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**COVER:** This "fingerprint" of an auroral spread superimposed on a satellite photo of the United States at night is the first direct measure of the X-rays, or Bremsstrahlung radiation, produced by an electron shower. The aurorae were photographed by the Defense Meteorological Satellite Program F2 satellite on Dec. 2, 1977. The colored spectra superimposed vertically represent the X-ray intensity of the aurorae: The higher the intensity, the higher the spike and the denser the aurora. Such direct sensing may help determine the effects of the magnetosphere on the ionosphere and lower atmosphere. (Photo courtesy of P. Mizera/AGU)

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**SCIENCE NEWS OF THE WEEK**

**Budget 1980: R&D lean at \$30.6 billion . . .**

Despite a proposed federal budget characterized by broad fiscal restraint, the FY 1980 budget that President Jimmy Carter handed Congress this week calls for continued government-wide growth in the spending for basic research. New obligations would exceed \$4.6 billion for basic research, up 9 percent over the FY 1979 figure. This represents a growth of two percent over cost increases, according to Frank Press, the President's science advisor. And obligations for all research and development, including basic research, would climb to \$30.6 billion, an increase of 4.2 percent over 1979.

The Carter administration, in its 1979 and 1980 budgets, has continued a trend of increasing R&D spending; cumulative R&D outlays for the two years would climb \$5.1 billion — 21 percent — including a 27 percent increase for basic research.

One of the more substantial changes is a requested 50 percent increase — to \$81 million — for advanced research equipment to upgrade aging laboratories. Other major projects earmarked in this budget:

- continued funding of the ISABELLE intersecting storage accelerator at the Brookhaven National Laboratory. It would be the most powerful physics-research facility of its type in the world;
- acquisition of a new coastal-research vessel to upgrade the academic oceanographic-research fleet;
- construction of three nuclear-physics facilities — a heavy-ion facility at Michigan State University; an energy doubling, electron-beam recirculator at the Massachusetts Institute of Technology; and an experiment-staging area for the Meson Physics Facility at Los Alamos Scientific Laboratory.

The defense budget for R&D is larger than for any other federal agency, accounting for approximately 45 percent of the total. Part of the justification for the requested 17 percent growth, to \$436 million, that Carter proposed for support of DoD's basic research is initiation of a six-year drive to develop submicron-size

very-high-speed integrated circuits and to develop high-energy lasers and particle beams. DoD sources contend that the high-quality microelectronics required for reconnaissance and attack systems are not being developed by industry. Complementary programs funded through the National Science Foundation would investigate the fundamental properties of microstructures, and the National Bureau of Standards would develop reference standards and technical services to aid the microelectronics industry and research community.

**NSF . . .**

If the proposed budget of the National Science Foundation is any indication, President Carter's interest in and support of science has not waned. The NSF budget request for FY 1980 breaks the billion dollar barrier, climbing to a high of \$1.006 billion. This represents an increase of \$77.6 million, or 8.4 percent above 1979, with major emphasis (\$828.3 million, an increase of 11.8 percent) being placed on basic research. Although the NSF budget accounts for less than .002 percent of the President's total request, the increase is significant and is perhaps substantial enough to keep up with inflation.

"The 1980 budget increases," says Richard C. Atkinson, director of the NSF, "reflect the fact that the President and his advisers clearly recognize that basic research is an investment in the nation's future." A large portion of that investment would go toward the purchase of equipment and instrumentation needed for individual research projects. Emphasis will be placed on programs aimed at upgrading science education and on programs designed to increase opportunities for minorities, women and handicapped persons to participate in careers in science. Special attention also will be given to fast-moving areas of science — brain function, nerve cells, food-related research and substitute materials.

Department or agency	Obligations			Outlays		
	1978 actual	1979 estimate	1980 estimate	1978 actual	1979 estimate	1980 estimate
Defense.....	11.5	13.0	13.8	10.7	12.1	13.4
Energy.....	4.2	4.6	4.7	3.9	4.5	4.6
National Aeronautics and Space Administration.....	3.9	4.4	4.5	3.8	4.2	4.4
Health, Education, and Welfare.....	3.2	3.7	3.7	3.0	3.2	3.6
National Science Foundation.....	0.7	0.8	0.9	0.7	0.8	0.9
All other.....	2.7	2.9	3.0	2.4	2.8	2.8
<b>Conduct of R. &amp; D., total.</b>	<b>26.2</b>	<b>29.4</b>	<b>30.6</b>	<b>24.5</b>	<b>27.6</b>	<b>29.7</b>

## HEW-NIH . . .

Emphasizing three major initiatives — preventive medicine, mental health and alcoholism and health systems reform — the Department of Health, Education and Welfare has asked for a \$191 million increase in the public health services budget, making the 1980 request \$7.8 billion.

About \$288 million of the \$425 million increase requested for preventive health measures would go to the proposed Child Health Assurance Program for primary care to low-income children and pregnant women. In its first year of service, an adolescent pregnancy prevention program would receive a \$53 million increase. Other preventive health programs that would receive significant increases are occupational health, antismoking, disease control and hypertension screening. Funding for childhood immunizations would decrease due to the success of reducing the backlog of unimmunized children.

The President has asked for an 8 percent increase for HEW's Alcohol, Drug Abuse and Mental Health Administration, making the overall 1980 ADAMHA budget \$1,114,600,000. The figure, according to ADAMHA spokesmen, includes two \$99 million projects that require new legislation before they may be implemented: The Community Mental Health Systems Act — as urged by the President's Commission on Mental Health, this would expand community services by loosening somewhat the funding requirements of the past — and a block grant program making more monies available to states for drug, alcohol and mental health services, and giving states a greater say in how such money is used.

