Space Cameras and Security Risks

Commercial satellites will be used for warlike purposes, attendees at a Carnegie Endowment meeting say, but the peaceful benefits outweigh the risks

"Before taking any decision concerning a target located deep inside a zone inaccessible to reconnaissance planes and [remotely piloted vehicles], three main points need to be analyzed: the target, the 'threats' surrounding it,and the route leading to it. The ideal way to handle these studies is to observe SPOT satellite images supplied from a data bank . . . prepared in advance and covering the main targets."—"Surveillance," a promotional booklet published in 1988 by SPOT Image of Toulouse.

WITH NO HINT of Gallic subtlety, this ad reveals the dark side of SPOT, the French commercial satellite that is said to be the exemplar of the "open skies" principle of free-wheeling, uncensored surveillance of the earth from space. It suggests that instruments of research and arms control can also be used to make war. And it indicates that SPOT Image, the quasi-private agency that sells photos from SPOT, believes its bread cannot be buttered with noble intentions alone.

Spy satellites were born of military need, so it is no surprise that the two best civilian "remote sensing" platforms—SPOT and the U.S. multispectral Landsat device—have military clients. According to Michael Krepon and Peter Zimmerman of the Carnegie Endowment for Peace, the Pentagon is the second biggest buyer of Landsat images, and governments buy about 30 to 35% of SPOT's products. Soyuz Karta, the new Soviet vendor of space-based imagery, uses satellites whose ground tracks coincide with many military installations in the West.

Krepon and Zimmerman mentioned these facts at a recent conference held in Carnegie's Washington, D.C., offices. It focused on the national security implications of making high-quality surveillance photos widely available. Zimmerman said the aggressiveness of SPOT's sales pitch was a bit disturbing.

The world is entering an age of "do-it-yourself intelligence," when anyone with a big bank account will be able to buy photos of his neighbor's military bases. Terrorists will be able to shop for targets around the globe. Because of its side-angle view and high resolution (objects as small as 10 meters wide can be picked out), SPOT can be a boon to target definition. Using twin images of a site, it is possible to create a three-dimensional scene, suitable not only for static analysis but also, with a sophisticated computer, to create a "movie" of the air approach to a target with rock formations, winding rivers, roads, and buildings all laid out as in real life. SPOT's pamphlet says these kind of data can be used to permit "low-altitude routes . . . to assist penetration." To illustrate the point it includes scenes of a U.S. air base in Greenland and a French base in Strasbourg. Visitors to SPOT headquarters in Toulouse can watch a video tape of a simulated bombing run into Tunisia. Images from space might be used to guide long-range weapons, and some consider it ominous that both Iran and Iraq have invested in image-enhancing computers.

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During the conference, Krepon raised a couple of concerns about the future of commercial surveillance. He asked whether some governments might not use such data to gain a military advantage, with richer nations benefiting more. And he wondered whether this might not lead to disruptions or favoritism in photo supply arrangements, especially in times of crisis, when, say, a nation not friendly to France might ask for SPOT photos of a target in a country allied with France.

Krepon's own view is that no nation can count on commercial surveillance for a military advantage because it is possible to evade detection, if doing so is important. And there are usually cheaper and better sources of tactical information. However, he said that access to surveillance data may effect international security "on the margins" in ways that are not yet clear. He saw no evidence of favoritism in providing access to photos, but he pointed out that the system has not yet been put to a hard test.

Pierre Bescond, SPOT Image's U.S. representative, said that "less than 10%" of its business is related to national security and that the company maintains a strictly neutral stance politically. In his assessment, space photos must have a resolution of 2 meters or less and be delivered more quickly than is now possible with SPOT (24 to 48 hours) to be of tactical value. The next satellite in the SPOT series may have a 5-meter lens, but there is no plan to build it as yet, Bescond said. No country has yet objected to SPOT Image about photos it has released. (As a test, Krepon ordered a SPOT photo of a classified French military site in southern France on the Plateau d'Albion, and got it. A photo analysis firm, Grayscale, wrote up a detailed description of the complex, circling 18 suspected missile launch positions.)

The consensus at the meeting was that the element of strategic transparency provided by the new commercial images does far more for maintaining peace than it does for sharpening the means of attack. The main benefit, said Bobby Inman, former director of the National Security Agency, is that it reduces the element of surprise. He said that authoritarian governments prefer secrecy and use it to advantage, while democratic ones—however unpleasant it may seem in the short run—benefit over time from more openness. For this reason, he said, he and former Air Force Secretary Hans Mark once "conspired" to release photos from U.S. military satellites but were thwarted by government attorneys. They were told that under the Freedom of Information Act, if one photo were released, the entire file might be opened to inspection. Thus, in cases where it was deemed important to get an image out to the public, Inman said, the government sent in aerial reconnaissance teams to duplicate the satellite work—at greater risk. Inman is enthusiastic about commercial surveillance, but doubts that the cost can soon be brought down enough to make it viable without government support.

