

Japan's boom economy invests in science

- Second year of budget increase
- Space and nuclear research get priority

Tokyo

JAPAN'S Science and Technology Agency (STA) gets a big boost in its 1990 budget for research and development. Large increases go to space research, including study of the global environment, and to the internationalization of Japan's research system. But the agency, which funds much of Japan's government research outside the universities, has no plans to increase funding for research on the human genome despite recent US criticism of Japan's failure to contribute to the international project.

The budget was accepted by the Ministry of Finance and the cabinet at the end of last month and should take effect in April after approval by the Diet. But the opposition parties which now control the Upper House of the Diet are expected to gain a stronger foothold in the Lower House after next month's election. Passage of the budget could be delayed by a strengthened opposition, although outlays for science and technology are unlikely to be affected.

The agency's budget increases 6 per cent in its second year of expansion. Before 1989, budgets were held to increase at about the rate of inflation as the Ministry of Finance struggled to eliminate the issue of debt-financing bonds (a target that has now been achieved). The agency also won substantial extra funds in a supplementary budget drawn up at the end of last year to distribute larger-than-expected tax revenues from Japan's booming domestic economy.

The extra funds will be used in fiscal year 1990. One of the main beneficiaries will be space research and development, which in addition to winning a 10 per cent increase in the budget for fiscal year 1990 receives an extra ¥10,100 million (\$70 million), or about another 10 per cent, under the supplementary budget, according to Yoshiro Miki, director of the Policy Research Division of STA.

Most of the increases for space go to development of Japan's module for the US space station (¥9,796 million), the H-2 rocket (¥37,799 million), and the Advanced Earth Observing Satellite (ADEOS) (¥1,705 million). ADEOS will monitor the Earth's climate and ozone layer and is expected to be launched in the mid-1990s.

The agency's huge budget for nuclear energy research has begun to pick up again, after declining from 1986 to 1988. The experimental fast-breeder reactor

Monju, which is expected to reach criticality in 1992, gets a large slice of the funds (¥50,579 million), as does the JT-60 tokamak for nuclear fusion research (¥22,435 million). Outlays also increase for development of the world's largest synchrotron, the Synchrotron Orbital Radiation (SOR) facility. SOR will be located in Hyogo Prefecture near Osaka and is expected to be completed in 1995 at a cost of ¥100,000 million.

The *Mutsu*, a nuclear-powered ship that has not set sail under its own power since its reactor began to leak during its maiden voyage in 1974 (*Nature* 310, 531; 1984), gets another ¥3,689 million. The agency, which has spent about ¥110,000 million (about \$800 million) on *Mutsu* over the past 21 years, plans to send the ship on an experimental voyage this autumn before scrapping it. But it remains to be seen if Japan's powerful anti-nuclear movement will let the ship put to sea.

Outlays for ocean research decrease slightly because construction and sea trials of the deep-sea submersible *Shinkai 6500* have now been completed. But the budget includes ¥562 million for the development of a new unmanned vehicle for surveying the deepsea floor down to 10,000 metres. Total construction costs for the vehicle are expected to be about ¥4,600 million.

The agency continues to expand the budgets for its small international research programme. ERATO will start four new projects in 1990 (as opposed to three in previous years). And the International

BUDGET FOR SCIENCE AND TECHNOLOGY AGENCY

	1987	1988	1989	1990	(% change from 1989)
	(thousand million yen)				
Total research & development budget	432.5	440.2	466.6	494.8	(+ 6.0)
Special Promotion Funds	8.4	9.2	10.1	10.2	(+ 1.0)
Space	94.6	98.5	109.1	119.4	(+ 9.5)
Nuclear energy	273.4	271.5	281.6	296.2	(+ 5.2)
SOR	0.07	0.6	1.9	2.8	(+47.4)
Ocean research	7.7	9.3	10.6	9.9	(- 6.6)
ERATO	3.2	3.8	4.6	5.1	(+12.4)
Human Frontier Science Programme	0.2	0.5	2.4	3.2*	(+33.8)

*Includes ¥ 1.3 thousand million from budget of Ministry of International Trade and Industry (MITI).

Frontier Research System, which is centred on the agency's Institute of Physical and Chemical Research (RIKEN) near Tokyo, will be expanded by establishing a new photodynamics research laboratory near Tohoku University in Sendai.

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No special treatment for HUGO

Tokyo

THE Human Frontier Science Program, which opened in Strasbourg last year, continues to grow in the new budget. But the human genome project, at one time considered as a candidate for incorporation in Frontiers, will get no extra funds from the agency.

In the early 1980s, the agency began to invest about a million dollars a year in the development of automatic DNA-sequencing machines in a collaborative programme with industry. And STA is now directing about the same amount into projects at RIKEN to sequence a small yeast chromosome and to map and eventually sequence human chromosome 21. But Makoto Furunishi of STA's life science division says there are no plans to increase the budget for the RIKEN project, which gets ¥213 million in 1990.

Furunishi says that researchers interested in genome research can apply to the Human Frontier Science Program for

support. But the agency has no intention of contributing to the Human Genome Organization (HUGO) which will coordinate international research on the human genome. Furunishi says it is not clear why HUGO is necessary. High-energy physicists carry out big international projects without a central organization so "why do biologists need HUGO?", he asks.

Other government ministries are keen to launch human genome projects. Last year, the Ministry of Education, Science and Culture set up a task force under the leadership of Kenichi Matsubara, vice president of HUGO, to lay the groundwork for a project. The Ministry of Health and Welfare has just won about \$2 million in the budget for fiscal year 1990 to start a project to sequence human oncogenes. And the powerful Ministry of International Trade and Industry (MITI) is strongly rumoured to be preparing to launch its own technology-orientated project.

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