# Relaunching NASA: Budget Cuts and Management Woes Impel Goldin to Realign Field Centers

The flawless docking of NASA's space shuttle Atlantis with the Russian space station Mir some 245 miles above Earth on 29 June was both a technological triumph and a political paradigm for the former foes. Over the following weekend the movie "Apollo 13," depicting the harrowing voyage to the Moon by three US astronauts in 1970, began setting weekly records as the No. 1 box-office smash. That both events held the American public in thrall says something about the excitement and enthusiasm that space travel can generate. Yet neither the Atlantis–Mir rendezvous nor renewed interest in the Apollo 13 nailbiter will dispel the storm clouds over America's space program.

With Congress wielding a heavy ax to the space agency's budget for the next seven years, NASA Administrator Daniel S. Goldin has launched a mission to economize and reorganize. Goldin's aggressive statements about remaking his agency into a lean and more efficient organization from top to bottom and limiting NASA's field centers to work they are best suited to do have led Clinton Administration officials to refer privately to him as their "poster boy for reinventing government."

Goldin had no choice but to grudgingly accept the White House's draconian $35 billion hit over five years—a huge 31% whack from the projection set in 1992, the last year of the Bush Administration. Then in January the Clinton White House demanded that Goldin chop another $5 billion by the end of the decade. When Goldin was lured from TRW in Los Angeles by the Bush Administration in 1992 to take command of NASA, the agency was on a course toward a $22 billion budget in the year 2000. While NASA's budget this year is $14.4 billion, Clinton asked Congress last February for somewhat less, $14.26 billion, for fiscal 1996. The mid-course correction after the Republican takeover of the House and Senate put the Clinton Administration's projections at $13.1 billion in fiscal 2000. Even so, Republicans in Congress are thinking smaller. Although the space agency has always enjoyed bipartisan support, Republicans, in their zeal to balance the budget by 2002, are intent to allocate $13.5 billion in 1996—about $840 million less than this year. On that trajectory NASA's budget would be below Clinton's projection by the turn of the century.

Angered by Congress's attempts to squeeze additional funds from the agency's budget, Goldin summoned the news media to NASA headquarters on 19 May to argue his cause. Sounding alternately combative and crabby, Goldin warned: "We can't go much further constantly cutting budgets without falling off the cliff. The deeper cuts Congress is contemplating simply go too far, and I am committed to fighting them. If they go through, all bets are off, and we will have to consider shutting down a combination of enterprises, programs and centers, and lose the vitality and vibrancy of the NASA program."

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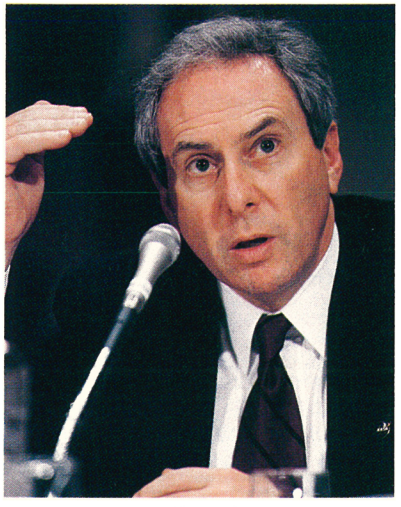


GOLDIN: Cuts will be 'devastating.'

Deeper cuts would "profoundly degrade aeronautics and space research," Goldin said. "It will have a devastating effect." In an interview a few days later, Goldin declared: "I want to tell you I have had it. . . . Maybe [Congress] ought to cancel the whole space program, and we could all sit in the bleachers and watch the rest of the world fly by."

Goldin's ire has been rising for months. Anticipating the budget cuts and micromanagement to come from Capitol Hill, he initiated two studies: a "Red Team" review conducted by senior managers picked by Goldin from headquarters offices and the NASA Federal Laboratory Review, prepared by a 26-member task force consisting mainly of aerospace executives educated as engineers. The latter study was chaired by John S. Foster Jr, formerly TRW's vice president for science and technology and now a consultant there; Foster previously served as director of Lawrence Livermore National Laboratory and director of defense research and engineering at the Pentagon.

