ment experience to head the new office. Arnauld Nicogossian, the longtime head of the life and microgravity office, was to remain head until his replacement was named, but in mid-July he was relieved of that duty. (Nicogossian is now the chief health and safety officer for NASA.) NASA Chief Scientist Kathie Olsen, a biologist who was instrumental in the reorganization, has been named acting chief while a search is begun for a permanent boss. But sources say she will not apply for the job. Swain, trained as a physician, is said to be a candidate.

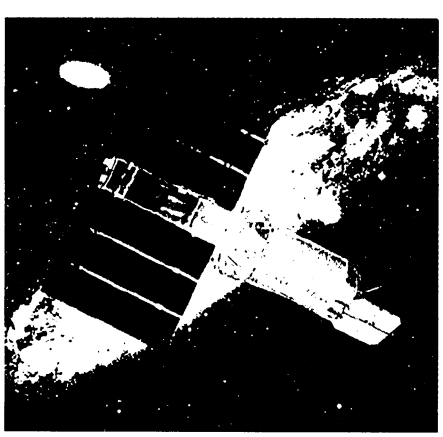
As for what kind of research will be done once the station is complete, Swain says that "we're not even sure what questions we will be answering in terrestrial laboratories. But I think we're going to have a dynamite research program to help find some fundamental answers." **–ANDREW LAWLER**

X-RAY ASTRONOMY

Solar Storm Knocks Out Japanese Satellite

TOKYO—Japan's x-ray astronomy program was dealt a new blow last month when a solar geomagnetic storm left an orbiting x-ray telescope spinning out of control. Scientists are dubious about their chances of saving the 7-year-old Advanced Satellite for Cosmology and Astrophysics (ASCA), whose replacement—the ASTRO-E x-ray satellite—was lost shortly after launch in February. "We haven't given up," says Hajime Inoue, head of space astrophysics research at Japan's Institute of Space and Astronautical Science (ISAS) in Sagamihara, outside Tokyo. "But we don't have a great amount of hope."

ISAS scientists believe a solar storm on 14 July expanded Earth's atmosphere to the point that it increased atmospheric drag on the satellite, which was orbiting at an altitude of about 440 kilometers. The drag disturbed the angular momentum of the satellite, which sent it spinning out of control. The next day it went into a safe mode, spinning in such a way that its solar panels are not facing the sun. Inoue says the best chance for regaining control of the satellite will come in a month or so, when ASCA moves into a better position for generating solar power.



CREDITS: (LEFT TO RIGHT) ISAS AND NASA-GODDARD; A. KING/AP

Premature ending. Solar storm increased atmospheric drag on ASCA, sending the spacecraft spinning out of control.

Developed jointly with NASA's Goddard Space Flight Center and several American and Japanese universities, ASCA had been a key component of ISAS's relatively small but carefully targeted space program. Its observations have generated more than 700 papers, Inoue notes proudly. One major finding was the detection of iron in the x-ray emissions from accretion disks, the swirls of gas and dust that orbit black holes. These iron emissions bore telltale evidence of the enormous gravitational pull of the black hole, something expected but never before observed. "ASCA had already been a very big success," Inoue says.

ASCA would have lasted only another year before falling into Earth's atmosphere. And a replacement for the lost ASTRO-E is still 4 to 5 years away. In the meantime, Japan's x-ray astronomers are trying to borrow time on other instruments. "There is a big gap in our [observational] program," Inoue says. **–DENNIS NORMILE**

BIOTECHNOLOGY

USDA to Commercialize 'Terminator' Technology

For the past year, the U.S. Department of Agriculture (USDA) has been juggling a political hot potato: whether to pursue commercialization of a controversial biotech discovery that can render seeds sterile. A diverse group of opponents, including some scientific groups and companies, have disavowed this so-called "terminator" technology as an unconscionable threat to poor farmers. But last week USDA officials announced they will move ahead with the technology because of its scientific promise—albeit with conditions negotiated with its industry partner to guard against it being used in harmful ways. Antibiotech activists adamantly oppose the decision, which runs counter to the intentions even of biotech giant Monsanto.

At issue is what is formally called a "technology protection system," developed by USDA and Delta & Pine Land Co. (DPL) of Scott, Mississippi, which are co-inventors on related patents. The intended application is to protect a company's investment in developing genetically engineered plants by preventing farmers from using their seeds for the next year's planting. This is done by adding three genes to a plant. If the seeds from the modified plants are treated with an antibiotic, the plants that grow from those seeds will pro-

ScienceScope

Costly Conference An animal genetics conference has sparked the costliest police action in Minnesota history. Police spent nearly $1 million providing security for the recent International Society for Animal Genetics conference in Minneapolis, state officials said last week.