The budget request also includes: \$160 million to the National Institute of Mental Health for research including prevention, utilization of treatments, hyperactivity, childhood depression, brain polypeptides and neuropsychology; \$50 million to the National Institute on Drug Abuse to study brain endorphins and enkephalins involved in addiction, possible long-acting narcotic substitutes and antagonists and nicotine dependence; \$25 million to the National Institute of Alcohol Abuse and Alcoholism for research into genetic and other causes of alcoholism, plus \$35.5 million for "special alcoholism initiatives" dealing with women and alcohol use, fetal alcohol syndrome, domestic violence and occupational aspects of alcoholism. Clinical training for all three agencies would be slightly reduced from 1979.

A net increase of \$20 million is budgeted for health systems reforms. A \$35 million increase is requested to expand health maintenance organizations, and a new program is proposed to help hospitals eliminate or convert unnecessary beds. Residency programs in family medicine and the Indian Health program would also receive significant boosts.

Despite an apparent cut in their proposed budget request, the National Insti-

tutes of Health have done "astonishingly well" compared with the rest of research, according to a spokesman. The budget, which would maintain the 1979 level of \$3.2 billion, calls for a 1.2 percent increase in basic research which is offset by a corresponding decrease in clinical and applied research. Though the National Cancer Institute still claims most of the pot, the National Institute of Child Health and Human Development would receive the largest boost — \$5.6 million — most of which would go to population research. General Medical Sciences snared the next largest share for a single program — \$4.4 billion to study cellular and molecular bases of disease. Additional money is being targeted for studies of the relationship between diet, environmental chemicals and cancer; effects of diet and smoking on heart and lung disease; and infectious tropical diseases.

## NOAA . . .

The President has requested \$735.3 million be available in 1980 for ocean, climate and weather services through the Department of Commerce's National Oceanic and Atmospheric Administration, a net increase of \$57.2 million over 1979. Approximately \$60 million would be available for new programs, including the initiation of the National Climate Program and an ocean pollution research program. The National Climate Program budget, totaling \$113 million from seven agencies, would receive \$7.1 million from NOAA. Weather services and research would have a net increase of more than \$18 million (aided somewhat by closing 22 part-time weather stations) devoted to a prototype flash-flood forecast and warning program, a remote sensing program for agricultural users, improving short-term local forecasts and hurricane research. Eight additional states would receive grants through the Coastal Zone Management program at a cost of \$9 million, and the Marine Sanctuaries program would be expanded. Marine environmental assessment programs would receive a large push (\$2 million) particularly with the beginning of an "ocean pulse program" to monitor the marine environment. Intensified studies of endangered marine animals would reap \$1.1 million and fisheries enforcement and management plans would receive \$2.6 million and \$2.1 million, respectively.

## NASA . . .

The National Aeronautics and Space Administration's \$4.725 billion budget plan is dominated by the Space Transportation System — essentially the space shuttle — which would account for more than 40 percent of the total and nearly 53 percent of what NASA defines as its research and development programs. The total is up \$159 million (about 3.5 percent) from the FY 1979 amount, of which \$96.2

million is in the area of space sciences — yet there are no new projects at all in the agency's FY 1980 plan. The proposed "science" increases are all for projects already underway, such as the Galileo orbiter and probe of Jupiter, the international "Solar Polar" mission, the shuttle-borne space telescope and others. Notably missing are two interplanetary missions that have been strongly advocated by the scientific community: the Venus Orbiter Imaging Radar, designed to give the first global view of that planet's surface, and a project that would fly past Halley's Comet on the way to a longer, velocity-matched rendezvous with comet Tempel 2. Corrected for inflation, the NASA plan is actually reduced from FY 1979, with 674 layoffs planned in the FY 1979 to 1980 period.

## DOE . . .

While the Department of Energy's proposed budget reflects only a slight effective increase in support for its programs, there are substantial changes in several major programs. The big winner, if President Carter has his way, is clearly solar. Overall support for solar R&D, as represented by outlays and tax credits, is up 24 percent to \$800 million. Solar-development programs whose payoffs are viewed as more distant and speculative fared even better; they would increase 40 percent. In fact, the agency's expressed commitment to finding new energy-supply answers is demonstrated by a 17 percent increase in obligations for basic research.

DOE Secretary James Schlesinger said that as programs near commercialization, the agency will shed its support so industry can move in. That partly explains the proposed 1980 decrease in geothermal and hydroelectric funds, he said.

And while nuclear-fusion and fossil programs basically held their own, fission — still DOE's dominant program — decreased by around 14 percent. Breeder and advanced reactor programs were among the notable losers, representing President Carter's concern with nuclear proliferation. What few gains appeared, were in programs for proliferation-resistant reactors, uranium-resource assessment, commercial waste management and spent-fuel storage.

## EPA

The Environmental Protection Agency's proposed budget shows an increase of \$76.6 million — to \$5.1 billion — for 1980, with program emphases staying about the same. The toxic-chemicals programs, however, would gain \$44.4 million over 1979. Funds requested for study of health effects due to pollution increased \$37 million. Similarly, grants-to-states programs would gain \$37.3 million for programs to control pollution, improve drinking water, control hazardous wastes and conduct environmental research. □