



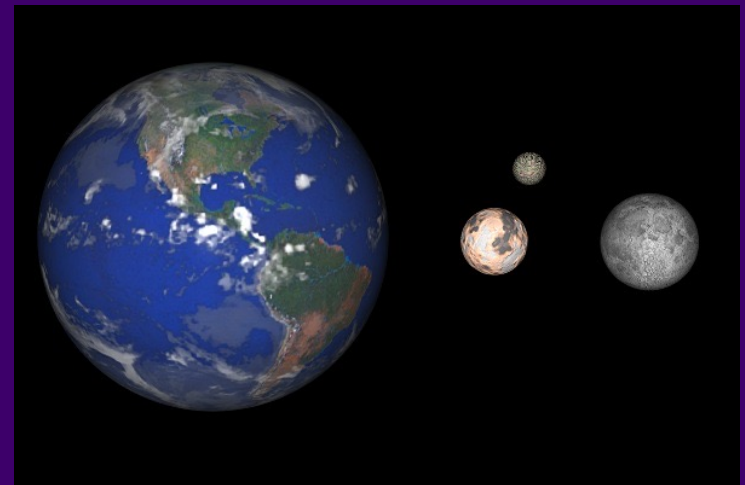
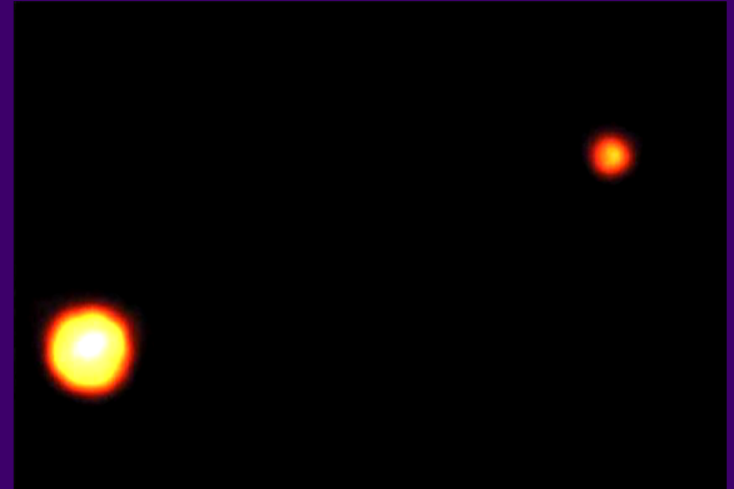
Pluto and Solar System Debris

Today:

- Pluto: the 9th planet(?)
- Other stuff near Pluto and beyond
- Comets
- Minor planets in inner solar system (asteroids)
- Earth impacts

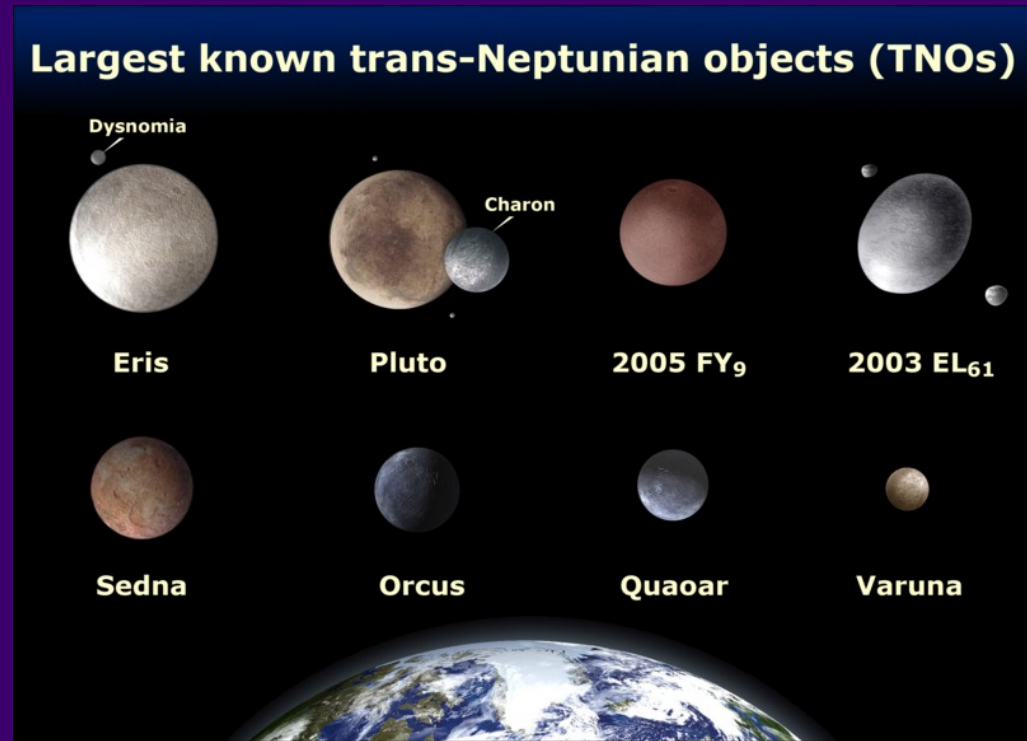
Pluto

- Discovered in 1930 by comparing photos taken at different times
- Slightly farther than Neptune, in tipped, eccentric orbit
- Smaller than our moon
- Has one moon, Charon
- Robotic mission launched January, 2006; will fly by in July, 2015



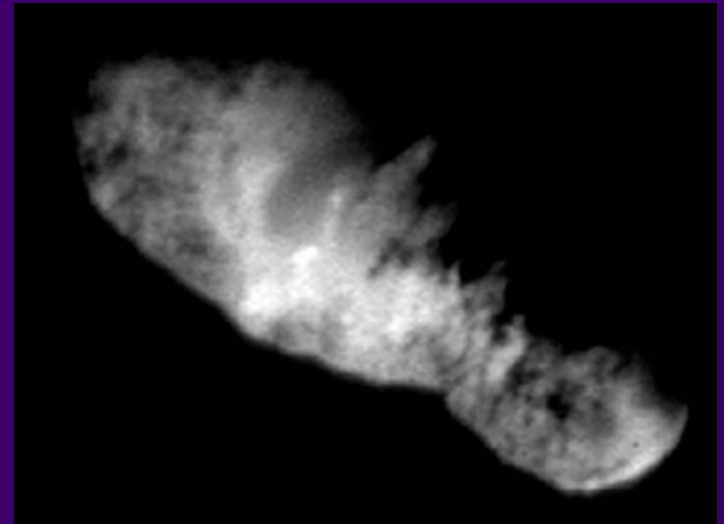
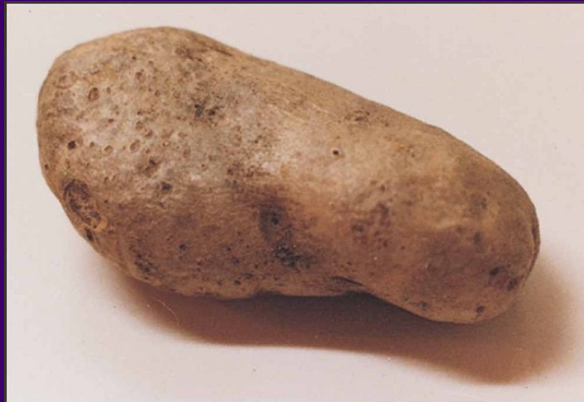
Kuiper Belt objects (stuff beyond Neptune)

