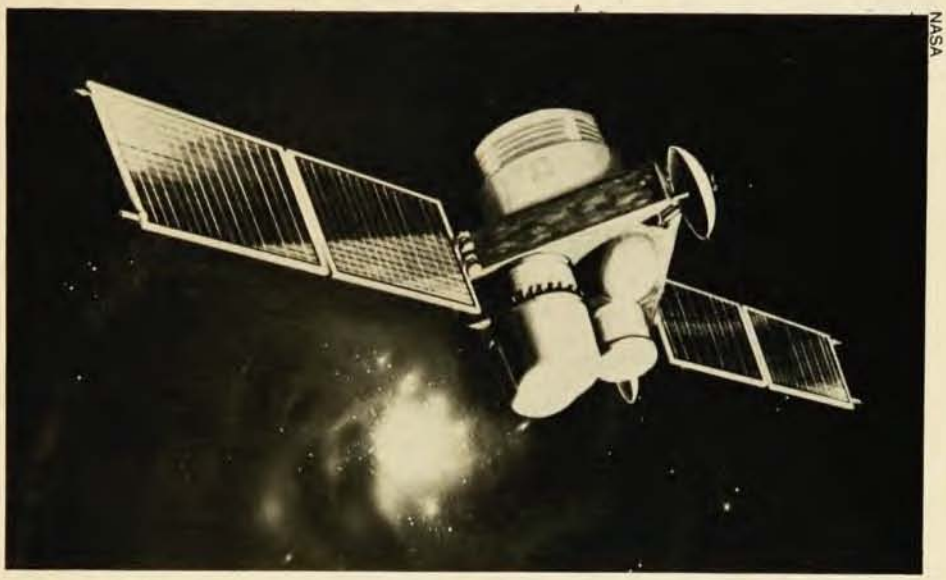
state & society

NASA budget for space sciences is 7% below 1980 level

Basic research at the National Aeronautics and Space Administration was one of the Federal basic research programs hardest hit by President Carter's budget-balancing amendment. The President has asked that his initial NASA budget request of $5.737 billion be trimmed down to $5.518 billion. This is about 5% above the expected level for 1980. But the single largest program in the budget, the Space Shuttle, is to be left intact. This translates into severe cuts in the space-sciences budget. Although space sciences accounts for only 13% of the total NASA research and development budget, about half of all the funds cut came from space sciences. The only consolation is that the budget is now in the hands of what appears to be a basically sympathetic Congress that may vote to reinstate some of the more devastating cuts.



NASA

Gamma Ray Observatory, to be launched in 1985, will carry a high-resolution spectrometer, burst detector, broad-band spectrometer, double Compton telescope and high-energy telescope.

Space sciences. The 1981 space-sciences budget now stands at $561 million, 16% less than what Carter requested in January and, more significantly, 7% less than what will be spent in 1980, even disregarding the effects of inflation. The bulk of the space-science cuts ($86 million) were taken from the joint US/European International Solar Polar Mission, delaying its projected launch from 1983 to 1985, and from physics and astronomy Spacelab payload development programs. The House Science and Technology Committee has recommended a partial restoration of those payload development funds. The International Solar Polar Mission will use two spacecraft, one provided by NASA and the other by the European Space Agency, to investigate the three-dimensional structure of the solar-wind flow and to study the corona from above the Sun's poles. Until now, spacecraft have measured the properties of the solar wind only near the ecliptic plane.

Other space science cuts include $6.1 million from the largely university-based physics and astronomy research and analysis program, which may be restored by Congress, and $1.5 million from the Pioneer 6 through 11 data analysis budget.

Space scientists are also mourning those projects that never made it as far as the January budget. Included in this category are the Halley Flyby/Tempel 2 Rendezvous mission (which would have yielded the first reconnaissance data on comets), Solar-Electric Propulsion System development (which would have supplied the low-thrust, high-impulse propulsion required for the comet mission and other NASA spacecraft), the Venus Orbiting Imaging Radar (the Venusian counterpart of the Mariner 9 mission to Mars) and the Upper-Atmosphere Research Satellite. These last three were requested by NASA but were denied by the Office of Management and Budget.

Space scientists can draw some solace from the fact that several of these programs have only been deferred, not rejected, and will probably be proposed again next year, such as VOIR and SEPS. There is even a move afoot in Congress to put SEPS into the 1981 budget.

What all of this leaves in the space-sciences budget is the Gamma Ray Observatory ($19 million), the only new start, and some funds ($39 million) for missions launched in previous years, such as the High Energy Astronomy Observatory, the two Voyager spacecraft and Pioneer Venus. Development work will also continue in 1981 on projects begun in prior years, such as the Explorer program ($33 million), Spacelab payload development ($29 million), and sub-orbital projects ($31 million).

The Space Telescope, a 2.4-meter optical telescope and at $119 million the largest single project in the space sciences budget for 1981, is expected to be launched by the Shuttle in 1983 (PHYSICS TODAY, April 1977, page 18). NASA is now in the process of selecting a host for the Space Telescope Science Institute, which would receive and evaluate data from the Space Telescope.

Planetary science. Development of a restructured Galileo mission to Jupiter will continue with $63 million. Galileo consists of an orbiter and an atmospheric probe. When the program was originally started in 1978, NASA was counting on a launch during the 1982 launch window, the optimum launch window for the next 30 years. But delays in the Space Shuttle, which will launch Galileo, have forced NASA to postpone the Galileo launch to the next available launch window, which is in

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1984. This posed a problem for NASA, however, because the 1984 launch will require more power than a 1982 launch would have, and the Interim Upper Stage, the solid-fuel engine that NASA wants to use in Galileo, will not be able to power the entire apparatus to Jupiter in 1984. NASA's answer was to split the Galileo orbiter and probe into two separate launches. Two Interim Upper Stage engines will power the two-part mission, thus adding to the cost of the Galileo Mission. The delays and the redesign of Galileo have cost the Office of Space Science alone about $200 million.

