programs that will use the station must also be funded adequately. Supporters of the space shuttle warn that astronaut safety could be jeopardized if further cuts are made, and the constellation of environmental monitoring satellites known as EOS and its complex data system are being built for launch over the next 6 years. NASA's other major expense is salaries—and the agency has already factored in a sizable reduction in its work force over the next 5 years.

But that coming drought is hardly evident in the flood of activities planned for this year. Jupiter data from Galileo are heading toward Earth, two Mars probes are slated for launch later this year, and a host of small astrophysical missions are being prepared. However, Huntress warns that this busy schedule is a "bow wave" from past spending, coupled with the smaller and cheaper satellites pushed by NASA Administrator Daniel Goldin in recent years. Goldin maintains NASA can do more with less, but Huntress says it will be difficult to sustain the wave with fewer dollars.

In the meantime, Huntress faces a range of unpleasant options. During the past few years, the space science office has restructured every major program under its control—radically scaling back the size and scope of the Advanced X-ray Astrophysics Facility, postponing other observatories, and chopping funds to operate a host of missions. In addition, the space science office at NASA headquarters has cut its own work force by half. "The space science office has reduced costs, scaled back development times for missions, and is seeking new technologies," says Sargent. "But at some level they have not gotten credit for it." University of Maryland space physicist Glenn Mason warns that money for analyzing data and operating spacecraft is already being drastically reduced. "This will roll through the community like a tidal wave," he says. "People better wake up."

If the plight of space science is attracting political attention now, it's at least partly because of doubts expressed by House Republicans about NASA programs like EOS. Science Committee Chair Robert Walker (R–PA) and Sensenbrenner have expressed concern that its growth will come at the expense of space science efforts that are NASA's traditional strength. Sargent, Mason, and Huntress don't savor the prospect of a mudslinging match between the earth and space science disciplines. "Pitting one part of the agency against another is not the way to deal with the problem," says Huntress. "The problem is the declining budget of the agency."

But such infighting will be hard to avoid unless Congress goes along with a budget that lifts all of NASA's boats. "So far it's been a gentlemanly affair," says Mason. "But somebody is going to lose."

–Andrew Lawler

EUROPEAN SPACE SCIENCE

Budget Freeze Nips Comet Camera

Last October, the European Space Agency (ESA), faced with the increasing cost of the international space station and financial squeezes in some of its 14 member states, froze the budget of its science program for the next 5 years (*Science*, 13 October 1995, p. 224, and 27 October 1995, p. 571). This funding crunch, both at ESA and within member states, is now beginning to bite, and it has prompted a crisis over a proposed camera for the Rosetta spacecraft that will shadow comet Wirtanen next century.

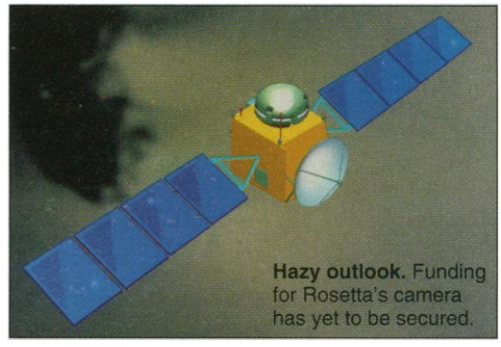
ESA wants a science camera on the mission, but no one seems to want to pay for it. Earlier this month, the agency, unable to pay for the camera itself, gave cometary physicist Uwe Keller of the Max Planck Institute of Aeronomy in Lindau, Germany, until the end of April to find funds from member states for a camera he proposed to ESA last summer. If he cannot, ESA will make a new call for proposals to see if another design can win financial support and bring to an end a complicated political game. "There is more politics, much more politics than you can believe," says Keller. "It's a poker game," adds David Southwood of London's Imperial College, chair of ESA's Science Program Committee.

Rosetta will fly in tandem with comet Wirtanen for 2 years as the comet heads for its closest approach to the sun in 2013. This cosmic pas de deux promises to be a spectacular follow-up to ESA's Giotto mission to Halley's Comet in 1986. From its experience with Giotto's photographs of Halley's Comet, ESA is well aware that space pictures captivate the general public and so wanted Rosetta to carry a camera for publicity as well as science.

But ESA's charter specifies that subscriptions to the agency pay for spacecraft and their launches—the scientific instruments they carry should be proposed by the research community and paid for out of national space budgets. Last spring, ESA invited researchers to put forward proposals for instruments for Rosetta. Keller, who headed Giotto's camera team, assembled researchers from Italy, France, Germany, Belgium, and the United Kingdom and made a proposal, called Osiris, for wide- and narrow-angle cameras working across the spectrum from ultraviolet to infrared—the only proposal for a science camera put forward.

ESA's Space Science Advisory Committee (SSAC) evaluated Osiris during the summer and recommended that it cover only visible wavelengths, because the ultraviolet and infrared were being covered by spectrometers. ESA also took the unusual step of sounding out member governments while Osiris was still being evaluated, to ensure it had financial backing. Germany would be expected to make a major contribution because of Keller's involvement, but according to Southwood, Germany said it could not fund the camera.

Then another player entered the fray: ESA's own research center, known as ESTEC, in the Netherlands. Germany had long been trying to persuade ESA to take some pressure off national space budgets by developing generic technologies common to several instruments. Taking this as a cue, ESTEC put together a proposal to upgrade the navigation camera ESA was providing as part of the spacecraft so that it could also provide publicity shots and some of the high-quality images needed for science. Under this scheme, this multipurpose camera would be built and paid for by ESA, but designed with input from scientists like Keller. But Keller says Germany was not keen on this plan. According to some observers, it preferred a reverse arrangement in which a science camera could also perform the navigation if ESA contributed to the cost. "There was a lot of confusion," says Southwood.



ESA

Hazy outlook. Funding for Rosetta's camera has yet to be secured.

Last month, however, the SSAC squelched any such plan. It decreed that a proposal for a science camera should come from the scientific community, not from the agency. And it said the Rosetta spacecraft should not exceed its budget of $800 million, thus ruling out ESA paying for the science camera.

And so the spotlight has shifted back to Keller. Earlier this month, the Science Programme Committee decided that Keller should have until the end of April to salvage Osiris. Roger Bonnet, head of space science at ESA, says that Keller must now "descope the camera and look for new partners" elsewhere in Europe or outside it. Bonnet and Southwood both believe this will be possible. If not, the saga of Osiris may prove a bad omen for ESA's future as the funding freeze extends to other science missions.

–Helen Gavaghan

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