- Seem to be quite numerous
- Largest known so far is Eris (fka Xena)
- Comets come from out here (or farther)

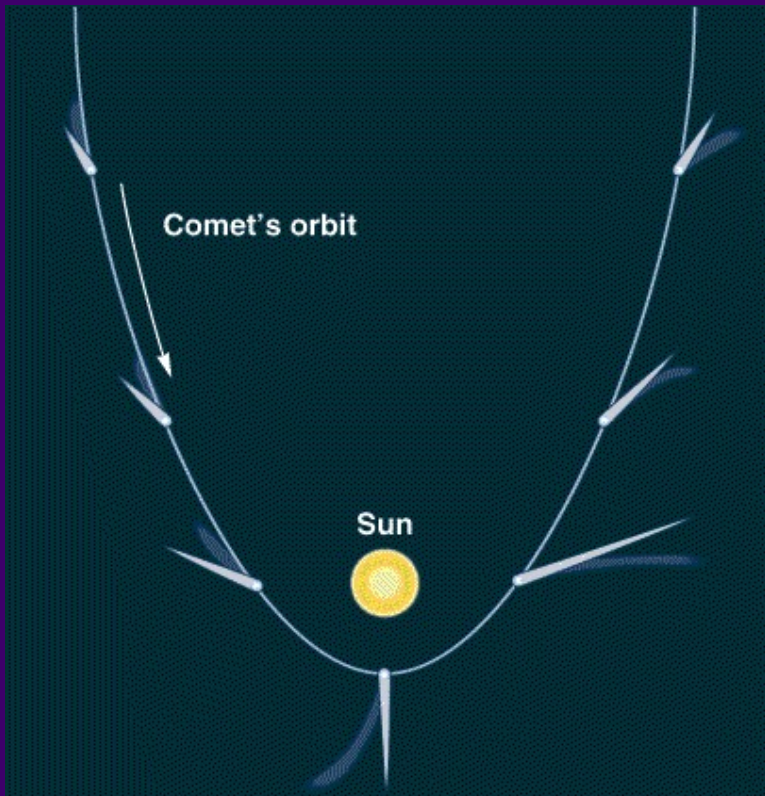


Comets

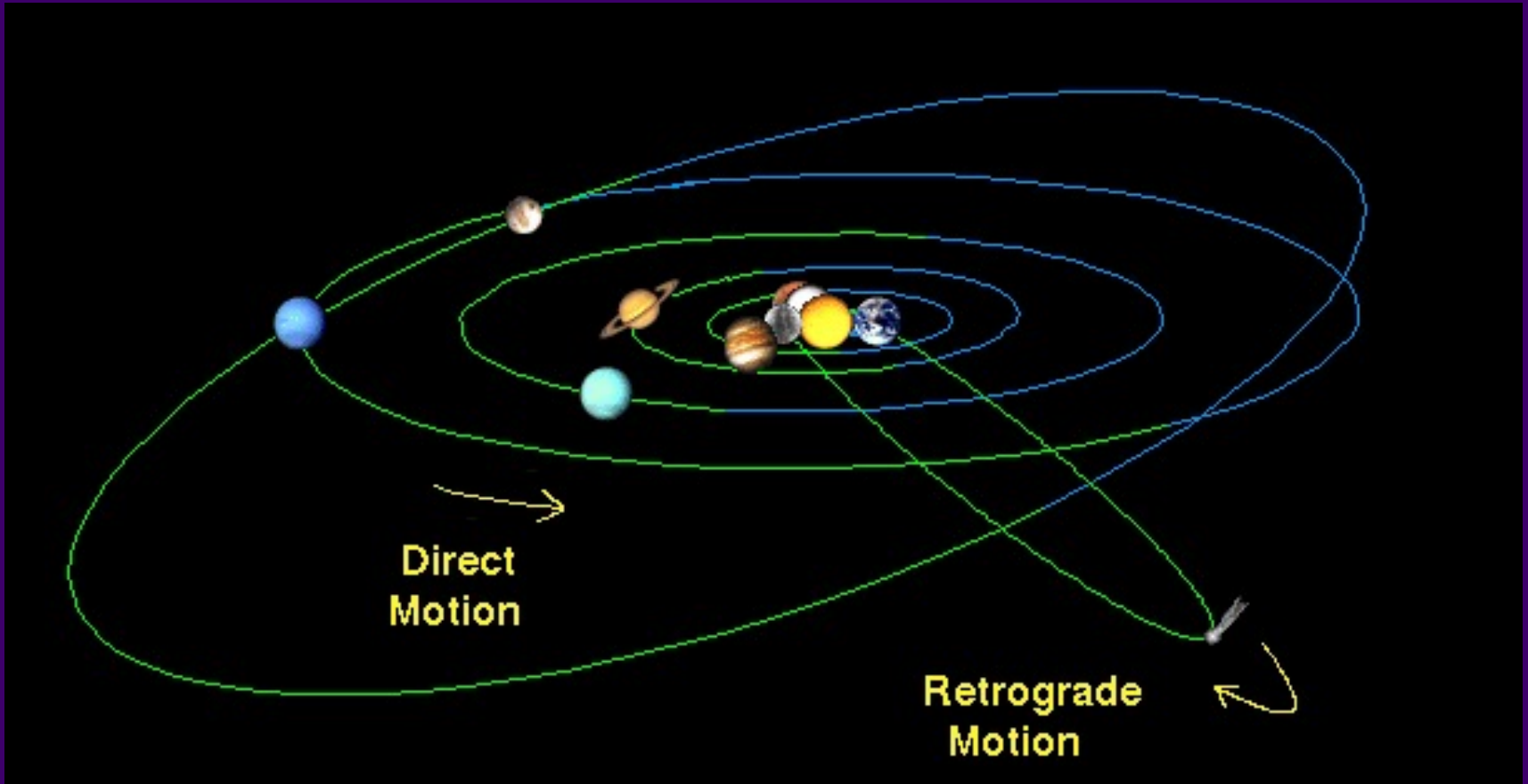
- Chunks of rock and ice in highly eccentric orbits
- Near sun, ice evaporates to produce “tail”
- A couple have been visited by robotic craft