The Red Team, with no scientists on board, released its "white paper" in early February as an internal document. Just as well. It riled managers and scientists at most of the NASA field centers because of the drastic shuffling of functions and cuts in personnel it called for. It didn't take long for members of Congress whose district included an affected center to become aware of the white paper and to express their dismay. Among the Red Team's recommendations: Eliminate all life science and gravitational biology from Ames Research Center in California and transfer the research and centrifuges to Johnson Space Center in Texas. Ames also would give up its contributions to NASA's Earth-monitoring satellites for the Mission to Planet Earth. This would leave Ames with aeronautics, which now accounts for 60% of its annual budget. Representative Norman Mineta, a Democrat whose district is nearby, complained that Ames would "remain a full NASA center in name only." But Goldin reassured Mineta that the agency expected the center to continue working with Silicon Valley companies to develop computer systems for 21st-century space odysseys. In fact, Goldin boasted that the recent decision of Silicon Graphics to create 3000 new jobs at a facility adjacent to Ames is an example of the powerful influence of NASA on emerging technologies.

Another Red Team proposal would make Goddard Space Flight Center in Maryland and Caltech's Jet Propulsion Laboratory the only two space and Earth sciences centers, with God-

dard responsible for all other Earth-orbiting space science spacecraft. But Goddard would hand over operation of the Earth Observing System Data and Information System to the commercial sector "to develop and privatize" and would drop about 2000 employees. Responsibility for the space shuttle, NASA's largest single program, would shift from Johnson to the Kennedy Space Center in Florida. Besides taking on all life science programs, Johnson would assume many of the operations and communications functions now at Goddard. Under the plan, Marshall Space Flight Center in Alabama would revert to its original mission—engineering vehicles for space flight. It would no longer conduct microgravity research, design science spacecraft or take part in operating the future space station. Displeased with the quality of work being done at Marshall, the Red Team advocated that development and eventual operation of the Advanced X-Ray Astrophysics Facility be taken out of the center's hands and given to a non-NASA institute.

Instantaneous opposition to the white paper led Goldin to appoint a "Zero-Base Review" panel to reevaluate the Red Team's conclusions. The new group was made up of NASA's senior managers, including a few scientists, led by Richard Wisniewski, NASA's deputy chief of space flight. It was somewhat surprising under the circumstances that the Zero-Base Review took many of the Red Team's recommendations and went somewhat further. While it didn't propose closing any centers or abandoning any major programs, it defined the missions of each center within NASA's five so-called strategic enterprises—Mission to Planet Earth, aeronautics, human exploration and development in space, space science, and space technology.

One of the most startling ideas put forth by the Wisniewski group is to have all aerospace operations, including the space shuttles, done by private contractors. The review team calls for reducing NASA's total civil service employment from the current 21 060 to around 17 500 by the year 2000—the lowest level since 1961, before the start of the Apollo program to land men on the Moon. In 1965, at the height of the Apollo buildup, NASA had 36 000 civil servants on its payroll, many of them scientists and engineers. Retirements, buyouts and other departures since January 1993 have resulted in a paring of NASA's government employees by some 2600, including 400 at NASA headquarters.

The suggested cutbacks would hit Ames hardest, wiping out more than 1400 positions—35% of its government and contractor jobs—over the next five years. Management of Ames's wind tunnel would be transferred to its longtime rival Langley Research Center in Virginia, work on the space station centrifuge would go to Johnson, Moffett Field would be unloaded, and Ames research aircraft would wind up at Dryden Flight Research Center at Edwards Air Force Base in southern California. The panel also followed the Red Team's proposal to close Marshall's Spacelab control facility and transfer future operations of AXAF to a new institute. The Zero-Base Review would give Goddard the hydrology and space science now done at Marshall and would transfer control of spacecraft operations to Johnson. The team also urged Goddard to stop funding contractor scientists and find a university to run the Goddard Institute for Space Studies in New York City. While the Zero-Base Review would eliminate a total of some 28 000 government and contractor jobs in the next five years and reduce spending at the centers, the number of positions and the size of the budget at one facility, Dryden, would actually go up to deal with increased aeronautics research—that is, if Congress does not reject the plan under the Republican rubric of "corporate welfare" as "subsidizing" the aircraft industry.

