Europe's cash crisis puts space plans under threat

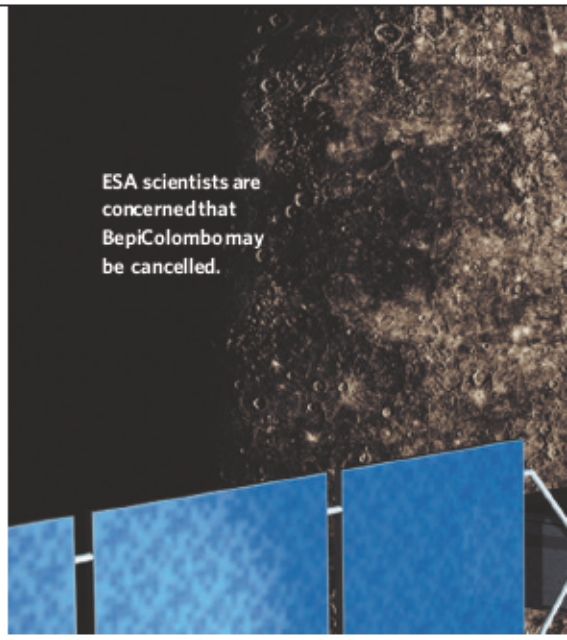
Space scientists in Europe are pleading with ministers to significantly boost the European Space Agency's (ESA's) science programme when they meet to decide its budget for the next five years. Without such an increase, researchers fear that high-profile missions may have to be abandoned.

"We are struggling to keep control of the budget," says Marcello Coradini, coordinator of Solar System Missions at ESA headquarters in Paris. Costs of science missions in development are predicted to exceed available money by €300 million (US$350 million) to €400 million over the coming decade.

If money allocated by ESA's ministerial council, which meets in Berlin on 5–6 December, does not alleviate the pressure on the programme's finances, scientists say it may not be possible to cut back missions without undermining their scientific goals. And agency officials say they may be reluctant to absorb the costs — roughly equivalent to one year of spending — through delays, because that means no new missions can be started.

The situation has led to speculation that BepiColombo, a mission destined for a 2013 launch to Mercury, might be cancelled. "That is the big danger painted in the sky," says Karl-Heinz Glassmeier, principal investigator on one of the instruments proposed for the spacecraft.

Nerves were set jangling about the project, which also involves the Japan Aerospace Exploration Agency, after it was postponed because the initial design was too heavy. That problem seems to have been solved, but officials say the estimated cost of the mission, at €600 million to €650 million, is still more than €100 million above target.



ESA scientists are concerned that BepiColombo may be cancelled.

ESA

Researchers on BepiColombo are not the only ones worried. "We're all biting our nails,"

Hayabusa ready to head home with asteroid sample

TOKYO

Japan's latest space mission seems to have succeeded in its second attempt to collect pieces of a small asteroid. If so, this will be the first time a sample has been collected for return to Earth from any object in the Solar System apart from the Moon. However, engine trouble casts doubts on whether the craft can return home safely.

On 25 November, the Japan Aerospace Exploration Agency (JAXA) said data sent from Hayabusa show that all stages of the sampling process went well. Agency engineers said it was almost certain that Hayabusa's sampler had touched down on the Itokawa asteroid as planned, and shot two metal pellets into the rock to throw up fragments of the surface. "I think we collected a sample," said project manager Jun'ichiro Kawaguchi.

Hayabusa was launched in May 2003, and arrived this September at Itokawa — a potato-shaped, 540-metre-long asteroid located about 300 million kilometres from Earth. Hayabusa is expected to leave Itokawa by early December for its return journey. Whether a sample was definitely collected will not be known until the craft reaches Earth in the summer of 2007.

To reach this stage, the members of the Hayabusa team have endured a rough time. Two of the craft's three reaction wheels, which stabilize the probe and help navigation, stopped working; the first failed in July and the second in October. Chemical engines on board were used instead. But their lower accuracy made landing more difficult. In the first landing attempt, on 20 November, Hayabusa seemed to park on the asteroid's hot surface for more than 30 minutes, and failed to collect a sample.

