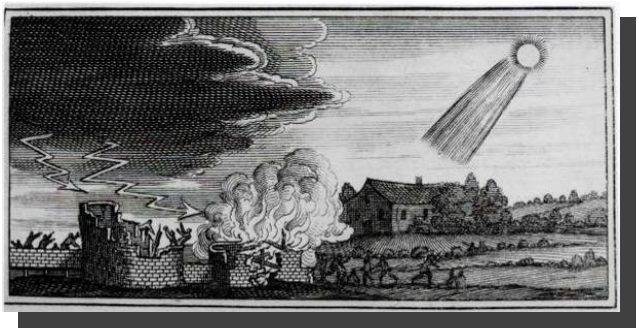
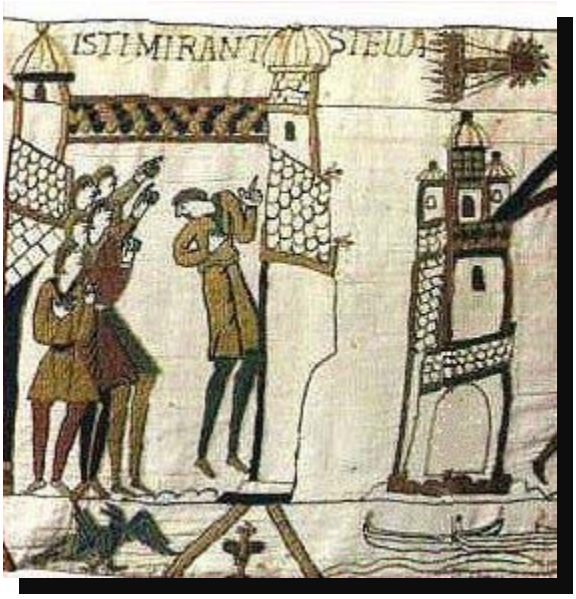


Woodcut showing destructive influence of a fourth century comet.
(Image courtesy NASA/JPL)

4th Century

Comets have been recorded in images and text for several thousand years in cultures as diverse as Ancient Greek, Aztec, Babylonian, Chinese, Egyptian, Islamic, and Native American. Early on, comets were thought to be atmospheric phenomena that predicted terrible occurrences like war, storms, and plague. What color, shape, and which constellations the comets progressed through were the keys to how their meanings were interpreted.



Halley's Comet shown in the Bayeux Tapestry.
(Image courtesy NASA)

1066

The Bayeux Tapestry isn’t really a tapestry. It’s an embroidered cloth over 230 feet long that documents the Norman conquest of England. It contains a picture of the 1066 appearance of Halley's Comet, which appears in the sky above dumbfounded onlookers. The caption reads "Isti mirant stella", that is, "They marvel at the ill-omened star."

Portrait of Tyco Brahe.
(Image courtesy Public Domain)

1577

Tycho Brahe made careful observations of a comet. By measuring the position of the comet, he was able to show that the comet was further away than the Moon! This contradicted the idea that comets were “gases burning in the atmosphere" – the current explanation at that time.

Comets represented an obvious change in a celestial sphere that was supposed to be unchanging. Comets also were the first observed bodies that were difficult to describe using uniform circular motion.

