

# Build A Comet!

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SciFest Africa, March 2013

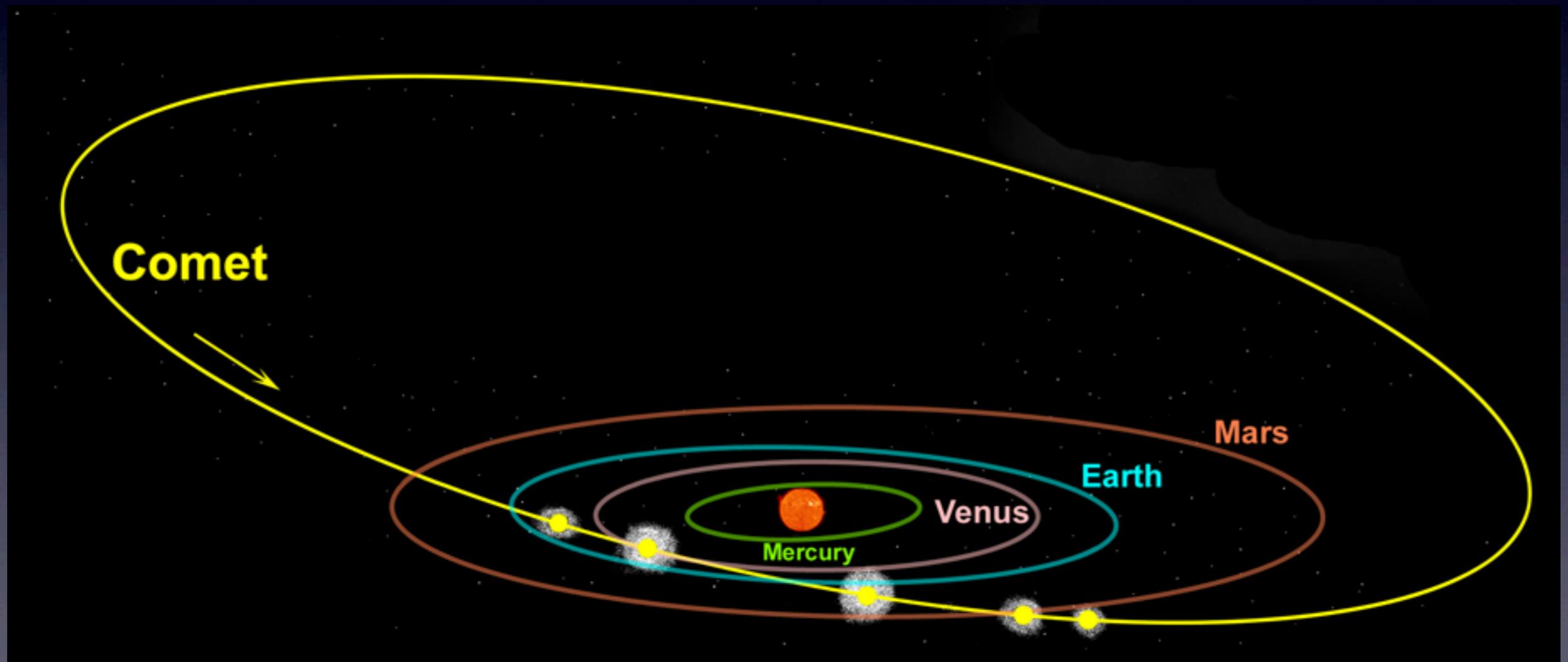
# Comet Basics

Comets are icy snowballs. They are made of the same things the rest of the planets are made of: rock and ice, mixed with a small amount of junk and goo (organic molecules)



# Comet Basics

Comets orbit the sun just like a planet or an asteroid does. Their orbit is long and elliptical... moving fast when it is near the Sun, and slow when it is far away.