Comets



Halley's Comet

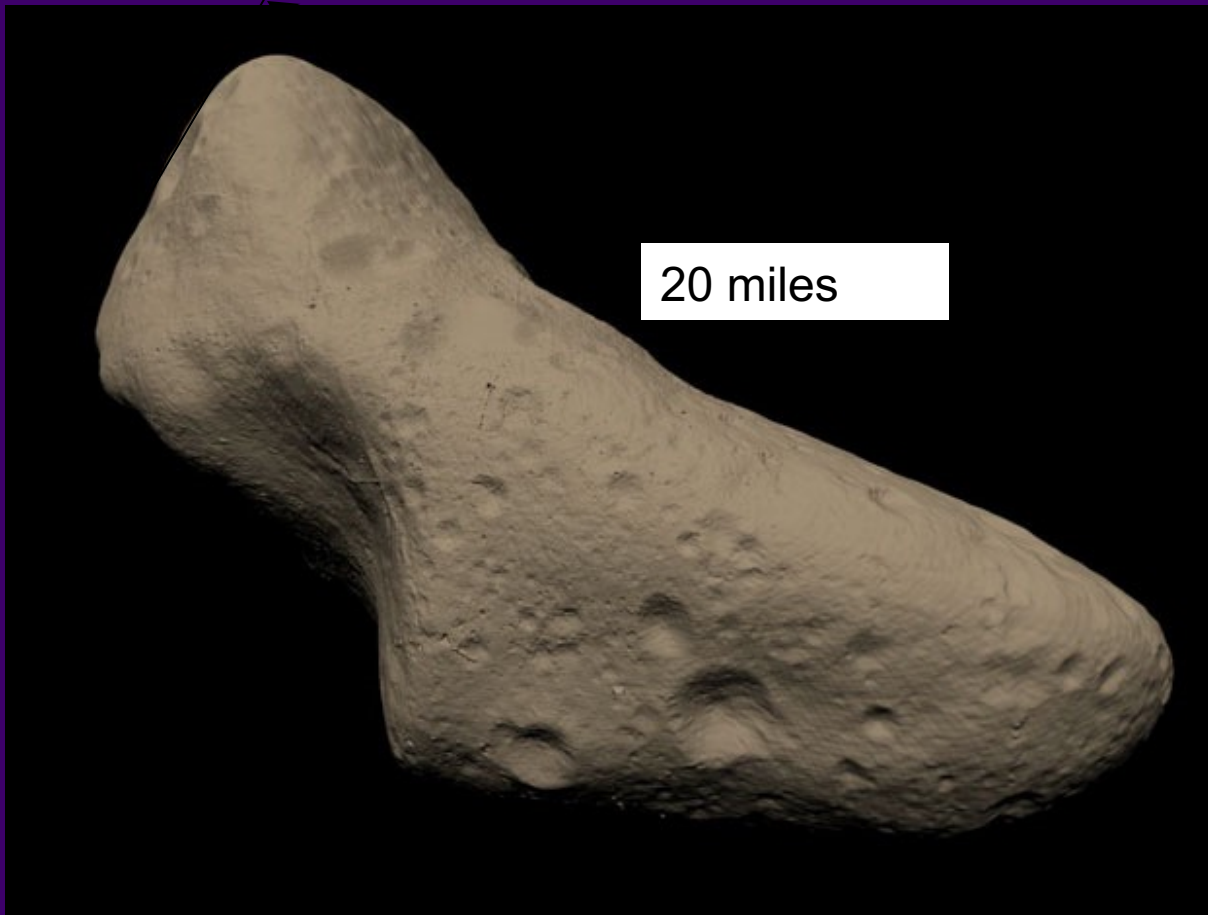


Asteroids (minor planets)

- Most abundant between the orbits of Mars and Jupiter
- Largest is Ceres, 800 km diameter; most are much smaller, irregular



Asteroid Close-Up



Asteroid Eros

It would take all day to walk end to end, but walk carefully. You would only weight about 1 oz. (the weight of a first-class letter).

Asteroids (minor planets)



Asteroids as seen from Earth



Asteroid Zelinda

Asteroids as seen from Earth



Asteroid 2002 RX211

(taken 2005 Dec 19 by Dale Gary)

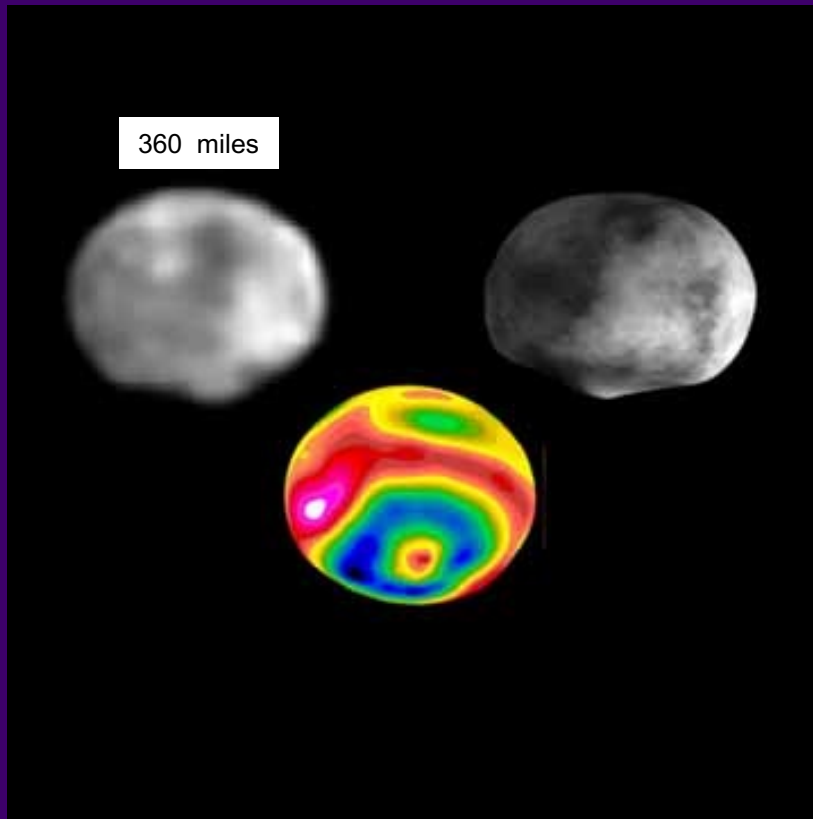
Asteroids as seen from Earth



Asteroid 2006 VV2

(taken by Robert Long)

