

More riches for Japan

Tokyo

SPACE science, astronomy and research on the global environment receive strong backing from the Japanese government in an expansionary budget for science and technology released last week.

The Ministry of Education, Science and Culture (MESC), the Ministry of International Trade and Industry (MITI), the Environment Agency and the Ministry of Health and Welfare all receive significant increases for science-related items, as did the Science and Technology Agency (see *Nature* 343, 195; 18 January 1990). Several new projects are provided for.

The budget was approved by the Ministry of Finance and the cabinet at the end of last month and will run from April.

Even though some delay is now possible because of resistance from the newly strengthened opposition parties in the Diet, the outlays for science and technology are unlikely to be much affected.

Japan's astronomers seem set to achieve their dream of building a huge 7.5-metre infrared telescope on Hawaii after years of lobbying. The Ministry of Finance has approved a tiny budget of ¥13 million (\$90,000) in preparatory funds for the telescope, construction of which is eventually expected to cost about ¥45,000 million (\$320 million). But Makoto Kinoshita of MESC's science and international affairs bureau stresses that there are many hurdles still to be overcome before the project is realized.

More clear-cut is approval of ¥845 million (\$6 million) to build a heliograph at the Nobeyama Radio Observatory. The heliograph will consist of a T-shaped array of 76 80-cm parabolic antennas, and is expected to be completed in two years at a cost of ¥1,900 million.

MESC's budget for space science decreases slightly in 1990 but it contains an important new allocation of ¥1,850 million (\$13 million) to develop a new solid-fuel rocket for the Institute of Space and Astronautical Science (ISAS). The rocket will have three times the power of the institute's present biggest rocket, the MU-3SII, which this week is expected to send Japan's first probe to the Moon. The new rocket will take four years to develop at a cost of about ¥20,000 million.

The most striking feature of MITI's budget is a huge new outlay of ¥6,274 million (\$45 million) to develop new technology and products to protect the global environment. MITI plans to use the funds at a new institute that will be set up as a foundation with donations from industry later this year.

The Environment Agency also gets a huge boost in its budget for the global environment. Most of the extra funds go to new research grants (¥1,200 million)

for universities and research institutes in Japan and overseas, and to the establishment of a new centre for global environment research at the agency's National Institute for Environmental Studies in Tsukuba (¥285 million).

MESC also gets new funds to reorganize the Research Institute of Atmospheric at Nagoya University into the provisionally named Solar-Earth Environment Research Institute where fluxes of energy and materials from the Earth and Sun and their effect on the global environment will be studied. The National Institute of Polar Research, which until now has devoted its attention to the Antarctic, will establish an Arctic research centre. And the Sand Dune Research Institute of Tottori University will be reorganized to tackle research on the deserts of the world as well as its current research of local sand dunes.

MITI continues to pour money into the development of superconductors and into its fifth generation computer project which will end in 1992. The budget for a small unmanned space platform, the Space Flyer Unit, being jointly developed by MITI, ISAS and STA for launch in fiscal year 1994, also rises as it nears completion.

Funding for a ten-year project to study cancer initiated in 1984 with the backing of former prime minister Yasuhiro Naka-

One step forward, one step back

Washington

THE space shuttle Columbia landed at Edwards Air Force Base in southern California early last Saturday morning, a day late because of bad weather but with the Long Duration Exposure Facility (LDEF) safely stowed in its cargo bay. LDEF will be taken back to the Kennedy Space Center before it is removed from Columbia and its numerous onboard experiments unpacked and analysed (see *Nature* 342, 847; 1989).

The day before Columbia landed, the National Aeronautics and Space Administration announced that the launch of the Hubble Space Telescope has been set back once more, this time from 26 March to 19 April. Engineers decided to remove one of the solid rocket booster and replace one segment of it because their records did not show whether or not one of the O-ring joints had been fully tested for leaks.

David Lindley

son (see *Nature* 310, 264; 1984) has been rising dramatically in recent years. The project is jointly funded by MESC, STA and the Ministry of Health and Welfare. But possibly the most significant item in the Ministry of Health and Welfare budget is a small outlay of about ¥300 million (\$2 million) to begin a project to sequence human oncogenes.

David Swinbanks

JAPANESE SCIENCE BUDGET

	1987	1988	1989	1990	(% change from 1989)
	(thousand million yen)				
<i>Ministry of Education, Science and Culture</i>					
Grants-in-aid of research	45.1	48.9	52.6	55.8	(+ 6.1%)
Government/industry research	7.9	8.9	10.3	11.5	(+ 11.9%)
Donations from industry	NA	NA	33.2	39.2	(+ 18.0%)
Domestic research fellowships	1.1	1.5	1.9	2.2	(+ 14.1%)
Nuclear fusion	7.7	7.6	8.5	8.9	(+ 4.1%)
Accelerator physics (TRISTAN)	12.9	16.5	15.9	16.3	(+ 2.3%)
Space science	11.8	19.8	20.8	18.0	(- 13.3%)
Astronomy	NA	NA	NA	0.9	-
Global environment	NA	NA	3.0	3.9	(+ 30.6%)
Earth science	2.1	2.1	2.2	2.3	(+ 4.6%)
Antarctic research	2.9	2.8	2.9	5.1	(+ 74.3%)
International exchange	5.5	6.6	5.8	6.2	(+ 6.1%)
<i>Environment Agency</i>					
Global environment	NA	0.3	0.9	2.1	(+142.0%)
<i>Ministry of International Trade and Industry (MITI)</i>					
Total R&D budget	221.4	221.2	233.6	249.8	(+ 6.9%)
Japan Key Technology Centre	25.0	26.0	26.0	26.0	(+ 0.0%)
Basic technologies for future industries	6.0	6.4	6.8	7.5	(+ 9.2%)
Large-scale industrial projects	15.1	13.6	13.9	14.1	(+ 13.0%)
Sunshine project	44.1	37.8	27.1	27.5	(+ 1.2%)
Moonlight project	11.4	9.7	10.7	11.6	(+ 7.8%)
Unmanned space platform	0.4	0.5	4.5	5.3	(+ 17.5%)
Superconductivity	NA	2.7	3.8	5.0	(+ 29.3%)
Fifth-generation computer	5.6	5.7	6.5	7.0	(+ 7.6%)
Global environment	-	-	1.0	6.3	(+530.0%)
<i>Ministry of Health and Welfare</i>					
Total R&D budget	39.8	44.1	48.4	51.2	(+ 5.9%)
AIDS	0.1	1.2	2.1	2.2	(+ 1.6%)
Cancer (10-year project)	7.6	8.7	10.7	12.0*	(+ 11.7%)

NA, equivalent budget not available.

*Includes budgets for Ministry of Education, Science and Culture (¥ 2.1 thousand million) and Science and Technology (¥ 7.9 thousand million)