

Union Calendar 624

98th Congress, 2d Session - - - - - House Report 98-1108
1108

**SALE OF LANDSAT COULD ADVERSELY AFFECT
INTERNATIONAL RELATIONS**

FORTY-EIGHTH REPORT

BY THE

**COMMITTEE ON GOVERNMENT
OPERATIONS**



SEPTEMBER 28, 1984.—Committed to the Committee of the Whole House on
the State of the Union and ordered to be printed

U.S. GOVERNMENT PRINTING OFFICE

38-469 O

WASHINGTON : 1984

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LETTER OF TRANSMITTAL

HOUSE OF REPRESENTATIVES,
Washington, DC, September 28, 1984.

Hon. THOMAS P. O'NEILL, Jr.,
Speaker of the House of Representatives,
Washington, DC.

DEAR MR. SPEAKER: By direction of the Committee on Government Operations, I submit herewith the committee's forty-eighth report to the 98th Congress. The committee's report is based on a study made by its Legislation and National Security Subcommittee.

JACK BROOKS, *Chairman.*

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98TH CONGRESS } 2d Session	HOUSE OF REPRESENTATIVES	{ REPORT 98-1108
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SALE OF LANDSAT COULD ADVERSELY AFFECT INTERNATIONAL RELATIONS

SEPTEMBER 28, 1984.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. BROOKS, from the Committee on Government Operations,
submitted the following

FORTY-EIGHTH REPORT

BASED ON A STUDY BY THE LEGISLATION AND NATIONAL SECURITY
SUBCOMMITTEE

On September 25, 1984, the Committee on Government Operations approved and adopted a report entitled "Sale of LANDSAT Could Adversely Affect International Relations." The chairman was directed to transmit a copy to the Speaker of the House.

I. SUMMARY

Knowledge of the earth's surface features is extremely helpful in improving utilization of land and water resources. Because of the vastness of the earth's surface, acquiring such knowledge has been a considerable challenge throughout the years.

Based on the promise of photographs of the earth taken by early astronauts, the land remote sensing satellite program, known as LANDSAT, was established under the auspices of the National Aeronautics and Space Administration (NASA) in 1972. The LANDSAT program consists of a single operating satellite which circles the earth 14 times a day gathering data on the entire planet's surface features in several different spectral bands, with a 16-day repeat orbit.¹ These data are transmitted in digital form from

¹ A 16-day repeat orbit means that it takes LANDSAT a total of 16 days to gather data on the whole earth's surface. That is, once every 16 days, LANDSAT reimages the same part of the earth's surface under the same lighting conditions.

the satellite to ground receiving stations where this data is converted by computers into visual imagery or pictures.

Over the years, as the value of LANDSAT imagery has become known, more and more countries around the world have begun to use it. Over a dozen nations have either singly or jointly put together the resources needed to build LANDSAT ground receiving stations so that they, too, can get the transmissions from this satellite directly. Other nations have become frequent purchasers of LANDSAT data from the U.S. Government's data center located in South Dakota. Still other nations have come to use LANDSAT imagery with the help of the Agency for International Development (AID). All told, there is no continent that has not already benefited from the use of LANDSAT data. This, despite the fact that many of the possible uses of LANDSAT data are only now being discovered and developed.

In the years since the first LANDSAT satellite was launched, four replacement satellites have been launched sequentially to assure that there would be a continuous flow of data from this type of spacecraft. The timing of the subsequent launches has generally been based on an expected satellite lifetime of three years. However, if the currently operating LANDSAT satellite begins to flounder or actually fails prematurely in orbit, the next LANDSAT satellite may be launched earlier than anticipated.

Thus, in order to ensure that there is always a LANDSAT satellite operating, there should be a LANDSAT spacecraft in ready reserve at all times.