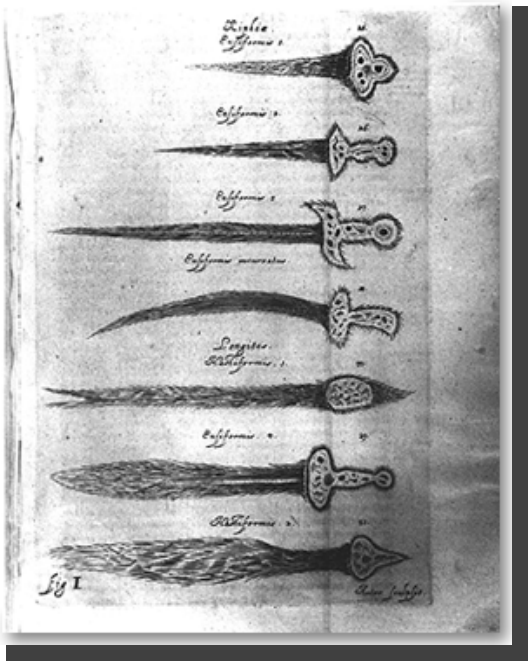
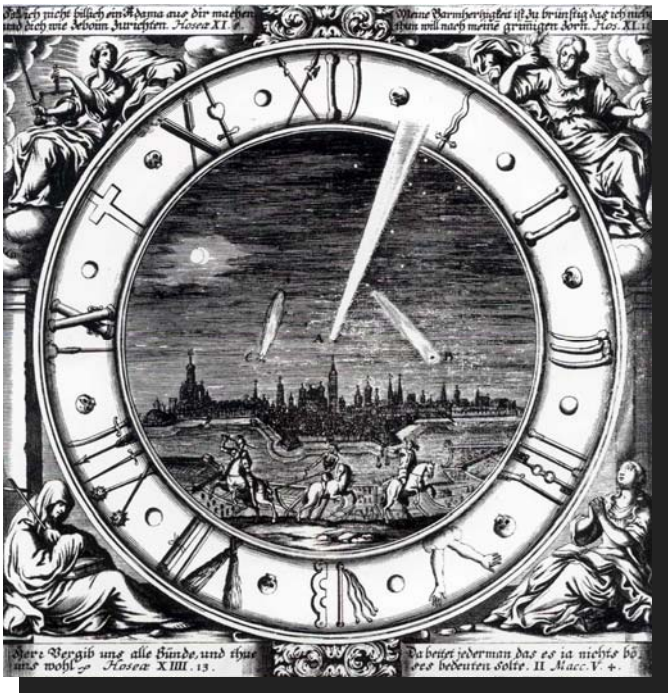


Illustration of different types of cometary forms from Johannes Hevelius’ *Cometographia*.
(Image courtesy NASA/JPL)

1668

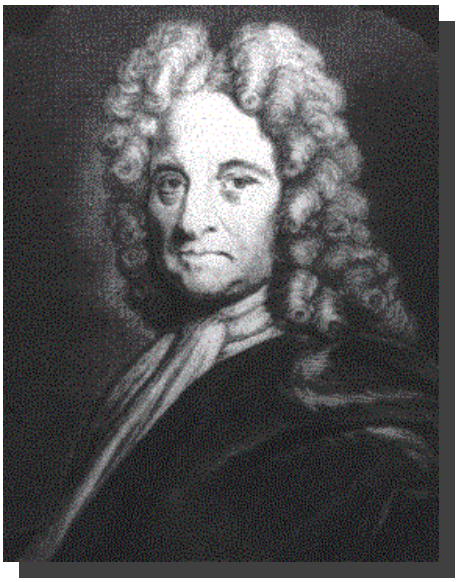
Johannes Hevelius, a Polish-Lithuanian astronomer writes a book detailing drawings of comets, *Cometographia*, which is published by Simon Reiniger, Gdansk (Poland).



View of Augsburg, Germany with the comets of 1680, 1682, and 1683 in the sky. (Image courtesy NASA/JPL)

1680-1683

Three comets were sighted from Earth in the years 1680, 1682, and 1683. At the end of the 16th century, astronomers became increasingly interested in explanations for the presence of comets, postulating various theories about their nature and motion. Early on, there was much heated discussion about whether comets existed in a region above or below the moon.



Sir Edmund Halley.
(Image courtesy Public Domain)

1705

After studying comets in great detail, Sir Edmund Halley predicted correctly that the famous comet of 1682 would return 76 years later, in December of 1758. Halley had used Newton's Laws to predict the behavior of the comet orbiting the Sun.

Portrait of Caroline Herschel.
(Image courtesy Public Domain)

1786-1797

Caroline Herschel was responsible for finding more comets than any woman prior to Carolyn Shoemaker. She discovered eight comets during the years 1786-1797 and earned a reputation for herself as an astronomer; she also published a much needed index to the star catalog of astronomer John Flamsteed. Herschel was one of two women to receive honorary memberships in the Royal Astronomical Society in 1835.

