

Two cheers for small space missions

Europe's achievements in space combine excellent science with responsible management. New measures to increase cost-effectiveness can only be welcome, while the United States can recover its shaky reputation by taking the lead in small missions.

OVER the past 20 years, two of the most expensive centres of European scientific excellence have been models of good management. Despite political buffeting, the European Laboratory for Particle Physics (CERN) and the European Space Agency (ESA) have consistently achieved ambitious scientific and technological goals while making hard decisions in controlling costs. Unfortunately, past successes are irrelevant when member states are determined to reduce the costs of participation, whereas past failures hang around the necks of such organizations for years.

It is important to distinguish between two types of external criticism of ESA and CERN. One type comes from those who are outsiders both institutionally and in spirit. The UK government is well established in this category — witness its unjustified claim that ESA's costs could be reduced by 25 per cent without damaging the science. The brute force of such an assertion can be valuable in concentrating minds, even if it is mistaken. Just as effective can be the critical scrutiny of outsiders who are insiders in spirit. One such is Professor Michael Cruise, of the University of Birmingham, England, who, responding to a need to reduce the estimated costs of a proposed mission in which he is involved to an acceptable level, has scrutinized the way in which ESA's mission costs arise. Cruise's analysis achieved a notable impact at a meeting last week of scientists involved in five such 'medium' mission proposals (costing up to US\$350 million or so), one of which will be selected in April. It was made clear that ESA will use the next medium mission as a pilot project in the application of his proposed cost reductions.

Space scientists are generally respectful of ESA's managers' capacity to work effectively within their budgets. Nevertheless, it is clear from Cruise's study that a trimming of ESA's practices is overdue — examples are the over-generous degree of provision of equipment such as computers, contracts with industry that place too little of the burden of unanticipated costs on contractors and opportunities to tighten the specification of missions early in their planning. The savings of 10 per cent or more that can be expected from such measures will also reduce the costs of subsequent ESA science missions. But the fun will begin when similar scrutiny is applied to other programmes in ESA, where cost disciplines are perceived to be more lax.

The political (budgetary) attractions of medium missions and small missions (\$50 million or less) can be scientifically dangerous. As ESA's latest big (or "cornerstone") mission, the Infrared Space Observatory (ISO) began to demonstrate last week when its first images emerged (see page 667), a major space-based observatory can provide large dividends for a variety of branches of astronomy. Those who pursue smaller missions at the expense of big ones — as seems to be happening in the United States — are misguided for that reason alone. Even more worrying is the suggestion by some US scientists that some of the small missions in NASA's Discovery programme (the first of which was launched last week) are driven more by a need to economize than to do good science.

ESA is not about to sacrifice big missions, and its cost reforms can only strengthen its external support. But the organization is about to reveal its limitations by abandoning any role with the smallest projects. Europe has a strong record of collaborations outside ESA, such as the AMPTE space-plasma project and the Rosat X-ray satellite. ESA had recently set aside funds to develop a role

for itself in this arena. Because of budget cutbacks following ESA's ministerial meeting last year, those funds are likely to disappear. But that is also symptomatic of one of ESA's shortcomings — its political structure and its relationships with industry are too cumbersome to make small, cheap and prompt missions a feasible part of its programme. With last week's launch of the NEAR asteroid rendezvous mission, NASA has an opportunity to teach its European equivalent the virtues of smallness — provided the economic virtues of its Discovery programme are matched by the science. □

South Africa's progress

After long delays, government initiatives give tangible cause for hope in South Africa.

THE significant subsidy increases awarded to South Africa's universities this year are the first sign that its government of national unity has taken seriously the crisis prevailing in the tertiary education system (see page 666). The report of the National Commission for Higher Education on the future funding system for universities and technikons is eagerly awaited. In the short term, the introduction of a system to provide funding, or at least adequate security against loans, for indigent students remains a pressing priority. But in the longer term, the government needs to address the issue of how many places in each discipline it intends to subsidize: the existing system has resulted in unfettered growth in student numbers in arts and social sciences in the past 12 years, while numbers in science, medicine and engineering have increased much more modestly.

The research community has understandably become frustrated about the lack of progress since the new government took over in May 1994. But here too, at last, there are signs of a new lease of life. The green paper (discussion document) released last month by Ben Ngubane, the Minister of Arts, Culture, Science and Technology, has the modest virtue of being not too prescriptive, while placing research firmly within the context of the reconstruction and development programme. With the appointment of Khotso Mokhele as president of the Foundation for Research Development — the government agency that funds research on both science and engineering in universities, technikons and museums — the community has an advocate with access to government who has good science at heart and the energy to pursue this ideal.

When President Nelson Mandela addresses the launch of the new National Academy of Science in Pretoria next month, he will probably try to persuade researchers that they should remain in South Africa to contribute their skills to reconstruction. It is important that they do so, but not only for reasons of secular patriotism. South Africa is the only country in Africa with both the infrastructure and the skilled manpower to stimulate the development that the continent so badly needs. The challenge to Mandela's government is to give effect to mechanisms that will encourage a renaissance of research in South Africa while at the same time ensuring that the science and engineering community becomes more broadly representative of society. □