

gent, chair of NASA's Space Science Advisory Committee, which acts as a liaison between NASA and the space science community. In the past, "there have been real explosions, and we haven't always come to closure," she adds. Indeed, many contrasted the Breckenridge meeting with OSS's 1991 planning meeting, remembered as the "Woods Hole shoot-out." One factor contributing to the smooth discussions this time was that the lead-up was much better, says Nick White, of Goddard Space Flight Center in Greenbelt, Maryland. "By the time people got there, things had been worked out." White, project scientist for the High Throughput X-Ray Spectroscopy mission, adds, "People involved with missions were not allowed to go [to Breckenridge]. It was thought that they may lobby [for their own projects]."

Faster, better, cheaper

Under the new plan, NASA aims to launch about three times more space

science missions in the period 2000–04 than it did in 1990–94, and at the same time cut the average mission cost by about 88%—from about \$750 million to about \$90 million. Such moves are in keeping with the "faster, better, cheaper" motto introduced by NASA head Dan Goldin. In practice, that means that technology development will play a much larger role in the space program than it has in the past.

Before, "technology was almost an afterthought," says Peter Ulrich, who heads OSS's technology development team. "In the new paradigm, we will still start with science goals, but there will be up-front investment" in technology development. "We used to hold performance as invariant," says Huntress. "Now that's too costly, and we hold cost invariant. It's generally understood that \$500 million is the limit [for a single mission]. And the quicker you do it, the cheaper it is." Sometimes, Huntress adds, that may mean

that less science gets done.

"Lightweight is the key" to bringing costs down, says Glenn Mucklow, who works on Ulrich's technology development team. For example, the team is working on miniaturizing electronics to make a "spacecraft on a chip," with autonomous control and monitoring functions on a single chip. It's also designing lighter, more compact cooling systems, and inflatable Sun shields and antennas made from plastic films. Says Mucklow, "Somehow, you have to get into a small launch package things that can get big in space and don't require a marching army on the ground for operations."

"One benefit of 'faster, better, cheaper' is that you can take a bit more risk," says Mucklow. That's because each mission will be smaller, with fewer instruments, and therefore less to lose. "And no scientist's entire career depends on a single mission."

TONI FEDER

Threatened with Closure, the Royal Greenwich Observatory May Yet be Saved

The Royal Greenwich Observatory, founded in 1675 by Charles II to help the British Royal Navy determine longitude by star positions, is slated to lose its current financial support next summer. That is the recommendation made by the UK's Particle Physics and Astronomy Research Council (PPARC) and approved in July by John Battle, the minister for science, energy and industry.

To save money, PPARC plans to concentrate the work of both the RGO and the Royal Observatory, Edinburgh (ROE) at a new facility in Edinburgh that is intended to provide technical support for UK ground-based astronomy. Indeed, with telescopes nowadays located at remote spots on Earth and in space, the two observatories have become centers of instrument and telescope design, rather than observation sites. "We don't need two kitchens," says Andy Lawrence, of the University of Edinburgh's Institute for Astronomy.

It's still unclear what will happen to the two royal observatories, but with the new center being located in Edinburgh, more people from the RGO than from the ROE stand to lose their jobs—and the University of Edinburgh may even take over the ROE. As for the RGO, Director Jasper Wall and others are seeking ways to keep it open.

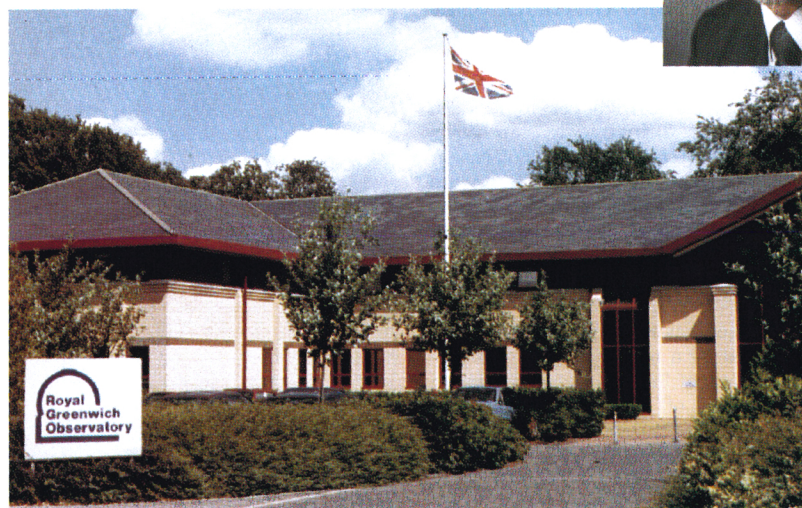
Talk of merging and downsizing the two observatories is not new, but the move to finally do so has been mired in contradictions and controversy.

Opponents decry the loss of the RGO, saying that PPARC's decision was made without wide enough consultation in the astronomy community; that the UK will lose facilities and expertise; and that PPARC overstates the amount of money that will

be saved.

For example, PPARC claims it will save £4 million a year (about \$6.5 million) out of its £201 million annual budget by consolidating the observatories and halving the combined staff size to about 100. But opponents claim

JASPER WALL is director of the Royal Greenwich Observatory, which was relocated to this site at the University of Cambridge in 1990 from Herstmonceux Castle in Sussex, where it had been moved in the 1950s from its original location in the London borough of Greenwich because of city lights and smog.



