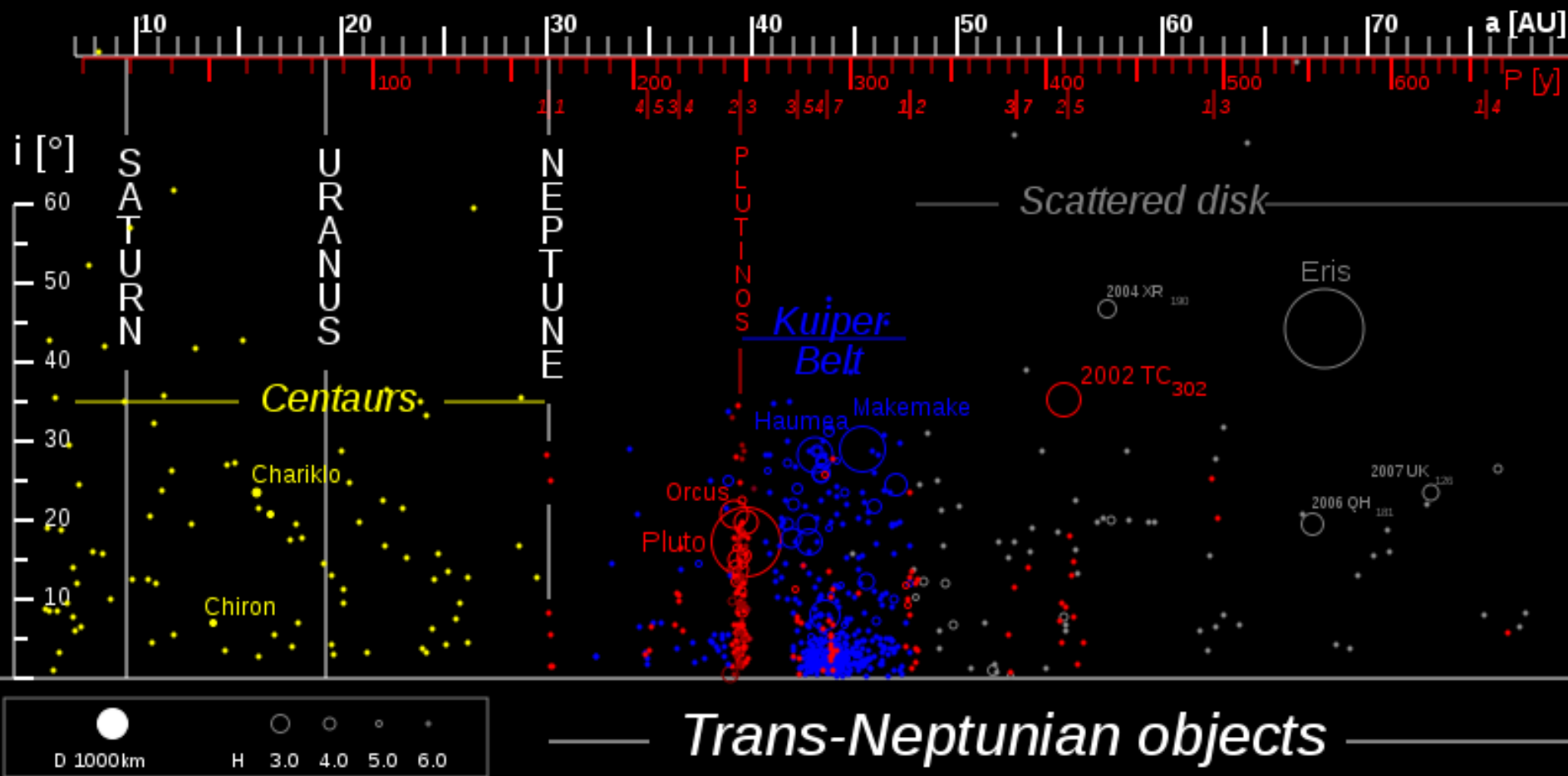


Kuiper Belt

Known Kuiper Belt objects as of January 1, 2000 (green), along with trojans of Jupiter (magenta) and scattered disk or centaur objects (orange)

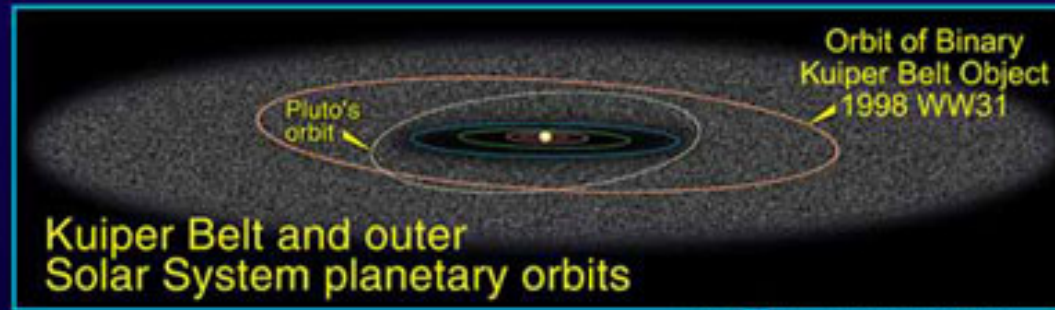


Trans-Neptunian Objects (TNO's)



Oort Cloud

hypothesized spherical cloud
of comets, at a distance of
roughly 50,000 AU



The Oort Cloud
(comprising many
billions of comets)

The Oort Cloud is shown as a vast, spherical cloud of white dots, representing billions of comets. It is centered on the Sun and extends far beyond the Kuiper Belt. A blue line points from the Kuiper Belt region in the diagram above to the center of the Oort Cloud.

*Oort Cloud cutaway
drawing adapted from
Donald K. Yeoman's
illustration (NASA, JPL)*

[Animation...](#)