

Kuiper Belt



- A collection of icy rocks.

Comets

Providers of Life?



Comets

- Dirty snowballs
- <10 miles across

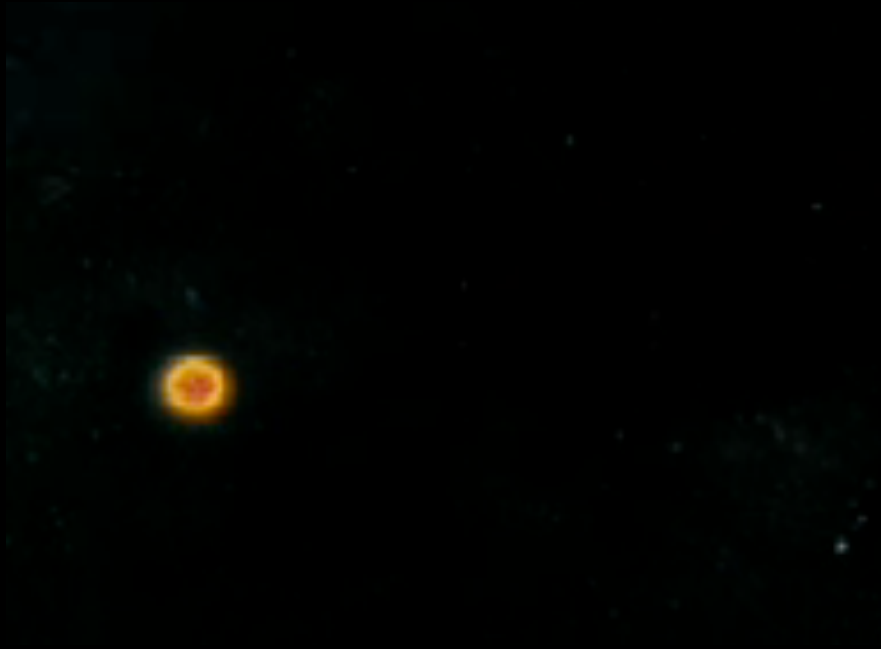


Comets

- As they get close to the Sun the ices on their surface sublime
- Best viewed in morning or evening skies