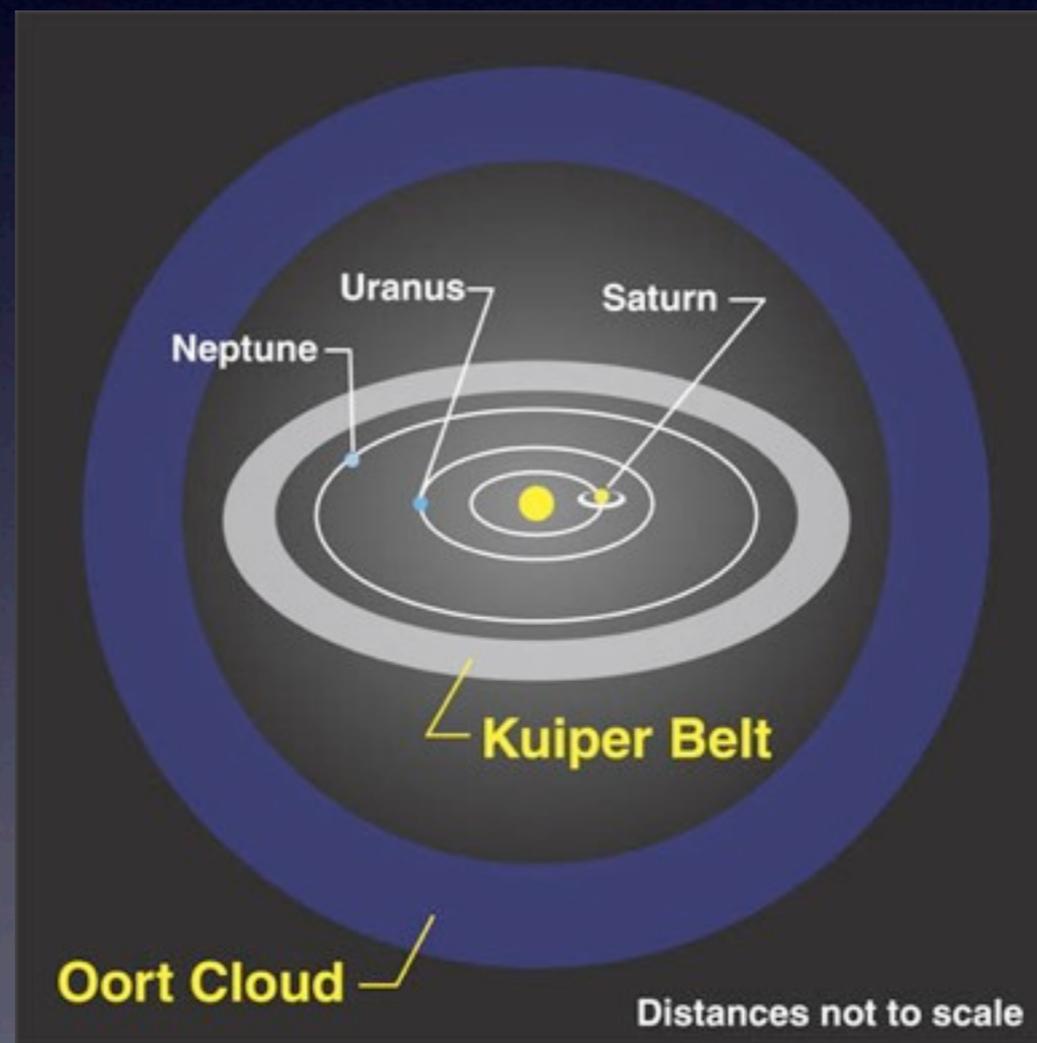


# Comet Basics

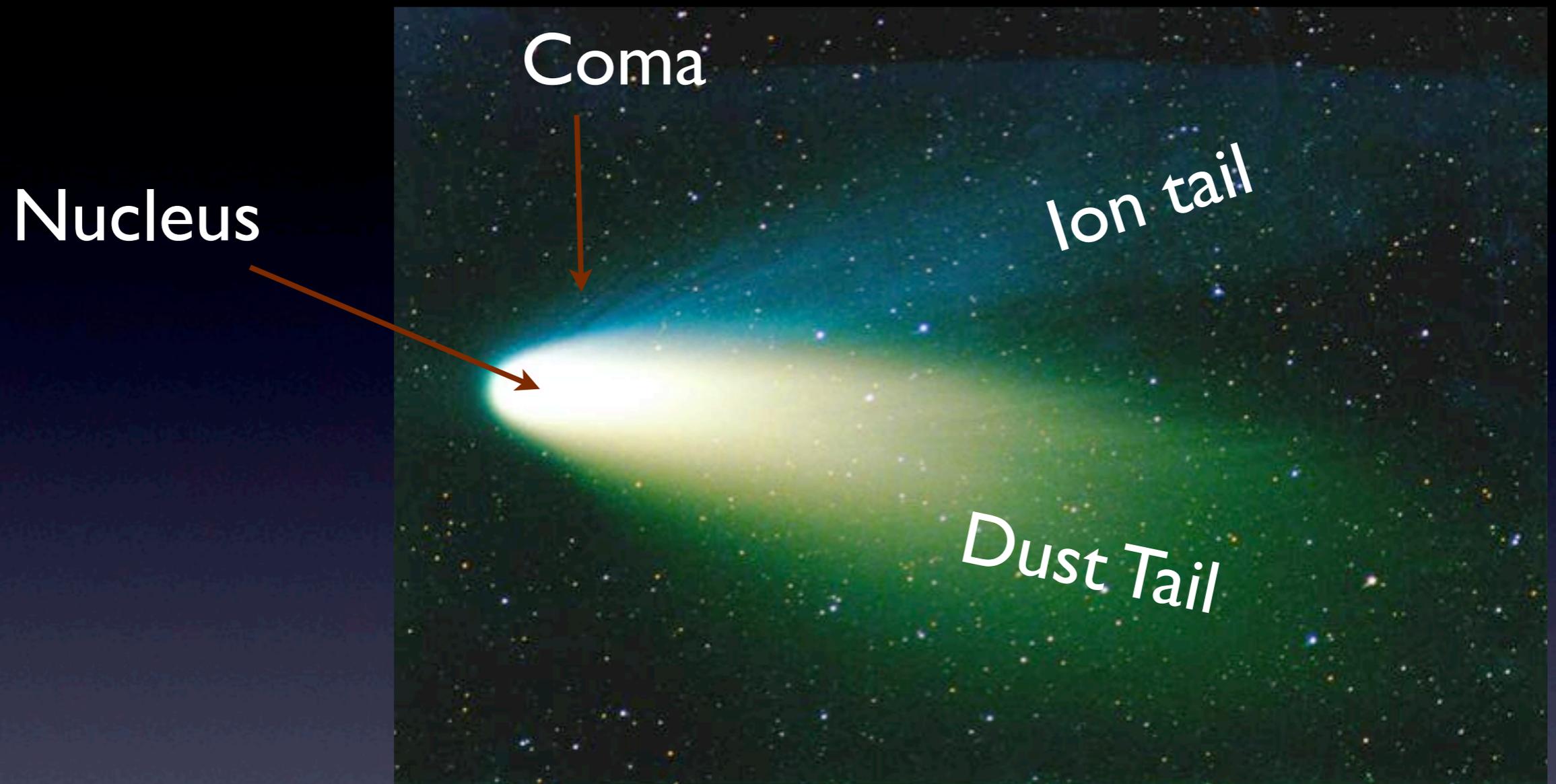
- As comets pass near the Sun, their surface sublimates off, leaving a cloud of gas and dust.
- Just like the planets and the asteroids, comets do not glow. They are only lit up by the Sun.

# Comet Basics

All comets come from a massive reservoir called the Oort Cloud. You can think of this as a big delivery truck traveling thru space: every once in awhile, a comet drops off.



