ERTS and international relations

The launch of the first Earth Resources Technology Satellite poses questions of invasion of national privacy and proprietary rights to the information

by Everly Driscoll

Artificial satellites have a tradition of freedom of skies that contrasts sharply with international law regarding aircraft. Legally an aircraft cannot fly over a sovereign nation's air space without permission, and allegations of espionage usually greet unauthorized overflights. Satellites have been free from such allegations since Sputnik I, the first satellite, was orbited on Oct. 4, 1957, without international protests. (This may have been because no nation was in a position to do anything about Sputnik at the time.)

The United Nations has reaffirmed this open sky policy with a Treaty on Peaceful Uses of Outer Space that establishes the right of any nation to conduct peaceful activities in space without getting permission from any other nation. Even military reconnaissance satellites equipped with sophisticated remote sensing instruments orbit the earth daily without interference. Perhaps it is because these satellites, rather than causing international conflict, have been credited on occasion with preserving world peace. The Soviets know what the United States is doing and vice versa.

These precedents may be one of the reasons that there has been little significant clamor over the launch of the first civilian satellite with the prime objective of looking at the earth's surface (SN: 6/24/72, p. 408). Earth Resources Technology Satellite I was launched July 23 (SN: 7/29/72, p. 72).

Another reason ERTS I is being taken in stride is that it offers each nation something positive, and the relative position of each nation in relationship to its neighbors and the world is not likely to change because of ERTS imagery. A third reason is that ERTS is only an experimental project—part of a much larger worldwide effort now under way to examine the usefulness of remote sensing of earth's resources from space.

Nevertheless, relevant questions concerning this technology are being raised at the United Nations and other international meetings. Some of these were outlined by Norman Fisher, chairman of the Australian committee on earth resources satellite (ERS) systems. Many countries, he said, have restricted areas, where aerial photography is either prohibited or can be done only under approved conditions. Should ERS systems be allowed to photograph these areas? (They will.) Should images of one nation's resources be acquired and distributed without permission? Who should have proprietary use of that data? What type of organization or organizations should be allowed to operate such satellites? If such satellites become operational, how can a less developed country, without the funds to operate its own satellites, commission, finance and research data about its own resources and for its own use.

Fisher illustrated one of his questions. In Australia, he said, mineral rights are generally regarded as belonging to the government. Mine departments of each state grant permission to lease the land over a specified period of time for mining any mineral deposits. During this time, it is the general practice that nobody but the titleholder, or lessee, is permitted to carry out any operations that can be described as prospecting for minerals. This includes airborne sensors; that is, any prospecting rights in the area apply to the air space above the ground.

Most of these questions do not apply to the two experimental satellites, ERTS I and II. The National Aeronautics and Space Administration *will* be getting images of the entire globe. But because NASA has played the game shrewdly, cautiously and openly—preparing the world, so to speak— there are not likely to be any repercussions.

ERTS camera resolution capability is at best 100 meters. Practically speaking, it will probably be more like 180 to 275 meters. It will not get down to the "object level," and thus any fears about its military espionage value are groundless. (It is generally accepted that military activities are known to world governments anyway. The only fear would be of those governments that don't want their own people to know what other governments know.) By putting the data in the public domain, NASA has gingerly side-stepped the proprietary-use question. Any nation that wants the information can get it at the same time other nations do.

The points raised are more relevant to systems that could be flown later once the technology has proved useful. The questions, say the U.S.S.R., France and Australia (to mention a few), should be answered before these later systems become operational.

An underlying concern is one of exploitation—"modern-day colonization," says one adviser. It is generally expressed as "Who has proprietary use of the data?" Will the United States, for example, be able to capitalize on another country's lack of expertise or money? What are the possibilities that an American oil firm will be able to orbit its own satellite, keep the data and go into a less developed country to explore for oil? (It is unlikely this will happen. But should a company be so naive, it might later find the oil, its equipment and the money it invested confiscated and nationalized by the host country.) Less dramatic scenarios are more likely; the host country might engage an oil company to explore the possibilities and then share the profits.