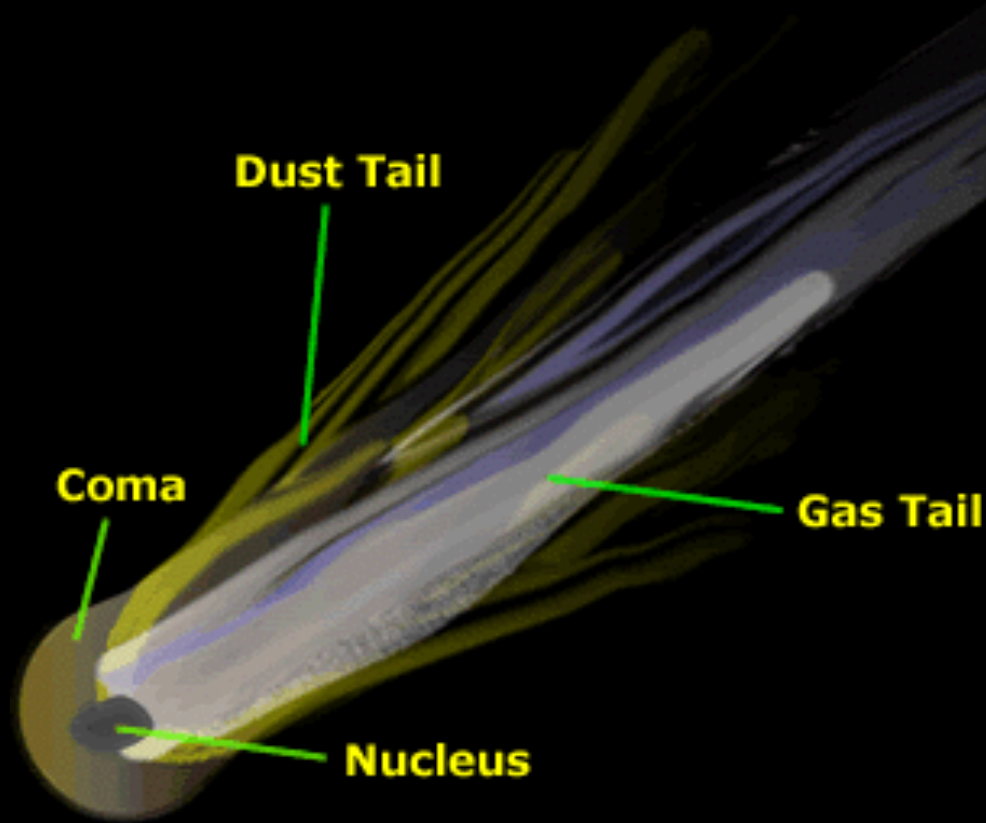


Comet approaching Sun



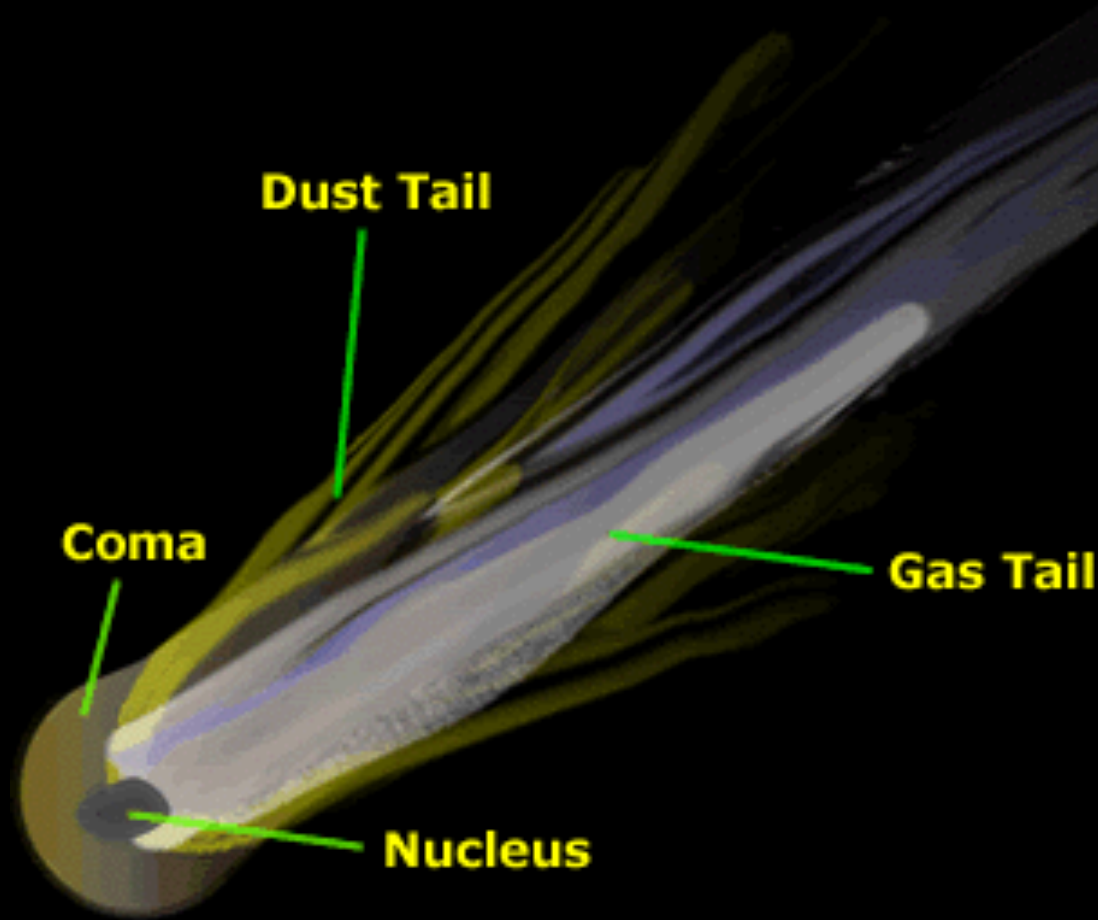
Anatomy of a Comet

- Nucleus
 - <10mi. diameter (water, methane, ammonia)
 - Planetary “building block” which never got incorporated into a planet



