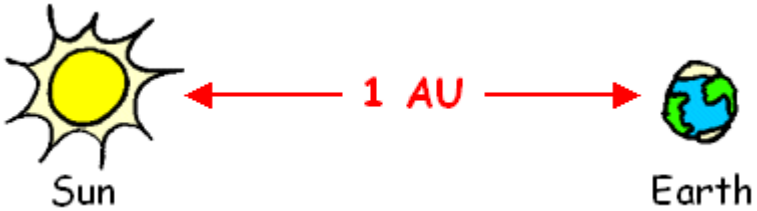
Our Solar System

Planets, dwarf planets, comets and asteroids all orbit the sun...

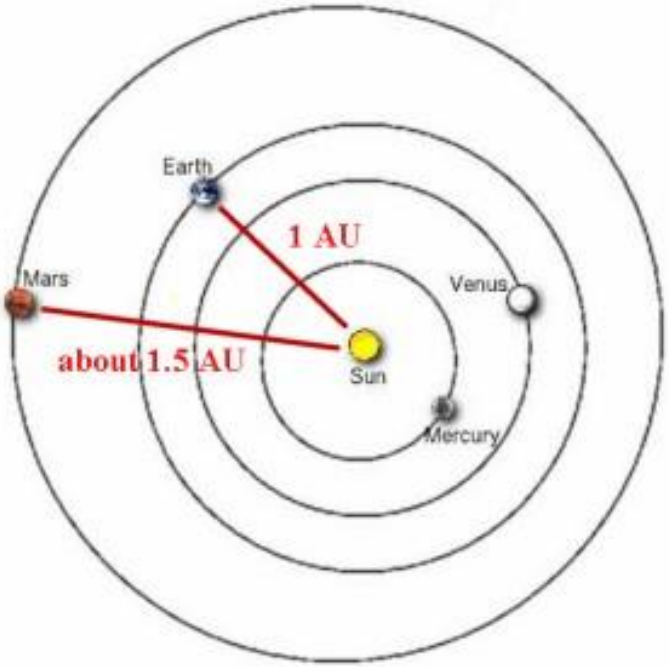
A note about distances…

- The distance from earth → sun is ~150 million km
- Saturn is 9.5 times further OR ~1.5 billion km
- Neptune is 30 times further from the sun…
- Very quickly distances become too great to comprehend in kilometers, so we use the <u>astronomical unit</u> or <u>AU</u>



Astronomical Units – A.U.

- 1 AU is the average distance betweent he sun and Earth
- Saturn is 9.5 times further so 9.5 AU from the sun
- Neptune is 30 AU from the sun



Planets

- Celestial bodies that orbit one or more stars
- Massive enough for its gravity to hold a spherical shape
- Massive enough (that is has enough gravity) to clear its orbital path of debris

