

had its critics—for instance, the Space Science Board of the National Research Council, which advised NASA last year it could see no scientific reason for a manned space station during the next 20 years, but since then, after a conference at Woods Hole on Cape Cod this summer, concluded that some science could be done on board. Despite vocal opposition in some scientific circles to another of the President's favorite projects, DOD's Strategic Defense Initiative, it seemed clear that Congress would go along with it. The President, who had first revealed SDI during a televised speech in March 1983, often called its development "a moral obligation." "Some call this Star Wars," he told the American Legion convention in Salt Lake City in September. "I call

it prudent policy and common sense."

Pass the fat. Congress, for its part, provided some preferences of its own, as it usually does to demonstrate to the agencies and public that it is responsible for the care and feeding of science, education and many other constituencies. Among its more public-spirited actions, it increased support for science and mathematics education, university space science programs, advanced scientific computing and postgraduate research fellowships. It also ignored outraged cries of "pork-barrel" tactics from leaders of the academic and scientific communities in adding funds for new science buildings at four campuses: Catholic University in Washington, D.C., will get another \$9 million on top of the \$5 million last year to

continue building its Vitreous State Laboratory; Columbia will receive \$3 million more for its National Center for Chemical Research, which got \$5 million in fiscal 1984; \$7 million will go to a new supercomputer center at Florida State University, located in the Congressional district of Representative Don Fuqua, chairman of the House Science and Technology Committee, even though a supercomputer center already exists at the University of Georgia, some 250 miles away; and \$2.3 million will be handed to the University of Oregon for a science and technology building. While none of these items was in the administration's budget request and none was submitted to peer review of any sort, funds for them will come from one source: Basic Energy

VLBA: A Congressman's victory over NSF project

In 1982, the National Research Council's Astronomy Survey Committee recommended as its top priority for ground-based astronomy the construction of an array of ten 25-meter radiotelescopes widely spread from Hawaii across the US to Puerto Rico. Known as the Very Long Baseline Array, it would operate as a single instrument, with each antenna directly controlled from a main operation center in Socorro, New Mexico. The committee, under the chairmanship of George B. Field of the Harvard-Smithsonian Center for Astrophysics, figured that VLBA would cost about \$50 million. For that price, said the Field Report, VLBA would surpass all existing or planned radiotelescopes in resolution, sensitivity, speed, image quality, polarization capacity and frequency coverage, providing images at ultrahigh angular resolution of such distant objects as quasars and galactic nuclei, as well as the Milky Way. In addition to providing an extremely accurate fix on the position of the objects, it would make possible the observation of the fine detail of their internal structure and dynamics. Not content with its astronomical capabilities, the committee went on to observe that VLBA would be applied to other important problems—notably, assisting the navigation of interplanetary spacecraft, making possible tests of Einstein's general theory of relativity and, over a period of years, providing repeated measurements of movements of the Earth's tectonic plates as small as 1 cm per year.

The Field Report was eagerly accepted by the National Science Foundation, which had commissioned the survey along with NASA. NSF, in fact, was so enthusiastic, it put VLBA in its budget for fiscal 1985, seeking \$15 million for the National Radio Astronomy Observatory to begin building the array that year. By this year, however, the estimated cost of the entire project had risen, because of inflationary effects, to around \$61 million.

Rising costs. Members of Congress also were concerned about rising costs. If all the recommendations in the Field Report were carried out, some claimed on Capitol Hill, the cost would run to much more than the \$1.9 billion the committee had reckoned when it totted up the sum in 1980 dollars. In June

1983, the House Committee on Appropriations directed its staff to review the implications of the Field Report for both NSF and NASA. The result was a critical 46-page report in which the House staff argued against supporting several proposed astronomy projects during the rest of the decade, especially because new facilities, such as the National Optical Astronomy Observatories and the Space Telescope, would certainly require more funding. Some US astronomy facilities, claimed the staff report, suffer from computer analysis problems or duplicate existing and planned centers, including those at Mauna Kea, Hawaii, and Cerro Tololo, Chile, where US and foreign countries support instruments side by side.

Armed with the report, Representative Edward P. Boland of Massachusetts, chairman of the House Appropriations subcommittee that oversees NSF, attacked the VLBA. As Boland saw it, astronomy was going to get a substantial sum for the space telescope and its institute at Johns Hopkins University through NASA and NSF was in the midst of reorganizing and coordinating three independent national astronomy centers that the Field committee had urged. What's more, the Field Report had assumed that NSF would construct a 25-meter millimeter-wave radiotelescope as part of an "essential" program to support basic astronomy research that was estimated to require a \$95 million increase in expenditures over a decade. It turns out that NSF dropped the plan about the time the Field Report came out because the 25-meter telescope was overtaken by more technologically advanced radiotelescopes. Anyway, claimed Boland, it is more important that NSF put more money into science education than into VLBA.

Successful case. Boland and his Appropriations committee aide, Richard N. Malow, succeeded in making this case in the House report on NSF. "For too long the funding of science education programs has received a disproportionately small share of the Foundation's budget," it said. "The 1985 request for science education represents only 5% of the total requested for the Foundation—and that level is down from approximately 5.7% in fiscal year 1984. In fact, it is important to

point out that the total amount requested and appropriated for science education for the past ten years is less than \$625 million. During roughly the same period, NASA and NSF astronomy projects either completed or currently underway have totaled \$2.9 billion. In addition, astronomy projects planned for the NSF and NASA as new starts for the balance of the 1980s are estimated to cost approximately \$2.25 billion. These projects include an advanced x-ray astrophysics facility, a shuttle infrared telescope facility, a solar dynamic observatory, the very long baseline array, the new national technology optical telescope, a large deployable reflector and a solar optical telescope.

"The committee, therefore, does not believe that the astrophysical or astronomy sciences have been underfunded. It does believe, however, that science education, which is vital to ensuring the future science capability of this nation, must receive an appropriate share of the Foundation's budget. In that context, the committee directs the Foundation to seek a 1986 fiscal year appropriation request that will reflect a commitment to a sustained level of funding of at least 8.5% of the total Foundation budget."

Boland convinced his colleagues in Congress that \$6 million of the \$15 million requested for VLBA in fiscal 1985 could be safely cut so that the funds could be applied to science and math education at NSF. What's more, even the remaining \$9 million for VLBA could not be spent until next April. Boland was not so successful, however, in persuading Senate members to go along with the House provision that NSF will allocate at least 8.5% of its budget in fiscal 1986 to science education. The Senate-House Conference Committee expressed its concern "about the precedent such 'linkages' would have on the respective constitutional responsibilities of the legislative and executive branches of government. Indeed, it was only with the fast footwork of two senators, Pete V. Domenici of New Mexico, and Jake Garn of Utah that the administration's project was saved from zero budgeting this year and the April spending compromise worked out.

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