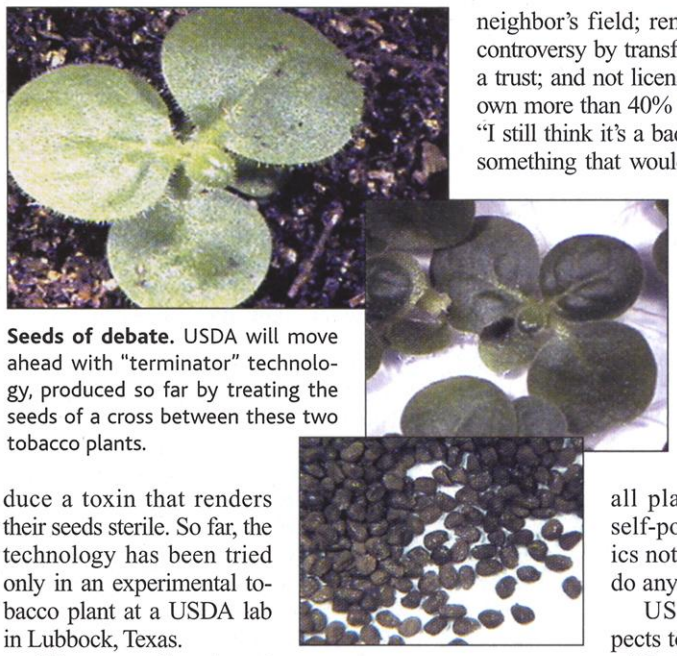
Animal-rights protesters had threatened to shut down the 5-day meeting of 650 scientists, which ended 26 July. But disruptions proved minimal as riot-ready police generally outnumbered protesters, who mustered just 100 people for their biggest march against biotechnology and animal experimentation. Still, "the experience was tense," said one attending scientist.

Some local politicians aren't sure the money was well spent. "The fact that [police spent $770,000] to control a couple of hundred protesters seems crazy to me," city councilman Jim Niland told the Minneapolis *Star-Tribune*. Officials plan to finish a protest postmortem this fall.

Switchback AIDS researchers in Italy are celebrating a government decision to rescind a 36% cut in extramural funding for HIV research. The change of heart leaves intact last year's grants budget of about $10 million, which mostly comes from the Istituto Superiore di Sanità (ISS) in Rome.

Last week's reversal came less than a month after *Science* reported—on the eve of the international AIDS meeting in Durban, South Africa—that authorities planned to gut the program (*Science*, 7 July, p. 28). "No sooner was the ink dry on the pages of *Science*," commented the Italian weekly magazine *L'Espresso* in its 3 August issue, than "as if by magic [health] minister Umberto Veronesi put everything back in place."

But Stefano Vella, director of the ISS's clinical research program and president of the International AIDS Society—which organized the Durban meeting—laments that the restored funds will come from within the agency's own budget rather than from additional government spending. "This is not a permanent solution, because it causes continuous conflict within the institute" between AIDS researchers and other scientists, Vella says. "It is a war among the poor for research money."



Seeds of debate. USDA will move ahead with "terminator" technology, produced so far by treating the seeds of a cross between these two tobacco plants.

duce a toxin that renders their seeds sterile. So far, the technology has been tried only in an experimental tobacco plant at a USDA lab in Lubbock, Texas.

When word got out about the first patent in 1998, the Rural Advancement Foundation International (RAFI) and others launched a highly visible campaign against the technology (*Science*, 30 October 1998, p. 850). Critics charged that it would prevent subsistence farmers from saving seeds and that pollen from the plants might sterilize neighboring fields as well. Soon after, the world's largest nonprofit agricultural research group, the Consultative Group on International Agricultural Research, pledged never to use the technology in its crops. Faced with heated opposition, Monsanto (now part of Pharmacia) also declared a moratorium on using the technology last October when it was considering buying DPL.

Meanwhile, away from the fray, some scientists inside and outside USDA have been arguing that the technology is too promising for the department to abandon. "There's so much good science to come from it," says James Cook, a plant pathologist at Washington State University in Pullman. The patent could be used to turn any gene on and off—"a goal of all plant breeding," said USDA tech transfer official Richard M. Parry Jr. at a meeting last week of USDA's new biotech advisory panel. He adds that "there are many other beneficial applications," including preventing the spread of genes from genetically modified crops to wild plants. These benefits persuaded USDA to pursue its patent and its agreement with DPL, despite vociferous opposition.