Asteroids as seen from Earth

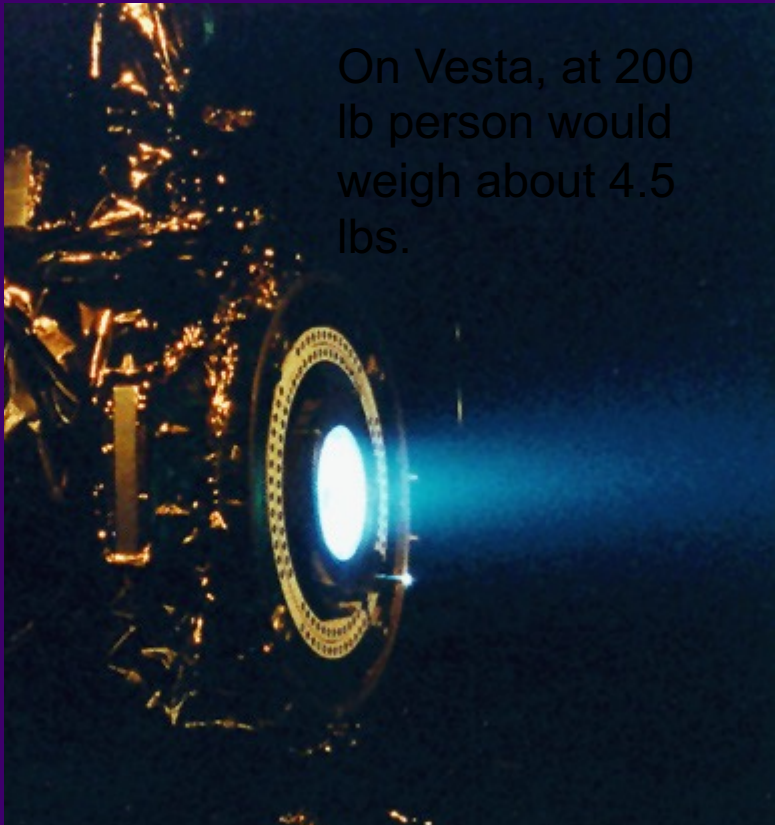


Asteroid Vesta
taken with the
Hubble Space Telescope

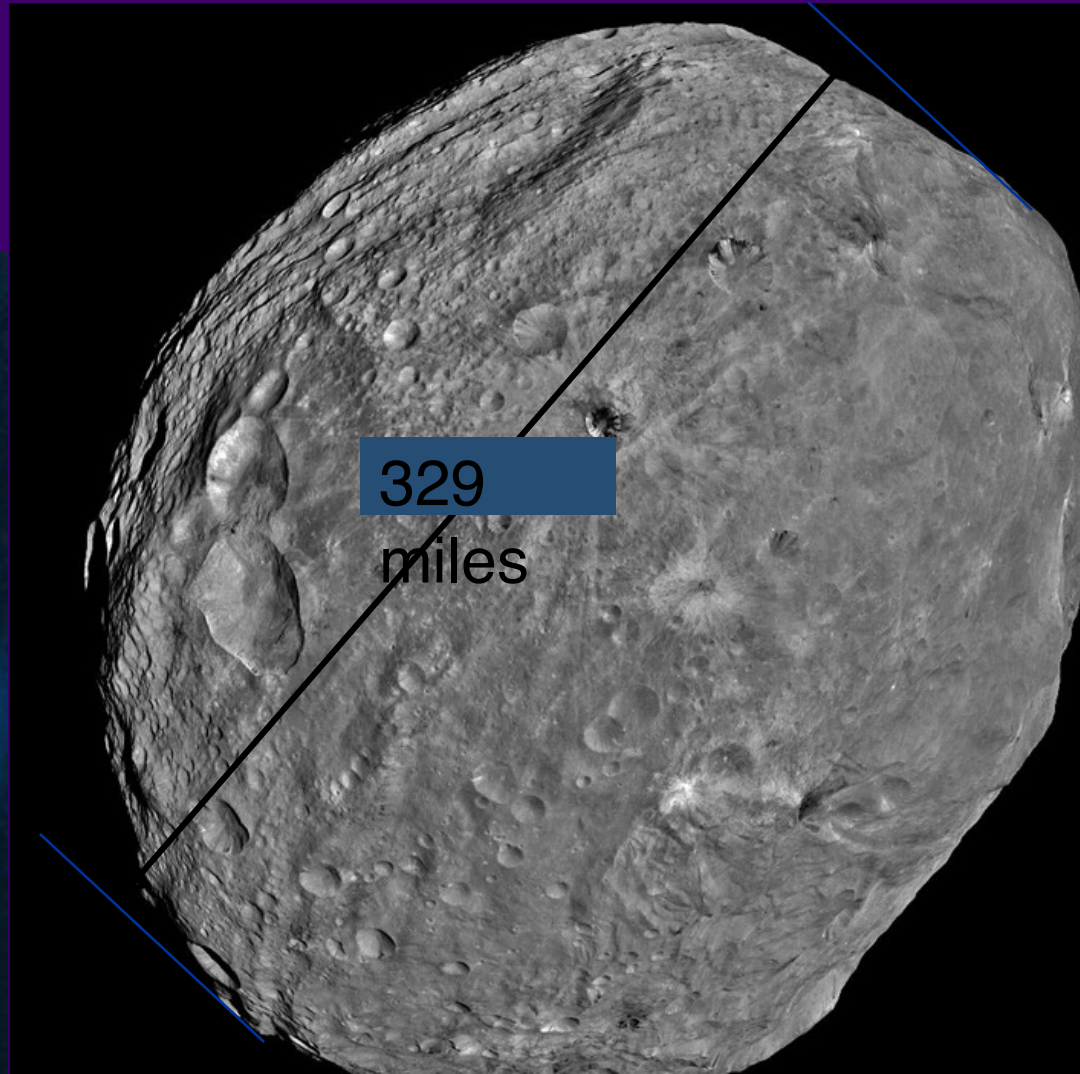


