

# Out in Space: Comets

By NASA.gov, adapted by Newsela staff on 10.18.16

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TOP: Taken on November 19, 2013, this image shows a composite "stacked" image of comet ISON (International Scientific Optical Network). MIDDLE: An image taken by the Rosetta spacecraft of comet 67P/Churyumov-Gerasimenko on September 30, 2016, from an altitude of about 10 miles (16 kilometers). NASA/MSFC/MEO/Cameron McCarty.

In olden times, people saw comets in the sky and called them "long-haired stars." They were amazed and scared. Comets seemed to have shown up and disappeared with no warning. Chinese astronomers tracked the comets carefully. They noted where and when the comets appeared. Later astronomers found their records very helpful.

Comets are made mostly of ice. The ice is covered in dark organic materials. Comets are sometimes called "dirty snowballs." Our solar system was formed about 4.6 billion years ago and many comets were also created at that time. Studying comets gives us clues about how the solar system formed. They also give us clues about how life formed on Earth. Comets may have brought water and organic materials to Earth and other parts of the solar system. Organic materials are the building blocks of life. One example is amino acids. Amino acids are important to human life.

## Gravity Shortens Their Orbit

Many comets come from an area far out in the solar system. Past Neptune and near Pluto is an area where icy objects orbit the sun. Sometimes gravity pushes these icy objects closer to the sun. These are called short-period comets. They take less than 200 years to orbit the sun. These comets appear in our sky on a regular basis. For example, Halley's comet appears in our sky every 76 years.

Long-period comets are less predictable. These arrive from a region called the Oort Cloud. The Oort Cloud is 100,000 astronomical units from the sun. (One astronomical unit is the distance from Earth to the sun.) Comets from the Oort Cloud can take as long as 30 million years to orbit the sun.

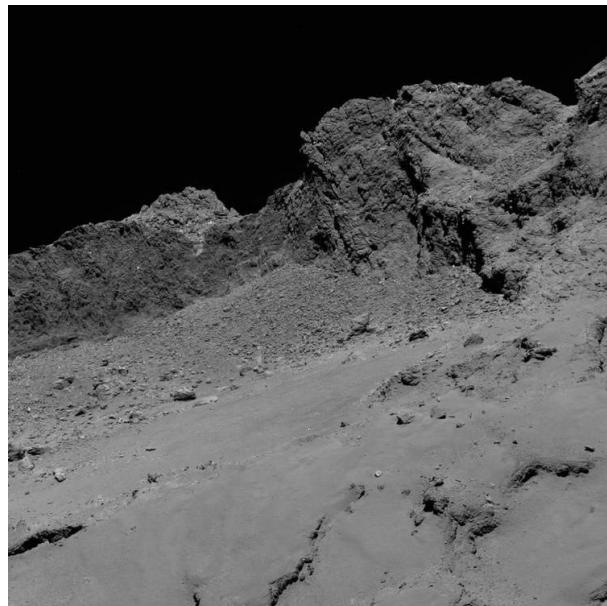
The center of a comet is called the nucleus. The nucleus of a comet is made of frozen gases with dust in them. Comets warm up as they get closer to the sun. The ice turns to gas. The gas collects around the comet and forms a "coma." When the coma is pushed back by solar wind coming from the sun, the comet's tail is formed. Comets actually have two tails — a dust tail and a gas tail.

### **Sungrazers Don't Survive**

Most comets keep a safe distance from the sun. Comet Halley comes no closer than 89 million kilometers (55 million miles). However, some comets, called sungrazers, get much closer. They crash straight into the sun or get so close that they break up.

Scientists have wanted to study comets for decades. In 1986 they got a few pictures of comet Halley's nucleus.

In 2004, a NASA spacecraft got closer than ever to a comet's nucleus. The Stardust mission collected samples from the comet and returned to Earth in 2006. The photographs from the mission show the nucleus' bumpy surface.



In 2005, NASA sent two spacecraft to comet Tempel 1.

One of the crafts was designed to crash directly into the comet's nucleus. In July 2005, the impactor craft did just that. On the way, it took detailed photos of the comet. The second craft recorded the collision and collected samples of the dust that was kicked up. Both the Deep Impact and Stardust spacecraft survived their first missions. They were used to visit comets again.

### **How Comets Get Their Names**

Comets are generally named for their discoverer. This can be either a person or a spacecraft. Comet Shoemaker-Levy 9 was the ninth short-period comet discovered by Eugene and Carolyn Shoemaker and David Levy.

### **Halley's Comet Through History**

1070-1080: The comet later named Halley's comet is shown in the Bayeux Tapestry, a medieval artwork.

1705: Edmond Halley writes that the comets seen flying past the Earth in 1531, 1607, and 1682 are in fact the same object. He predicts its return in 1758. The comet arrives on schedule. It is later named Halley's comet.

1986: An international fleet of five spacecraft visit comet Halley as it makes its regular (about every 76 years) pass through the inner solar system.