ROYAL GREENWICH OBSERVATORY

that this plan will save only £1 million more than would be saved by keeping open both observatories at reduced size. "What I strongly contest is that the extra savings [gained by merging the observatories] are adequate to justify the disruption to programs," says Martin Rees, who holds the honorary title of astronomer royal and is based at the University of Cambridge.

Both observatories are involved in building the international twin 8-meter optical-infrared Gemini telescopes that will be located in Hawaii and Chile. These activities "will start to tail off next year," says PPARC CEO Ken Pounds. "PPARC will then have too many people for the work we can afford." But Rees, who until last March was a member of PPARC's governing council, questions "such pessimistic projections" and claims that "PPARC has not adequately debated how its budget should be apportioned between particle physics, space- and ground-based astronomy."

The savings gained from merging the observatories will be used to support both ground- and space-based university astronomy research, according to Pounds, who is an x-ray space astronomer.

The UK Astronomy Technology Centre is scheduled to open in Edinburgh next spring. A PPARC panel chose Edinburgh over Cambridge—and thus the ROE over the RGO—because the ROE "more closely matches [PPARC's] current and future programme requirements . . . with the necessary skill mix." Roughly, the ROE's strengths lie in infrared and submillimeter optics, while the RGO's are in optical wavelengths and telescope design, according to astronomer Dave Carter of Liverpool John Moores University (JMU). The panel also deemed the RGO's business activities—developing and building robotic telescopes in collaboration with JMU—too financially risky.

In an attempt to save the RGO from becoming a museum, the observatory's management and staff want to start a business with the RGO name that would collect and distribute astronomical data, engage in public outreach and continue to design and build robotic telescopes. "It would be complementary, not in competition, with the technology center," says Wall, who will present a business proposal to PPARC later this month. Staff members at the observatory are "cautiously optimistic," says RGO astronomer and staff representative Margaret Penston. "There is still the anxiety about how many posts the new organization will have and what they will be."

TONI FEDER

Newest NOAA Research Ship Studies Pacific Rainfall

The *Ronald H. Brown* is the latest research ship to be added to the National Oceanic and Atmospheric Administration's fleet. On 21 July, the *Brown* (named for the late secretary of commerce) set off on its first scientific mission, to a tropical region in the eastern Pacific Ocean that has a strong, but not accurately measured, influence on global weather patterns. The data collected will be used to resolve discrepancies between satellite microwave measurements (which show the region to be one of the world's rainiest) and satellite infrared measurements (which indicate much less rainfall).

According to the mission's chief scientist, Sandra Yuter of the University of Washington, the 274-foot ship is equipped to conduct both atmospheric and oceanographic research, making it unique in the US research fleet. The crew is recording and archiving data from all the ship's atmospheric and oceanographic sensors, and that data will later be made available to the research community.

Reached at sea by e-mail in early August, Yuter said the boat was still in transit to its station location at about 8° N, 125° W, and had been experiencing high winds and rain brought by Hurricane Guillermo. The ship had also taken on some uninvited guests: a group of boobies. "The relation between the birds and the science crew has been strained," she noted. "When we make our hourly weather observations, we present an easy target on deck. Some of the science crew have taken to wearing their rain gear as a precautionary measure."

The *Brown*'s next mission will be to study hydrothermal vents off the Pacific Northwest coast of the US. Information on the *Brown* and on Yuter's study can be found on the World Wide Web at <http://www.pmc.noaa.gov/rb/> and at <http://www.atmos.washington.edu/gcg/MG/tepps>.

JEAN KUMAGAI



Bréchnac Becomes First Woman to Head CNRS

About a month after Claude Allègre became science minister in France's new socialist government, he chose physicist Catherine Bréchnac to head up the country's—and Europe's—largest research organization, the National Center for Scientific Research (CNRS). Bréchnac, who took over from Guy Aubert on 18 July, is the first woman to serve as the organization's director general.

Bréchnac's appointment has been welcomed by the French scientific community. "She is a well-established scientist with an excellent record of administration and a great passion for science," says Jean-Pierre Bourguignon, a mathematician at the Institut des Hautes Etudes Scientifiques near Paris and a former member of CNRS's scientific council. "She is very straightforward, and is able to listen to people," he adds.

These qualities should be useful for running the mammoth organization during a period of anticipated reforms. CNRS has seven departments in the social, life, physical and mathematical sciences with about 11 600 researchers,

and over 25 000 employees in total. In 1996, the organization's budget was about \$2.2 billion.

Allègre

wants to reduce the bureaucracy and increase the number of researchers at CNRS, according to his special adviser, Vincent Courtillot.

That means, says Bourguignon, "Bréchnac will have to transform these guidelines into actual measures." It's clear, he adds, "that Allègre's office will fight hard to get the research budget back to the top of the government's priority list." Courtillot, who was preparing CNRS's budget for next year as PHYSICS TODAY went to press, would say only, "In the 1998 budget, the government will place emphasis on increasing soft money for labs and on new positions for young researchers."

It's expected that Bréchnac will emphasize basic research, and also strengthen CNRS's ties to universities and industry. According to Gérard Mégie, an atmospheric physicist at



ERIC LECOULTY

C. BRÉCHNAC