Small comet theory faces barrage from foes

Space physicist Louis A. Frank wowed the world in May with evidence that 30,000 house-size snowballs bombard Earth each day. Now, skeptics are lobbing critiques at the space snowball concept.

The harshest attack comes from scientists who argue that Frank and his colleagues have been fooled by meaningless static in his satellite camera. Frank counters with new data that, he says, prove the existence of the elusive, 30-ton comets. The combatants squared off last week in San Francisco at a meeting of the American Geophysical Union. The critics also published their reports in the Dec. 15 GEOPHYSICAL RESEARCH LETTERS.

Their findings have eroded some of the support Frank garnered in the wake of his announcements earlier this year. "This certainly has raised the level of skepticism in the community. I think people are just playing wait-and-see for now," says Robert R. Meier of the Naval Research Laboratory in Washington, D.C.

The recent criticism represents only the latest downturn in a decade-long roller coaster ride for Frank, a researcher at the University of Iowa in Iowa City. He originally proposed the so-called small comet hypothesis in 1986 after finding dark spots in images from the Dynamics Explorer 1 satellite.

The satellite's camera took pictures of Earth's ultraviolet daytime glow, emitted by oxygen in the upper atmosphere. To explain the dark splotches in the images, Frank concluded that the satellite's view must be blocked by large clouds of water vapor high above Earth. He suggested that tiny comets were delivering water to the dry upper atmosphere.

Most researchers dismissed the observations as instrumental noise that produced occasional dark pixels in the images. This year, however, Frank turned some former skeptics around with confirming evidence from a higher-resolution ultraviolet camera on NASA's Polar satellite (SN: 5/31/97, p. 332).

Another team of Polar investigators questions those data. George K. Parks of the University of Washington in Seattle and his colleagues operate the Ultraviolet Imager (UVI) camera on Polar, which sits next to Frank's camera. When Parks ran the UVI camera in a special mode, he found dark spots in the dayglow images. However, the same spots turned up in calibration images taken by UVI in the laboratory before launch.

"I don't think there were any comets in the lab, so these [spots] have to be instrumental," he says.

In another test, Parks searched both cameras' images for evidence of blurring caused by a wobble in the Polar satellite. If Frank is correct, then the spacecraft's motion should smear the image of the dark spots, just as jiggling a camera will ruin a picture. Parks found no blurring. "Neither [camera] shows evidence for cosmic snowballs," he concludes.

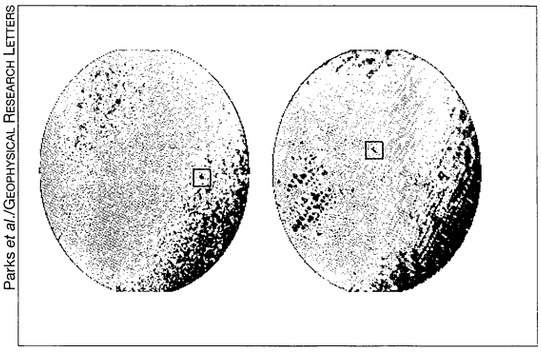
Frank agrees that smaller dark spots could be noise but says that the largest ones appear to be real because they are bigger than the calibration spots. Furthermore, he says, the wobble signature shows up in the data when the motion of the clouds is taken into account.

At the meeting, Frank presented the results of what he calls "the ultimate test." If the dark spots were artifacts, then his camera should see equal numbers at all points in the satellite's orbit. Instead, the number of observed spots decreases as the satellite recedes from the planet, just as his theory predicted.

Other scientists criticized elements of the small comet hypothesis. A team from the University of Arizona in Tucson concluded that small comets cannot exist in large numbers because each would equal the full moon in brightness. Another Arizona group failed to find craters on the moon matching the pattern they would expect if the snowballs were striking it. A third set of Arizona scientists showed that the atmospheres of Earth and Mars should contain far greater concentrations of noble gases if small comets were pelting these planets. Still other scientists proposed that meteoroids could account for some of the dark spots in the ultraviolet images.

NASA is trying to enlist help to detect the hypothetical comets. The space agency is obtaining old data from Navy radar installations and is arranging for observation time on several telescopes.

—R. Monastersky



Parks *et al.*/GEOPHYSICAL RESEARCH LETTERS

A dark spot in the atmosphere (left) resembles one in the lab (right).

Even fraternal twins may share cancer risk

A woman under age 45 with a twin sister who has breast cancer faces roughly eight times the average risk of getting the disease, a new study shows. Moreover, a man whose male twin has testicular cancer confronts nearly 38 times the normal risk for that rare disease.

Researchers at the London School of Hygiene and Tropical Medicine reached these unsettling conclusions in an analysis of data gleaned from Britain's nationwide birth and cancer registries. After locating twins who were cancer patients in England and Wales between 1971 and 1989, they determined how often both siblings of a pair developed the same cancer.

In comparing same-sex twins, both identical and fraternal, researchers found that of 301 women between the ages of 20 and 44 whose twins had breast cancer, 22 had the disease. Of 113 men whose twins had testicular cancer, 3 had received the same diagnosis. Both incidences greatly exceed the cancer risk faced by the general population. Among both groups of twins, the onset of cancer at a young age in one twin increased the chance that the other twin would develop the disease.

"This does suggest something prenatal," says epidemiologist Anthony J. Swerdlow, a coauthor of the report in the Dec. 13 LANCET. Both fraternal and indentical twins share the intrauterine environment, although fraternal twins diverge genetically and identical twins do not.

Swerdlow and his colleagues also found that fraternal twins generally have higher breast and testicular cancer risks than identical twins. While about two-thirds of all twins are fraternal, the data reveal that among the men with testicular cancer whose twin status was known, 85 percent were fraternal. Of the twins with breast cancer, 77 percent were fraternal.

The findings hint that estrogen plays a role in cancer risk. Earlier studies relating breast cancer to high birthweight suggested that exposure to high concentrations of estrogen in the womb may increase the risk of cancer later in life (SN: 2/15/97, p. 108). Women pregnant with twins have high concentrations of estrogen, and some data suggest that women carrying fraternal twins have even higher amounts, says Neil E. Caporaso, an epidemiologist and oncologist at the National Cancer Institute in Bethesda, Md. The new study provides only indirect support for the estrogen theory, Swerdlow says, since "there might be other factors."

In any case, the increased risk of cancer stemming from being a twin seems to decline with age for both breast and testicular cancer, Swerdlow says.

The study "is a milestone," says Dimitrios Trichopoulos, an epidemiologist at Harvard University School of Public Health in Boston. "It's the best study on this subject that's ever been done."

—N. Seppa