Europe's high-flying X-ray eye: Exosat

Even with results just beginning to emerge from the IRAS satellite's studies of the infrared sky (see p. 356), the European Space Agency's Exosat was launched May 26 to take the latest look at X-ray sources at the other end of the spectrum. Based on a proposal from the late 1960s, Exosat will observe its targets not only by aiming its instruments at them, but by watching as their emissions are blocked from sight by the edge of the moon.

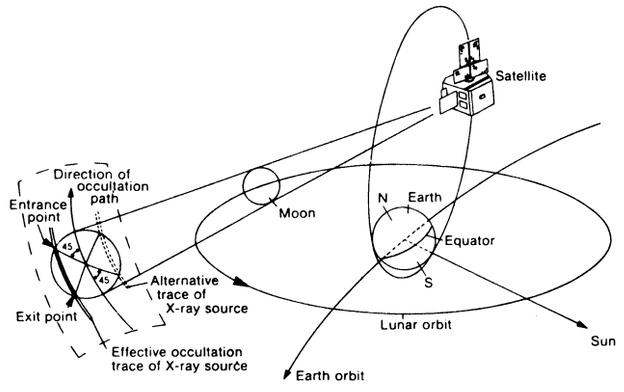
Placed in an orbit ranging from less than 350 to more than 191,000 kilometers above the earth, the satellite has an almost unobstructed view of the celestial sphere, enabling individual sources to be tracked continuously for up to 80 hours at a time. This also puts the probe in nearly uninterrupted sunlight, minimizing the distortions caused by temperature changes from going in and out of earth's shadow. (It will still not have a full-time view, however, since its lofty excursions will carry it up and down through earth's radiation belts, so its observations will be limited to times when it is at least 50,000 km up.)

Exosat will be able to view about 20 percent of the sky in its "lunar occultation" mode, using the progressive advance of the moon's edge to help map the X-ray brightness of diffuse sources. Using 12 cold-gas jets to control its instruments' orientation, the satellite carries fuel for about 50 such occultation measurements, each lasting from about an hour before the moon gets in the way until an hour after. The conventional, non-occultation observations will be possible over much longer timespans.

Exosat was originally designed in 1977 (following a four-year delay due to ESA's funding difficulties) to be launchable by one of the National Aeronautics and Space Administration's Delta rockets, since ESA's own Ariane rocket was then still being developed. When Ariane came along, it was decided to switch, but the Delta compatibility proved to be a godsend. Exosat was set for launching late last year on Ariane #6, but Ariane #5 suffered a malfunction that left it on the bottom of the Atlantic and caused a lengthy delay in the program. With ESA trying to maintain a predictable launch schedule for its paying customers such as communications and weather satellites, Exosat was faced with the possibility of having to wait until 1984 for an available Ariane flight. Concerned both with the cost of such a delay and with the chance that certain of the satellite's components would deteriorate during the long storage period, the project's astronomers urged ESA to switch back to a Delta launch —buying the service from NASA for about $26 million. A certain amount of pride-swallowing was presumably involved on ESA's part, not only because Ariane is competing for business with NASA's space shuttle but because tight U.S. space funding has prompted NASA to cut back its involvement in several U.S./European programs, generating considerable frustration in Europe. Nevertheless, ESA bit the bullet in late February (barely three months before the launch), and has publicized the view that NASA's short-notice response "confirms the very good relationship between ESA and NASA and proves that transatlantic cooperation in the space field is indeed a reality." A "reality" viewed in many quarters as being of increasing importance to both space agencies.

One form of such cooperation (besides sharing in the development cost of some missions, though Exosat is not one — NASA will merely provide some assistance with tracking) can involve international participation in the actual research. Some ESA missions proposed in recent years, for example, have been pointedly designed so that NASA could either stay out or pay part of the cost and join in. Exosat, however, has been envisioned since its 1973 inception as a satellite whose data would be made available to "a wide [and thus presumably international] scientific community, rather than be restricted to instrument developers as had been the case for all previous Agency scientific programmes." ESA still states this view (the quotation is from 1983), suggesting that Exosat may be filling a role not only as an observatory, but as a fence-mender.

—J. Eberhart



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Exosat's highly elliptical orbit, inclined 72° to earth's equator, allows the satellite's instruments to observe the changing brightness of X-ray sources in the sky as they are progressively blocked off by the moon and then re-emerge after the "occultation."

Food for thought in the elderly

Even when older people are well educated and financially comfortable, they may experience mild nutritional deficiencies that cause subtle impairments in thinking and memory. So suggests a study conducted by New Mexico scientists and reported in the June 3 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

Past studies have shown that nursing home patients with severe nutritional deficiencies suffer a moderate to severe impairment in thinking and memory, and that giving them nutritional supplements improves their cognition. Other studies have revealed that many independently living older people—perhaps as many as half of those in the United States — experience mild nutritional deficiencies. But whether persons in this latter group also suffer thinking and memory impairments due to their nutritional deficiencies hasn't been known. James S. Goodwin, Jean M. Goodwin and Philip J. Garry of the University of New Mexico School of Medicine in Albuquerque decided to test this hypothesis.

They studied 260 subjects between the ages of 60 and 94 years who were living on their own. Eighty-five percent had finished high school, and 49 percent had finished college. Their mean monthly income in 1979 — when the study was launched — was $1,186. On the basis of physical examination, all appeared to be in good health and not to be suffering from any severe nutritional deficiency. However, since it was possible that some of the subjects were suffering from mild nutritional deficiencies, their nutritional status was assessed—first with three-day food records which they themselves provided, and then with analysis of specific nutrients in their bloodstreams. They were then given two psychological tests — one to measure ability to think abstractly and to solve problems, and one to measure their ability to remember.

The investigators found that the five to 10 percent of subjects lowest in nutritional status on the basis of food records did poorer on the thinking and memory tests than did the remaining 90 percent of subjects with superior nutritional status. They also found that the five to 10 percent who were lowest in nutritional status on the basis of blood levels of vitamins also did worse than the top 90 percent on thinking and memory. Protein, vitamin C and various B vitamins — folic acid, niacin, pyridoxine, riboflavin, thiamine and vitamin B_{12}—emerged as the nutrients of particular importance to subjects' ability to think and remember.

What is now needed, the scientists say, is a study to learn whether nutritional supplements can improve the thinking and memory of healthy older people.

—J.A. Treichel