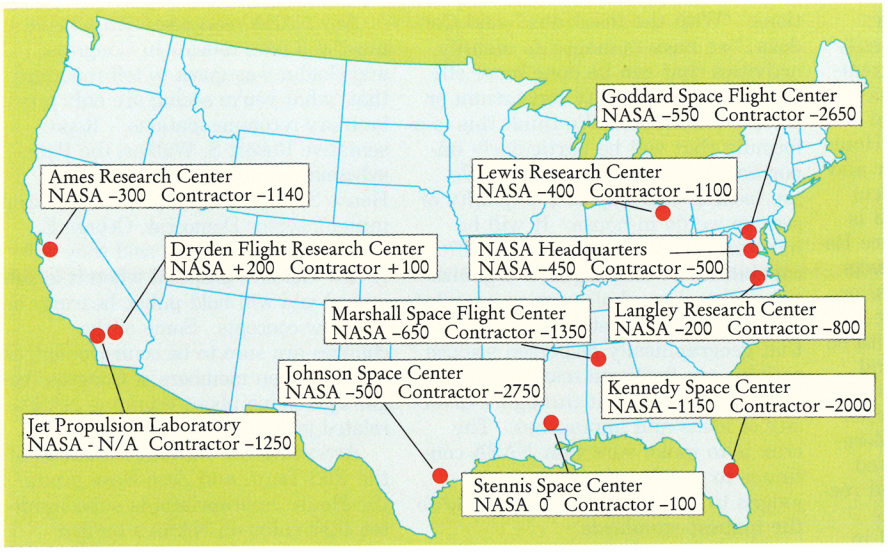
BILL INGALLS/NASA

CORDOVA: Institutes to 'enable science.'

The Wisniewski panel's most significant recommendation for NASA research involves the creation of a half-dozen science institutes, each to be located at or near a NASA site but run by a university, an academic consortium or an industrial company. The move is intended to improve the quality of NASA's scientific efforts, though, "the institutes aren't going to save a nickel," said Goldin at his news briefing on 19 May. "But they will make for much better science at NASA." Goldin vowed to improve peer review and the quality of science at the agency, which has been criticized over the years by some in Congress and academe. "We intend to be more open, more responsive to the science community," said France Cordova, NASA's chief scientist.

In its 69-page report, the Foster task force endorsed the Wisniewski team's concept of science institutes. "There is great appeal in combining NASA research capabilities with the expertise and intellectual resources of a university or consortium of universities," the Foster panel stated. "While not a cost-saving approach, this should help retain and build technical strength in an environment of budget reductions." The task force also agreed with the Zero-Base team on the presence of redundant functions at the centers and urged that the breadth of their missions be narrowed, but it advised NASA to exercise caution before consolidating functions or shifting work. Like the Zero-Base team, the Foster panel stopped short of recommending the elimination of any center. Instead it instructed the agency to continue its examination of options for achieving further savings, particularly by introducing improved management techniques. "The roles and missions, particularly between NASA headquarters and the centers, are complicated and not well aligned with the strategic enterprises," said the Foster report. "There are excessive layers of organization and a headquarters that is attempting to provide too much of the program management." Headquarters should be responsible for "creating vision, objectives, strategies, policies, initiation of programs, international partnerships, congressional relations, budgets and approval of program plans from the centers," the task force noted. "Centers must be delegated authority and accept responsibility for management of programs. Headquarters should retain management of the space station and other major cross-center programs such as the space shuttle."

The Foster group tossed one of its recommendations way beyond NASA in urging the government—presumably the White House and Congress—to provide sufficient funding for "high priority" programs in basic and applied research and to reduce or eliminate lower priority projects or those




**JOB LOSSES AT NASA** are expected to total 28 000 by the year 2000. The map shows how many government and contractor employees will be cut at each of the 10 centers and at headquarters. In addition, if the space shuttle is taken over by a single prime contractor, another 5000–10 000 jobs will be eliminated by fiscal 2000.

that have outlived their importance. Setting such priorities would require wisdom and knowledge beyond the scientific capacities of most politicians, and the Foster panel did not offer guidelines for achieving the ends it seeks.

The agency's dilemma is obvious, said the Foster report. "NASA has a fine body of technical people, but there is too much overhead, too many people, too many layers of organization and too much infrastructure. NASA can elect to retain as much of its staff and infrastructure as possible within the budget mandates, sacrificing programs and hoping that future budgets will improve. Alternatively, it can decide to preserve as many of its critical programs as possible by downsizing quickly to match the new fiscal realities. The task force urges the latter course."

