

**STATEMENT OF**

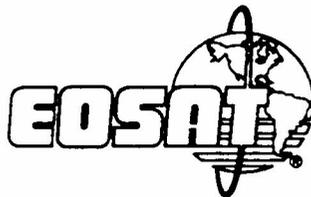
**DR. ARTURO SILVESTRINI  
PRESIDENT AND CHIEF EXECUTIVE OFFICER  
EARTH OBSERVATION SATELLITE COMPANY**

**SUBMITTED FOR THE HEARING ON**

**THE LANDSAT PROGRAM**

**BEFORE**

**THE SUBCOMMITTEE ON  
SCIENCE, TECHNOLOGY, AND SPACE  
OF THE COMMITTEE ON  
COMMERCE, SCIENCE, AND TRANSPORTATION  
UNITED STATES SENATE**



**6 MAY 1992**



**STATEMENT OF**  
**DR. ARTURO SILVESTRINI**  
**PRESIDENT AND CHIEF EXECUTIVE OFFICER**  
**EARTH OBSERVATION SATELLITE COMPANY**  
  
**SUBMITTED FOR THE HEARING ON**  
**THE LANDSAT PROGRAM**  
  
**BEFORE**  
  
**THE SUBCOMMITTEE ON**  
**SCIENCE, TECHNOLOGY, AND SPACE**  
**OF THE COMMITTEE ON**  
**COMMERCE, SCIENCE, AND TRANSPORTATION**  
**UNITED STATES SENATE**  
  
**6 MAY 1992**

**INTRODUCTORY COMMENTS**

I would like to begin by expressing my thanks for the subcommittee's interest in the Landsat program and commercialization. The last Senate oversight hearing on the Landsat program was at the time of the original passage of the Landsat Commercialization Act of 1984. Since then increasing concerns have been raised about our collective failure to fully utilize remote sensing data to study changes in the global environment and to guide policies that would halt or reverse dangerous trends resulting from human activities. Combined with problems and delays in the commercialization process itself, these concerns have caused some to question the viability and value of commercialization. EOSAT appreciates the opportunity to appear before you to address these concerns in light of the current status of the commercialization effort, and to make suggestions for revisions in the legal charter for commercial land remote sensing.

I would like to stress that EOSAT is here today as the government's partner in the Landsat program, a status we have enjoyed since 1985 when we were chosen to work with the government to build a dynamic land remote sensing industry in the United States. Like commercialization itself, this relationship has not always been easy. Commitments were not always honored by the U.S. Government, and EOSAT at times fell back on an aggressive defense of its prerogatives under the 1984 Landsat Commercialization Act. The spirit of partnership necessary for Landsat commercialization to be a success was eroded. Yet these problems and delays by themselves do not justify abandoning the public/private partnership. Rather they highlight the need for regular dialog among all parties to dispel mutual misperceptions and establish a common understanding of what has actually transpired since commercialization began, how that relates to trends that were established much earlier in the Landsat program, and how Landsat can contribute to efforts to preserve the global environment. Dialog is the only way to ensure that proposed changes in the program actually address the real causes of the problems we are seeking to solve.

EOSAT believes that, with some fine-tuning, the 1984 Landsat Commercialization Act, as amended in 1987, provides us with the flexibility that is needed to carry out this dialog and implement needed changes. We hope that the ongoing EOSAT/NASA dialog, which is producing positive results for the collection and dissemination of global change data and the funding of research, will serve as a model for wider discussions to address other problem areas. For this reason, we would like to echo the words of the 1987 amendment to the commercialization act in which Congress stated that "it is in the national interest of the United States that the involved Federal agencies and the private sector remain flexible in carrying out their respective responsibilities under that Act." Although EOSAT sees the necessity for legislation to authorize and fund Landsat 7 construction and to transfer oversight to agencies more directly involved in utilizing Landsat data, as well as to maintain a flexible data policy and fund research activities, other major changes in the Landsat program would be misguided at this point. With Landsat 6 we are about to begin the central phase of the commercialization process established by the 1984 Landsat Commercialization Act. Major changes in commercialization policy now would cost taxpayers millions of dollars — just as they are about to reap the benefit of the investments made by both the public and private sectors during the preliminary phases of commercialization. In addition, such changes would deprive the nation of its opportunity to assess the viability of commercial land remote sensing.