Early on in the current Administration, money contained in the annual budget to build two additional LANDSAT satellites was cut. If these two had been built, they would have been expected to carry the program through 1994. At the time these cuts were made, they probably did not appear to be critical to the overall viability of the LANDSAT program, as there were then two such satellites either under construction or in ready reserve which were expected to carry the program through late 1988. One of these satellites was launched on schedule in early 1982. Within a year and a half of its launch, however, this spacecraft developed serious problems which necessitated the early launching of the one remaining LANDSAT satellite. This LANDSAT satellite is expected to carry the program through March 1987. As a result of these developments, the Administration's decisions to cut the funds of the LANDSAT program and not build any more LANDSAT satellites became highly significant. These budget decisions meant that there is now no LANDSAT satellite in ready reserve. In addition, because it takes four years to build a LANDSAT satellite, there is a very high probability that in the next few years there will be no operational LANDSAT satellite at all.

Shortly before serious problems developed with the fourth LANDSAT satellite, the Administration changed the status of the primary sensor on the LANDSAT satellite program from "experimental" to "operational" and concomitantly transferred the responsibility for administering the overall program from NASA to

the National Oceanic and Atmospheric Administration (NOAA).² Within weeks of this change, the President announced his intention to sell to the private sector the LANDSAT satellite system, along with the Nation's four weather satellites, known collectively as METSAT.

Concerned about the effect the President's proposal might have on the interests of the Nation, the Subcommittee on Legislation and National Security held an oversight hearing on September 28, 1983. Because the proposal to sell METSAT had already been thoroughly debated and criticized, this hearing focused on the proposal to sell the LANDSAT satellite and its ground support units, with particular emphasis on its potential impact on the U.S. relations with other countries.

At the hearing, the Chairman of the Source Evaluation Board on Civil Space Remote Sensing, Department of Commerce, testified that the Administration did not intend for the Government to build any more LANDSAT satellites. He acknowledged that, because of the absence of any LANDSAT satellites in ready reserve, there would indeed most likely be a sizable gap in LANDSAT data transmissions between the time that the Government's last satellite stopped working and the time when a private operator could have a new satellite in operation. He also noted that in order to maximize the chances of disposing of LANDSAT, the Administration would place as few restrictions on the private sector operator as possible. As a result, the Administration would probably allow a commercial operator of LANDSAT to terminate existing LANDSAT-related agreements with other nations, distribute LANDSAT data on a discriminatory basis, and set whatever price it wanted for LANDSAT products, if these actions would facilitate the private running of the system.³

The Acting Assistant Secretary, Bureau of Oceans and International Environmental and Scientific Affairs, Department of State, testified that LANDSAT had generated a number of foreign policy benefits and measurable international prestige for the United States since its inception. He noted, however, that the Administration's decision to transfer LANDSAT to the private sector did not present any inherent obstacles for the conduct of foreign affairs.

The Senior Assistant Administrator for Science and Technology, Agency for International Development (AID), testified that LANDSAT has been a valuable tool in fostering the economic development of at least forty low-income countries of the world with whom the United States cooperates. While he was optimistic that the sale of LANDSAT would not seriously jeopardize AID's programs, he was concerned that AID might face problematic copyright restrictions with a privately owned and operated system.

² The primary sensor on LANDSAT, the Multispectral Scanner (MSS), attained "operational" status on January 31, 1983. The other sensor onboard LANDSAT is the Thematic Mapper (TM) which is still considered "experimental" and continues to be under the control of NASA. The TM is expected to attain "operational" status on January 31, 1985, and be transferred to NOAA at that time.

³ *International Implications of Proposed Sale of LANDSAT Satellite*, Hearing before a Subcommittee of the Committee on Government Operations, House of Representatives, September 28, 1983, pp. 90-98. See also *Effects on Users of Commercializing LANDSAT and the Weather Satellites*, a report of the General Accounting Office, GAO-RCED-84-93 (February 24, 1984).

The Director of the Resources, Community and Economic Development Division of the General Accounting Office (GAO), testified that while other nations were not per se opposed to the sale of LANDSAT, they were very concerned that the sale of LANDSAT would result in discriminatory data distribution policies that would adversely affect them, terminate the satellite transmissions to their ground receiving stations, and increase prices so much that they would have to reduce their LANDSAT data purchases.