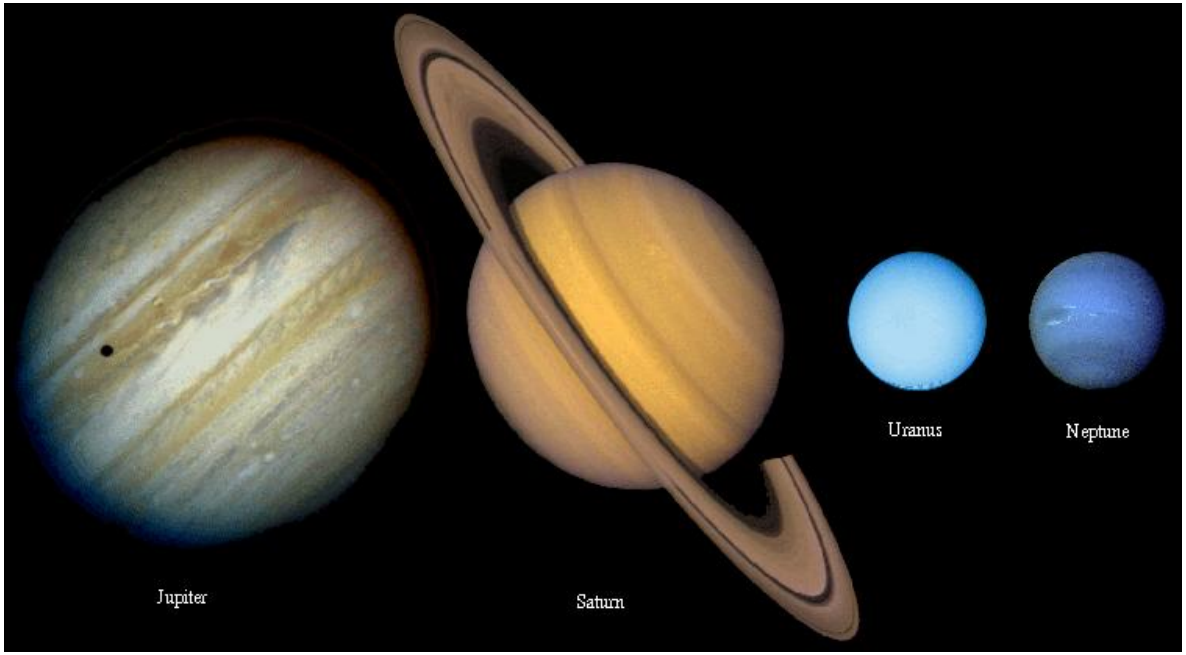
Terrestrial Planets

- Dense and rocky
- Closest to the sun
- Smaller in size
- Smaller orbits (shorter “year”)

- Warmer average surface temperature (-63°C to 467°C)

Jovian Planets

- "Gas giants"
- Further from the sun
- Large in size



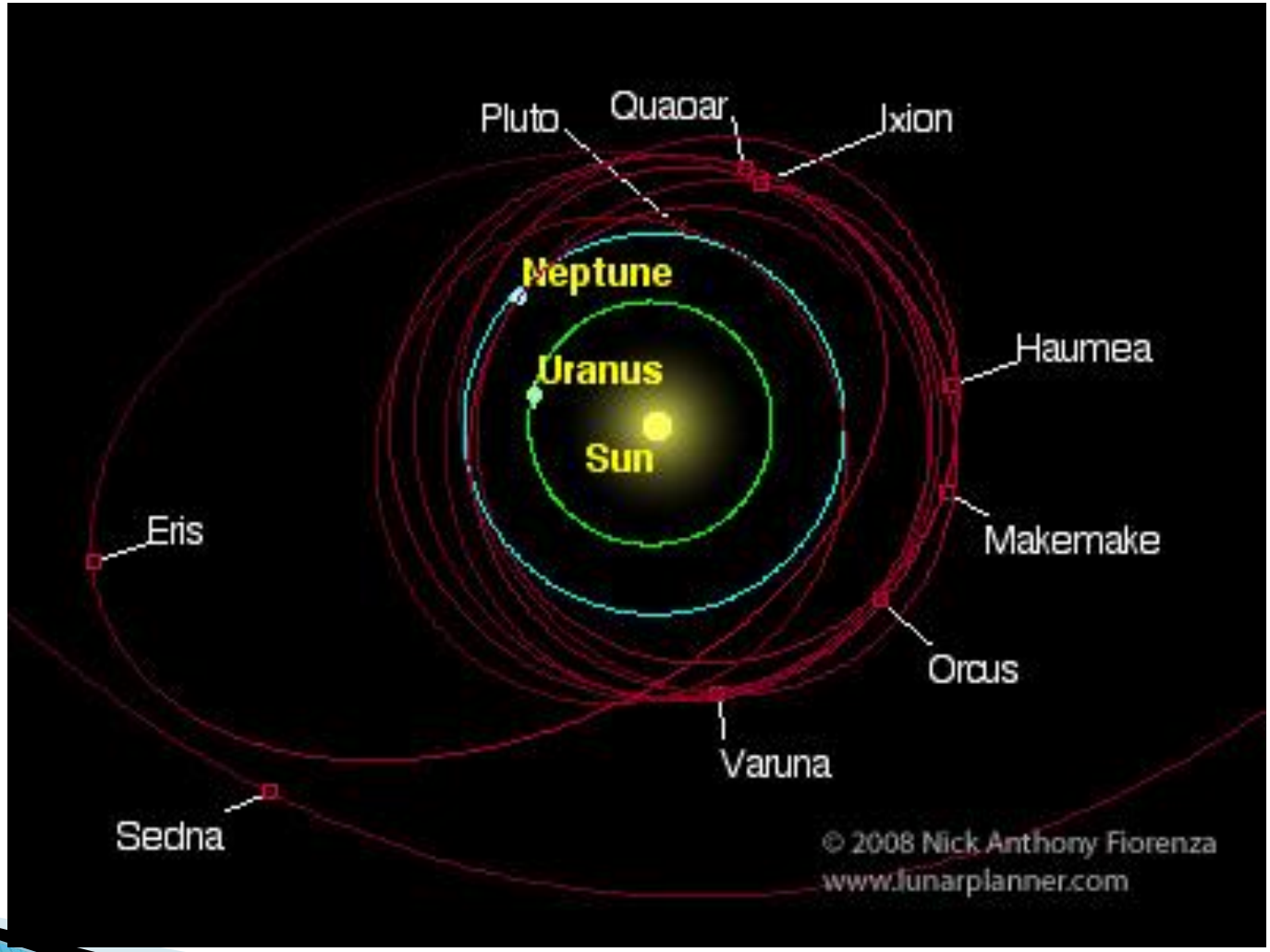
- Larger orbits (longer "year")
- Cold average surface temperature (-215°C to -150°C)

