so-called magnetotail stores energy from the sun and later discharges it, in part by generating auroras. The Auroral Probe carries an ultraviolet camera and should complement observations taken by NASA's Polar spacecraft.

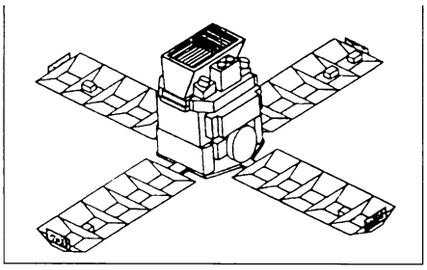
September

● The Japanese Space Agency plans to launch a craft that should become the first space-based component of the Very Long Baseline Interferometer, a global array of radio telescopes. This airborne radio antenna is intended to aid in producing sharp images of a variety of radio sources, including active galactic nuclei.

November

● On a shuttle flight, NASA expects to launch a U.S.-German mission that relies on a reusable satellite called Astro-SPAS. For the second time in 3 years, the satellite will carry three ultraviolet spectrometers to examine the atmosphere of hot stars and the composition of the interstellar medium. The spectrometers detect ultraviolet radiation at a key set of wavelengths—shorter than those detected by the Hubble Space Telescope but longer than those recorded by the Extreme Ultraviolet Explorer satellite. One set of instruments, known as ORFEUS (Orbiting and Retrievable Far and Extreme Ultraviolet Spectrometer), consists of two spectrometers and a 1-meter telescope designed to study emissions from ultraviolet-bright

NASA



The spacecraft to be used in the High Energy Transient Experiment.

stars at high spectral resolution. The other instrument, IMAPS (Interstellar Medium Absorption Profile Spectrograph), is a single spectrometer and telescope that can record the spectra of fainter stars but at lower spectral resolution. After separating from the shuttle, Astro-SPAS stays within 40 km of its mother ship for retrieval 6 to 7 days later.

● Three years ago, the Mars Observer spacecraft vanished just before entering orbit around the Red Planet. NASA hopes it will have better luck with the Mars Global Surveyor (MGS), scheduled for launch in November and arrival at Mars 10 months later. Seven of the surveyor's 11 instruments are replicas of those lost on the Observer. During the first 4 months after its arrival, MGS will use a combination of thruster firings and aerobraking (lowering its altitude by using atmospheric drag) to transform its elliptical orbit into a near-circular polar orbit 367 km above the Martian surface. In that configuration, the craft is slated to explore the Red Planet for 2 years, providing global maps of the Martian surface, mineral distribution, and climate. Following its mapping mission, the craft is expected to serve as a relay station, transmitting radio signals from other Martian missions.

December

● NASA plans to launch a second craft to the Red Planet. Mars Pathfinder is scheduled to land on Mars in July 1997. A small rover will explore the terrain surrounding the craft. In addition to testing new concepts in lander technology, the mission will study the structure of the Martian atmosphere, the geology of the surface, and the composition of Martian rock and soil. The primary mission lasts for about a month, but exploration could continue for an additional year.

● Another mission to Mars may also get off the ground in December. After a 2-year delay, the Russian Space Agency plans to launch a craft, now dubbed Mars 96, that includes four landers as well as an orbiter. A pair of cameras on the orbiter will provide astronomers with stereo views of the Martian surface, imaging features as small as 20 meters in length. Two of the craft's landers will use their pointed legs to penetrate several meters beneath the surface. All four landers will examine the composition of Martian rock and soil. □

Astronomy

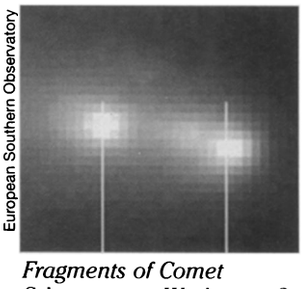
Breakup of a comet

Last September, something strange happened to a comet called Schwassmann-Wachmann 3. It became 1,000 times brighter. By October, skywatchers could even have detected it with the naked eye.

Simultaneously observing the icy body with two telescopes on the same Chilean mountaintop, astronomers have now found evidence of even more dramatic activity. The comet appears to have broken into three or four pieces. In infrared images taken with the European Southern Observatory's 3.6-meter telescope in La Silla, Hans U. Kaufl discerned three separate blobs. Five hundred meters away, Hermann Böhnhardt monitored the body in visible light with the observatory's New Technology Telescope. He also saw three blobs, two of which coincide with those seen in the infrared.

Astronomers Böhnhardt, of the Ludwig Maximilian University in Munich, and Kaufl, of the European Southern Observatory in nearby Garching, Germany, report their findings in a Dec. 13, 1995, circular of the International Astronomical Union. They made the observations in mid-December and estimate that the fragments were moving apart at the rate of 250 kilometers a day.

European Southern Observatory



Fragments of Comet Schwassmann-Wachmann 3.

On Dec. 27, using the Spacewatch telescope atop Kitt Peak near Tucson, James V. Scotti of the University of Arizona in Tucson confirmed that the comet had split. On Dec. 28 and 29, astronomers in Modria, Slovakia, observed the fragments.

If Schwassmann-Wachmann 3 broke apart as early as September, it would account for the comet's brighter appearance, notes Brian G. Marsden of the Smithsonian Astrophysical Observatory in Cambridge, Mass. Sunlight striking the exposed surfaces of a recently fragmented comet causes it to expel large amounts of gas and dust. The more dust a comet spews, the more light it reflects and the brighter it appears. Indeed, notes Marsden, if another comet, Shoemaker-Levy 9, hadn't fragmented into some 20 pieces, it might not have been visible when it smashed into Jupiter in July 1994 (SN: 12/17/94, p. 412).

Schwassmann-Wachmann 3, however, may not have shattered until after the September brightening, says Kaufl. Images taken in early December by other astronomers at La Silla do not show fragments; instead, they indicate an elongated nucleus. The images suggest that the nucleus of the comet split up no earlier than mid-November.

Kaufl speculates that although the breakup occurred after the comet brightened, the two events have a common explanation. Cracks and rifts on the icy nucleus may have widened in September, when the comet passed closest to the sun. The widening cracks would have not only released greater amounts of gas and dust, making the comet brighter, but also set the stage for later fragmentation, he suggests.

Regardless of when the fragmentation took place, it attests to the fragility of comets, notes Marsden. Over the years, astronomers have detected about 30 comets whose nuclei have split, leading some planetary scientists to theorize that each of these icy bodies consists of a loosely held assembly of house-sized snowballs (SN: 5/7/94, p. 298).