# Parts of a Comet



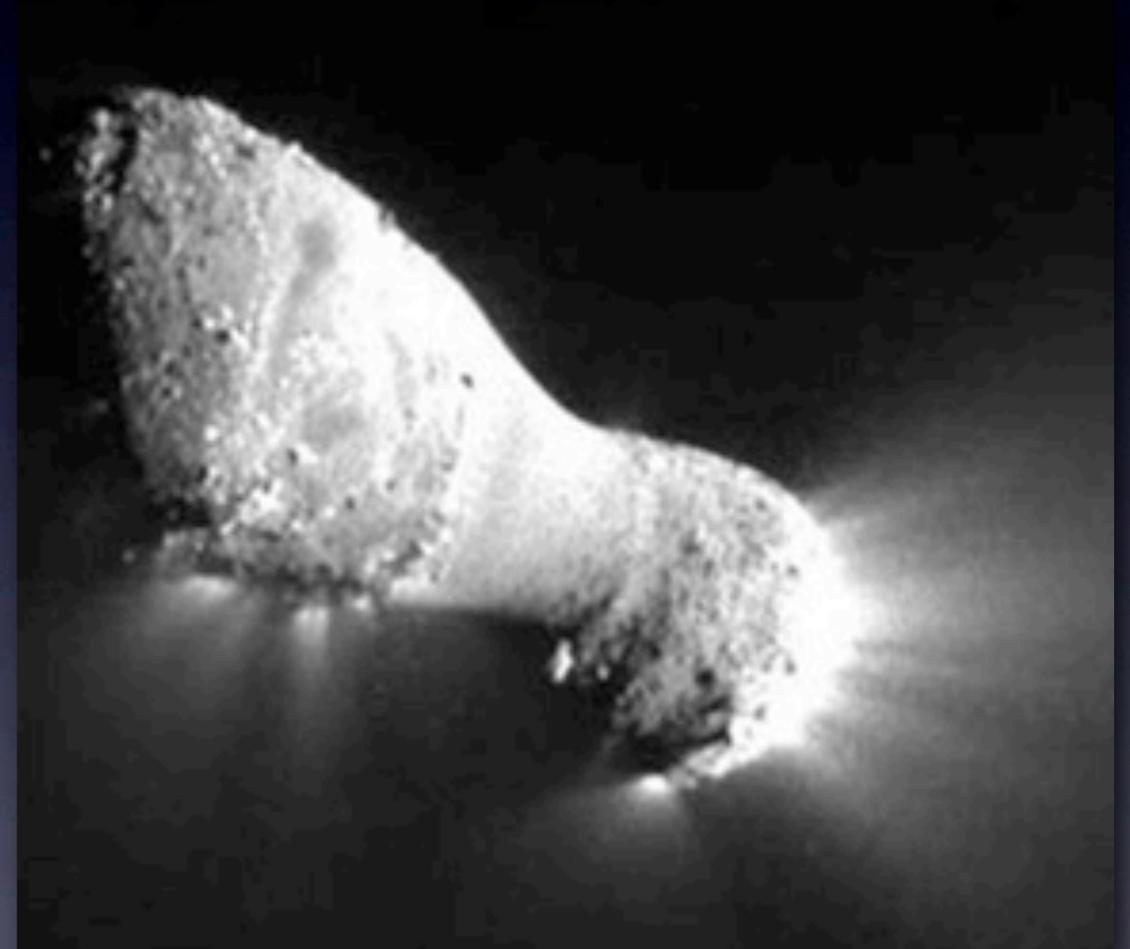
Typical comet nucleus is 1-10 km, but the coma can be 10,000's of km, and the tail millions of km.

Coma and nucleus are made as gas sublimates away from nucleus.

# What does the Nucleus Look Like?



Impact into comet Tempel 1, 2005



Flyby of comet Hartley 2, 2010

NASA's *Deep Impact* spacecraft has flown past two comets

# Why are Astronomers Interested in Comets?

- They've been frozen for billions of years. When they come near the Sun and release their gasses, we can see what was trapped billions of years ago. It's the true 'raw ingredients' of the Solar System, delivered by a time machine.
- Their orbit tells us about the size of the Oort cloud, and the influence of passing stars.
- We can observe the chemistry when the Sun's rays suddenly hit cold ices -- creating some organic molecules that might be useful in creating life.