Portrait of Maria Mitchell, painting by H. Dasell, 1851.

1847

Maria Mitchell was the first woman American astronomer. She discovered a new comet that was named after her on October 1, 1847.

In 1848 she was the first woman to be elected to the American Academy of Arts and Frederick VI, the King of Denmark, awarded her a gold medal for her discovery.

Paymaster Horace Parnell Tuttle, taken by the U.S. Navy in 1888. (Image courtesy Public Domain)

1862

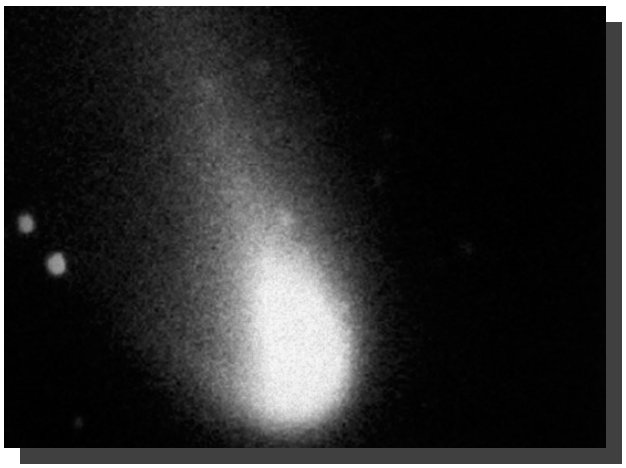
Horace Parnell Tuttle was an assistant ad Harvard College Observatory. On the night of July 19th, 1862 he spotted a faint, fuzzy comet in the sky. When he announced this discovery to the world – another person, Lewis Swift came forward saying he had seen the comet on July 16th. Since comets are named for the first person to see them in the sky the Comet was called 109P Swift-Tuttle.

Comets have elliptical orbits and you can calculate when you will see them again. By digging through the history of comet sightings, British astronomer Brian Marsden suggested in the 1970's that Swift-Tuttle had been observed in 1737. If his prediction was correct, Swift-Tuttle would return in 1992 – and it did.

Professor Lobos Kohoutek, briefs the news media on what they might expect to see when his comet makes its closest approach to Earth on January 5, 1974. (Image courtesy NASA)

1973

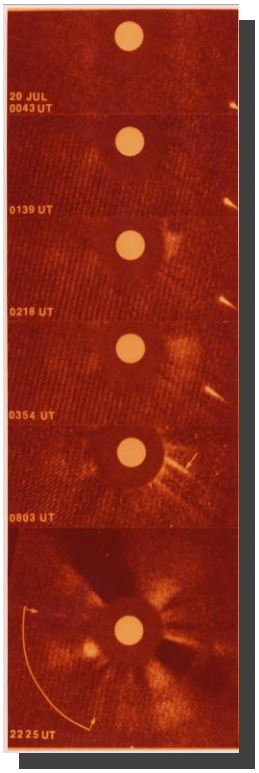
People had been taking pictures of the stars for years to learn all kinds of things about them. A Czech astronomer and Professor Lubos Kohoutek used a double exposure to discover a comet that was 370 million miles from Earth. The Czech astronomer could see the comet, on March 7th, 1973 but it took another 9 months for the comet to come close to Earth.



Comet Wild 2 (pronounced ‘Vilt’) as seen from Earth.
(Image courtesy NASA)

1978

Professor Paul Wild (pronounced ‘Vilt’), a Swiss astronomer, discovers his second Comet, Wild 2 on January 6th.



A 1979 image shows a comet colliding with the Sun.
(Image courtesy NRL)