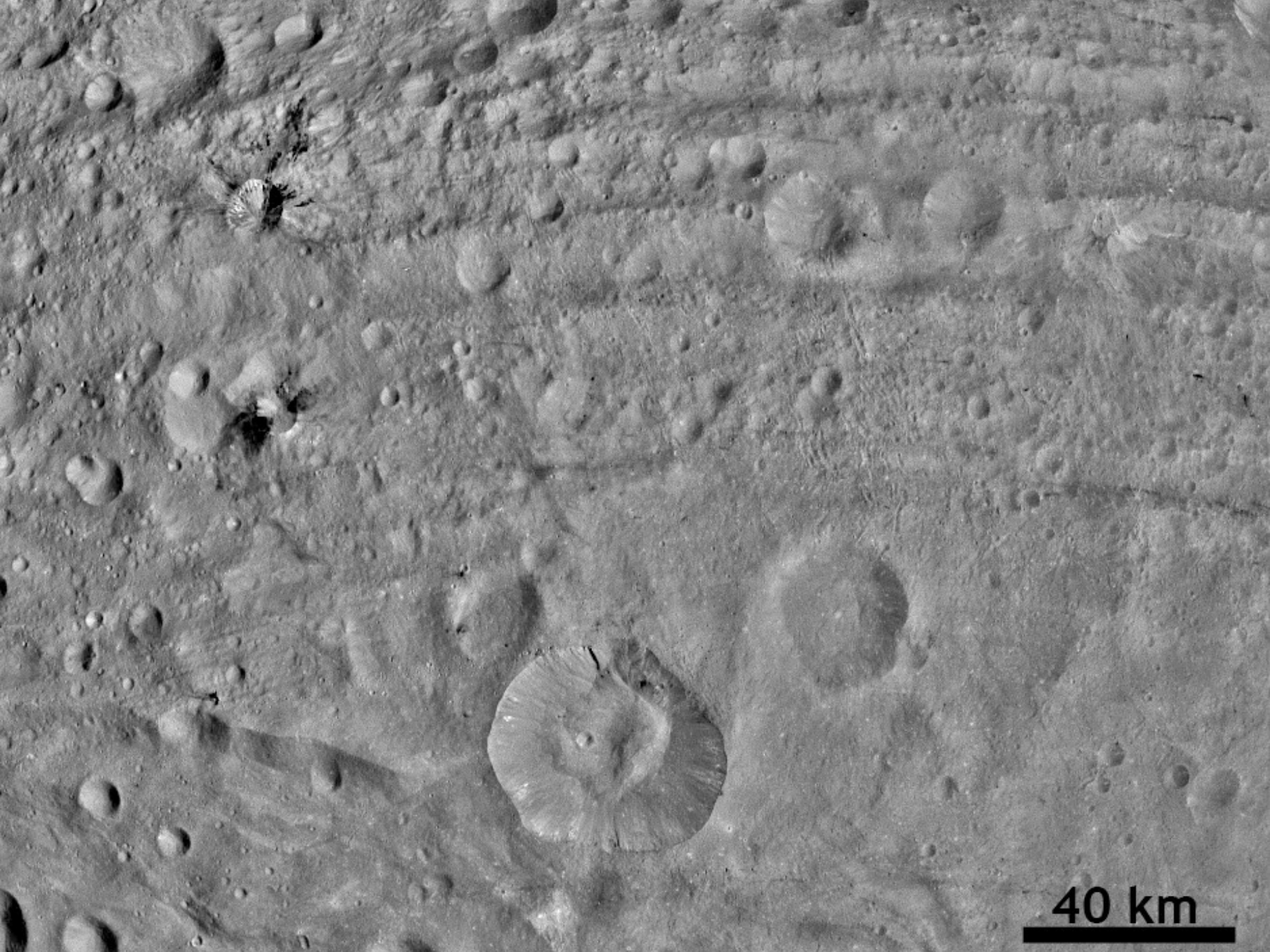
Asteroid Camilla
(has a moon)

Vesta Dawn Mission



On Vesta, at 200 lb person would weigh about 4.5 lbs.