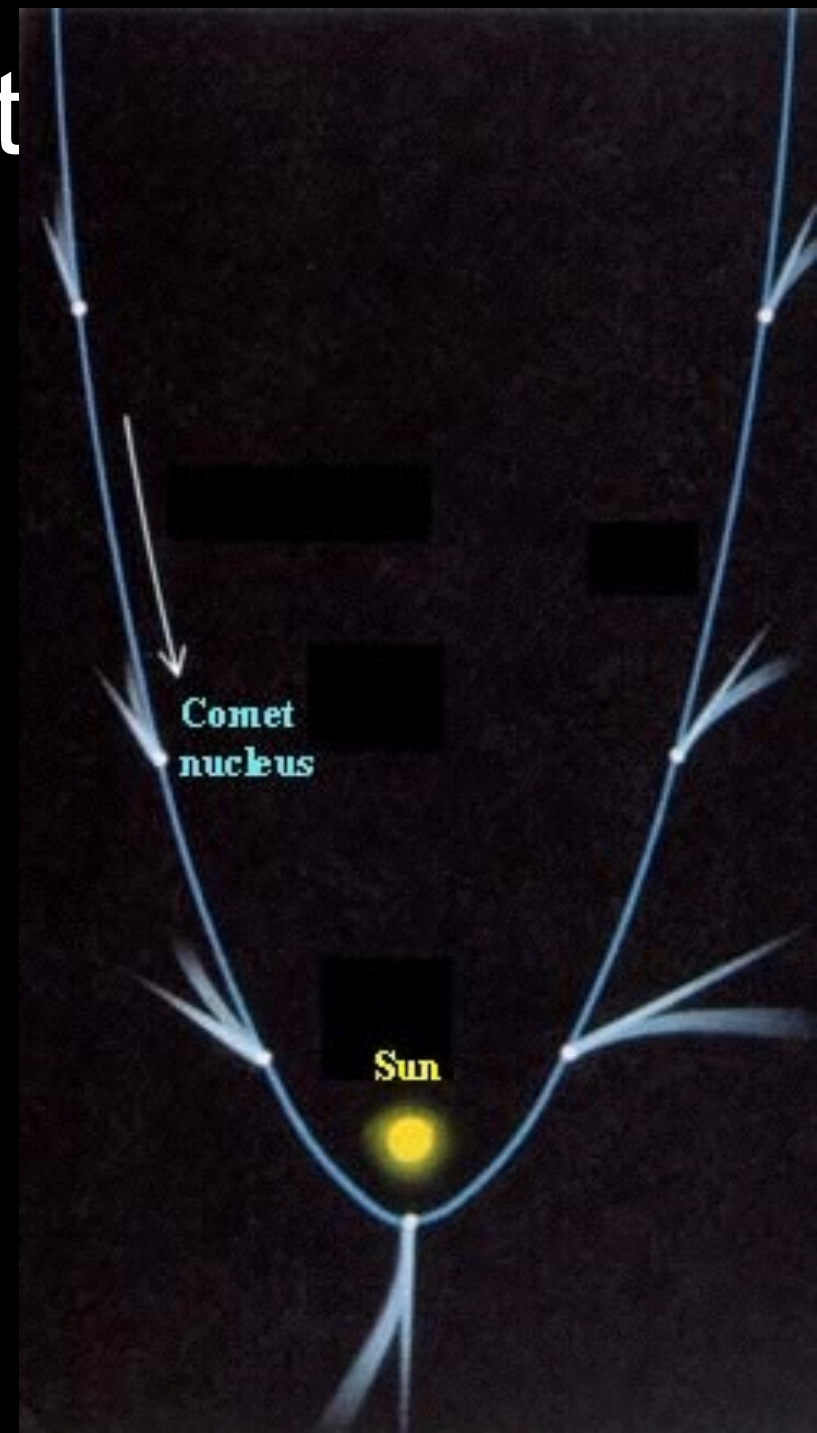
Anatomy of a Comet

- Coma
 - Cloud of gas & dust produced by evaporation of the nucleus when warmed by the Sun
 - Can extend 60,000 miles



Anatomy of a Comet

- Tail
 - Coma material pushed back by the Solar Winds
 - Always points away from the Sun
 - Can stretch up to 1 A.U. long