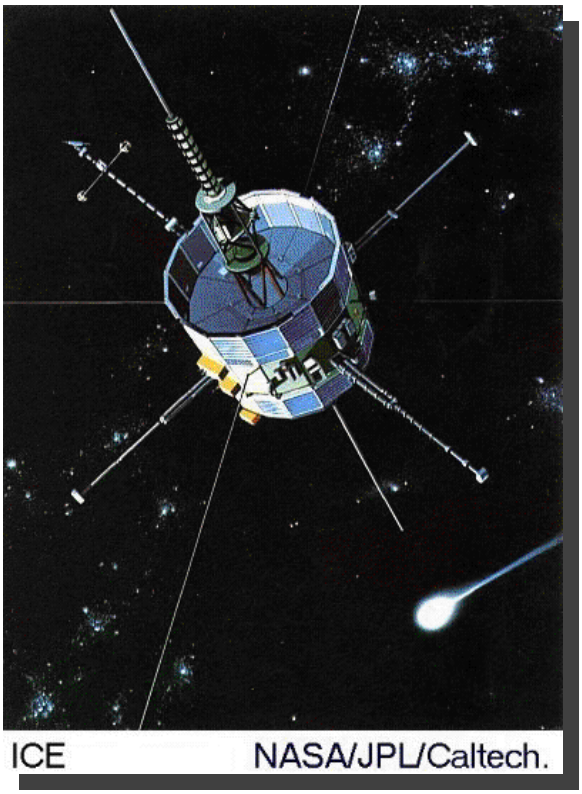
1979

An image taken on August 30th, revealed a new comet, called SOLWIND 1 – that has never been seen again. It was located 5.96 solar radii from the Sun. Why would a cold comet disappear when it came that close to the Sun?

Image of the Giotto space probe.
(Image courtesy ESA)

1985

Scientists wondered what was inside a comet to make that bright and beautiful tale. So, on July 2nd, the European Space Agency (ESA) launched the Giotto space probe to take a close-up of Halley's Comet. The encounter on March 13th, 1986 revealed a frozen center called a nucleus. At the time it was compared to an iceberg in space!



1985

In the first-ever on-the-spot sampling of a comet, a U.S. satellite glided through the tail of the Giacobini-Zinner comet on September 11th.

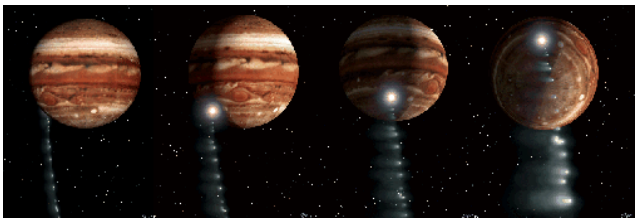
Nucleus of Halley's Comet.
(Image courtesy NASA)

1986

Halley's Comet is one of the most famous comets because it visits Earth so regularly. This was the first time humans could send a robotic spacecraft the 63 million kilometers (about 39 million miles) to take pictures of the heart of a comet. Many different space agencies sent missions to it:

- Russia sent two probes, Vega 1 and 2
- The European Space Agency sent the Giotto probe
- The Japanese sent the Suisei probe

What they saw resembled a frozen iceberg!



Artist's rendition of fragments of Comet Shoemaker-Levy smashing into Jupiter, sending up towering fireballs.
(Image courtesy NASA)

1994

In the first collision of two solar system bodies to be observed, Comet Shoemaker-Levy 9 slams into Jupiter on July 16th and 17th. The comet had split into at least 21 separate pieces (some as large as 2 km across) before impacting the atmosphere of Jupiter.

The comet was initially discovered by Caroline and Eugene Shoemaker along with David Levy. It was the 9th periodic comet the three had discovered – which is why there is a 9 on the name. It was the first comet observed to be orbiting a planet.

Comet Hale-Bopp over San Francisco Peaks near Flagstaff, AZ.
(Image courtesy NASA)

1995

On the night of July 23rd, two different American astronomers, both reported the discovery of the comet bearing their names: Hale-Bopp. Hale-Bopp was visible for 18 months!

This comet travels quite a way – it only enters the inner Solar System every 3,000 years. As it travels along its elliptical path, it goes as far as 33 million miles from the Sun.

Comet Hyakutake.
(Image courtesy NASA)

1996

Comets are named for the first person to see them in the sky. So amateur astronomers hope to glimpse one and give it their name. This comet was named for Japanese amateur astronomer, Yuji Hyakutake.

He first sighted the comet on January 31st, but it traveled within 10 million miles of Earth on March 26th.

