

Marina Del Rey, California. He has been chairman of the President's General Advisory Committee on Arms Control and Disarmament since 1982 and serves as a consultant to the Defense Nuclear Agency. He holds a PhD in electrical engineering from Stanford University and has been a member of the physics staff at RAND Corp, a projects officer at the Air Force Weapons Laboratory at Kirtland Air Force Base and a technical-staff member at the Hughes Aircraft Corp Research Laboratory.

Graham has wanted the NASA post for years—even before Mark's appointment, according to sources at NASA. Since Mark's departure, Graham has

lobbied ardently for it—so much so, sources say, that he wangled an hour with Reagan to plead his case after Beggs had refused to accept him as deputy. Beggs argued that Graham lacked the proper background for the post. Reagan overrode Beggs's veto and named Graham on his own. At Graham's confirmation hearing, Senator Ernest Hollings, a South Carolina Democrat, expressed fears that the appointment presages the militarization of NASA—a development that many inside the agency and the Pentagon foresee happening, particularly if "Star Wars" research offers compelling reasons for forging a defensive shield in space.

—IRWIN GOODWIN

Space physicists issue report amid gloom

When the National Research Council's Committee on Solar and Space Physics sent its list of priorities for the next 15 years to NASA on 12 August, it recommended as its top item the International Solar Terrestrial Physics program. ISTP was planned in 1983 as a cooperative effort by the US, Japan and the European Space Agency on a series of six missions to study the Sun's oscillations and interactions of the Sun's plasma wind and magnetic field with Earth's magnetosphere and upper atmosphere. The first spacecraft is to be launched in 1989, with missions continuing into the mid-1990s. The other high priority is the Solar Optical Telescope, a high-resolution instrument scheduled to fly on the space station in the early 1990s and provide the basis of a solar observatory.

By blessing both projects in its report, *An Implementation Plan for Priorities in Solar-System Space Physics* (National Academy Press, 1985), the committee hoped to influence NASA and Congress as others have done—namely, with the Research Council's 1982 Field Report on astronomy (named after the study panel's chairman, George Field of Harvard) and the 1983 report by NASA's own Solar System Exploration Committee. The solar-physics report, however, was completed in a gloomy atmosphere: Its two leading missions are in the budgetary shadows.

SOT delay. Initiation of the ISTP mission was omitted from NASA's fiscal 1986 budget for space science. Then SOT suffered a sharp cut by Congress. SOT has been delayed repeatedly as NASA funneled more funds into completing the Hubble Space Telescope, which it considers scientifically more significant and publicly more glamorous. Even so, the Research Council panel urged the agency to take "immediate" action to develop SOT. The

panel noted that SOT is intended to focus on the Sun's surface oscillations, peculiar rotation and cyclical sunspots, thereby helping to advance the new field of helioseismology (PHYSICS TODAY, April 1982, page 25). It is plain to the panel that SOT and ISTP are likely to provide a better understanding of the effects of the Sun's activity and its plasma energy on the terrestrial environment, along with their possible implications for Earth's weather.

The other two major missions the committee recommends are in less danger just because they are further off. The long-heralded Solar Probe, targeted for launch in 1995, would skim to within four solar radii (about 3×10^6 km) of the Sun's surface to measure the sources of the solar wind in an unexplored region of the heliosphere. The Solar Polar Orbiter would set off in the year 2000 to soar above the poles of the sun to explore the three-dimensional characteristics of the heliosphere.

As it happened, the committee chairman, Stamatios M. Krimigis of The Johns Hopkins University, got a chance to explain the recommendations at hearings before the House Subcommittee on Space Science and Applications on 8 October. Seated beside James Van Allen of the University of Iowa, Krimigis was able to make his case with dramatic aplomb. "The program we envision," he said, "is scientifically challenging, technologically achievable and reflects the natural evolution of discoveries we made when this nation ventured into space. It was Jim Van Allen, using Aerobee sounding rockets, who first explored the Earth's magnetic field... Jim's presence here is a reminder that after opening a whole new world of space physics, we are resting on our laurels."

To give solar-system space physics more prominence within NASA, Krimigis told the five House members at

the hearing, the four separate divisions that now house aspects of the program need to be centralized in a new division at the agency. Moreover, the panel proposed that NASA boost its funding for solar-system space physics from \$300 million in fiscal 1986 to as much as \$400 million per year for the rest of the century. The prospect of this happening depends largely on whether ISTP and SOT actually go into development. It is unlikely that the committee's recommendations will be carried out in Washington's current state of financial restraint.

Possible starts. However, just when the outlook for the science seemed most dismal, NASA Administrator James M. Beggs offered hope. In preparing the agency's budget for fiscal 1987, Beggs is said to have killed the plan for a spacecraft to rendezvous with Comet Wild-2 (PHYSICS TODAY, November, page 38), which would have cost about \$800 million, and instead to have sought White House approval for new starts on ISTP and the TOPEX oceanography spacecraft. TOPEX, which is to be a joint effort with France, would be the first US satellite launched on the European Space Agency's Ariane booster. An impressive reason for advancing ISTP is that it involves Japan, with one satellite, and the US's principal allies in Europe, with two satellite systems, in fulfillment of an agreement signed in 1983. NASA has received reports that both government officials and space scientists at ESA and in Japan are angry over US delays in approving the project. In this connection, Krimigis told House members, "This program would serve to reestablish our credibility with our European allies, which was severely tested following the cancellation of our commitment to the International Solar Polar Mission four years ago."