That the Foster panel's conclusions are in accord with those of the Zero-Base Review is no mere coincidence. The two groups swapped complaints, anecdotes and ideas. In the end the Foster report, largely because of the kinds of people associated with it, offered more managerial recommendations: It charged NASA with instituting a standardized financial management system so that data will be "consistent and comparable" throughout the agency. It asked the Jet Propulsion Lab to submit a "formal mission management plan at a programmatic level of accountability" and called on NASA, once it approved the plan, to "terminate its micro-mismanagement of JPL." The panel suggested that NASA establish for each center an advisory council with members drawn from industry, academe and the Federal government. It argued for larger discretionary funds for center directors (now set at roughly 0.1% of their annual R&D budgets for outside contractors) to allow them greater "funding flexibility to take timely advantage of opportunities" in acquiring new technology or other leading edge capabilities—"not toward the solution of program budget problems."

When Goldin read the task force recommendations for managerial changes, he recalled that he shouted, "Yea, verily they are right. We need to empower the center directors." Goldin expressed concern about the Foster report's warning of an imbalance between technology transferred "out" of NASA and technology coming "in." "At present NASA seems too insular in its R&D, and in the future a greater effort must be made to acquire technology from outside the agency," said the report. "In those areas where NASA is behind, it should stop playing catch up. Commercial global communications, navigational satellites and miniaturized optical sensors may be areas where NASA can get useful expertise. NASA should plan and implement an outreach process for timely technology transfer within a broader definition of the activity. This involves stopping in-house work and depending on outside sources for the expertise where it is more advanced than NASA's." Taking the admonition seriously, Goldin canceled development of customized financial management software and directed his staff to find off-the-shelf accounting software for headquarters and the centers.

The Foster task force did not cover some of the route taken in 1991 by a committee headed by Norman Augustine, then CEO of Martin Marietta and now president of Lockheed Martin, the nation's largest defense contractor. The Augustine committee sharply criticized NASA for lacking a true course in space and argued that the US has not had a clear purpose or an ambitious direction since President Kennedy launched the Apollo program in the early 1960s (see PHYSICS TODAY, April 1991, page 87). But whereas the Augustine committee asked Congress to fund NASA for an annual 10% growth rate through the rest of the 1990s, the Foster panel found such a recommendation to make little sense in the present budget-balancing frenzy.

The fiscal straits NASA now finds itself in are likely to strengthen the case for the new science institutes. Goldin, Cordova and many scientists believe the idea has come in the nick of time to invigorate space research. Cordova said the institutes would draw on such models as the Scripps Institution of Oceanography, run by the University of California, JPL, operated by Caltech on NASA funds, and the Space Telescope Science Institute, which is managed by a consortium of 23 US universities through the Association of Universities for Research in Astronomy. "We are not trying to shape the institutes in NASA's image," she declared. "We're interested in what the new managers can bring to the table to make the institutes better scientific establishments. As a first test, Ames and Johnson have been asked to start their engines in the launch procedure."

The Johnson Center in Houston is a natural for creation of a life sciences institute. The region is a bastion for biomedical expertise. NASA employees would retain control of the health and training of astronauts, while life sciences research would be transferred to an organization like

the private Texas Medical Center, which includes the Baylor University hospital. Goldin also envisions creating an industrial park, perhaps at nearby Ellington Field, that could work closely with the institute. Houston already is home to the Lunar and Planetary Institute, which conducts planetary research for NASA and is operated by the Universities Space Research Association. Cordova expects that the planetary and biomedical organizations will eventually merge.

The institute concept appears to be a lifesaver for science at Ames and Marshall, which are bound to suffer major losses of programs and personnel if the Red Team report and Zero-Base Review are fully implemented. "The Red Team's white paper had recommended removing scientific research from Ames," Cordova said in an interview. "It described Ames and Marshall as mere hobby shops." When the white paper appeared, she recalled, Ames became nervous and approached some of the universities in the area—notably the University of California at Berkeley and Stanford University. This led NASA to begin discussing an astrobiology institute at Ames. Meanwhile, several Alabama universities show interest in setting up an institute that would expand on materials science and hydrology programs at Marshall.