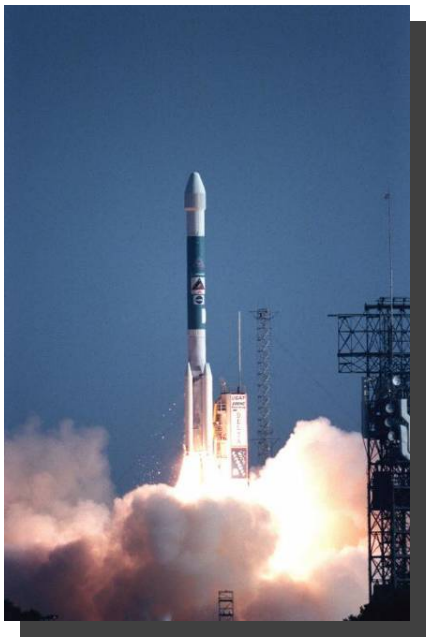
By looking at the comet with special instruments scientists determined that the comet contained about 50 million tons of frozen ethane – which is only about 1% of its total mass.

The Leonid Meteor Shower.
(Image courtesy NASA)

1998

The last time we say Comet Tempel-Tuttle was 1965. It seems to have broken up into pieces and scientists predicted that when the Earth's orbit crossed the debris field we would see a huge meteor storm. It was feared that the meteor storm would damage the nearly 500 satellites in orbit.

But when scientists looked at the peak of the meteor shower on November 17th, the rate of meteors never exceeded a few hundred per hour – which is really not enough to qualify as a storm.



Picture of the launch of Stardust Spacecraft – NASA's first mission to return comet dust to the Earth.
(Image courtesy NASA)

1999

On February 7th, NASA used a Delta II rocket to propel the Stardust spacecraft into space. It took a 7-year journey to gather particles from the coma of Comet Wild-2 (pronounced 'Vilt') and return them to Earth.

Image of the nucleus of Comet Borrelly.
(Image courtesy NASA)

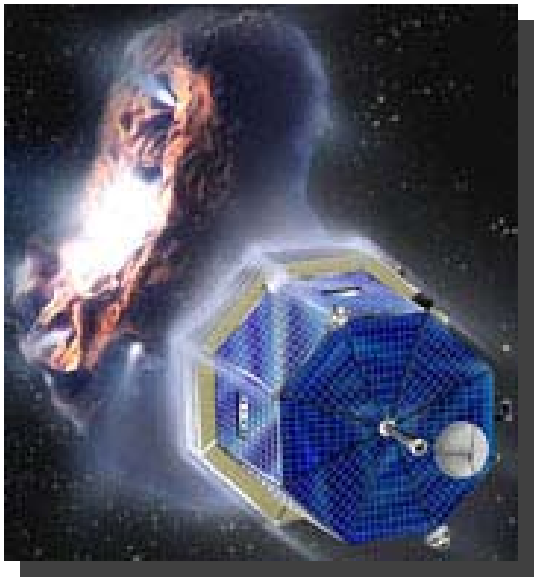
2001

Deep Space 1 launched from Cape Canaveral on October 24, 1998. During a highly successful primary mission, it tested 12 advanced, high-risk technologies in space. In an extremely successful extended mission, it encountered Comet Borrelly on September 23rd, and returned the best images and other science data ever from a comet.

Comet Ikeya-Zhang.
(Image courtesy Gerald Rhemann)

2002

Some comets have shorter orbits and come more frequently to the Inner Solar System – where we can see them. Others take longer amounts of time. This comet visits about every 350 years. It was first documented by two astronomers one in Japan and one in China on February 1st. It bears both of their last names Ikeya-Zhang in honor of their observation.



Artist's rendition of Contour space probe and comet nucleus.
(Image courtesy NASA)

2002

The Comet Nucleus Tour, or CONTOUR, mission was to study two very different comets as they made their visits to the inner solar system. It was the first mission designed to study both the physical and chemical properties of comets.

At each comet flyby, the spacecraft would get closer than we ever had - as close as 60 miles - to the comet nucleus and capture high resolution pictures, perform detailed analysis of the composition, and determine the comet's precise orbit. This information would dramatically improve our knowledge of comet nuclei and their diversity.