# Where Does The Tail Point?



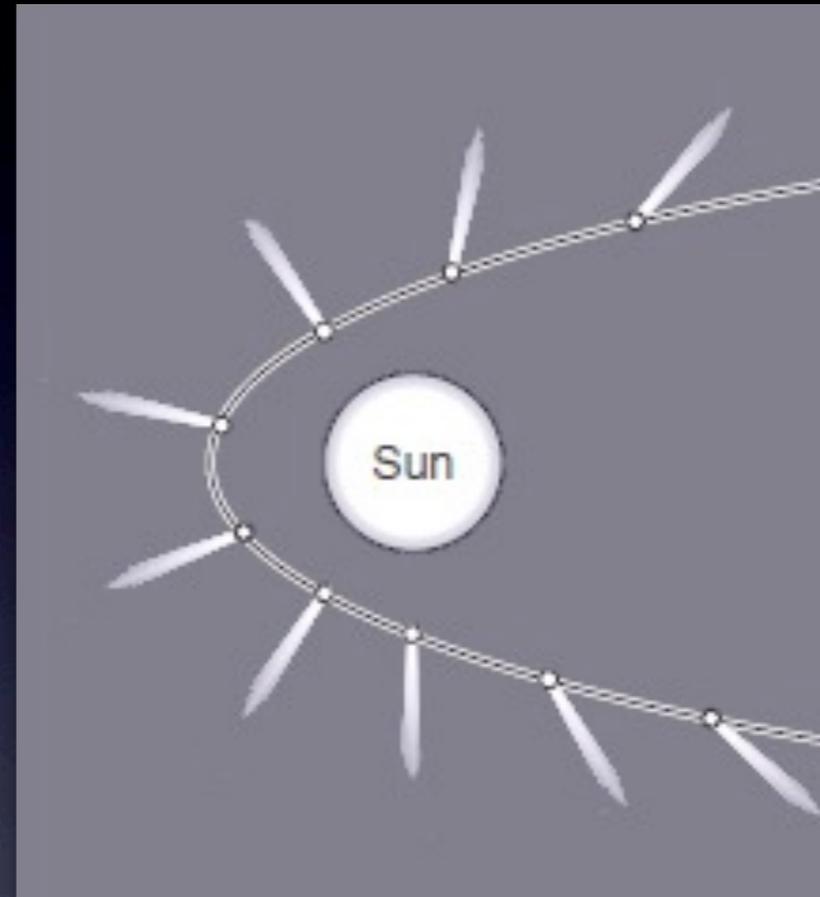
Usually, a train leaves smoke behind in its path.

# Where Does The Tail Point?



But in a strong enough wind, the smoke will be pushed in front or to the side of the engine.

# Where Does The Tail Point?



A comet and its tail are just like a train and its smoke...  
but the wind in space (the 'solar wind') is very strong,  
so **comet tails always point away from the Sun.**

2013 Is a Great year for  
Comets!

# Comets are named for their discoverer



**Sir Edmund Halley**



**PanSTARRS Survey Telescope**

Comet Halley (1600's)