As though to underscore this point, the U.S. government sent out a warning in January that its support for commercial surveillance is faltering. It came in the form of a telegram from John Hussey of the National Oceanographic and Atmospheric Administration (NOAA) to EOSAT, the marketing agency for Landsat photos, and foreign Landsat receiving stations. Hussey said that the half-year federal operating subsidy of $9.4 million runs out on 31 March, and unless new funding is obtained, NOAA will have to turn off the two orbiting craft (Landsats 4 and 5). The agency may sacrifice other projects to keep the Landsats

running, or it may get an emergency appropriation from Congress. The next Landsat, now fully funded, is in development and will not be launched until mid-1991.

In addition, NOAA officials revealed without disclosing any details that they are discussing with France the feasibility of creating of a joint SPOT-Landsat office to handle commercial affairs in the 1990s.

The Soviet Union, meanwhile, has named a U.S. agent to sell images produced by Soyuz Karta—a subsidiary of Continental Grain called ContiTrade. Its director, Myron Laserson, said that the Soviets recently declassified a space camera called the MK-4, and will soon be selling high quality photos with a ground resolution of 6 meters. However, the Soviets still hew to the policy of not selling images of socialist nations, and they do not release digital images, the type computers can manipulate.

While changes are occurring rapidly in civil surveillance from space, neither of the great leaders in this technology—the United States and the Soviet Union—has entered the arena in full force. Many at the Carnegie conference said U.S. policy-makers are biding their time and waiting for the nature of the market to clarify before making any irrevocable commitments.

■ ELIOT MARSHALL

Human Gene Transfer Test Approved

The federal government has approved what will be the first transfer of a foreign gene into humans. The experiment is expected to begin at the National Institutes of Health within a few months.

Because of its precedent-setting nature, the proposal, by NIH researchers W. French Anderson, Steven A. Rosenberg, and R. Michael Blase, has been intensely scrutinized over the past 7 months (*Science,* 16 December 1988, p. 1501). Both NIH director James B. Wyngaarden and the Food and Drug Administration approved it last week.

Although this experiment is not considered gene therapy in that the transplanted gene will not provide a therapeutic benefit, the same technique could later be used to correct genetic diseases. In this first test, however, the transplanted gene will simply serve as a marker to track the progress of a promising but experimental cancer treatment.

The initial gene transfer experiment will be limited to ten cancer patients who are expected to live no more than 90 days. They will be fully informed of the risks of the experiment, which are considered slight.

■ LESLIE ROBERTS

Leakey Leaves Kenya Museums

Anthropologist Richard Leakey last week resigned as director of the National Museums of Kenya, a position he has held for two decades. The resignation culminates a year of growing private and public tensions between Leakey and various government officials, including the vice president, Josephat Karanja, who also heads the ministry of Home Affairs and National Heritage that oversees the museums.

Leakey told *Science* that he resigned after the vice president appointed, without consulting him, a new board of governors of the National Museums. This action "showed a lack of confidence in my leadership," said Leakey, "and made it impossible for me to continue as director." When he submitted his letter of resignation to Karanja last week, Leakey sought permission to continue anthropological explorations at Lake Turkana, the work for which he is best known outside Kenya. So far no response has been forthcoming. The permanent secretary to the vice president declined to comment to *Science*, either on the matters surrounding the resignation or the prospects for Leakey's future work at Lake Turkana.

During the past year Leakey has been under increasing criticism in some sections of the Nairobi press, concerning management of the museums and alleged preference for expatriates in positions of power. "The facts speak for themselves," says Leakey. "There were two expatriates employed by the National Museums, out of a total of 620 workers." Under Leakey's tenure the National Museums has come to comprise a natural sciences museum and research facility in Nairobi, six regional museums, and an internationally funded Institute of Primate Research, with an operational and development budget this year of $6 million.

Questions of museum business aside, Leakey last summer was involved in a very bitter and public dispute with the Minister of Tourism and Wildlife, George Muhoho, over the continued loss of elephant and rhino to poaching. Leakey charged the minister with willfully dragging his feet over antipoaching measures, because of alleged involvement in the lucrative ivory business of government officials. Muhoho demanded that Leakey name names. As a result Vice President Karanja in September requested Leakey's resignation, saying he was embarrassing the government. Leakey declined, and argued that he was speaking not as a government employee, which he is as director of the National Museums, but on behalf of the East African Wildlife Society, of which he is chairman. Some observers believe that the reorganization of the museum's board of governors, which forced Leakey's resignation, was inspired more by concern over the elephant poaching confrontation than over museum business.

With a great deal of free time now on his hands, Leakey looks forward to expanding considerably his active involvement in anthropological fieldwork, he told *Science*. Researchers in this country will watch with interest to see if these plans are impeded in any way.

■ ROGER LEWIN

Richard Leakey *excavates a 1.5-million-year-old fossil skull.*