Dwarf Planets

- Celestial bodies that orbit the sun with enough gravity to hold its spherical shape but...
- They are not massive enough to clear their orbit of debris
- Examples: Pluto, Eris (larger than Pluto!), Haumea and Makemake are beyond Pluto
- Ceres is between Mars and Jupiter

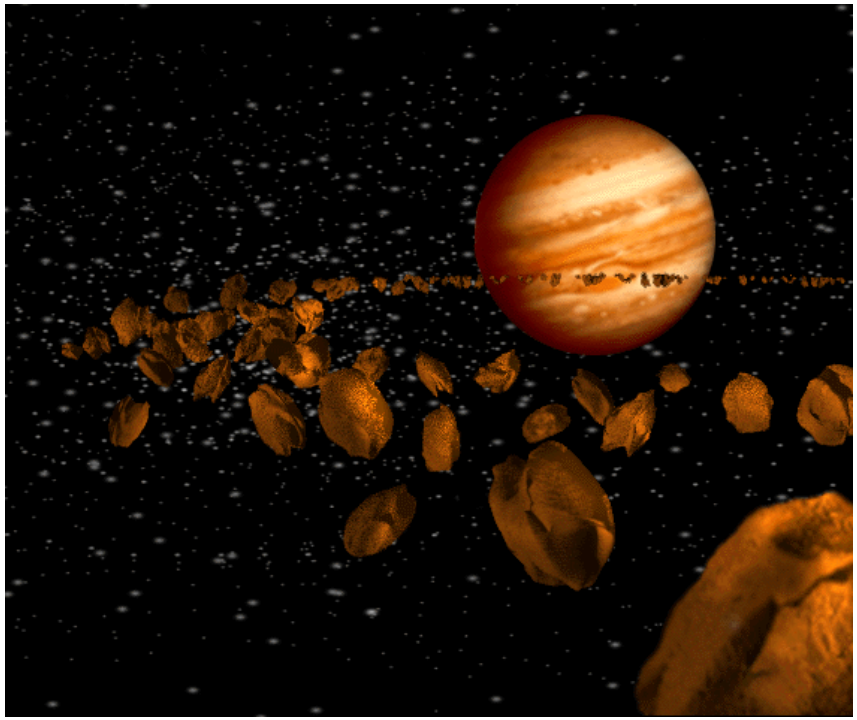
Relative Sizes of the Dwarf Planets

Dwarf Planet Orbits



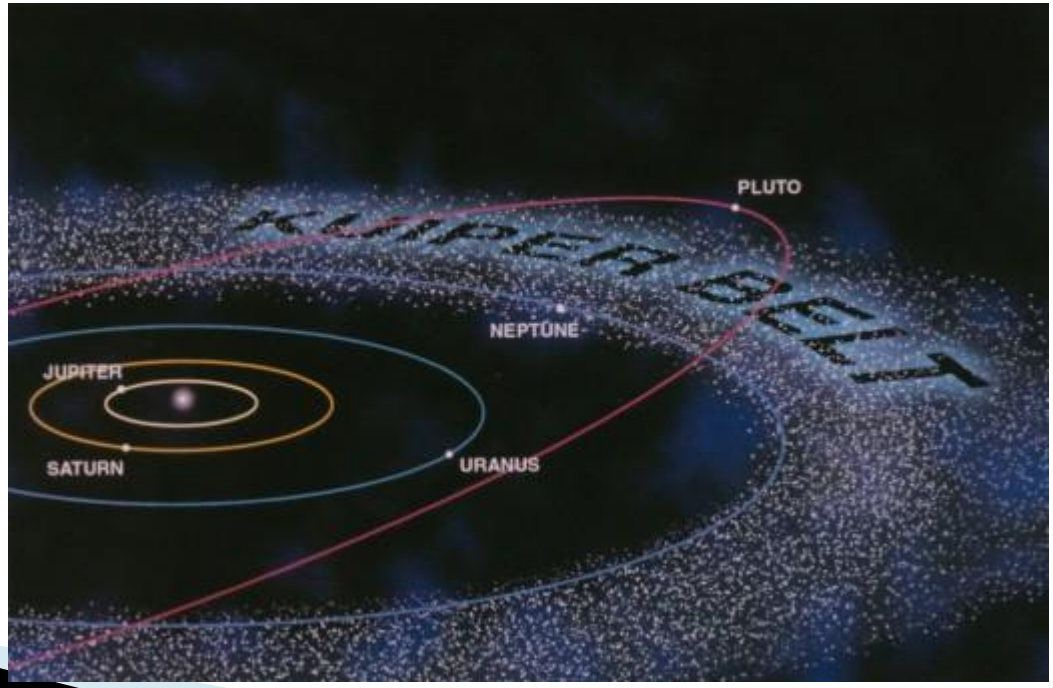
Asteroids

- Small, mostly irregular shaped debris ranging from sand grain size to 1000km across
- NEAs, or Near earth asteroids, exist inside Mars' orbit and are at risk of hitting earth
- Most asteroids in our solar system are in the Asteroid Belt located between Mars and Jupiter