But, six weeks after launch scientists lost contact with the spacecraft on August 15th.

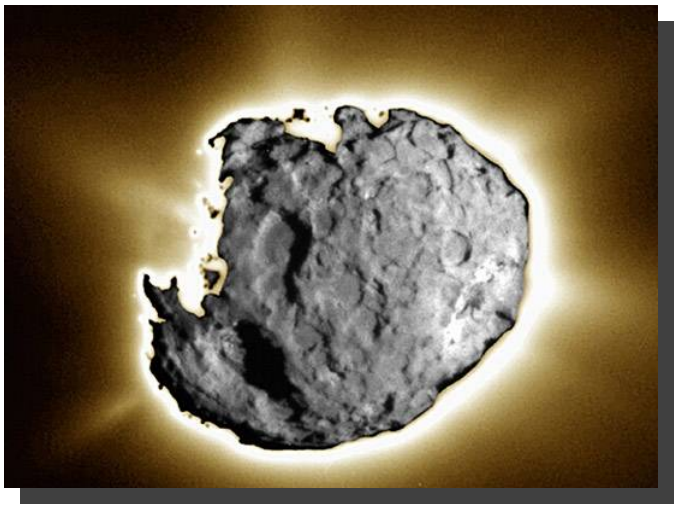


Image of Wild-2 (pronounced 'Vilt') taken by the Stardust spacecraft.
(Image courtesy NASA)

2004

The NASA Stardust spacecraft encountered Comet Wild-2 on January 2nd. It took pictures of the comet's tail and collected particles on "aerogel," a silica foam 99.8% air, the lightest material ever made.

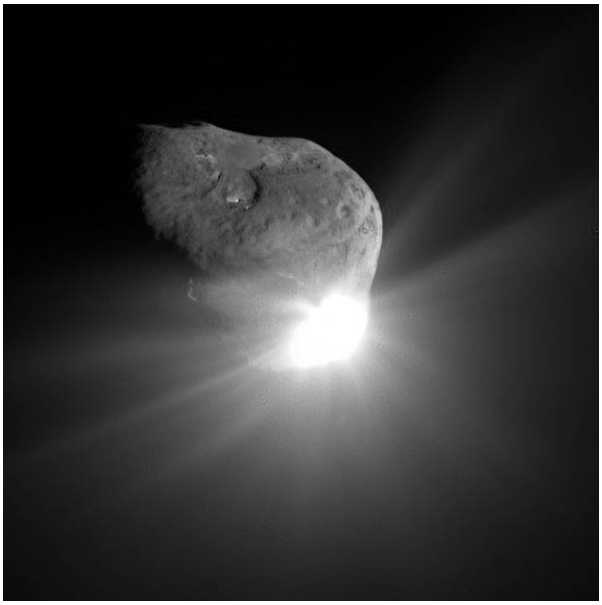


Image of Deep Impact's impactor probe colliding with the nucleus of Comet Tempel 1.
(Image courtesy NASA/JPL-Caltech/UMD)

2005

NASA launched its Deep Impact spacecraft from Cape Canaveral, FL on January 12th. On July 4th, the 820-pound impactor spacecraft collided with the nucleus of Comet Tempel 1, half the size of Manhattan, creating a brilliant cosmic smashup that capped a risky voyage to uncover the building blocks of life on Earth.

Image of Stardust Return Capsule.
(Image courtesy NASA)

2006

Stardust was the first space mission dedicated to studying a comet and the first solid sample return mission in over 30 years. Stardust captured thousands of particles of comet dust during a daring close encounter with Comet Wild 2.

On January 15th, 2006 the Stardust Sample Return Capsule (SRC) was safely returned to Earth within the Utah Test and Training Range (UTTR) at the Dugway Proving Grounds outside of Salt Lake City, UT. It brought back samples of interstellar dust that may consist of ancient grains that are older than our solar system.