The Director of the Office of Technology Assessment (OTA) testified that with respect to LANDSAT, there was a fundamental incompatibility between the U.S. foreign policy goals and the commercial goals that would be pursued by a private operator of the system. He noted that many developing nations of the world view the transfer of LANDSAT to the private sector as a hostile action on the part of the United States. He further noted that the policy of making LANDSAT data available to everyone on an equal basis (i.e., a nondiscriminatory data distribution policy) was a key ingredient in explaining the acceptance of LANDSAT by the world's nations and was an essential element in maintaining the "open skies" policy which allows all U.S. spacecraft to circle the globe without restriction.

II. DISCUSSION

A. INTRODUCTION

Early in 1983, serious questions about the wisdom of the proposal to sell LANDSAT had prompted Chairman Brooks to request both the GAO and OTA to conduct thorough investigations of the possible ramifications abroad of such an action. This discussion presents many of the results of these studies, beginning with a look at how LANDSAT data has come to be used by various nations around the world, followed by an examination of the possible impact that the sale of the LANDSAT system would have on the U.S. relations with other countries, and developments which could affect the future operations of either a government or privately owned LANDSAT system.

B. THE USES OF LANDSAT DATA

Since the launching of the first LANDSAT satellite in 1972, the imagery from this spacecraft has proved to be useful in agriculture, map-making, hydrology, geology, land-use planning, environmental monitoring, and surveying marine and ocean resources. The GAO investigation documented the many ways in which various nations have reaped significant benefits from LANDSAT data. At the September hearing, GAO testified that LANDSAT has been particularly important for developing countries where less is known about the land and its resources than for the more industrialized nations. GAO cited several examples—in particular, how Brazil, Peru, Thailand, and India have used LANDSAT data.

Brazilian officials said that LANDSAT had proven especially valuable for monitoring sugar cane—an important crop used both as food and in manufacturing synthetic fuels. Brazilian space agency officials said that the satellite data was needed

because Brazil's large land area made the use of aerial photography for surveying the crop impractical.

Peru has acquired LANDSAT data from Brazil and the United States to produce its first nationwide topographic map. Peruvian officials said that the nature and location of the nation's natural resources are not fully known, because about two-thirds of the nation has never been accurately mapped. The officials said mapmaking through aerial photography is too expensive and that flying in remote regions of Peru is too dangerous. The officials added that the speed with which LANDSAT provides information is especially important in a country like Peru, where natural disasters such as earthquakes, droughts, and floods can rapidly change roads, rivers, and agricultural conditions.

Thai officials told GAO that increasing population has caused more and more land to come under cultivation. The impact of this expanded farming was not clear until LANDSAT images showed deforestation occurring at an alarming rate. Ground surveys and aerial photography had not disclosed the full dimensions of the problem. After seeing the LANDSAT pictures, the Thai government strengthened controls on the clearing of forests.

In India, LANDSAT's images of shrinking lakes provided graphic evidence of the effects of recent droughts and contributed to government decisions to provide relief to affected areas.⁴