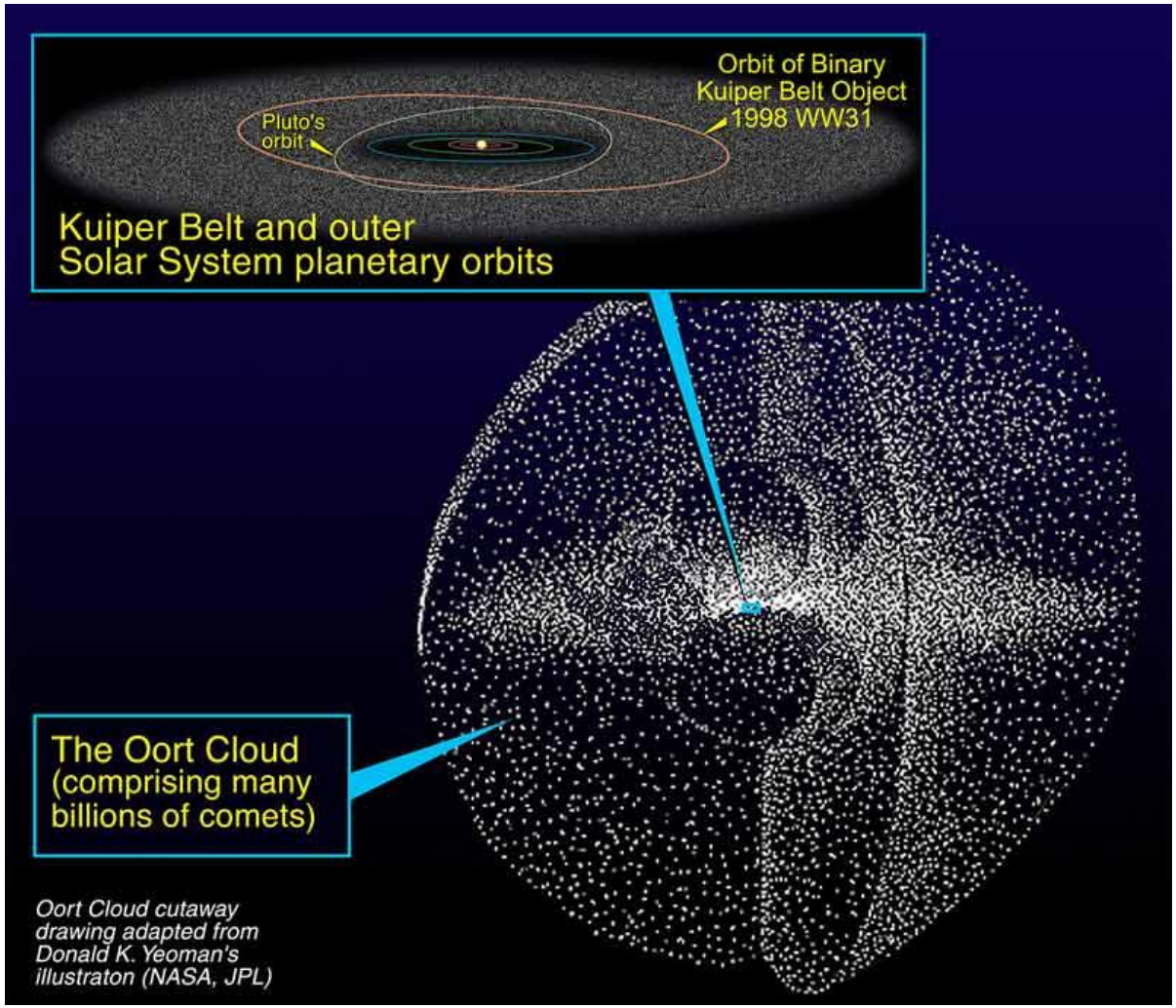
Asteroids and Comets

- Kuiper Belt outside Neptune's orbit has dust and up to 23 dwarf planets
- Many short period comets originate here