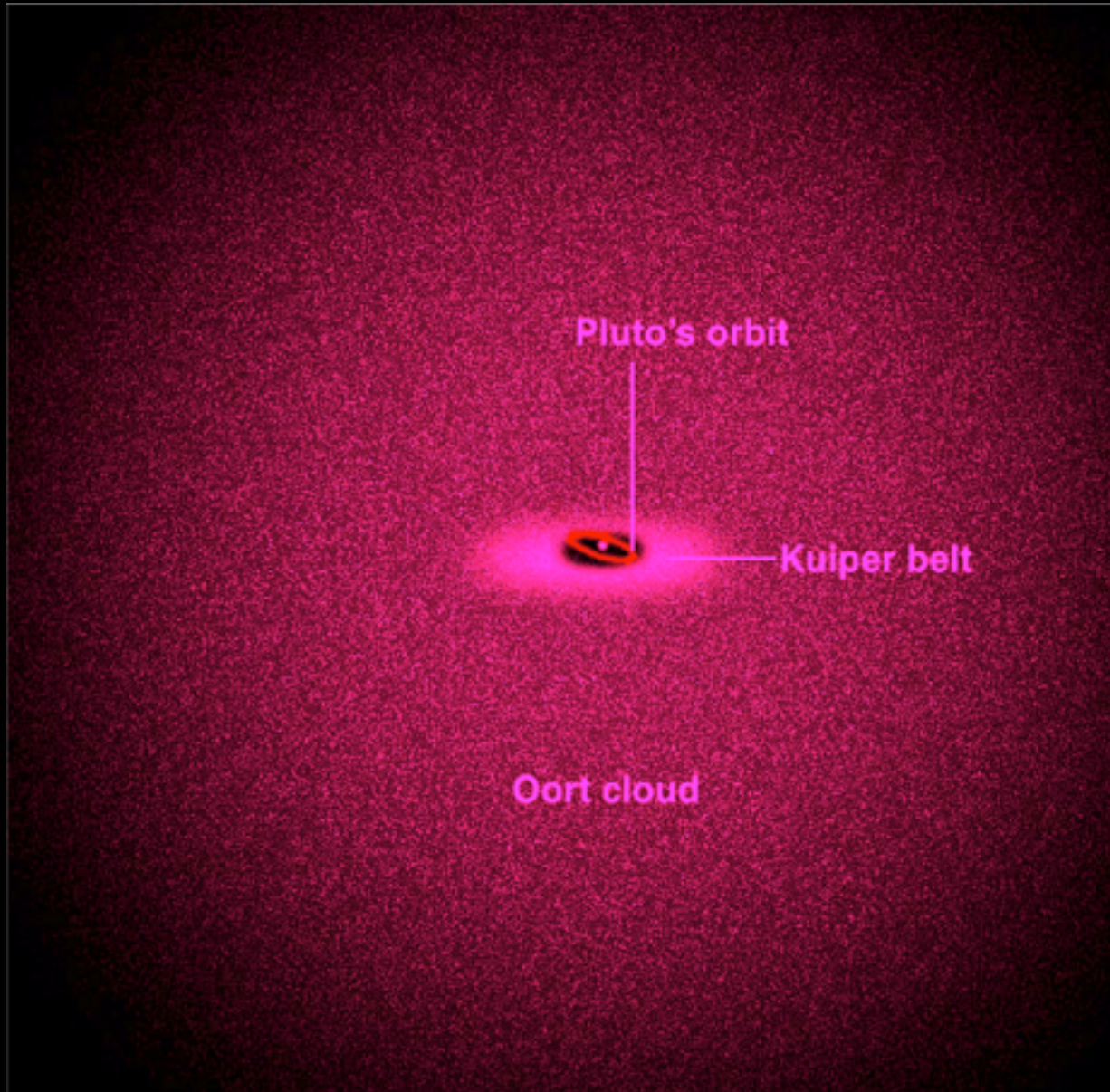


Anatomy of a Comet



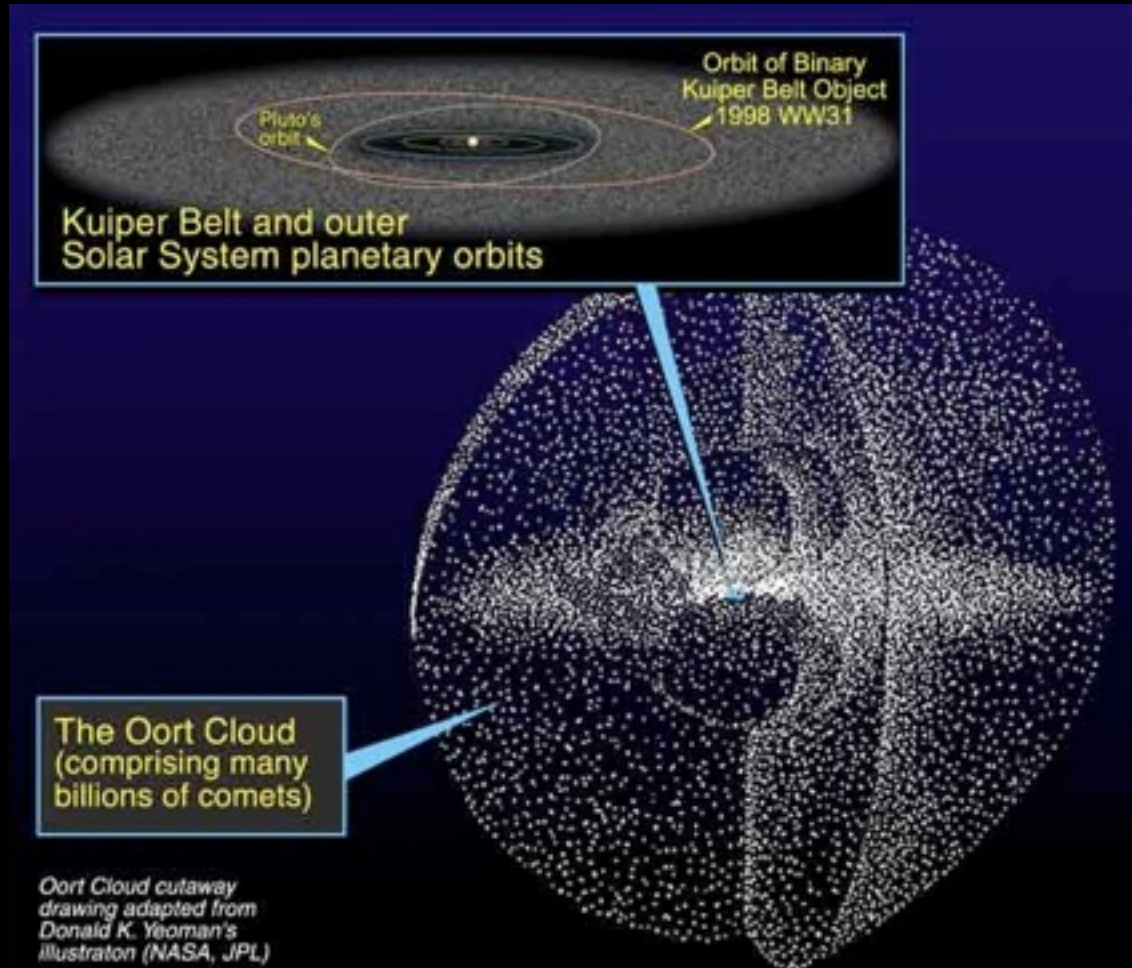


Oort Cloud



Oort Cloud

- Extends $\frac{1}{2}$ way to the nearest star
 - 50,000 A.U.
- May contain 1,000,000,000,000 comets



Long vs. Short

- Long period comets
 - 200 - millions of years
- Short period comets
 - less than 200 years