Planetary scientists are concerned about the future of planetary exploration, and with good reason. The Pioneer mission to orbit Venus and drop a probe into its atmosphere and the Voyager mission to fly by Jupiter and Saturn will have completed their primary objectives by the fall of 1981. Galileo will not reach its destination until 1986. During this five-year hiatus in planetary encounters, planetary scientists will have to rely on the backlog of data from these missions to keep them busy. "I think that is an alarming situation," Eugene Levy, chairman of the committee on planetary and lunar exploration of the National Academy of Sciences space science board, told PHYSICS TODAY. "Just as the scientific challenges and opportunities are burgeoning the nation is shrinking away from an active and vigorous program," he said. Compounding this problem is the fact that planetary missions are becoming inherently more and more expensive as we move out of the early reconnaissance phase of planetary exploration.

The new high-energy astrophysics project in the 1981 budget, the Gamma Ray Observatory, will be launched from the space shuttle in 1985. The 1981 budget request for this effort is $19 million. The observatory, which is being designed to last for about two years, will improve our estimates of the positions of gamma-ray sources (such as quasars, supernovas, pulsars, radio galaxies and neutron stars) by a factor of 50–100. It will carry five instruments to detect very high-energy gamma rays from pulsars, nuclear gamma rays and gamma-ray bursts.

Applications. Carter cut his original request for space and terrestrial applications by $26 million to a total of $369 million, 7.3% higher than the 1980 level. At the same time, however, he asked Congress to appropriate an additional $30 million for the Landsat D space and ground systems, which are suffering cost overruns. The applications budget continues to emphasize remote sensing, space communications and materials processing in space.

The 1981 budget includes a National Oceanic Satellite System, a cooperative project between the Department of Defense, NASA and NOAA. NOSS is estimated to cost $800 million over a 10-year period. In 1981 DOD is expected to provide $11.5 million for NOSS, and NASA and NOAA will each provide approximately $6 million. The new monitoring system is to demonstrate the feasibility of providing from polar-orbiting spacecraft, in real time and under varying weather conditions, continuous observation of the Earth's ocean surface winds, sea state, surface water temperature, wave height, ice and other geophysical measurements.

A major new space applications emphasis is a five-year satellite communications development effort. In 1981, $29 million will be spent on space communications, 28% more than in 1980. —MEJ

DOD basic research: 10% real growth

The Congress is now deliberating a request for the FY 1981 Department of Defense budget that includes $637 million for research. That figure is $15 million less than what Carter requested for DOD research in January. Using the official estimate of inflation as it applies to research (of 9% per annum), the current request just allows DOD to claim a 10% real growth for 6.1 (basic) research, keeping Defense Secretary Harold Brown's 1977 pledge.

Most of the $15 million in cuts from the original budget request have been made in the Navy and Air Force research programs, but nothing in the DOD research budget has had to be cancelled totally as a result of the President's budget amendment. Although DOD has not yet decided exactly which programs will suffer budget reductions, George Gamota, DOD director for research, told us that, "judging from past experience, the newer programs will be scrutinized the hardest in the next few months, in order to protect the continuity of research efforts." As of January, DOD's request for basic research in physics was about $120 million, an 18% increase over 1980.

DOD expects to continue its very-high-speed integrated circuits development program in 1981 with about $35 million. The five-year program is expected to cost $200 million. Contracts for this program will be awarded to both universities and industries. DOD has also proposed a $6.1-million ultra-small electronics research program. A generation beyond the very-high-speed integrated circuits, the ultra-small circuits would further reduce the size of the conductor widths to 50–500 Å to achieve still faster circuity.

Approximately $35 million is budgeted for particle-beam technology, of which up to $6 million will be spent on research. The major objective of this program is to demonstrate the feasibility of stable exo- and endo-atmospheric propagation of high-power beams. Ultimately, DOD hopes to be able to apply this technology to weapons uses.

DOD will also devote "a considerable effort" in 1981 to "filling in" the regions of the electromagnetic spectrum for which appropriate sources and detectors are not yet developed. For example, the region of approximately 1 mm wavelength appears to be best for detecting targets and guiding weapons under conditions of poor visibility. But this is a region where the performance of conventional microwave tubes is poor and where conventional lasers are unavailable. DOD is exploring as a source of high-quality radiation a hybrid between the microwave tube and the laser, such as the free-electron laser. —MEJ

CERN elects Schopper as director

Herwig Schopper, head of the DESY laboratory at Hamburg, has been named the next director-general of CERN in a unanimous vote of the CERN Committee of Council. The committee is composed of a delegate from each of the twelve CERN member states. Schopper will succeed the two current directors-general, John Adams and Leon Van Hove, whose five-year terms of office expire 1 January 1981.

Schopper has been a professor at Hamburg University and chairman of the Directorate of Directors at DESY since 1973. He received his doctorate in 1951 from the University of Hamburg and has held professorships at the Universities of Erlangen, Mainz and Karlsruhe. Schopper was chairman of the scientific council of the nuclear research center in Karlsruhe from 1967 to 1969. In 1970 he was named head of the department of particle physics at CERN and since last year has served as a member of the CERN scientific policy committee.

The Italian delegation to the CERN council had at first disputed Schopper's nomination. Schopper was running against an Italian, Antonino Zichichi, professor of advanced physics at the University of Bologna, founder and di-