NASA also wants a university or nonprofit consortium to take over the Goddard Institute for Space Studies in New York City, now operated by the Goddard Space Flight Center, some 250 miles away. The space agency would like to establish an atmospheric institute at Langley in Hampton, Virginia, and a microgravity and space power institute at Lewis Research Center in Cleveland. The University of Maryland has indicated that it is interested in establishing an institute around Goddard in Greenbelt, Maryland.

Clearly, the initial response by universities to the institute concept has been enthusiastic, but Cordova wants industry to put in bids as well. "I have a portfolio of letters from interested parties," she said, "but so far the corporations haven't expressed interest." If a university, corporation or nonprofit consortium takes on an institute, someone would have to pay overhead costs, of course, which could be a stumbling block to such a venture.

Goldin, who once described the ten NASA centers as "medieval city–states," each with its own fiefdom ready to battle any rival, now sees the institutes as the best way to strengthen space science and engage universities, industry and foundations. "With the institutes," said Cordova, "we have managed to identify activities that can be done more efficiently by a university consortium or private enterprise. We think this is a formula that will be particularly important to strengthen science. We are looking critically at the quality of science we do in-house. It will be hard to justify duplicating scientific capabilities or starting new organizations when the whole agency is under the budget knife, yet we recognize that geographically dispersed science activity can facilitate scientific excellence and excitement through a diversity of ideas and approaches. The crux is to make sure that NASA continues to enable science that is judged to be world class when held to the highest standards.

"We believe that institutes will go a long way in educating engineers to the value of basic research," said Cordova. "What we intend to do is further integrate scientists into what is basically an engineering organization." She pointed out that at JPL, NASA's showcase of science research, fewer than 200 scientists appear on the fulltime payroll of 5800. Everyone at JPL is employed by a contractor, Caltech, not by NASA. In the coming realignment of the field centers, many of the 776 government scientists in all of NASA would likely transfer to the new institutes.

Any NASA reorganization scheme must still pass muster in Congress, and Goldin was quick to tell reporters that "what you're seeing are only preliminary recommendations." Representative Robert S. Walker, the Pennsylvania Republican who heads the House Science Committee, and the committee's senior Democrat, George E. Brown Jr of California, said they will review Goldin's proposal when it is submitted and will hold public hearings on any new concepts. Some of the changes are sure to be controversial, especially when members of Congress begin squabbling about retaining NASA-related jobs in their home districts.

Accepting the recommendations of the Red Team and Zero-Base group, the House appropriations subcommittee that rules on NASA's budget voted on 10 July to eliminate or consolidate Goddard, Marshall and Langley by the close of fiscal year 1997. The subcommittee directed NASA to transfer most of Goddard's missions and functions to JPL and to distribute Marshall's responsibilities to Lewis, Johnson, Kennedy and Stennis as a cost-saving measure. House and Senate appropriators have several months to consider the implications of the various plans to redesign NASA. During that period the costs and benefits are likely to be overshadowed by the politics.

**IRWIN GOODWIN**

## WASHINGTON INS & OUTS

# Clinton Chooses MIT's Moniz to be OSTP Associate Director

On 19 June President Clinton confirmed a rumor that had buzzed in Washington science circles for more than two months: **Ernest J. Moniz**, head of MIT's physics department for the past two years and director of the university's Bates Linear Accelerator Center from 1983 to 1993, would be nominated associate director for science at the Office of Science and Technology Policy. The position is one of four associate directors under OSTP director John H. Gibbons, who also is Clinton's science adviser. If confirmed by the Senate, Moniz will succeed **M. R. C. Greenwood**, who left on 1 May to return to the University of California, Davis, as dean of graduate studies.

Moniz is familiar with OSTP operations. He served as a consultant there, helping Greenwood to organize the forum on university-based research held at the National Academy of Sciences early last year and to draft the Clinton Administration's policy statement "Science in the National Interest."

After earning a PhD in nuclear theory at Stanford University in 1971, Moniz spent a year each at the Center for Nuclear Energy Research in Saclay, France, and at the University of Pennsylvania before joining MIT in 1973. Friendly and highly regarded as a researcher and administrator, he is currently serving as chair of the Nuclear Science Advisory Committee to the Department of Energy and the National Science Foundation and as chair of the External Advisory Committee for Physics for Los Alamos National Laboratory. He will need to give up those advisory posts upon his confirmation.

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