Long period Comets

- Hale-Bopp
 - Aprox. 4200 years





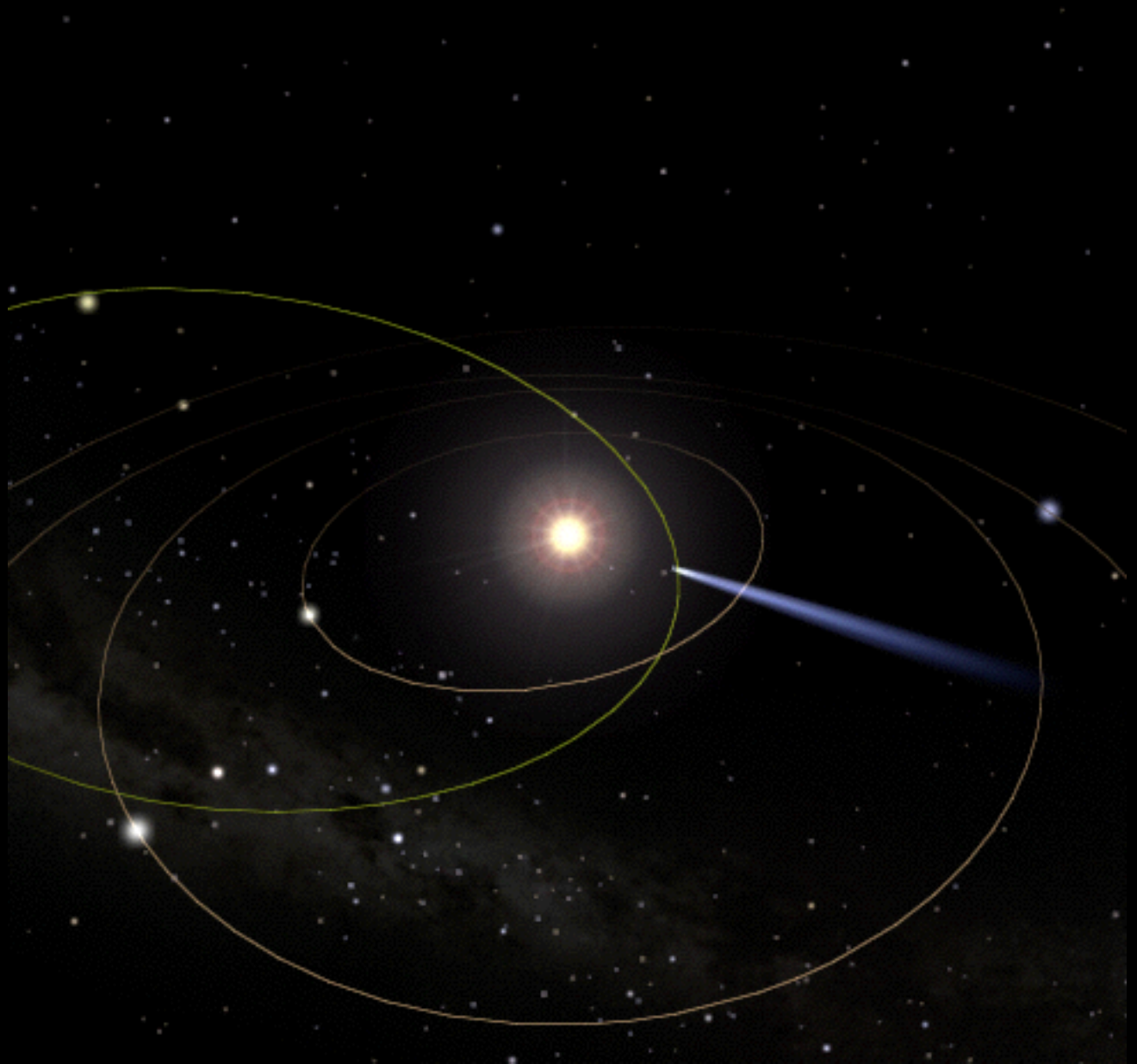
Long period Comets

- Hyakutake
 - 10,000-20,000 years



Long period Comets

- Comet
McNaught







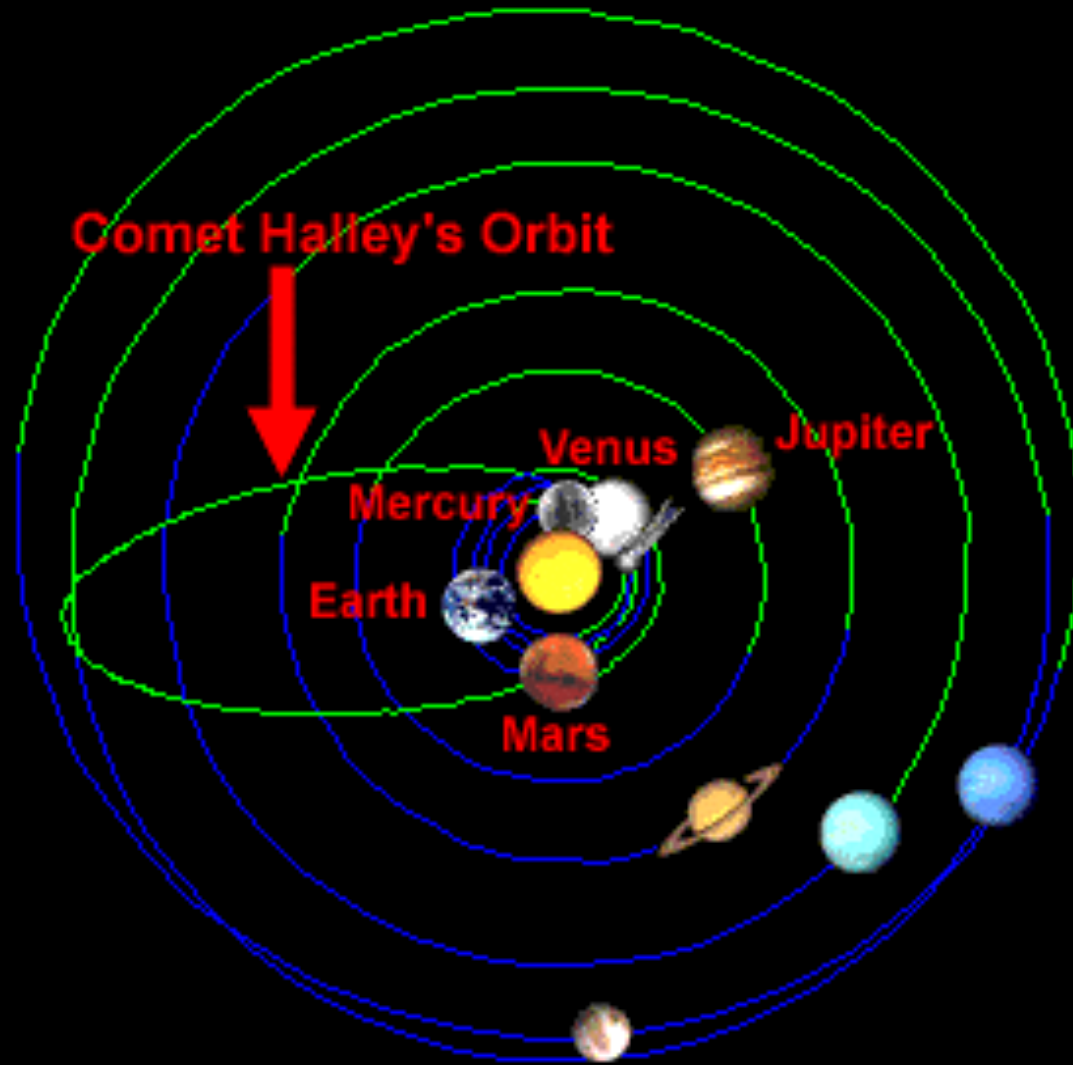


Short period Comets

- Halley's
 - 76 years

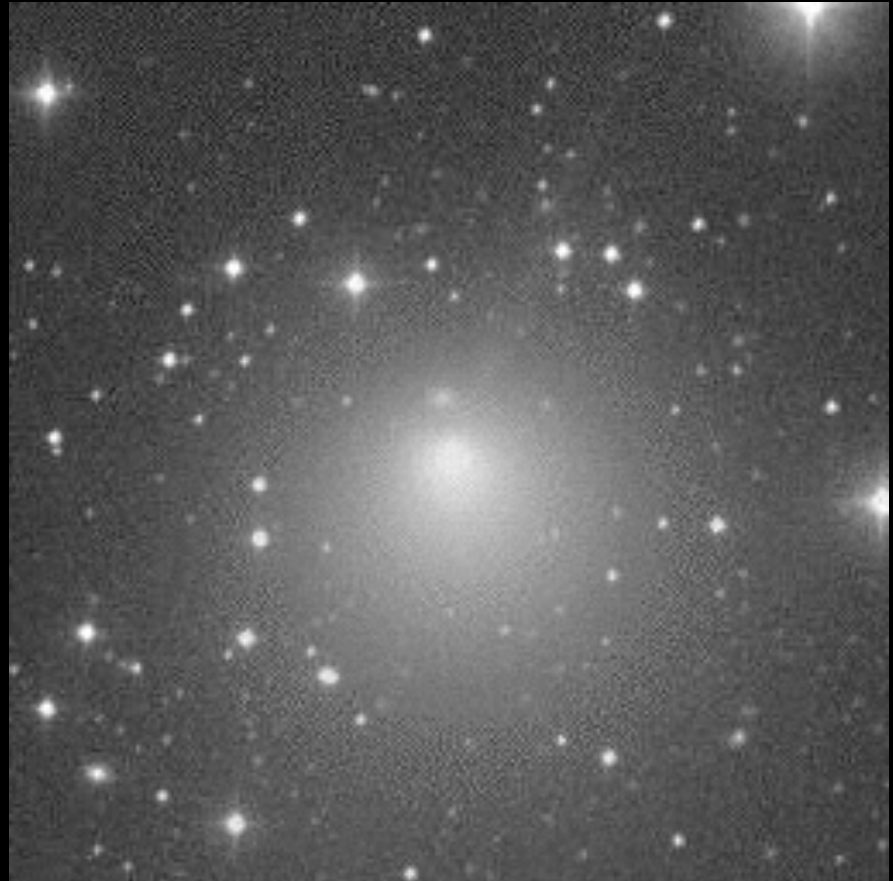


Halley's Comet



Short period Comets

- Encke
 - 3.3 years

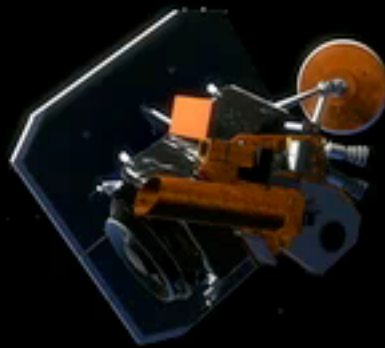


Comet Spacecraft -Stardust



Comet Spacecraft

-Deep Impact



Comets

- Lose about 1% of their mass with each pass by the Sun



Discovering Comets





Meteors

- Dust particles that enter our atmosphere



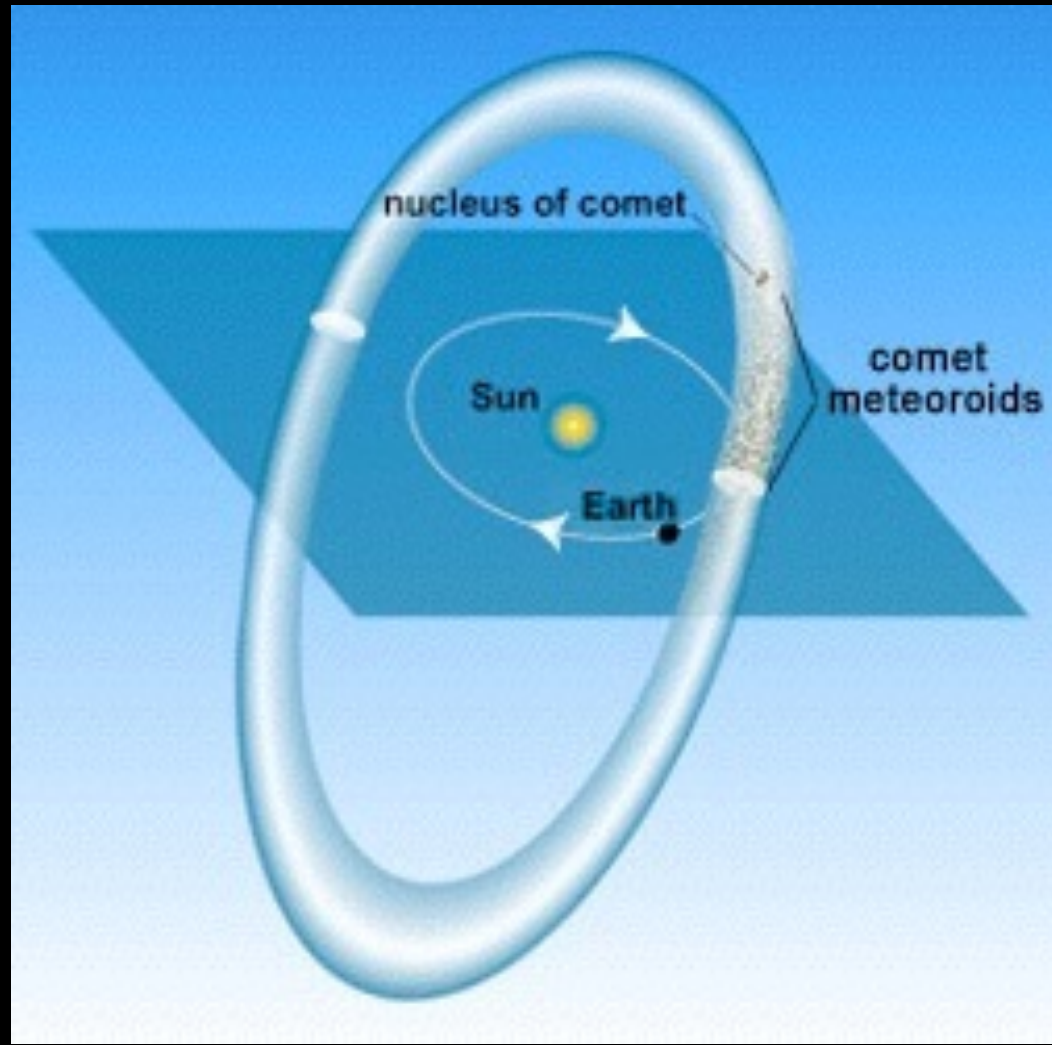
Meteor Showers

- Comets generate vast amounts of debris



Meteor Showers