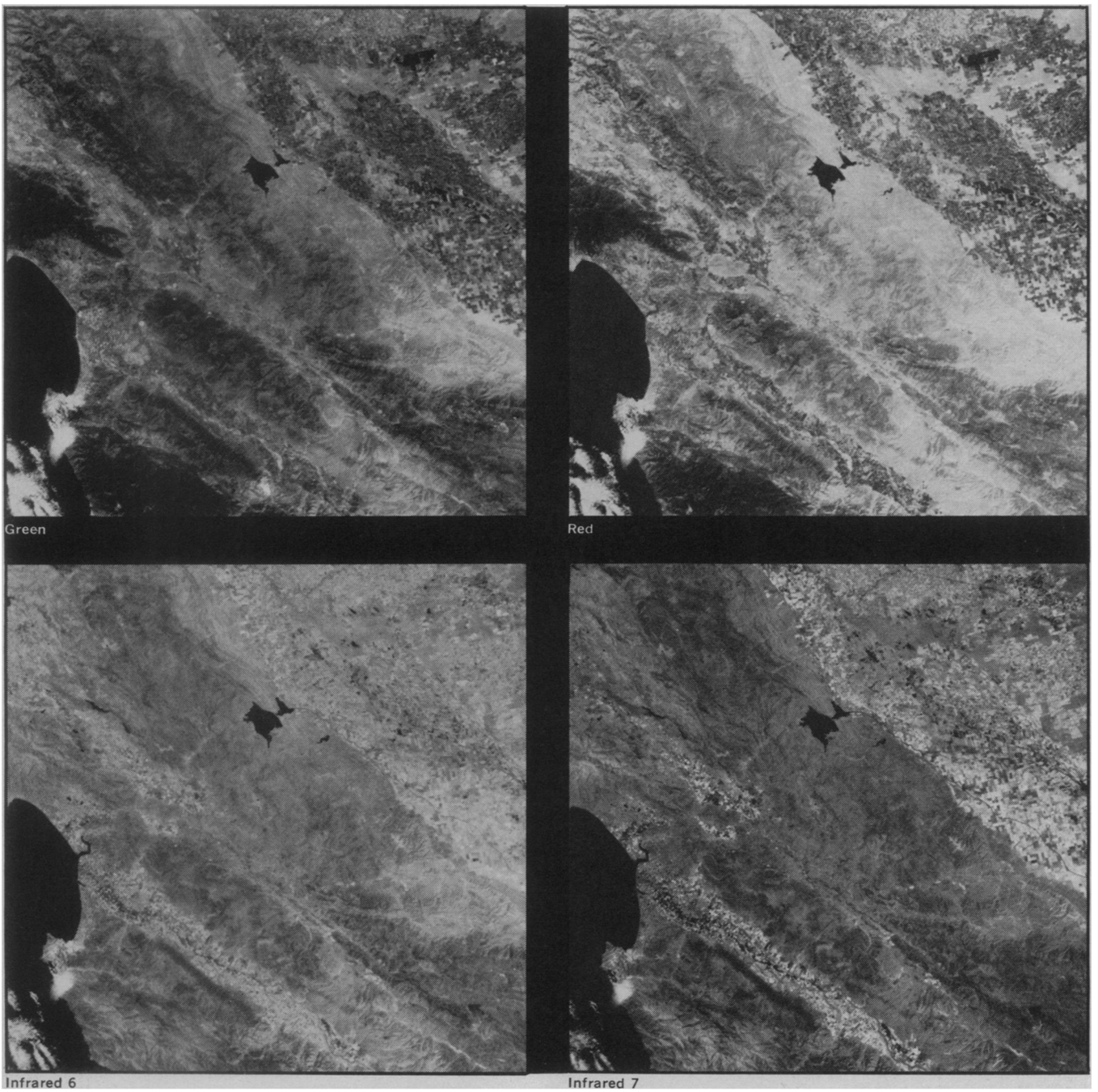
There are numerous avenues for eliminating the proprietary issue altogether. All of them would, in one form or another, make the data freely accessible to all comers. An example of such satellite use is TIROS, a weather satellite. Any country can buy a "readout" machine for $5,000 or $6,000. When the satellite is overhead, the nation can read out its own weather. TIROS is a freebie—built and paid for by the United States. In other cases a consortium of nations might put up the capital and then have users pay for service.

If an international commercial corporation wanted to buy and fly ERS systems, the firm could code the satellite so that each nation would have access to the data taken over its territory through a small receiving ground station. The user nations could request and pay for three passes or six minutes of camera time over their country, for example, and do with their own data as they chose.