Asteroids and Comets

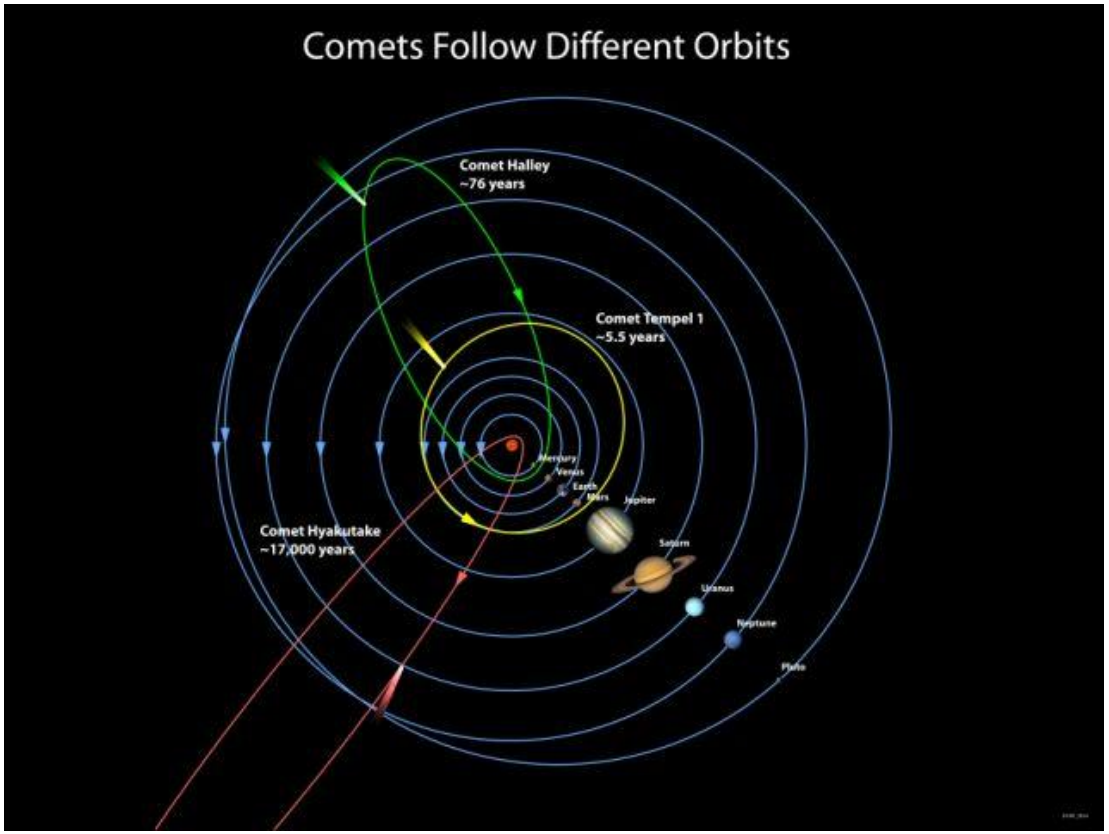
- Oort Cloud is a spherical cloud of small, icy fragments about 50,000 to 100,000 AU from the sun
- Source of long period comets



