

SOHO / LASCO CONSORTIUM (NASA / ESA) (6)

Section director, who then encouraged Oates to start his own search. Oates soon realized that more SOHO comets were being found in the real-time images than in previous years. "This made me wonder if the searches in the past were not as thorough," he recalls.

### Sungrazer Seasons

Oates then systematically searched the archived images from SOHO's early years, looking for objects that followed a path typical of a Kreutz comet. This proved a most effective strategy; within 10 months he had found his 100th SOHO comet. Better still, his work revealed a seasonal pattern: due to the relative geometry of the Earth, the Sun, and the Kreutz stream, "comet storms" — in which a comet is found every two days or so in C2 camera images — occur twice a year, from April to June and from October to December. During these periods the comets peak in brightness within C2's narrow field, while the rest of the year — when the comets travel more nearly perpendicular to the Earth-Sun line — most vaporize before they can enter the instrument's field of view.

Assuming that the "storm" rate is close to the true average pace of detectable fragments and that the average orbital period of a sungrazer is 800 years, Sekanina has estimated

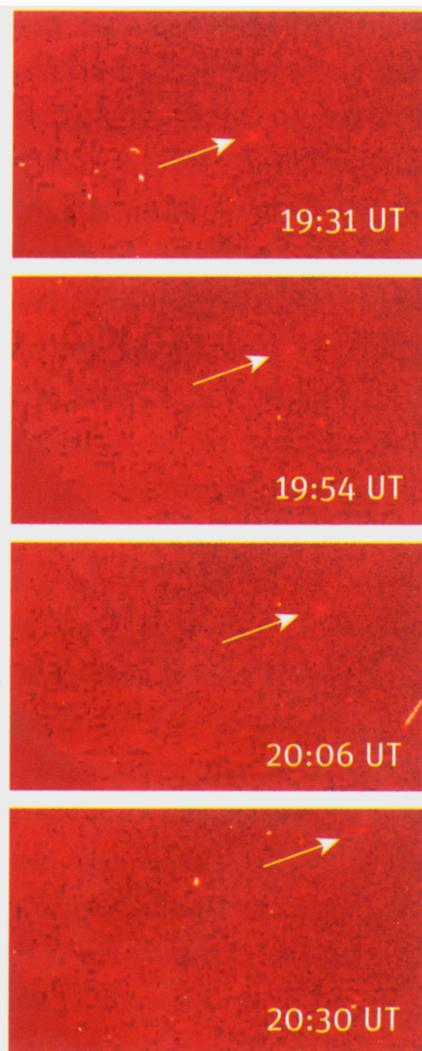
**GOING, GOING, GONE** C/1998 H2 (SOHO 48), a Kreutz sungrazer that completely evaporated, was detected on April 30, 1998. This series of images spans about five hours.

that about 200,000 of these mini-comets orbit the Sun. Calling them comets is generous; the nuclei can be as small as 5 meters (16 feet) in diameter. Biesecker considers them intermediate between small comets and meteor-shower debris. Even the largest, perhaps 50 to 100 meters across, have not survived perihelion (though the tail of an especially bright one found on May 22, 2003, persisted briefly after perihelion). Sekanina has estimated that it would take a fragment with an initial diameter of at least 1 km to do so. He has also noted that the peak brightness of a fragment directly correlates with its initial mass; the combined mass of all the small Kreutz fragments orbiting the Sun is insignificant compared to the mass of the largest known Kreutz comet nucleus, perhaps several tens of kilometers across.

Light curves show that Kreutz comets imaged by C3 tend to peak in brightness around 12 solar radii from the Sun. Hiroshi Kimura (Westfälische Wilhelms University, Germany) and his colleagues have noted that this is the distance at which the silicate mineral olivine sublimates, and that a moderation in the decrease of the comets' brightness



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**SOLAR VISION** The vast majority of the more than 900 comets discovered by the SOHO spacecraft were first detected by the satellite's Large Angle Spectrometric Coronagraph (LASCO). Its C2 and C3 telescopes use occulting disks to block the Sun's glare (size of the Sun is represented by the white circle). These images from the C2 telescope have a narrower field of view than C3, as shown on the following page. The insets reveal the movement of C/2004 G5 (SOHO 755), a Kreutz comet discovered by author Tony Hoffman. The uncometlike speck at the limit of resolution is typical. Nevertheless, 85 percent of SOHO finds are related to the spectacular comets illustrated on page 33.

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