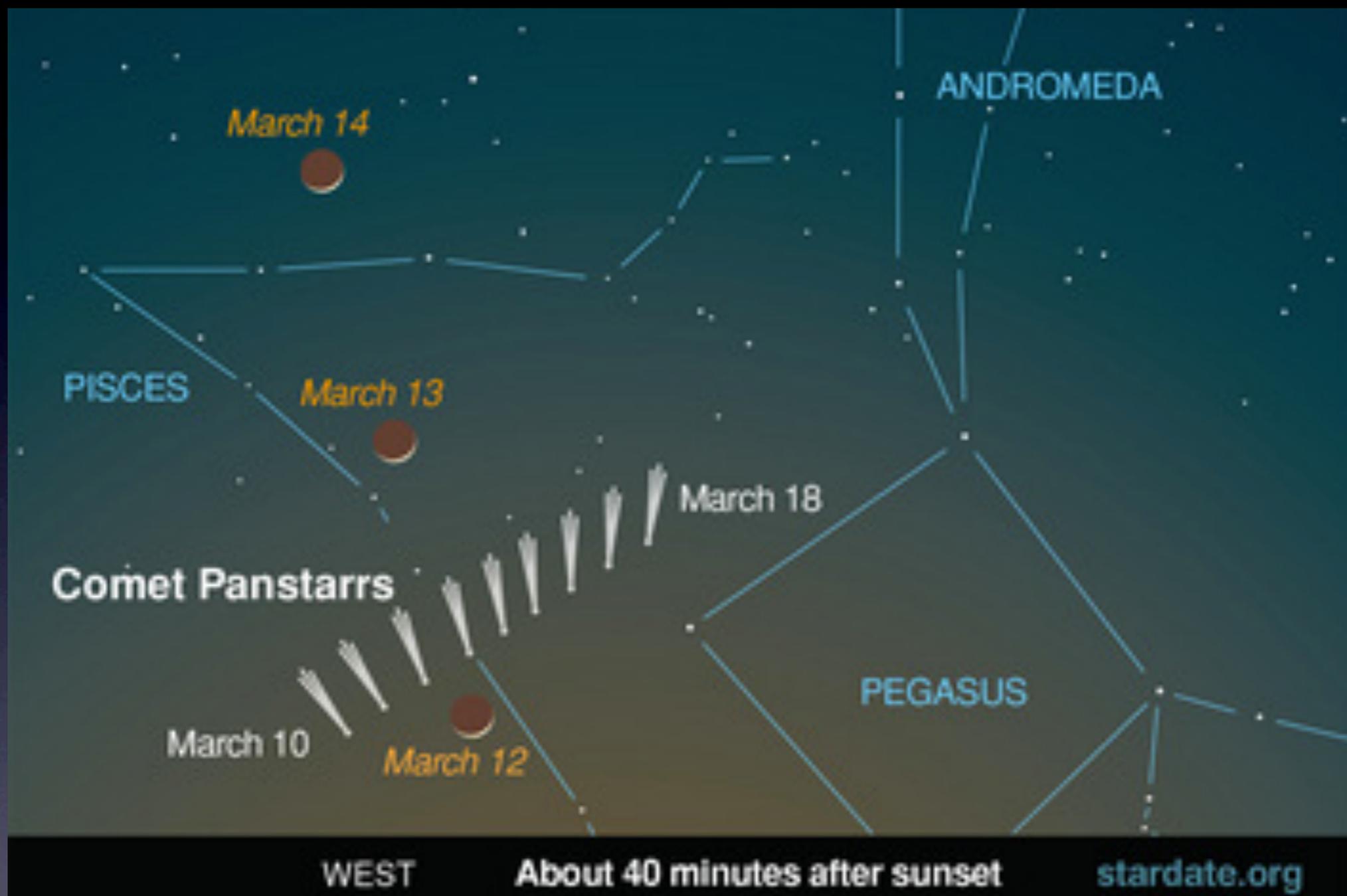
Comet PanSTARRS (2011)

# Comet PanSTARRS



# Comet PanSTARRS

- Discovered by Panoramic Survey Telescope and Rapid Response System (Pan-STARRS)
- Visible just above horizon, just after sunset (~7:30 PM)
- Visible without binoculars, but you must be in the right place at right time
- Need a clear view to the low western horizon
- Comet is moving from south to north: first visible to us, and then later in Europe and USA.
- Closest approach to Earth: March 10, 2013
- It is visible, because its orbit takes it close to Sun and Earth.