What's more, the Defense Department has expressed some interest in ISTP in conjunction with research projects of the Air Force and the Strategic Defense Initiative, commonly known as "Star Wars." The US satellites could provide measurements of solar-wind parameters, which have not been available since the redirecting of NASA's ISEE-3 from the vicinity of Earth toward an encounter with Comet Giacobini-Zinner on 11 September. James Ionson, director of SDI's Innovative Science and Technology Office, speaks of using new Chemsat and Multiprobe spacecraft, along with the \$50 million NASA-Air Force Combined Release and Radiation Effects Satellite. These would release gas clouds into near-Earth orbits to examine how missiles might be concealed during reentry into Earth's atmosphere and how lasers perform when fired from the ground through dense clouds. Ionson also

showed interest in the possibility that ISTP could provide the Star Wars program with data on the solar wind's effect on Earth's magnetosphere, which in turn could affect conditions that SDI spacecraft might encounter. ISTP's polar probes also might produce data on space plasma and auroral

phenomena in polar regions, where conditions for missiles and directed-energy weapons are much different from those in equatorial regions.

The Research Council report, it should be noted, was not concerned with Star Wars matters.

—IRWIN GOODWIN

Academies will build western outpost

What Rockefeller and Carnegie did for education, science and medicine earlier in this century, Arnold O. Beckman, founder and chairman of a California company that makes precision instruments, is apparently trying to do right now. Since the early 1960s, when he donated the 1200-seat main auditorium at Caltech, where he earned a PhD in photochemistry in 1928 and served on the chemistry faculty until 1940, Beckman has emerged as possibly the nation's biggest private benefactor of scientific research. His gifts, made through the Arnold and Mabel Beckman Foundation, totaled \$75 million in 1985 alone.

His latest donation of \$20 million is for a West Coast study center for the National Academy of Sciences and National Academy of Engineering. The gift was characterized as "the largest single contribution ever received by the academies." The center will be built on a 7-acre site valued at \$6 million, to be given by the Irvine Co, which is planning and developing an entire city around the Irvine campus of the University of California and near the John Wayne Airport. A letter from President Reagan, distributed at a press conference held simultaneously in Irvine and Washington, D.C., on 4 November, extolled Beckman for a "distinguished career and this generous act," which "combine to make you a sterling example of two essential American qualities: the entrepreneurial spirit and the public spirit."

The construction of the center will begin in spring and it will open for business a year later. It will be used as a West Coast facility for studies and symposia conducted by the academies and the National Research Council, similar to the way the Soviet Academy operates its far-eastern branch in Vladivostok. Both academies, along with the Institute of Medicine and the Research Council, now share buildings in Washington, D.C., and in Woods Hole, Massachusetts. Together, they ran some 70 meetings at universities, hotels and motels west of Denver last year, involving about 2500 scientists, engineers and other specialists. All told, one-third of the members of both academies live in western states, with more members in California, it so

happens, than in any other state in the nation.

NAS President Frank Press said West Coast members wanted to participate in more projects but had been put off by the distance to Washington and Woods Hole. What's more, Beckman observed in answer to a question, a West Coast facility would provide a truly national outreach for the academies and heighten interest in the rapid growth of science and technology in the Pacific Basin.

Studies of ethical issues. Beckman, an NAE member since 1967, explained that the center would be used mainly for broad studies of ethical questions in science and technology. Such issues dominate genetic engineering, for instance, and some defense R&D, such as the Strategic Defense Initiative. "I have long been concerned with the haphazard manner in which we handle many ethical issues related to science, technology and society," said Beckman. "Currently, these matters are aired in the media largely by activists who see only a narrow aspect of a problem. Through simplistic sloganeering and mass demonstrations, they seek to establish policies that should be established only after thorough and thoughtful study by competent leaders in whatever professions may be involved, including social sciences, economics, religion and politics, as well as medical

ARNOLD AND MABEL BECKMAN



and physical sciences and engineering."

Beckman's gift came one month after the University of Illinois announced it would receive \$40 million from the Beckman Foundation to establish a research institute with two centers—one dealing with materials and computing sciences, the other with biology, behavior and artificial intelligence. University administrators call it the largest gift ever by an individual to a public university. Construction of the institute is likely to start next year with funds from a \$10-million grant by the state of Illinois. The state also has guaranteed \$2 million per year to operate the institute, and additional financial support is expected from private sources. The grant for the institute was Beckman's second to his alma mater, where he received graduate degrees in physical chemistry before attending Caltech. In 1979 he gave \$5 million as an endowment to support young scientific and medical researchers at Illinois.

Besides the gifts to the academies and the University of Illinois this year, Beckman has given \$12 million to Stanford University to help build a \$50-million center for molecular and genetic medicine and a \$1.5-million endowment for a research professorship at Rockefeller University. In the late 1970s, Caltech received \$6 million for the Mabel and Arnold Beckman Laboratories of Behavioral Biology, and last year he gave \$2.5 million for the Beckman Laser Institute at the University of California at Irvine and another \$6.5 million to Caltech for the Arnold and Mabel Beckman Laboratory of Chemical Synthesis.

At the news conference in Irvine, Beckman refused to answer questions about future philanthropic plans, saying such questions were "not relevant to this meeting" and that his foundation "does not seek publicity." But in academic circles there is intense interest in courting Beckman, who founded Beckman Instruments Inc while he was teaching at Caltech. He merged it into Smith-Kline Corp in 1982 to form SmithKline Beckman, of which he is a major stockholder. Beckman's rise began in 1935, when he started his company on his first product—a pH meter to measure the acidity of lemon juice in a Southern California citrus-processing plant. In 1940 he introduced two new products—the quartz photoelectric spectrophotometer for automated chemical analysis and the helical potentiometer, a variable-resistance device for the pH meter that turned out to be important in radar during World War II and later in computers, control systems and various electronic products.

—IRWIN GOODWIN □