

# Europe chooses cosmic radiation project

**Paris.** Cobras/Samba, a new satellite designed to measure cosmic background radiation over the whole sky, has been given top ranking over four rival projects for the next 'medium-sized' space mission of the European Space Agency (ESA), which is scheduled for launch around 2004.

The project was selected at a meeting in Paris last week of ESA's space science advisory committee (SSAC). It will be the third medium-sized mission within ESA's Horizon 2000 science programme, which began in 1985 and is scheduled to run until 2015.

Such missions, which are budgeted at around ECU345 million (US\$424 million) each, complement the larger cornerstone

missions of about ECU625 million that form the backbone of the programme.

The Cobras/Samba mission would cost about ECU340 million, and would have 10 times greater sensitivity and 50 times the angular resolution of the Cosmic Background Explorer (COBE). It was COBE which, in 1992, discovered temperature irregularities in the cosmic background radiation field caused by primordial perturbations occurring within  $10^{-35}$  seconds of the Big Bang.

The new satellite would build on these results. It would aim to establish whether the large-scale uniformity of the Universe resulted from an early period of expansion

known as inflation, and it would look for primordial irregularities that gave rise to galaxies and other structures in the Universe.

As well as providing information on the physics of the early Universe, such measurements can also be used to estimate many astrophysical parameters — such as the Hubble constant — to within a few per cent.

The choice of Cobras/Samba came at the end of a two-day meeting in Paris, at which details of the five projects were presented to about 250 scientists. The advisory committee's recommendations will now go to ESA's science programme committee, which meets in early June. The latter panel, which makes the final decision on the choice of the mission, has never overturned a recommendation by the SSAC.

But any victory celebrations will be dampened by the knowledge that the winning mission must find ways to reduce its costs by 10 per cent, which will mean delaying the launch from the scheduled date of 2003 by at least one year.

ESA decided earlier this year that this mission would be used as a pilot test to assess what savings could be made in mission costs, after the agency had been forced by member states to achieve an annual reduction of around 3 per cent in ESA's science budget (see *Nature* 379, 476; 1996).

Cobras/Samba's suitability for this pilot test seemed to have acted in its favour in the competition with its main rival, Intermarsnet, a project that included three landers built by the US National Aeronautics and Space Administration and a data-relay satellite built by ESA.

According to an ESA official, Cobras/Samba scored points for the fact that its proposed costs are already well within budget, while its design lends itself to a relatively straightforward pilot phase.

In contrast, Intermarsnet was the most expensive of all the five finalists. ESA was also concerned that it would be unable to meet NASA's scheduled 2003 launch date for the mission, given the delays that would be needed to carry out the savings pilot test.

Intermarsnet itself prevailed over MORO — a lunar orbiting observatory aimed at studying the Moon's surface and interior — as the choice of planetary scientists. In the astronomy field, Cobras/Samba was given preference over STARS, a mission to measure the internal structure of a wide range of stars by fine analysis of fluctuations in their brightness.

The remaining candidate, STEP, was aimed at testing the equivalence principle and carrying out a broad range of experiments in fundamental physics. But the proposal suffered from uncertainty about US and French plans for a similar satellite, and the fundamental physics group decided not to push its candidacy. ►

## Pentagon delay on asteroid mission

Washington. Funding for a US military project to send an advanced spacecraft to rendezvous with several asteroids is being held up within the Pentagon, even though Congress agreed to provide \$20 million for the mission last year and the Department of Defense gave it the official go-ahead. Work on Clementine 2 has effectively stopped while project managers and their political allies try to persuade the Air Force and the Pentagon comptroller to release the money.

Sources in Congress say they do not know why the funds are being withheld, but some suspect that the Defense Department is trying to 'reprogramme' money to support operations in Bosnia. Members of the Clementine team say that funding problems of this type are not uncommon with advanced military technology projects.

Clementine 2 is scheduled to be launched in May 1998. The plan calls for a spacecraft to fly past three or more near-Earth asteroids, and to release small probes to crash into their surfaces, so that sensors on the main spacecraft can observe the impacts.

Like Clementine 1, which mapped the Moon in 1994, Clementine 2 is intended chiefly to test advanced spacecraft technologies developed for strategic defence and other purposes. One important objective is to prove the ability to track and rendezvous with fast-moving targets in space. The mission also supports a military programme for 'planetary defence' — protecting the planet against possible extraterrestrial threats.

The Air Force's Phillips Laboratory in New Mexico has lead responsibility for Clementine 2, with the Naval Research Laboratory in Washington DC responsible for integrating the spacecraft, and the Lawrence Livermore National Laboratory in California developing sensors.

Project engineers completed a 'concept design review' in March. But the hold-up in funding has prevented further progress. A 'preliminary design review' is due in July

and a 'critical design review' in November; that schedule is now in jeopardy and project engineers have identified several back-up options in case the launch is delayed. A slip of several months, to September 1998, would in fact offer some advantages, including a shorter mission duration (9.5 rather than 13 months) and eliminating the need to use the Earth's gravity to give the spacecraft a boost to reach its asteroid targets.

But the September 1998 date would leave no room for slips in the schedule, and the spacecraft would not have as good a viewing angle once it reached the asteroids. Additional delays would also make it more difficult to keep the project within its budget of approximately \$100 million.

The funding hiatus could also slow down the work of an informal Clementine 2 science advisory team headed by Eugene Shoemaker of the Lowell Observatory in Arizona, which, among other tasks, has to continue refining orbits for the target asteroids. The team also needs to begin selecting the science instruments that will fly on the spacecraft.

Shoemaker still hopes that the National Aeronautics and Space Administration (NASA) will participate in the project, as it did in Clementine 1, by sponsoring a formal scientific advisory team. But NASA officials say this is unlikely, given current funding constraints. NASA also has its own low-cost asteroid mission scheduled for 1998 and NEAR (Near-Earth Asteroid Rendezvous), due to meet the large asteroid Eros in 1999.

No one is certain how and when the funding issue will be resolved. James Muncy, a congressional staff member who works on space issues for Dana Rohrabacher (Republican, California), says that several members of both the House and the Senate are working on the problem. He adds that it is simply a matter of continuing to put pressure on Pentagon officials until they release the money.

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