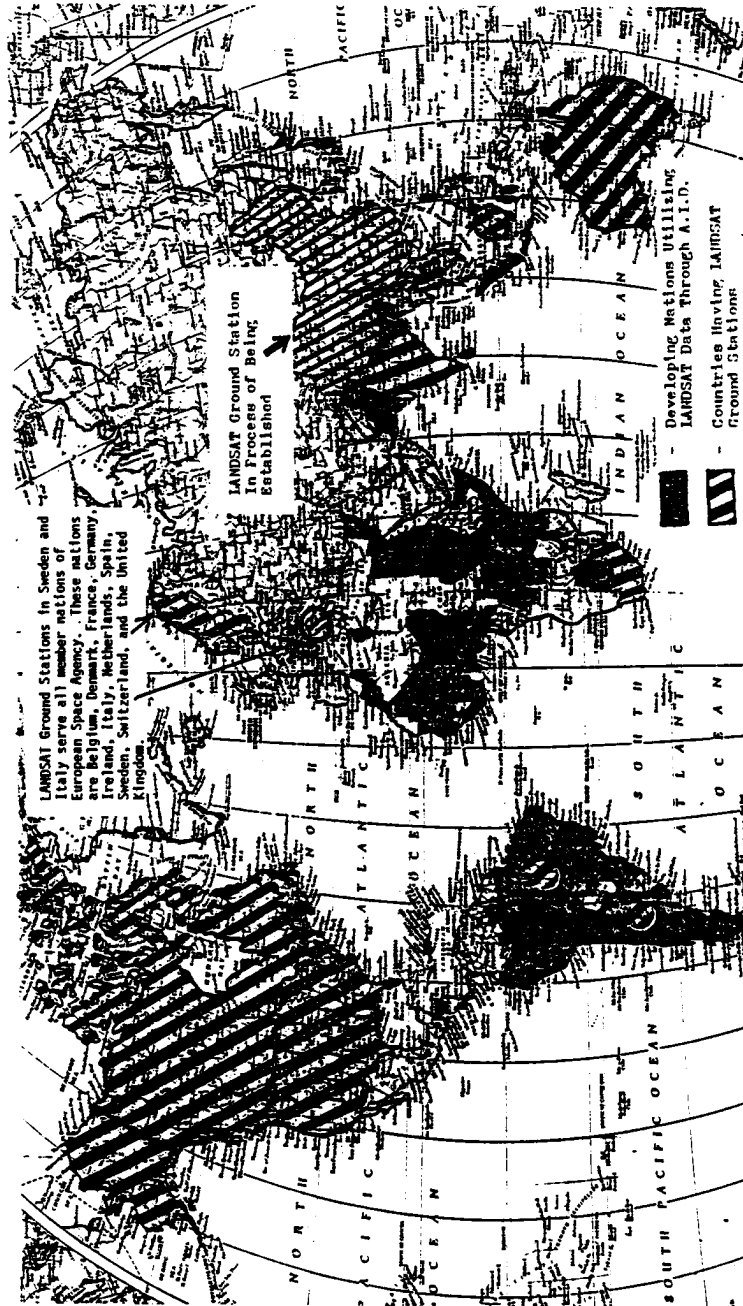
The Committee notes with concern that GAO investigators discovered that little, if any, effort had been made on the part of the U.S. Government to keep LANDSAT user nations around the world informed about the contemplated changes in the status of LANDSAT or to discuss their concerns over the proposed sale with them. The Committee notes that while the decision to sell LANDSAT or any other Government-owned item which has international utility, may ultimately be a purely domestic decision, the U.S. Government should show more consideration toward user-nations as it considers policy options. The U.S. Government must not forget that these nations have invested considerable resources in acquiring LANDSAT capabilities, and that any decision which affects the future of LANDSAT is of definite concern to them.

Many of the world's nations are not able to derive benefits from LANDSAT without technical and/or financial assistance. Because these are the developing nations that stand to gain the most from LANDSAT over the years, AID has provided the required assistance to these countries. To date, AID-assisted LANDSAT user nations are: Argentina, Bangladesh, Benin, Bolivia, Botswana, Brazil, Cameroon, Chile, Costa Rica, Dominican Republic, Ecuador, Egypt, Haiti, Indonesia, Ivory Coast, Jamaica, Jordan, Kenya, Lesotho, Malawi, Mali, Mauritania, Morocco, Nepal, Niger, Nigeria, Pakistan, Peru, Philippines, Senegal, Sierra Leone, Sri Lanka, Somalia, Sudan, Swaziland, Syria, Tanzania, Thailand, Togo, Tunisia, Upper Volta, and Zaire.

⁴ *International Implications of Proposed Sale of LANDSAT Satellite, Ibid.*, pp. 51-52.