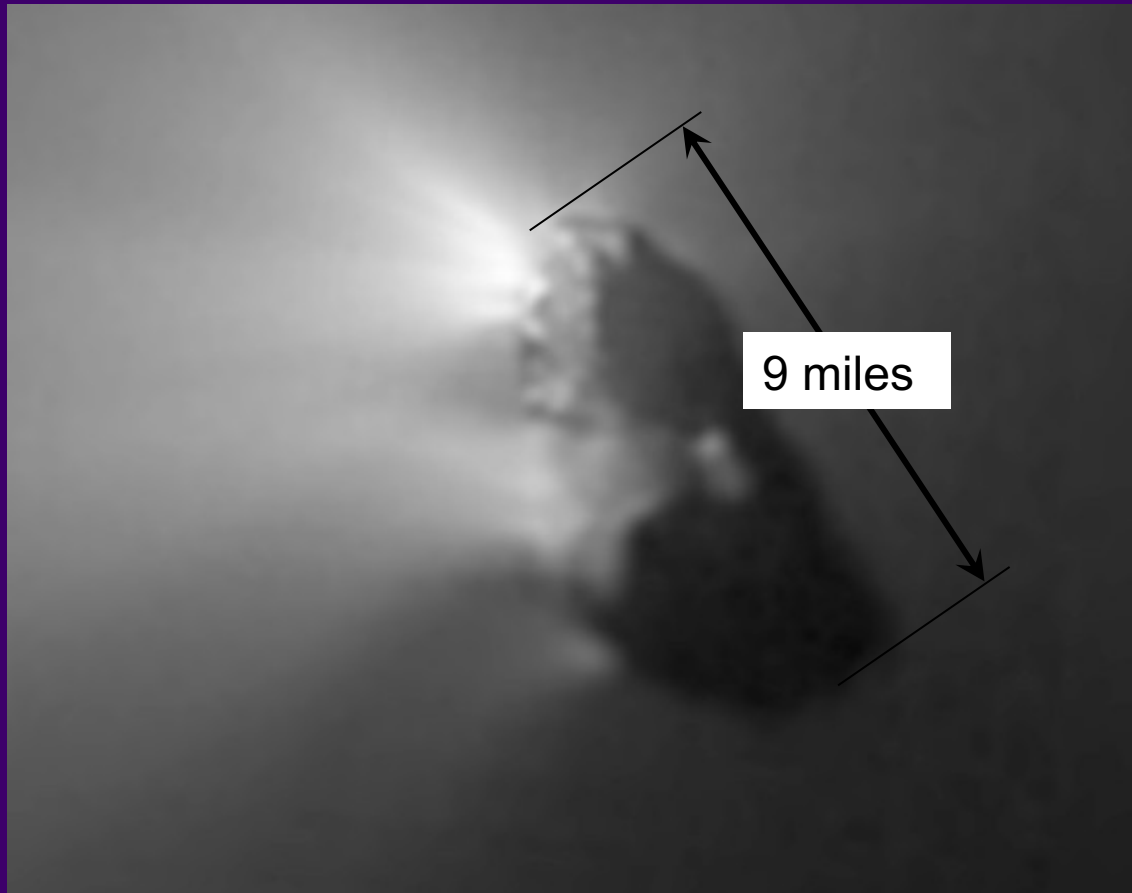
40 km

Comet Close-Up



Comet Tempel 1

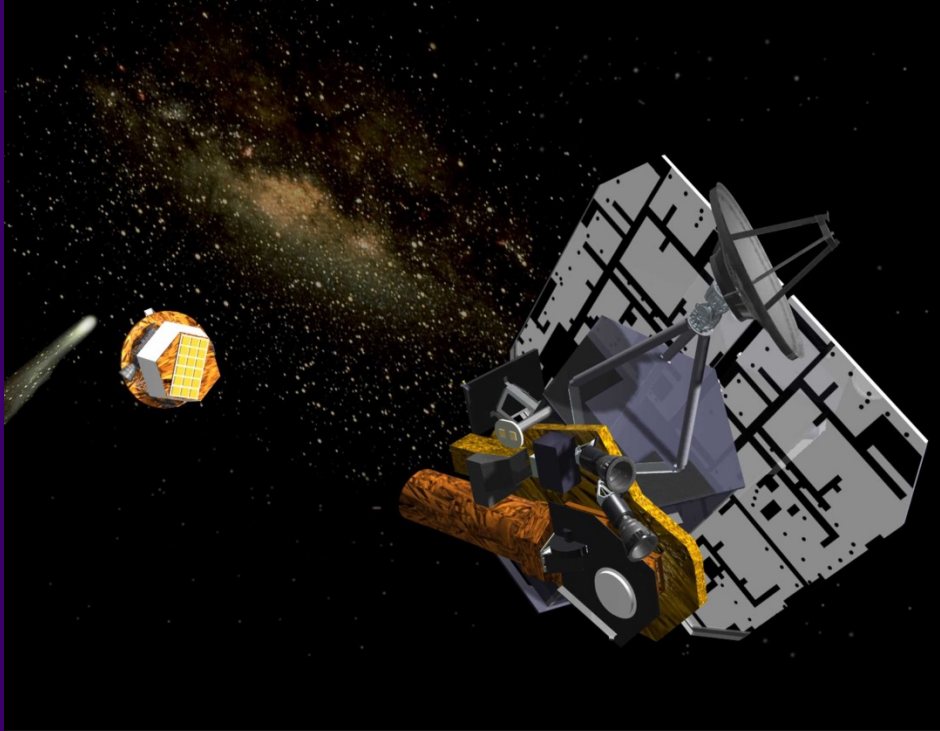
Comet Close-Up



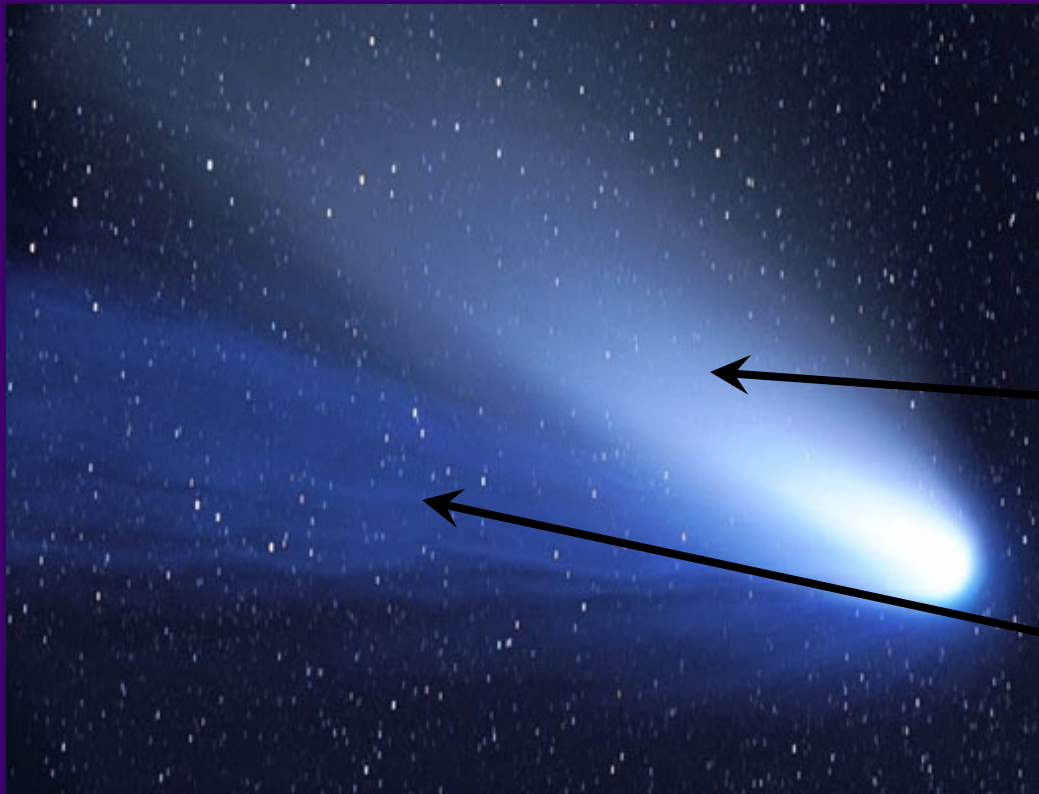
Comet Halley

Space Probe to a Comet

Deep Impact



Comets as seen from Earth



Comet Hale-Bopp

Dust Tail

Gas Tail

Comets as seen from Earth



Comets as seen from Earth