The opponents were well represented at the panel meeting, where USDA sought advice on what conditions it should include in the licensing agreement with DPL—not, as some expected, on whether it should proceed with the agreement at all. The diverse panelists offered several, such as making DPL legally liable should the plants damage a neighbor's field; removing USDA from the controversy by transferring its patent rights to a trust; and not licensing it to companies that own more than 40% of the market for a seed. "I still think it's a bad idea. I'm signing on to something that would make it a tiny bit better," said Margaret Mellon of the Union of Concerned Scientists.

By the meeting's end, the panelists had reached consensus on just one recommendation: USDA should ban the technology's use on existing varieties and on all plants that aren't highly self-pollinating—which, critics note, is what DPL plans to do anyway.

USDA's decision—it expects to finalize the agreement with DPL in the next few months—is unlikely to satisfy groups such as RAFI, which issued a press release calling the advisory board discussion "a giant charade." But in the larger scheme, what USDA does will not determine the fate of "terminator" technology; several companies are pursuing patents on similar technologies—and they will probably not be inviting critics to the table. **–JOCELYN KAISER**

GEOPHYSICS

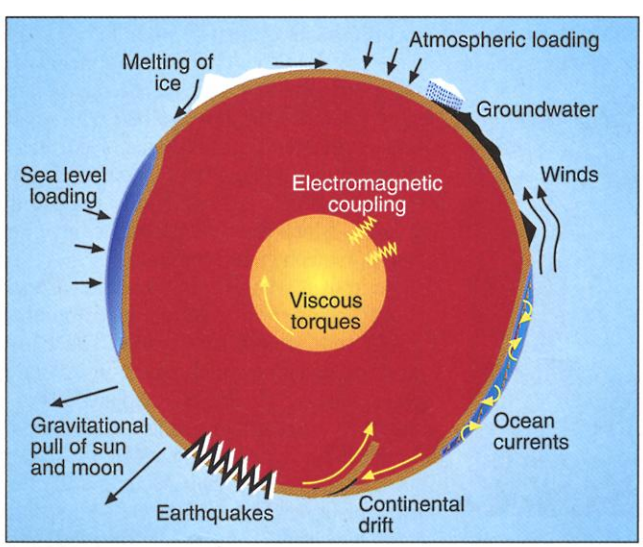
Atmosphere Drives Earth's Tipsiness

For more than a century, geophysicists who track Earth's rotation have sensed a rhythmic unsteadiness about the planet, an ever-so-slight wobbling whose source remained frustratingly mysterious. But researchers have been homing in on the roots of the so-called Chandler wobble, and now a report in the 1 August issue of *Geophysical Research Letters* fingers the shifting pressures of the deep sea and ultimately the fickle winds of the atmosphere.

Although the 18th century Swiss mathematician Leonhard Euler predicted that Earth should wobble on its axis at a pace of around once a year, it wasn't until 1891 that American businessman and amateur scientist Seth Carlo Chandler Jr. detected this wobble through analysis of stellar observations. Once every 14 months, Chandler found, Earth's spin axis wanders near the geographic pole within a rough circle anywhere from 3 to 6 meters across. If the off-kilter motion resulted from a single nudge to the tilted spinning top that is Earth, calculations showed it would have faded away in a few decades. Something must keep pumping energy into the wobble, researchers knew—but what?

Candidates abounded, but most eventually fell short. The jolts of great earthquakes come too infrequently. Wind blowing on mountains proved too feeble. That seemed to leave something in the ocean as the most likely possibility. To pin it down, geophysicist Richard Gross of the Jet Propulsion Laboratory in Pasadena, California, compared how Earth actually wobbled between 1985 and 1996 with how strongly the ocean and atmosphere, as simulated in the latest computer models, could have driven the Chandler wobble. Winds and currents proved far too weak in themselves, but the varying pressure that water pushed around by the wind exerted on the sea floor accounted for two-thirds of the wobble. Shifts in atmospheric pressure explained the other third.

Gross "has found the two biggest contributors" to the Chandler wobble, says geophysicist Clark Wilson of the University of Texas, Austin. And only one of these is in charge. "The oceans are mainly wind-driven, so you have the atmosphere driving the whole thing," Wilson explains. Aside from satisfying geophysical curiosity, that insight could help fly spacecraft to the planets. Gauging a spacecraft's precise location is tricky from an unsteady platform like Earth, but it may be easier now that scientists know what's rocking the boat. **–RICHARD A. KERR**



Battered planet. Many forces affect Earth's rotation, but the atmosphere alone drives the 14-month wobble.

CREDITS: (TOP TO BOTTOM) M. OLIVER/USDA-ARS (SEEDLINGS AND SEEDS); MODIFIED FROM K. LAMBECK, *NATURE* 286 (10 JULY 1980)