AID characterized the assistance it has provided to these nations as technology adaptation, operational monitoring, and/or institution building. Through technology adaptation, AID has primarily helped Third World nations to make crop production estimates to begin to deal with the problem of how to feed the over one-half billion people in the world who are on the brink of starvation. Through operational monitoring, AID has helped a number of countries to assess their total land resources and document changes that are occurring in land use. One of the most significant forms of operational monitoring which LANDSAT facilitates concerns the tracking of the destructive process whereby deserts encroach on fertile land. Through institution building, AID has begun the process of taking LANDSAT technology to the Third World people who actually use it. As a result, LANDSAT imagery is becoming a type of technology that is understandable and usable by residents of many nations throughout the world independent of U.S. resident expertise.

The following map shows the many nations that either have LANDSAT ground receiving stations or have used LANDSAT imagery with the assistance of AID. These nations do not necessarily include those that have purchased LANDSAT imagery from the U.S. Government data center in South Dakota.



All the potential uses of LANDSAT imagery are not yet known. The Committee notes, however, that each year the LANDSAT program has been in existence, more and more uses for its imagery have been discovered and more nations have come to use it.

C. IMPACT OF LANDSAT SALE ON U.S. INTERNATIONAL RELATIONS

Before the potential impact of the sale of LANDSAT upon U.S. international relations can be assessed, the effect that the establishment of the LANDSAT program has already had upon these relations must be examined.

After over a decade of operation, the clear consensus is that the LANDSAT program has had a positive impact on the U.S. relations with other countries. The witnesses at the Subcommittee's hearing described the LANDSAT program in such terms as a builder of considerable good will abroad (GAO); a generator of foreign policy benefits (State); a benefit to both the United States and developing countries (AID); and a significant contribution to U.S. foreign policy and international relations (OTA).

The Committee is concerned that by transferring the LANDSAT program to the private sector, the Government could be losing a valuable foreign policy tool. While the possible range of assistance that might be given to various developing nations by the United States is quite broad, few programs appear to match the ability of the LANDSAT program to simultaneously foster self-sufficiency, technological competence, and national pride. Even though only a U.S. company or individual would be allowed to take over the LANDSAT system under the Administration's proposal, the Committee believes that the U.S. Government can continue to reap notable foreign relations benefits from the LANDSAT system only if it retains considerable control over the system.

While LANDSAT now generally appears to be a popular program among the nations of the world, its acceptance was not immediately forthcoming at its inception. Some nations did not take kindly to having satellites take pictures of their terrain when they had no control over what was photographed within their borders, or who could obtain the finished pictures. Several nations argued in the United Nations that LANDSAT not be allowed to photograph their countries unless they had given the United States permission to do so.

No LANDSAT system could be practical if permission had to be obtained from every nation in the world over which the satellite happened to pass. Recognizing that such a situation was untenable, but entirely possible if the concerns of the various nations were not addressed, the United States decided to adopt a policy of nondiscriminatory data distribution with respect to LANDSAT imagery. This meant that any nation or individual in the world would have the same access to all imagery generated by LANDSAT, and that fees would be kept to a minimum so as not to disadvantage less wealthy nations. No one would have preferential rights to any LANDSAT imagery, not even the nation that was being imaged. By adopting this policy, the U.S. Government helped to squelch the fears of developing nations that some private investor might obtain

knowledge about a nation's resources that the nation itself did not possess, and then attempt to exploit that information.

Thus far, the nondiscriminatory data distribution policy has been most successful in assuaging fears about LANDSAT. In addition, witnesses at the hearing noted that the nondiscriminatory data distribution policy for LANDSAT has been a key ingredient to the maintenance of the "open skies" policy which permits all U.S. satellites to circle the globe without restrictions.

The Committee is concerned that any deviation from the nondiscriminatory data distribution policy for LANDSAT could have serious negative repercussions for the United States abroad. There are still nations that object to LANDSAT taking images of their terrain. Their arguments have not prevailed to date, however, because the U.S. Government has fought hard to sell and enforce the nondiscriminatory data distribution policy. If the U.S. Government is no longer the major party in control of the LANDSAT system, the relationship of trust that has grown between the U.S. Government and developing nations with regard to the LANDSAT program will not necessarily transfer to a private owner of the LANDSAT system. A simple sale of LANDSAT to the private sector, as OTA testified at the hearing, is viewed as a hostile action on the part of the United States by some nations. In addition, OTA stated:

In view of the continued importance of the "open skies" principle to the use of space, it is important for Congress to consider carefully the implications of this potentially radical change of policy upon other issues, both civilian and military.⁵

The Committee is concerned that any change in the control of the LANDSAT system be as nondisruptive as possible to existing international arrangements between the United States and other nations. In light of the significance of the nondiscriminatory data distribution policy to the success of the LANDSAT program, as well as the maintenance of the "open skies" policy, the Committee believes that retention of this policy should be a permanent, non-negotiable part of the LANDSAT program regardless of the system's ownership or control. The Committee wishes to emphasize the importance of this matter, since the Administration stated at the hearing, as well as in other forums, that it would prefer to permit a private operator of the LANDSAT system to dispense with the nondiscriminatory data distribution policy, if doing so would facilitate the commercial objectives of a privately owned system.⁶

On this particular matter, as OTA noted at the hearing, the commercial objectives of a private owner and the foreign policy goals of the United States may appear to be fundamentally incompatible.⁷ With the desire to make a profit the driving force behind a commercial operator, it is obvious that selling LANDSAT data on a preferential basis to the highest bidder might appear to be the best way to run the system. With international good will, trust, and the

⁵ *Ibid.*, p. 14

⁶ *Ibid.*, pp. 98. See also *Effects on Users of Commercializing LANDSAT and the Weather Satellites*, p. v.

⁷ *Ibid.*, p. 11.

future of other civilian and military space programs at stake, the perspective of the Government should take precedence; LANDSAT data must continue to be available at minimal prices on a nondiscriminatory basis. The Committee believes that making this requirement a condition of sale should minimize the adverse impact that the sale of LANDSAT might have on relations between the United States and other nations.

The Committee is pleased to note that in Public Law 98-365, the Land Remote-Sensing Commercialization Act of 1984, enacted on July 17, 1984, the Congress has ensured that dissemination of LANDSAT-type data from private firms will be on a nondiscriminatory basis.

D. DEVELOPMENTS THAT MIGHT AFFECT THE FUTURE OPERATIONS OF
LANDSAT

While the United States is currently the only nation in the world to have a satellite-based land remote sensing system, this will most likely not be the case for much longer. France, having recognized the value of such a system, plans to launch its own land remote sensing satellite late in 1985. In anticipation of this event, France is already engaging in an active promotional marketing campaign to line up potential customers for its satellite's data.

The Committee recognizes that the arrival of a competitor in the land remote sensing arena will most likely have a profound impact on the LANDSAT program. No longer can the marketing of LANDSAT data be secondary to the development of land remote sensing technology. If the United States intends to continue to reap the benefits of providing other nations with land remote sensing imagery, the United States will have to offer a product that is competitive in both quality and price with that offered by the French.

A desire to better market LANDSAT data appears to be at least partly responsible for the Administration's decision to turn the satellite system over to the private sector.⁸ The testimony of the Administration's representative from the Source Evaluation Board clearly indicated that the Administration believes that the private sector knows more about the marketing of products such as LANDSAT imagery than does the U.S. Government. The Committee does not take issue with this assumption, but it is concerned that the rush to better market LANDSAT imagery not jeopardize the long-term survival of the system.

At the hearing, the SEB testified that it would be anywhere from 5 to 15 years before the market for LANDSAT data would be large enough to support a commercial venture. GAO agreed, noting,

It is premature to talk about a commercial market for LANDSAT because up to this point in time we have been talking about a research and development type activity. The market is just not established commercially.⁹

Consequently, any plan to turn LANDSAT over to the private sector must take account of the present small size of a commercial market for LANDSAT imagery. If the plan does not provide for

⁸ *Ibid.*, pp. 100-101.

⁹ *Ibid.*, p. 60.

adequate subsidy in the early years, it will not be a transfer plan at all, but a plan to kill the LANDSAT program. Even if the private sector is better at marketing LANDSAT data than is the U.S. Government, it cannot generate a market overnight.

