Yohkoh Captures a Solar Flare

It may not look like the sun, but the image at right shows what the Japanese satellite Yohkoh saw when it trained its instruments on the sun's surface just 2 weeks ago, on 25 October. That was when powerful flares were erupting from an active region in the sun's atmosphere (the bright region at the left), causing minor disruptions in power grids on Earth. On board Yohkoh, the Soft-X-Ray Telescope (SXT)—the highest-resolution x-ray telescope yet flown in orbit—was poised to catch the action.

Much of the sun's surface, at a relatively cool 5000°C, appears dark to the x-ray detectors on the U.S.-Japanese telescope. But at a temperature of millions of degrees, the gases of the corona—the sun's atmosphere—glow at x-ray wavelengths. In active regions, loops of magnetic field bulge outward from the familiar sunspots on the surface and concentrate the gases, forming bright streamers and arches called x-ray loops. These can be seen scattered around the image.

X-ray loops are common now that the sun is near the peak of its 11-year sunspot cycle. But ever since Yohkoh was launched on 30 August, the SXT's investigators have been waiting to catch a rarer phenomenon: the flares that sometimes erupt in and around x-ray loops. On the weekend of 24 and 25 October, investigators finally saw what they were after, as the large active region started producing flare after flare. "We got a beautiful data set," says Loren Acton of Lockheed Palo Alto Research Laboratories, the U.S. principal investigator for the SXT.

By studying how flares develop and die out over the satellite's 3-year lifetime, Acton and his collaborators, including Japanese principal investigator Tadashi Hirayama of the National Astronomical Observatory, hope to learn the source of their enormous energies. During a flare, the gas along x-ray loops can brighten many thousandfold in a few minutes. Some instability in the underlying magnetic field, says Acton, must be triggering the fierce heating of the coronal gases. "The sun has somehow learned to convert magnetic energy into thermal energy," he says.

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To figure out how the sun makes the conversion, the investigators plan to correlate images from the SXT with data from other Yohkoh instruments and ground-based observations. If flares can be understood, solar physicists will have brightened their prospects for achieving a broader goal: "understanding the magnetic evolution of the sun's corona," as Acton puts it.

They'll also have gained insight into an event that can wreak havoc on Earth. The bursts of high-energy particles released by flares create gusts in the solar wind. As Earth's own magnetic field trembles under the assault, currents are induced along the ground, straining power grids. That's why a flare on the sun can mean lights out on Earth. ■ TIM APPENZELLER

Hunger Strike at Kamchatka Institute

The wave of democratization sweeping the Soviet scientific establishment has triggered a dramatic confrontation at the Institute of Volcanology in Kamchatka, at the far eastern end of Siberia. Taking an "extreme measure," ten scientists began a hunger strike on 21 October to dramatize their demand that the authority of the director, Sergei Fedotov, be curbed. Four days later, they had won this battle—though at the cost of permanently splitting their internationally respected institute.

U.S. volcanologists who had heard of Fedotov's autocratic rule weren't altogether surprised at the blowup. "This was a drastic action, but it's a long-festering problem," says Thomas Miller of the U.S. Geological Survey's (USGS) Alaska Volcano Observatory. The world at large learned how bad things had gotten on the 24th, when the hunger strikers faxed an appeal to the "International Community of Earth Scientists" through U.S. contacts. During Fedotov's 20 years as director of the institute, the fax read, "he became known for his autocratic tendencies [and] his counteraction to democratic changes and to the freedom of research. Imposing of co-authorship, hampering of academic career[s], blocking trips abroad, and at last firing of dissidents are typical for his style of leadership." Fedotov's reputation even reached the Soviet press in the early days of glasnost. A 1987 *Moscow News* story quoted one intimidated staff member: "All of us are afraid of him. Those who weren't aren't working here any longer."

Fedotov was able to get away with his high-handedness for so long not only because of the traditional power of the Soviet bureaucracy but also because leaving the institute carried a heavy price. It is the only center for the study of active volcanoes in the USSR, and Kamchatka is the only area of Soviet territory that has any active volcanoes. If you had to leave the institute, you were out of volcanology. C. Dan Miller of the USGS's Cascades Volcano Observatory recalls the "brilliant and well-respected physicist" who, after being fired, had to spend 2 years shoveling coal for a living before he could get himself and his family out of Kamchatka.

Last spring, dissident staff members managed to persuade the Academy of Sciences of the USSR to set up a separatist institute—the Institute of Volcanic Geology and Geochemistry, to which almost half of the Institute of Volcanology's scientific staff migrated. But before the new institute received any material support, Georgy Yelyakov, president of the Far East division of the academy, put Fedotov back in charge of the dissidents by making him head of a new Kamchatkan Science Center that would supervise all academy activities in the region.

That was the last straw, says Oleg Volynets, one of the Kamchatkan dissidents who is now visiting Cornell University. Volynets' colleagues started their hunger strike. That, plus prompt and impassioned responses from colleagues at more than a dozen institutions around the world and lobbying in Moscow, soon brought Yelyakov around. He stopped the creation of the overarching science center and will form a committee to supervise the fission of the original institute. But no one is particularly happy about the split-up. "It's not a nice event," says Volynets. "Nobody won." ■ RICHARD A. KERR