Kreutz Family Values

The year after Ikeya-Seki's appearance, comet researchers Ichiro Hasegawa, Lubor Kresák, and one of us (Brian Marsden) each recognized that the Kreutz family consists of two distinct lineages. The orbital parameters of the groups' members are similar, but the lines of nodes, where an orbit crosses Earth's orbital plane, can be divided into two sets about 20° apart.

So-called Subgroup I comets — the Great Comet of 1843 (C/1843 D1) being the most prominent — approach to within a half solar radius of the Sun's surface at perihelion. Subgroup II comets have slightly greater (though still scorching) perihelion distances. In the 1967 *Astronomical Journal* paper in which he developed the idea of subgroups, Marsden demonstrated that the two most prominent known Subgroup II comets — Ikeya-Seki and the Great Comet of 1882 — must have split from each other around the time of their previous perihelion, early in the 12th century, their common parent perhaps being the 1106 comet.

Recently, in further modeling of the orbits of the 1882 and 1965 sungrazers, Jet Propulsion Laboratory researchers Zdenek Sekanina and Paul Chodas concluded that the split occurred about 18 days after perihelion. They added that the breakup of the primordial comet that created the two subgroups, believed to be about 120 km in diameter, must have been at least one revolution earlier. There has also been speculation — but scant evidence — that a brilliant comet seen in 372 BC, which the Greek philosopher Ephorus claimed to have seen tear in two, was perhaps the progenitor of the entire Kreutz system.

Enter SOHO

An unlikely comet-hunting tool has become key in advancing the understanding of sungrazers. When the Solar and Heliospheric Observatory (SOHO) spacecraft was launched

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TAIL BLAZER Operators of the SOHO spacecraft discovered that the satellite's cameras could detect comets invisible to ground-based observers. The first examples, such as C/1996 Y1 (SOHO 6) shown here, were obvious. But many of the satellite's years-old archived images contained much fainter comets that have been discovered only recently.

in late 1995, no one anticipated the trove of comets it would reveal. SOHO, a joint project of NASA and the European Space Agency, is in a "halo orbit" 1.5 million km sunward of Earth, near the L_1 Lagrangian point. This permits essentially continuous viewing of the solar environment with the spacecraft's dozen instruments.

Although earlier solar-science missions — Solwind and the Solar Maximum Mission — found 16 comets between 1979 and 1989, SOHO has far surpassed them. As of late May 2005, the SOHO team had confirmed 967 comets, 949 of which had been officially announced. About 85 percent of them belong to the Kreutz group.

All but five of SOHO's comets have been found with its Large Angle Spectrometric Coronagraph (LASCO) telescopes, either its narrow-field (C2) or wide-field (C3) camera. (A coronagraph uses an occulting disk to create an artificial eclipse, revealing the corona and objects hidden in the solar glare.) C2's field of view extends from about 2 to 6 solar radii, while C3's runs from about 4 to 32 solar radii.

The first SOHO comets were discovered, often serendipitously, by the project's own scientists and ground controllers, but it took an amateur astronomer — Michael Oates of Manchester, England — to turn the finding of SOHO comets into a science (*S&T:* October 2000, page 89). In August 1999, soon after Australian Terry Lovejoy became the first amateur to find a comet in the spacecraft's images publicly available on the mission's Web site (http://sohowww.nascom.nasa.gov), SOHO project scientist Douglas A. Biesecker gave a talk on the satellite's comet-finding abilities at the International Workshop on Cometary Astronomy in Cambridge, England. He inspired five participants to find their own SOHO comets, including conference host Jonathan Shanklin, the British Astronomical Association's Comet

STARING AT THE SUN The Solar and Heliospheric Observatory (SOHO) travels around the Sun in lockstep with Earth. The satellite swings around in a "halo orbit" about the L_1 Lagrangian point, 1.5 million kilometers sunward from Earth, a vantage in which the Sun is always in view.