Comet Pobjmanski

Gas Tail

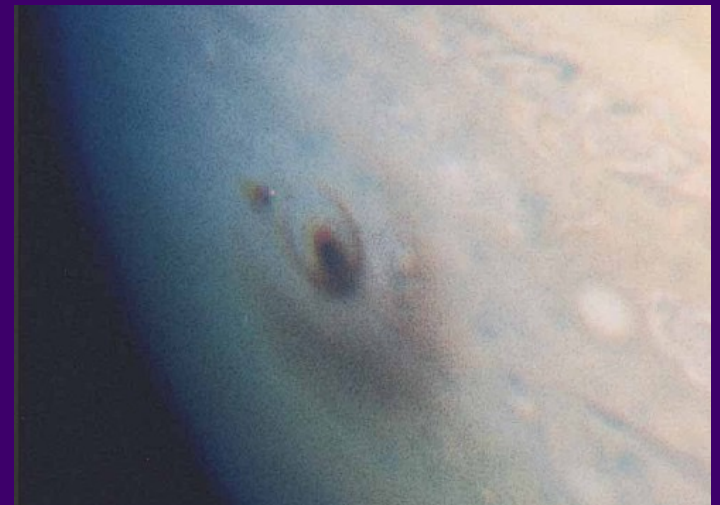
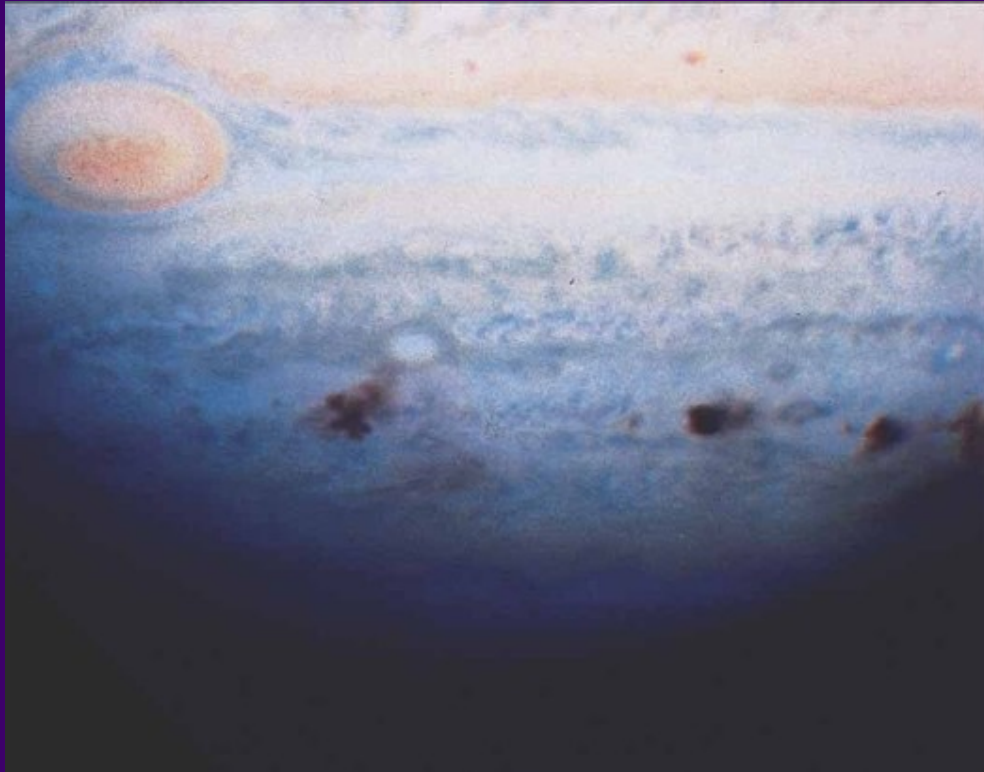
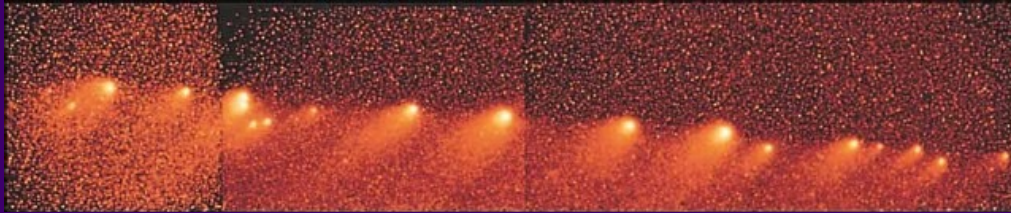
Dust Tail

Comets as seen from Earth

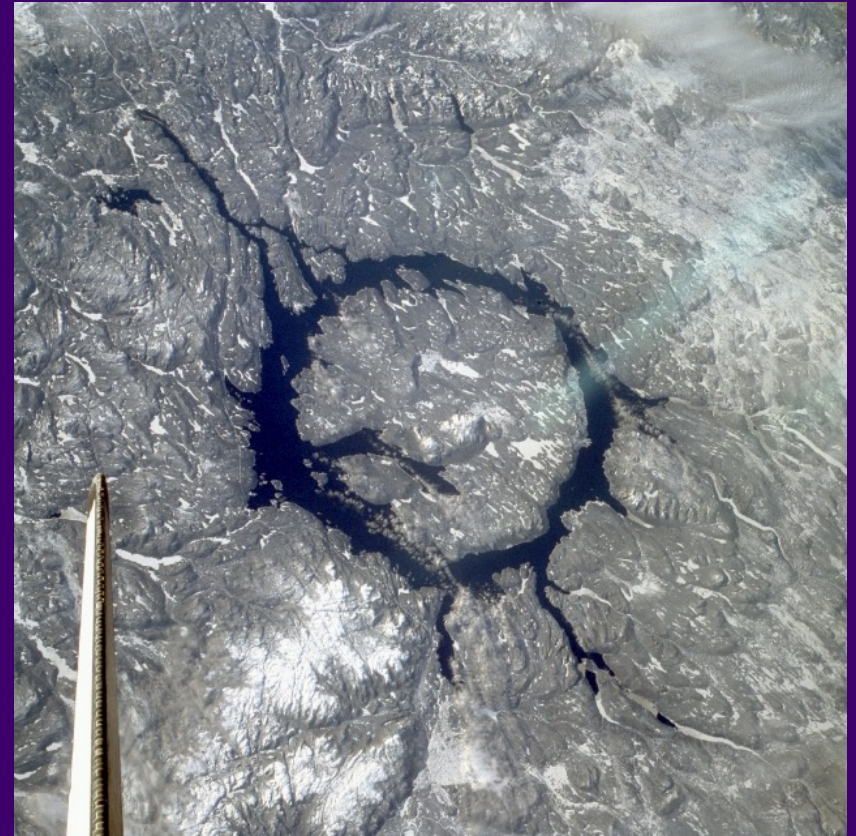


Comet Ikeya-Zhang
(gas tail is pinching off—note
how fast it is moving, while
dust tail changes slowly)

