Is the 'Christmas Comet' cracking up?

October 18 2013, by Richard Ingham

Comet ISON caught on camera by NASA's Hubble Space Telescope on April 10, 2013, when it was 394 million miles from Earth

An incoming comet that skygazers had hoped would provide one of the greatest celestial shows of the century, could be a fizzle.

So say astronomers tracking the eagerly-awaited Comet ISON as it races to a searing encounter with the Sun.

Formally known as C/2012 S1 (ISON), the comet was spotted by a pair of hard-working amateur Russian astronomers, Vitaly Nevski and Artyom Novichonok, on September 21, 2012.

It is called ISON because they used a telescope called the International Scientific Optical Network near Kislovodsk, in the northern Caucasus.

After the discovery was validated by the International Astronomical Union (IAU), interest in the enigmatic wanderer became huge.

Calculations showed that after looping around the Sun, the comet would become a blaze of glory towards the end of the year—a timing that gave it the tabloid title of "Christmas Comet" or even "Comet of the Century."

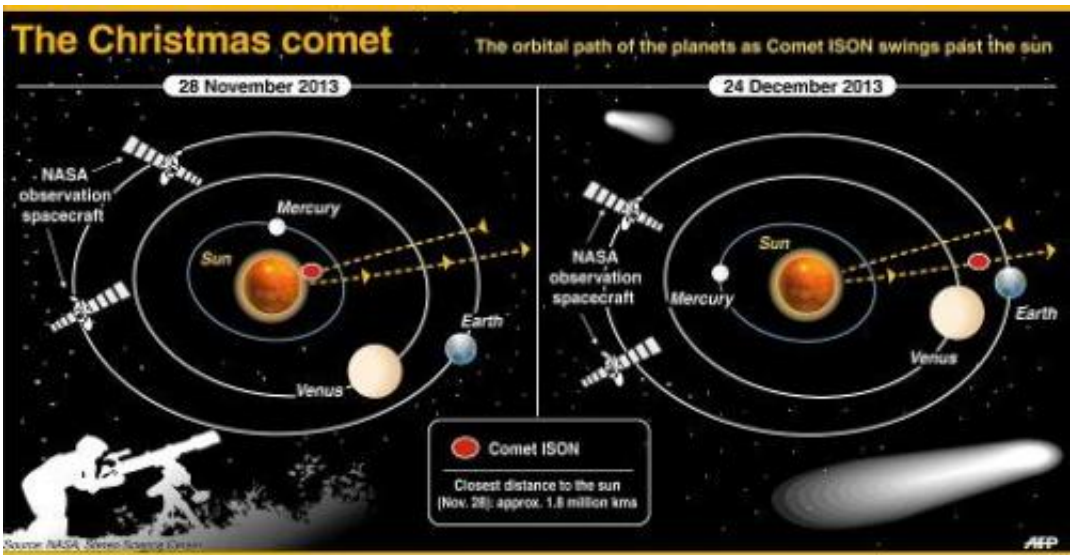
But fears are multiplying that the great show will be cancelled.

Light signatures from ISON, which has just streaked past Mars, indicate the comet is about to break up, says Ignacio Ferrin, an astrophysicist at the University of Antioquia in Medellin, Colombia.

"This disintegration will take place before it reaches perihelion," Ferrin told AFP in an email. Perihelion is an orbit's closest point to the Sun, which ISON is supposed to reach on November 28.

"There are also predictions for disintegration at perihelion. But based on the evidence, the comet will not get there," said Ferrin.

He explained that comets typically brighten as they get closer to the Sun, crossing a temperature threshold that causes their icy surfaces to evaporate, depositing water vapour, other gases and dust in their wake.



Map showing Comet ISON's swing past the sun and its position compared to Earth in late December (130 x 122 mm)

But, said Ferrin, the light curve from ISON slowed down and then remained practically constant, with no sign of greater brightness, as it raced forward.

This is a signature that matches four previous comets that have broken up catastrophically, he said.

"Comets in general appear to be quite fragile, and are observed to fragment or split," said Duncan Steel, a visiting astronomer at Armagh Observatory in Northern Ireland.

"It has always been a good bet that ISON would do this, and there is now evidence that this may be now occurring."

Cursed to wander Solar System

Comets are believed to be huge clusters of primeval dust and frozen ices,

including water and organic molecules that, say some, delivered the building blocks of life to the infant Earth.

Doomed to orbit the Sun in periods that can range from years to many millennia, comets undergo thermal stress as they near the star.

Veterans that make short-period flybys, such as Halley's Comet, appear to have a crust of silicates and "tarry" carbon molecules to insulate them from the heat.

But rare visitors such as ISON have no such protection, said Steel. Internal gases start to expand in the heat, stressing the crumbly "dirty snowball" structure.

Comets can also be torn apart by gravitational forces if they cross the path of a planet.

This image released by NASA April 24, 2013, shows a composite photo, assembled from separate images of Jupiter and comet Shoemaker-Levy 9, taken by the Hubble Space Telescope in 1994

This famously happened with Comet Shoemaker-Levy 9, whose fate was dictated by Jupiter. Fragments of the comet smashed into the jovian giant in 1994.

Even if the gloomy predictions are wrong, ISON still has to survive the climax of its ordeal by fire.

A "Sun-grazing" comet, at perihelion, it will be less than 1.2 million kilometres (730,000 miles) from the surface of the star—just three times the distance between the Earth and Moon—and subjected to

temperatures of 2,800 degrees Celsius (5,000 degrees Fahrenheit).

According to preliminary estimates by the Lowell Observatory and Southwest Research Institute in Arizona, ISON has a good chance of surviving the solar furnace and gravitational rip at perihelion.

Comets smaller than 200 metres (650 feet) across almost always are destroyed when passing at such a distance. ISON appears be between 1,000 and 4,000 metres (1,000 and 4,000 yards) across.

What, though, will be left of ISON after it has kissed the Sun?

Will enough remain for it to be a real comet? Or will it be just a sad, shrivelled lump?

"We have absolutely no idea," said Patrick Rocher, of the Institute of Celestial Mechanics at the Paris Observatory.

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