Time and fuel were running short, so the 25 November try was almost the last chance to collect a sample. "It was learning in real time," says Donald Yeomans, US project scientist for Hayabusa and senior research scientist at NASA's Jet Propulsion Laboratory in Pasadena, California. With each attempt, he says, "they learned more and more about how the spacecraft behaves".

Hayabusa snaps its own shadow as it descends.

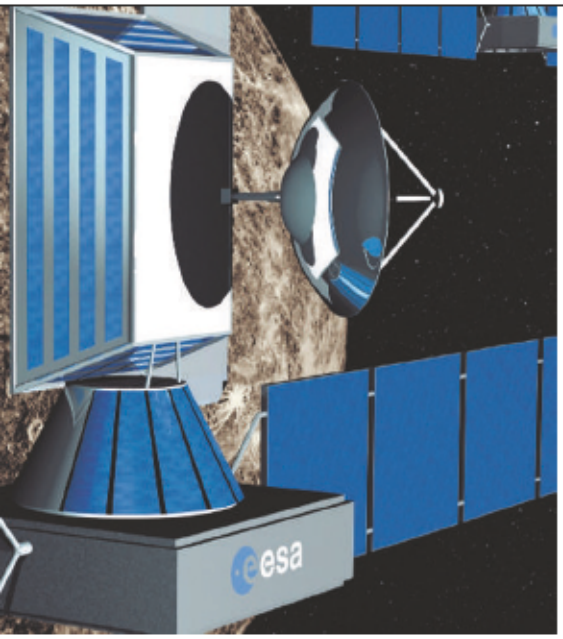
JAXA

Still, concerns remain. Hayabusa lost its balance soon after departing from the asteroid. Engineers are investigating the cause, but one possibility is that the craft's long stay on Itokawa's hot surface during the first landing attempt damaged one or more of its 12 chemical engines. JAXA said that if the trouble could not be fixed, it would be difficult for Hayabusa to return to Earth.

But astronomers have praised Hayabusa's achievements so far as showing the way for future asteroid missions — especially those involving the operation of ion-propulsion engines and delivery of high-resolution images. Analysing the sample, assuming it makes it back to Earth, would also help to answer questions about how the Solar System was created.

The mission is renewing Japan's confidence in space activities. JAXA has recently tried a string of high-risk missions, but has seen many failures over the past few years. "Hayabusa's success has become a tailwind for Japan's space development," Hajime Inoue, JAXA's executive director, said at a press conference. "It proves that the way we have been doing things wasn't wrong." ■

Ichiko Fuyuno



says Richard Harrison of the Rutherford Appleton Laboratory near Oxford, UK, who works on the Solar Orbiter mission proposed for 2013. "If you look at the list of approved missions, Solar Orbiter is right at the end. It makes you feel kind of vulnerable."

The reasons for the science programme's money problems are twofold. First, it is still recovering from overruns on the Herschel–Planck mission, which forced the agency to cancel the planet-hunting telescope Eddington in 2003. The Herschel infrared observatory and the Planck satellite, which will measure the cosmic microwave background, are due to be launched together in 2007 and are €178 million over budget.

"If we had done badly we know we could be punished. But how could we be more successful than now?"

"It was a big hit," says David Southwood, ESA's director of science. He says the agency is clamping down on missions whose costs spiral, and may cut projects that cannot meet their original budgets. "We are being much more hard-nosed," he adds.

The other factor is that member countries' contributions to the science programme, which makes up 12% of ESA's overall budget, are mandatory, so members must unanimously agree to any increase. The programme's purchasing power has fallen by 20% since the mid-1990s as payments have failed to match inflation.

Scientists and agency officials are not optimistic about that changing this year, and are urging ministers to reflect on recent successes of the programme. It has 16 operational spacecraft and can boast the notable achievements of Mars Express and Huygens, which touched down on Saturn's moon Titan earlier this year (see page 538), as evidence of their track record. "If we had done very badly, we know we could be financially punished," says Coradini. "But how could we be more successful than we are now?"

He and other officials have asked ministers for a 2.5% year-on-year increase in funding, amounting to about an extra €100 million between 2007 and 2011. That would still leave a shortfall, but Coradini is optimistic: "If we get that amount of money, I think we will not only see the light at the end of the tunnel, we could get out of the tunnel." ■

Jenny Hogan