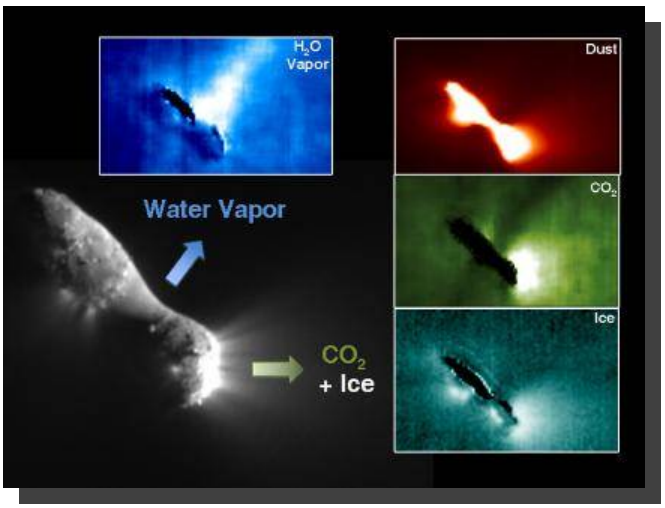
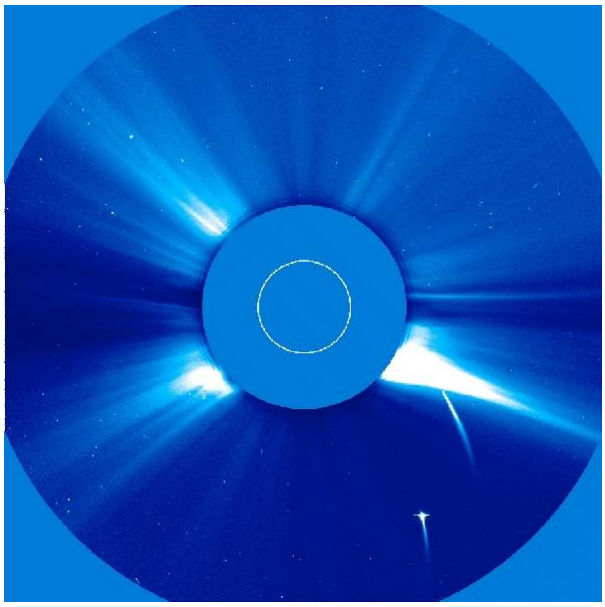


Image of Comet Hartley 2 showing different kinds of jets. (Image courtesy NASA/JPL-Caltech/UMD)

2010

On November 4th, the EPOXI mission (repurposing the Deep Impact spacecraft) encountered Comet Hartley 2 and provided the first images clear enough for scientists to link jets of dust and gas with specific surface features.



Two "sungrazing" comets in the lower right. The planet Mars can be seen in the upper right corner. (Image courtesy NASA)

2010

The sun experiences a storm of icy comets - between December 13th and 22nd, the Solar and Heliospheric Observatory (SOHO) detected 25 comets diving into the sun". Sundiving comets -- a.k.a. "sungrazers" -- are nothing new. SOHO typically sees one every few days, plunging inward and disintegrating as solar heat sublimes its volatile ices. "But 25 comets in just ten days, that's unprecedented," said Karl Battams of the Naval Research Lab in Washington, DC.

Four views of Comet Tempel 1.
(Image courtesy NASA/JPL-Caltech/University of Maryland/Cornell)

2011

On February 14th, NASA's Stardust-NExT (New Exploration of Tempel 1) mission encountered Comet Tempel 1. The images progress in time beginning at upper left, moving to upper right, then proceeding from lower left to lower right. When the spacecraft first approached, it got a clear look at the same surface that was imaged previously by NASA's Deep Impact mission in 2005.

As Stardust-NExT flew closer to the comet, it began to see new territory that had not been imaged before. The new territory appears on the left side of the upper right image. In the lower left image, the vast majority of terrain pictured had not been seen until now. The fourth image, at lower right, shows Stardust-NExT's view as the spacecraft left.

Rosetta's Philae lander descending onto comet nucleus.
(Image courtesy ESA, image by AOES Medialab)

2014

The Rosetta spacecraft will catch and land a robot on Comet "67P/Churyumov-Gerasimenko" ("C-G"). The European Space Agency (ESA) is spearheading this international mission, with NASA providing key scientific instruments for studying Comet C-G and other celestial bodies.