Comets

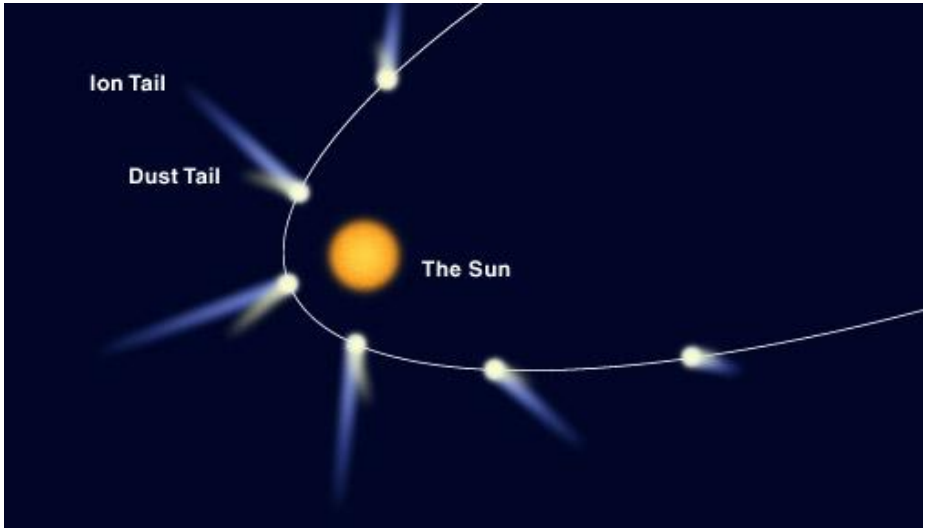
- "Dirty snowballs" composed of ice, rock and gas that originate from the Kuiper belt and Oort Cloud

- Travel in long elliptical orbits around the sun that change due to the gravitational pull of the planets



Comets

- Their long dust tail can stretch for millions of kilometers



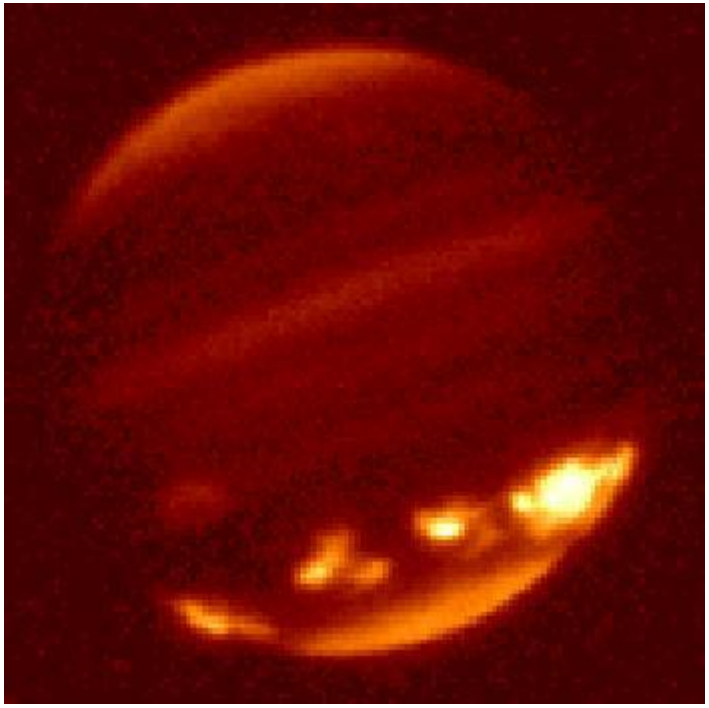
- Short period comets – periods less than 200 years

- Long period comets – period could be thousands of years (Hale-Bopp 4200 yrs)

Comets

- Some do impact planets in our solar system – one may impact Earth someday

- Comet Shoemaker-Levy 9 crashed into Jupiter in 1994 leaving visible scars for nearly a year



Meteors

- Meteoroids – pieces of rock (chunks of asteroids or planets) floating through space

- Meteors
  - “shooting stars”
  - Meteoroids which are burning up in Earth’s atmosphere
- Meteorites – meteors that reach Earth’s surface

Meteor Impact Sites

- Impact sites provide evidence that meteors have hit the earth

- Impact site in Arizona… A meteor roughly the size of a school bus hit the Earth creating a crater 1.2 km wide and 200m deep

Meteor Impact Sites

- Impact site in Manicouagan, Quebec
- Earth's 5th largest confirmed impact crater at 100km across
- Asteroid that hit was approximately 5km across

- Chicxulub Basin in Mexico
- Meteor that hit here 65 million years ago wiped out half of the Earth's organisms.... Including the dinosaurs!!
- 300 km across