The French recognize this fact and are prepared to turn their system over to the private sector gradually over a ten-year period. As OTA testified at the hearing, however, even then the French system may not actually be privately run because the French Government is a part owner of the company to which the French system will ultimately be turned over.

The Committee believes that assuring the survival of the LANDSAT system is of paramount concern because U.S. Government agencies are currently the major users of land remote sensing technology, and to permit the U.S. Government to become dependent on other nations for this data could present problems. Consequently, any plan to turn the system over to the private sector must be flexible enough to provide for unforeseen contingencies. To provide the necessary flexibility, the U.S. Government should remain an active participant in the LANDSAT program. This would also enable the U.S. Government to reap the maximum possible foreign policy benefits from the LANDSAT program. On this point also, the Committee notes with pleasure that Public Law 98-365 provides for the continued involvement of the U.S. Government in any LANDSAT-type program as the licensor of land remote sensing systems.

The Committee also believes that in light of the advent of foreign competition in land remote sensing, it would be wise for the Administration to encourage competition among U.S. companies for the land remote sensing market. To do so would maximize the possibility that the United States will continue to lead the world in the field of land remote sensing and avoid the problems incumbent in the creation of state-sanctioned private monopolies.

III. CONCLUSION

The satellite-based land remote sensing program known as LANDSAT has proved to be quite useful in acquiring knowledge of the earth's surface features. This information has been useful not only to the United States, but also to developing countries that are trying to assess their nations' land and water resources.

To date, over 40 developing nations have used LANDSAT imagery with the assistance of AID. More than a dozen other nations have singly or jointly built ground stations to receive LANDSAT data directly. Still others have purchased LANDSAT data products from the U.S. Government data center in South Dakota.

The U.S. Government has reaped immeasurable international benefits from the LANDSAT program. Despite this fact, the Administration has proposed to transfer the LANDSAT system to the private sector. The Committee is concerned that in making such a transfer, the U.S. Government could be losing a valuable foreign policy tool.

The crucial element in the widespread acceptance of LANDSAT has been the U.S. policy of distributing LANDSAT data in a non-discriminatory manner at minimal prices. This policy has also been

the cornerstone of the "open skies" policy which permits all U.S. spacecraft to fly without restriction around the earth. The Committee is deeply concerned that any plan to transfer LANDSAT to the private sector not alter the nondiscriminatory data distribution policy, in violation of Public Law 98-365, and thereby jeopardize the "open skies" policy.

IV. FINDINGS

1. The LANDSAT program has had significant, positive foreign relations benefits for the United States.
2. LANDSAT imagery provides the only available information on the surface conditions of certain parts of the world.
3. The key to LANDSAT's acceptance thus far and its development in the future is the unrestricted availability of its products at minimal prices.
4. The U.S. nondiscriminatory data distribution policy for LANDSAT information is the key to the maintenance of the vital "open skies" policy that allows all U.S. spacecraft to circle the globe without restriction.
5. Any deviation by the United States from our longstanding nondiscriminatory data distribution policy for LANDSAT information is likely to be viewed as a negative action by many foreign nations.
6. It will be an estimated 5 to 15 years before a large enough market for LANDSAT products will develop that would completely support a privately owned and operated LANDSAT system.
7. The Administration's efforts to inform other nations with LANDSAT ground receiving stations of commercialization efforts that would directly affect them have been inadequate.

V. RECOMMENDATIONS

1. Our Nation's longstanding nondiscriminatory data distribution policy should be continued regardless of LANDSAT's ownership, in accordance with the provisions of Public Law 98-365. Our reaffirmation of this policy should be communicated to all the nations of the world.
2. Consistent with Public Law 98-365, the U.S. Government should remain an active participant in the LANDSAT program to assure its continuation and to assure that the United States as a nation reaps the maximum foreign relations benefits from this program.
3. Every effort should be made to inform other nations with LANDSAT ground receiving stations of developments in any attempt to commercialize LANDSAT, to honor our expressed and implied LANDSAT related commitments to such nations, and to accommodate their concerns regarding LANDSAT's future as much as possible.