Space Science: The Longer-Term Concern

By JONATHAN EBERHART

For three years running, beginning with fiscal year (FY) 1983, NASA requested less money in its successive budgets for research and analysis (R&A) of data about the planets than it had received from Congress the year before. Each time, congressional committees, responding to pressure from space scientists, boosted the amount to *more* than the previous year's sum. For FY 1986, however, NASA is actually seeking a planetary R&A increase on its own. It is a small one, less than the amount of deterioration expected from inflation, and amounts to only 2.3 percent (to a total amount of $62.9 million) in an overall NASA budget whose requested increase (to $7.89 billion) is about 5 percent (SN: 2/9/85, p. 86). But its presence, unlike past "augmentations" that have been inserted by Congress after the fact, is described by one space science watchdog organization as "a welcome change from recent crisis years."

And yet, says the Space Science Working Group (SSWG) of the Association of American Universities, which recently completed an analysis of the NASA FY '86 budget request, tight money problems of a deeper kind are still there. "These are not problems which have developed overnight, or in one year, and they will not be solved in one year either," said Arthur F. Davidsen, director of the Johns Hopkins University Center for Astrophysical Sciences in Baltimore, presenting SSWG's view recently to a congressional space science subcommittee. "... Each year that these problems are not addressed," he noted in a prepared statement, "they become more critical and difficult to solve."

In fact, says SSWG chairman Martin H. Israel of Washington University in St. Louis, figures from NASA's own Space and Earth Science Advisory Committee (SESAC) indicate that the purchasing power (in corrected, 1982 dollars) of NASA's R&A budgets for space science has been decreasing by about 3 percent per year for 15 years.

SSWG cites four "fundamental aspects" of the NASA program, fitting all or in part under R&A, which it says need "substantial improvement" over time: development of new instruments, inexpensive opportunities to fly them, increased graduate education programs and increased recognition of the role of R&A in general (as a separate matter from the spectacular space missions themselves).

In SSWG's view, says Davidsen, "the NASA space program ... is on a ballistic trajectory for 1986. Superficially, this may sound good, but in reality it means the rocket engines have been shut off, and we are just coasting.... And as long as no new energy or momentum is added to our projectile, its path will eventually come to be recognized for what it really is—free fall."

The future of NASA's R&A programs, furthermore, depends in part on the year-to-year progress of the agency's overall budgets, sometimes a difficult thing to read. A year ago, in presenting NASA's FY '85 budget request, agency head James Beggs said that President Reagan had included 1 percent of "real growth"—above and beyond inflation—and planned to include an additional 1 percent per year through the end of the decade. This year, when asked whether the 1 percent indeed showed up again, Beggs said yes—if one allows for the fact that, "in line with the President's initiatives," the same budget also includes a 5 percent pay cut for the federal government's civilian employees.

It also includes the beginnings of no new spacecraft programs, even though two (the TOPEX ocean topography experiment and U.S. participation in the International Solar Terrestrial Program) were specifically recommended by SESAC itself. And SESAC had concluded in a report just seven months ago that the studies and new equipment covered by the R&A category must be given "a priority in funding and attention commensurate with that of flight programs."

A number of U.S. space spectaculars are coming soon, such as the Voyager flyby of Uranus and the launching of the Hubble Space Telescope, "and we can probably survive by coasting for a year," Davidsen noted, "but it will require more energy next year if it is to avoid slipping into free fall."

For example, the slight increase in the planetary category of R&A, although an improvement over previous years, "doesn't deal with the long-term problem," according to Eugene Levy, director of the University of Arizona's Lunar and Planetary Laboratory in Tucson. "In past years," he says, "it looked like 10 to 15 percent of the research groups would be put out of business." The FY '86 plan does not seem to renew that threat, but he maintains that the small boost is insufficient to introduce real changes and, when further diminished by inflation, becomes "just another step in the erosion."

And that, says the SSWG, *is* the long-term problem. The group's four proposed "fundamental" remedies:

- **Frequent, low-cost flight opportunities in earth-orbit.** More important to earth science, physics and astronomy than to planetary research, notes Israel, they nonetheless represent opportunities in those fields to develop new instrumentation, conduct science and give graduate students "hands on" experience in a variety of ways. Besides NASA's inexpensive (and restrictive) "getaway special" canisters, carried by the space shuttle, there are other shuttle-borne systems in the works, such as "hitchhikers," which are like enlarged getaway specials but with provision for two-way communications with scientists on the ground. What used to be provided only by balloons and sounding rockets ought now to be a role for the shuttle, says Israel. But he echoes Davidsen's remark that "it is clear that the shuttle has so far not provided the quick and easy access to space that is necessary for a productive space science program." Furthermore, Davidsen says, touching on a theme close to President Reagan (as well as to NASA's Beggs), "NASA needs a 'frequent-flyer program' in 1986 if it is to have many experienced and loyal passengers for the [proposed U.S.] space station."
- **New instrumentation.** "Much university laboratory equipment for space research," the SSWG report says flatly, "is out of date." In fact, says Davidsen, "much of our current research is being carried out, and the next generation of students being trained, with equipment from a past generation." In 1983, says Israel, a NASA university-relations study group urged the addition of $11 million a year to space science R&A funds expressly for equipment. And, he notes, in some fields — such as analysis of isotopic anomalies in microgram samples of meteorites — researchers without state-of-the-art equipment sometimes "just can't play." Levy puts it more strongly still: With limited resources, he says, many institutions find themselves with a choice either to do without the equipment or "fire the staff."
- **Graduate education.** "Universities train the future generations of scientists and engineers," notes the report, and here the SSWG actually gives NASA a passing mark. Last November, the agency expanded a program that was supporting graduate students in research at NASA centers to include 40 more students each year—to grow to 120—working at NASA-supported university laboratories.
- **R&A itself.** Here the SSWG's main comment is a quote from the report of NASA's own SESAC advisory group (SN: 8/18/84, p. 103), though its members are non-NASA scientists: "It cannot be emphasized too strongly that the quality of NASA's scientific program and the return that the country receives from its investment in space missions directly depends upon the effectiveness, the health and the vitality of the Research and Analysis Program."

On its own behalf, the SSWG says in its own report that "it is notable that for the first time in several years, NASA is proposing increases for all of the Research & Analysis budget." But, the group adds, "the continuing erosion in U.S. basic space science research represents a loss of investment in our nation's future." □