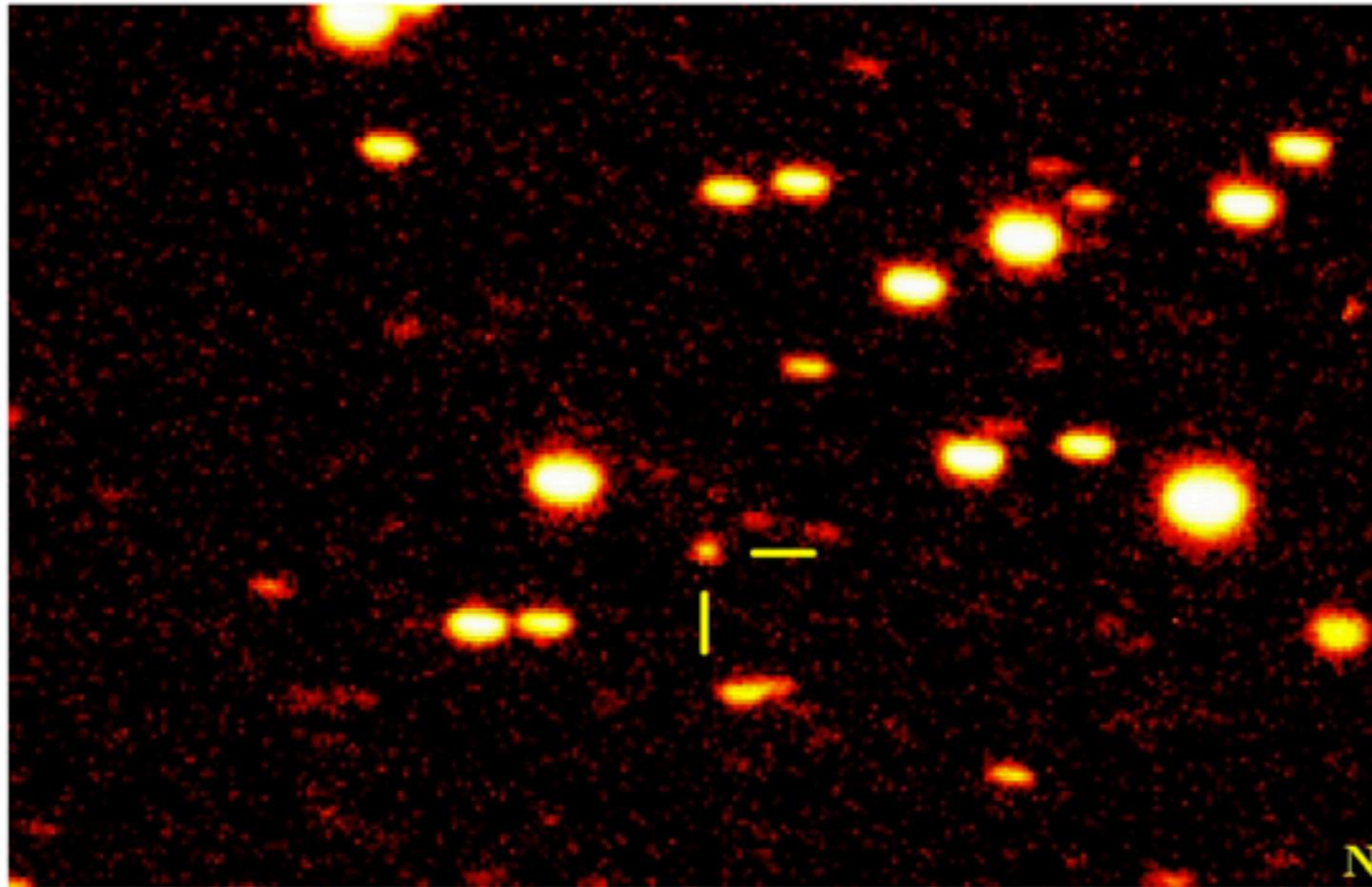


# Comet ISON

ASTRONOMY

## Newly Found Comet Could Outshine the Moon

DEC 28, 2012 04:57 PM ET // BY IRENE KLOTZ



Skywatchers may be in for a rare treat in 2013 – a newly discovered comet is expected to pass very close to the sun, putting on what could be the celestial show of a century.

Two amateur astronomers in Russia are credited with finding the object, known as Comet ISON and so named for the International Scientific Optical Network that made the discovery.

### PHOTOS: Close Encounters with Comets

"The object was slow and had a unique movement. But we could not be certain that it was a comet, because the scale of our images are quite small and the object was very compact." Artyom



DNEWSvideo



DNews: Why You Might Wake Up Paralyzed



THEMUSTreads



Why Sinkholes Are Eating Florida



# Comet ISON

- ISON = International Scientific Optical network, Russia. Discovered with small telescope (40 cm). Still faint now.
- Comet is heading toward the southern hemisphere in Aug-Nov 2013, then the northern hemisphere.
- It will come close to the Sun and close to the Earth, so it *might* be very bright... maybe the brightest comet in several years, and easy to see without binoculars.

# Comet Resources

- <http://cometchasing.skyhound.com/>
- <http://transientsky.wordpress.com>

These two sites will tell you about current comets - PanSTARRS, ISON, and any new ones

- iOS app 'Sky Walk' is a brilliant tour of the sky. Does not include comets, though.

# Recipe for a Comet

- 2 cups water ( $\text{H}_2\text{O}$ )
- 2 cups dry ice ( $\text{CO}_2$ )
- 2 spoons dirt
- Dash of ammonia ( $\text{NH}_3$ )

Mix, stir, and enjoy!