The International Space Station at Risk

Human space exploration is in deep trouble. The challenge is to maintain momentum, visibility, and funding just when the public and the U.S. Congress are preoccupied with problems of security and economic recovery. President Bush's budget request for 2003 cuts funding for the International Space Station (ISS) vehicle and operations and would eliminate its costly Crew Return Vehicle, meant for use in case of an emergency. Substantially less money is sought for biological and physical science experiments aboard the ISS. In February 2002, the new NASA administrator, Sean O'Keefe, was unable to assure the U.S. House Committee on Science that the ISS may ever grow beyond what NASA calls "core complete."

That is not good news, because a core complete station is a minimal station. With a full-time crew of only three, able to use but a fraction of the 30 equipment racks the station holds, a vast opportunity for significant space research will be squandered. Most of the crew's time will continue to be spent on maintenance and repair. (A docked shuttle, another Soyuz capsule, or a Safe Haven might help out somewhat.) The proposed cuts would eliminate the fundamental biology core program and much of the materials science and engineering research, as well as telescience and simulators to assist the investigators. The critical Centrifuge Accommodation Module, including animal habitats and the ability to supply artificial gravity, has been repeatedly delayed—now until 2008. The National Space Biomedical Research Institute, which is developing measures to ensure crew health in long-duration missions, also faces drastic cuts just as its programs are reaching fruition.

U.S. Representative Ralph Hall, ranking Democrat on the U.S. House Committee on Science, fears that a minimal station with a projected 40% cut in its research budget leaves "a station that's hard to justify to the American taxpayers as being worth the billions of dollars we've already put into it." The congressional budget decision, anticipated this summer, represents a watershed for serious space science.

As we are assembling the greatest international laboratory ever conceived, even the space science community is losing its patience. The loss would extend far beyond U.S. science. We have long-standing international agreements with colleagues in Europe, Russia, Japan, and Canada—commitments the United States should honor. Only the continuous presence of a trained crew, available for substantial research as operators and subjects, will allow us to attack critical problems in space life sciences, materials research, physics, technology, and Earth observations. Even in its earliest days, the ISS revealed unexpected cataract development in the astronauts and embarked on a new radiation monitoring program for rare ionized heavy particles. Increasingly large protein crystals have already been grown in weightlessness and depend on the long exposures to zero gravity of the ISS. A major physics investigation, the 6-metric-ton Alpha Magnetic Spectrometer, will search for antimatter particles in space beginning in 2004. In contrast, the Russian space station Mir wasn't fully equipped, and the Shuttle-borne Spacelab and Spacehab missions of up to 2 weeks were too short to track long-duration processes.

One reasonably questions the expenditure of scarce national research resources on health measures to permit space exploration when there isn't even a plan for a plan to explore Mars with astronauts. The answer is that the R&D is complex and time-consuming and that we can ill afford to wait until a Mars mission is undertaken in order to begin to find out how to protect the crew. Furthermore, the solutions to problems of space biology and physiology bear on related clinical problems of bone loss, orthostatic hypotension, balance disorders, and radiation protection on Earth. Without a productive station, there is little future for further human space exploration and all of the education and technology spin-offs that accompany it.

NASA has been considering the establishment of a nongovernmental organization to allow the research community to participate in a streamlined operation of the ISS. This works well for the Space Telescope and should help the ISS as well. The problems facing the ISS cannot be brushed aside, and unless it is restored to its promised capability we will have little opportunity to achieve the scientific return afforded by this unique laboratory. We must do better.

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