

Heliophysics nugget: Sungrazing comets as solar probes

December 6 2012, by Karen C. Fox

(Phys.org)—Heliophysics nuggets are a collection of early science results, new research techniques and instrument updates that further our attempt to understand the sun and the dynamic space weather system that surrounds Earth.

To observe how winds move high in Earth's atmosphere, scientists sometimes release clouds of barium as tracers to track how the material corkscrews, blows around, and changes composition in response to high altitude winds – but scientists have no similar technique to study the [turbulent atmosphere](#) of the sun. So researchers were excited in December 2011, when Comet Lovejoy swept right through the sun's corona with its long tail streaming behind it. Several missions—including NASA's Solar Dynamics Observatory (SDO), NASA's Solar and Terrestrial Relations Observatory (STEREO), ESA/NASA's Solar and Heliospheric Observatory (SOHO) and the JAXA/[NASA mission](#) Hinode—captured images of the comet, showing how its long tail was buffeted by systems around the sun, offering scientists a unique way of observing movement as if they'd orchestrated the experiment themselves.

This unexpected set of observations captured the attention of scientists, bringing two research communities together: comet researchers who can use [solar observations](#) for their studies and solar scientists can use comet observations to study the sun.

Scientists recently shared their results at the 2012 Fall [American](#)

[Geophysical Union](#) meeting in San Francisco, Calif., and how the comet helped highlight the intensely dynamic environment in the sun's atmosphere, the corona. Since comet tails are rapidly ionized by losing electrons in that hot environment, their movement is affected by the sun's magnetic field. Thus the tail's path can act as a tracer of the complex [magnetic system](#) higher up in the corona. Understanding such magnetic systems is a crucial part of space weather research and the study of how magnetic energy is converted to giant explosions on the sun such as [solar flares](#) or coronal mass ejections.

People have been hunting for sungrazing comets for hundreds of years, but as of 1979, we only knew of 9. Today we have seen 3,000 thanks to better observation tools. Credit: NASA/Goddard Scientific Visual Studio

[Comet Lovejoy](#) is a kind of comet known as a sungrazer, which swings particularly close to the sun. Since SOHO launched in 1995, it has shown us thousands more sungrazer comets than any tool ever has before—almost 2,400 comets as of November 2012. Because we are in a period of high sun grazing comet activity, scientists can expect many more chances to watch these natural research satellites in the coming years. Another large comet is expected to have a close solar pass on November 21, 2013. This comet is roughly the size of Hale-Bopp, so it should give quite a show.

Provided by NASA

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