Comet Shoemaker-Shoemaker-Levy 9



Comet and Asteroid Impacts

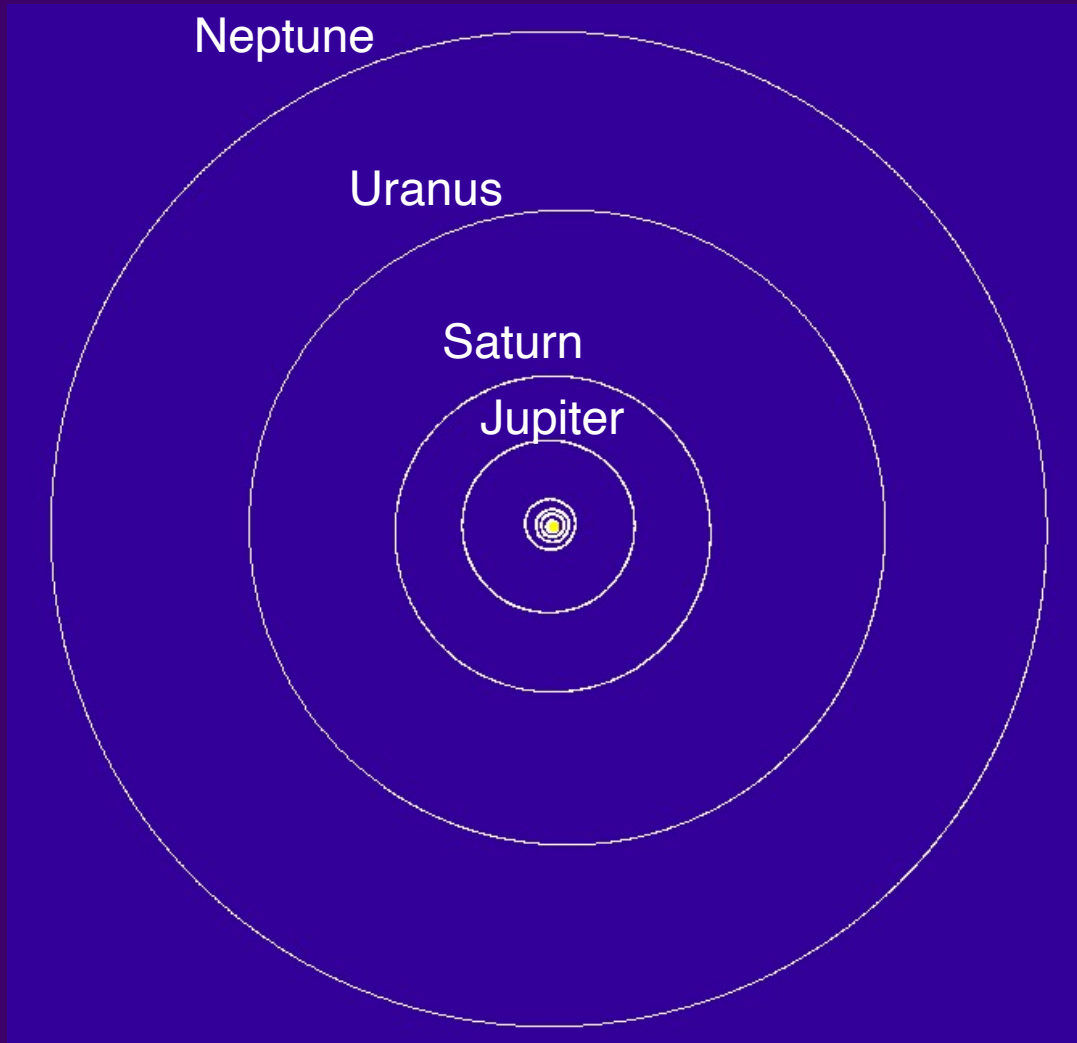


Meteor Showers

(These occur when
earth passes through
cloud of debris along a
comet's orbit.)



The Outer Solar System



On this scale:

1 A.U. = 7 pixels

Orbital radii:

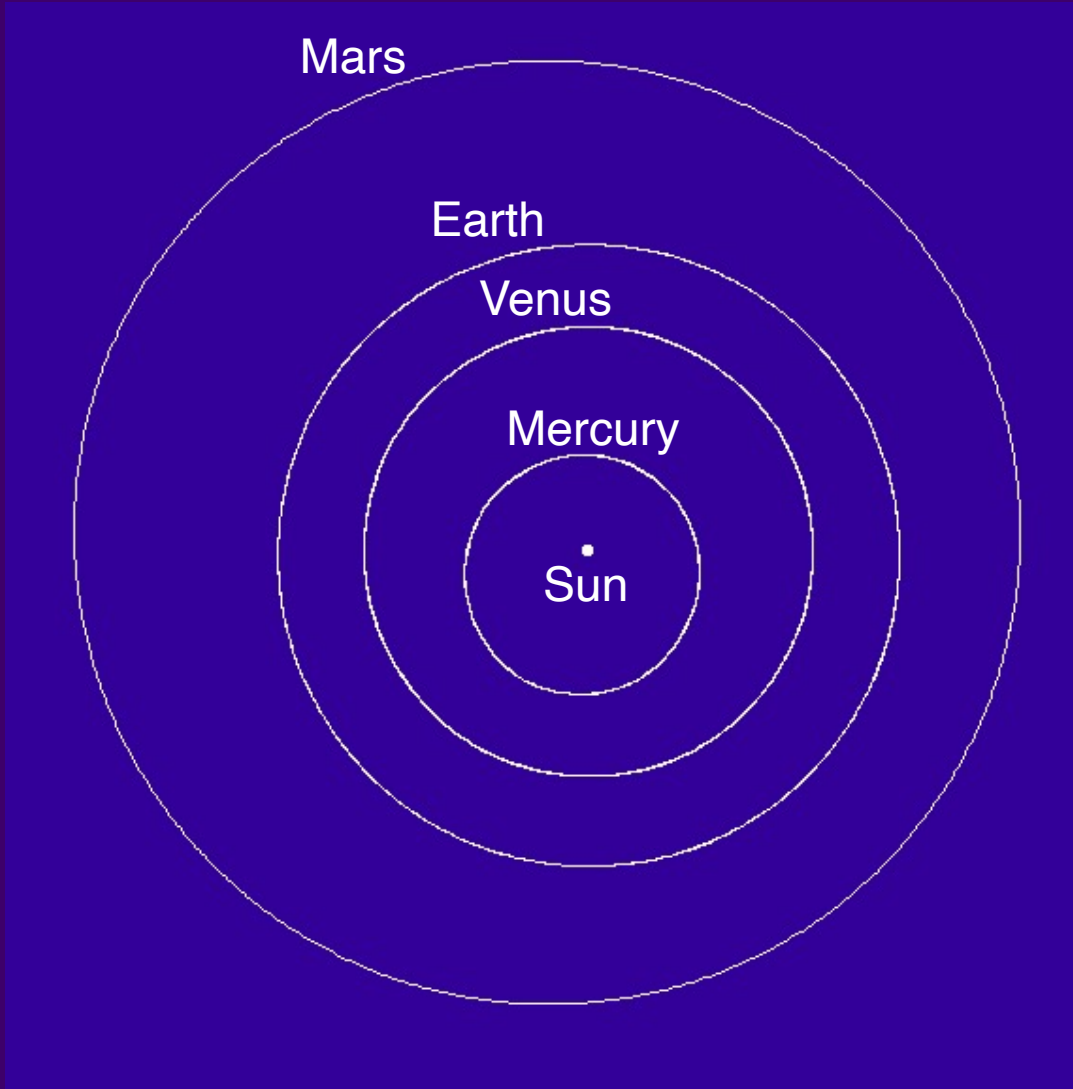
Jupiter 5.2 A.U.

Saturn 9.5 A.U.

Uranus 19 A.U.

Neptune 30 A.U.

The Inner Solar System



On this scale:

1 A.U. = 120 pixels

Diam. of Sun = 1 pixel

Diam. of moon's orbit =
1/2 pixel

Diam. of earth = 1/100
pixel

Earth and Moon to scale