Or a specialized agency of the United Nations could be set up to manage the satellite systems. The possibilities are numerous.

Another concern of less developed countries is how to use the imagery. Beyond having access to the data, will they have the expertise to interpret the information and the money to exploit it? The United Nations Science and Technology Subcommittee for the Peaceful Uses of Outer Space has established a working group called Remote Sensing of the Earth by Satellites to explore such questions. One of the ideas, says Franco Fiorio, chairman, is to assist the developing nations in building up

Early photographs from ERTS I



NASA

Monterey Bay, Santa Cruz, the Salinas and San Joaquin Valleys and the San Andreas Fault zone were photographed from 900 kilometers July 25 by the multispectral camera aboard ERTS I. Shown are photographs in the green, red and two infrared spectral bands. The infrared bands are in wavelengths 7,000 to 8,000 angstroms and 8,000 to 11,000 angstroms.

The fields in the Salinas and San Joaquin Valleys appear gray in the green band and dark gray to black in the red band. The black fields are darker because the plants there absorb more radiation. Fields that are bare soil appear dark gray in the green and lighter in the red. Note the fields that appear black in the green and red but are barely distinguishable in the infrared. Sand, concrete roads and buildings appear white in the red and green bands. Surface water is best detected in the infrared. The aqueducts in the central valley and a canal extending northwest and southeast from a reservoir (upper middle) appear black in the infrared as do smaller bodies of water. The water is lighter in tone in the red band. Color differences in the water can be seen in Monterey Bay. This could be the result of the early morning smog being blown out to sea. A smoke plume from Santa Cruz indicates the surface wind direction is from the north. The linear feature extending from the lower right to the upper left is the San Andreas Fault.

the relevant expertise—training photogrammetrists, for example. Some nations, such as Brazil, have already developed their own earth resources professionals. Others have sent their scientists to the United States for instruction. Currently 36 nations are using ERTS imagery.

There are other international aspects of ERS systems: the tools are now available for man to survey the earth's resources, not just on a local or national level, but on a regional and global level. Once man has this knowledge, what will he do about it? Would one country be willing to limit its corn production if ERS revealed a bumper crop in another nation? Would a country adjust its production to meet the world market and balance the world's inventory?

The Stockholm conference (SN: 6/17/72, p. 390) revealed that there *is* a growing consciousness that the economics, conservation and use of earth's resources must be treated globally. Nevertheless, says one observer, it was obvious that the lesser developed countries were insisting on their right to pollute and exploit to reach the level of the developed countries before they would accept pollution controls. Earth models can be developed from ERS systems that will tell man what he can and cannot do on a local level, and the global or regional consequences of his actions.

It is not likely that ERS systems will tell man anything he couldn't find out by other means: with ERS, however, the data will be available sooner and on a global scale. One international incident illustrates this point. Sweden tested its lakes a few years ago and found an increased acid content. The pollution was caused from sulfides in industrial smoke. The scientists concluded the pollutants were not from Sweden. They studied the wind patterns and then accused English power plants of mucking up their lakes. The English denied it. What was eventually discovered was that an American company was selling Germany high-sulfide coal that couldn't be used in the United States. Seasonal winds were sweeping the industrial smoke from Germany to England and then to Sweden. Who sues whom? It is a real problem, says one government official, an unresolved three-nation debate that focuses on the need for regional and global considerations.

"I think it is pretty clear," says Armin Spaeth, head of West Germany's office of research policy on space and aviation in the Ministry of Science and Education, "that remote sensing by satellite and traditional nationalistic attitudes are totally incompatible."

It will take global models to which ERS data will contribute significantly, to see—at the onset—beginnings of irreversible change. It will also take global cooperation to prevent planeticide: a cooperation not even achieved in the United States when it becomes evident that over-grazing and thus erosion is occurring in range lands covering five or six states. Is it a state or Federal responsibility? How are local jurisdictions compromised or used?

Analyses of ERTS I data will provide some answers about the value of the information and its usability. And it is clear that at the least, satellites such as ERTS I are not fundamentally dangerous to any one region, country or geographical entity. They are potential instruments for global management of this planet's resources. The major question remains: Is the world ready now, or will it ever be willing for planetary action which requires putting aside localized, short-term interests for actions on long-range goals to ensure the quality of tomorrow? □