- The Earth's orbit intersects the orbit of a few dozen short period Comets.



Meteor Showers

- The Earth passes through the debris once a year

What Causes a Meteor Shower

Scene 1: Earth encounters a stream of dust particles left by a crumbling comet.

Scene 2: Most particles burn up 40 to 60 miles high in the Earth's atmosphere.

Scene 3: The pea-sized particle leaves behind a large glowing column of white-hot air — what we see as the meteor.

TRT = 14:24

Courtesy *Sky & Telescope*

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Meteor Showers

- All meteors will appear to *radiate* from a fixed point in the sky.



Fig. 483 - The meteor storm of 9 October 1933. All the meteors appear to diverge from the same point — the so-called 'radiant'.

Meteor Showers

- Occur on a fixed calendar date
- Increase from 5 per hour to around 100

TABLE 13.1

Meteor Showers and Comets

<i>Shower</i>	<i>Comet</i>	<i>Occurrence</i>	<i>Meteors/h</i>
Quadrantids	1491 I	Jan. 1–4	80
Lyrids	Thatcher	Apr. 19–24	35
Aquarids	Halley	May 1–8	40
β Taurids	Encke	June 24–July 6	—
Perseids	Swift-Tuttle	Aug. 9–17	40
Orionids	Halley	Oct. 15–25	45
Taurids	Encke	Oct.–Nov.	5
Leonids	Temple-1	Nov. 15–20	40
Geminids	Phaethon	Dec. 7–15	60
Ursids	Tuttle	Dec. 17–24	5

Note: Showers are named for the constellation from which they appear to radiate. A comet is a candidate source of the meteor shower if its orbital

Meteor Showers

- Immediately after the passage of a Comet the meteors can be greatly enhanced.







2001-11-18
17:50:23