### **STATUS REPORT ON THE LANDSAT PROGRAM**

The commercialization experiment has encountered problems, but significant progress has been made in commercializing remote sensing technology, even though we are only just now reaching its central phase — the operation of a commercially oriented satellite, Landsat 6. Unfortunately, our progress has often been overshadowed by the unnecessary and damaging debate in recent years that was pushed by erroneous conclusions based on superficial and incomplete analysis of what has transpired since commercialization began. The resulting polarization of positions has not fostered the good working relationship between the public and private sector necessary if the United States is to remain the leader in remote sensing. Fortunately, EOSAT is finding that the climate is changing. This week, for example, Space News reports that a new study commissioned by two NASA Centers for Commercial Development of Space foresees a booming commercial market for the remote sensing industry, and calls into serious question the pessimistic view of earlier studies that are the foundation of much of the criticism of Landsat commercialization. Although I have yet to see the new study, I am aware of what EOSAT has achieved and where it stands today. I would like to describe these achievements to you.

- **The end of the federal operating subsidy on 30 September 1992.**

By expanding the market base, increasing sales, and reducing operating costs, EOSAT has closed the gap between sales revenues and operating costs. As a government program, Landsat never came close to meeting this objective, which has been a central goal of commercialization. Under the commercialization timetable, this goal was to be achieved by the time that Landsat 6 was in operation. We will reach the goal early. The final months of Landsat 4 and 5 operations and the operation of Landsat 6 will cost the taxpayer nothing, compared to the nearly \$20 million a year that the government has been paying for the operation of Landsats 4 and 5 and the even higher sums suggested in some of the latest plans under consideration for Landsat 7.

- **Private investments in ground and space segments of Landsat system.**

EOSAT has invested more than \$12 million dollars in order to develop a robust ground segment for the Landsat system. As part of these investments, we have built a new ground receiving station in Norman, Oklahoma, and have developed and installed new processing equipment. The processing equipment is already on line, and the new ground station begins

operation this month. In addition, EOSAT contributed \$10.8 million towards the construction of Landsat 6. These private sector contributions have directly reduced federal expenditures for Landsat 6 and improved service for our customers. Furthermore, additional investments are being considered in order to extend the U.S. sphere of influence in commercial remote sensing.

- **Creation of an international marketing network that has increased the user base for Landsat data.**

Prior to commercialization, the trend in Landsat sales was towards ever increasing reliance on sales to federal agencies. Government purchases do remain an important part of the market, especially in 1990 and 1991 when events in the Persian Gulf pushed military purchases. But even in those years, purchases in support of national security concerns were less than 25 percent of sales. More importantly, the trend of the early 1980s towards ever greater reliance on federal sales has been reversed. Today commercial sales in the United States and abroad account for nearly 50 percent of EOSAT's sales revenues. In building this commercial network, EOSAT received no federal support, but has relied exclusively on its own sales revenues.

- **Improvements and new efficiencies in ground operations.**

Since 1985 the federal appropriation for Landsat operations has fallen 50 percent in real terms. This cut was driven by budget austerity measures implemented by the Administration and Congress. In order to protect our commercial interest in Landsat, EOSAT was compelled to find more efficient ways to operate Landsats 4 and 5 with the limited funds available. We had to maximize output, while minimizing the impact on users. Our success in achieving these objectives was facilitated by the equipment we designed and built for Landsat 6 operations, but were able to bring into operation ahead of schedule. Government agencies are not pushed by the market forces that drove EOSAT to introduce these changes, and it was to gain this type of market-driven efficiencies that Landsat commercialization was begun.

- **Lower digital data prices made possible by a commercial pricing structure.**

Part of EOSAT's commercialization mandate was to explore commercial pricing of data. In the years prior to commercialization, the government was pursuing a cost-recovery approach, and prices were escalating rapidly. In 1985, the last year in which the government operated Landsat, users paid \$4,400 for a digital Thematic Mapper (TM) scene, plus an \$800 surcharge if the scene was a new acquisition rather than data from the archive. Given the federal budget cuts and the government-wide effort to have users pay for the government programs that benefit them, the upward spiral probably would have continued had commercialization not taken place. EOSAT, however, recognized that this cost-recovery approach could not work in the face of competition from the French satellite system, SPOT. A loyal customer base had to be built through competitive prices and good service. Thus after its contract was signed, EOSAT dropped the price to \$3,300 and soon eliminated the surcharge for new acquisitions. Since that time, prices have risen, but adjusted for inflation the price of a TM digital scene is still 21% lower today than in 1985 — and no surcharge is imposed for new acquisitions. From a competitive viewpoint, allow me to note that SPOT's price is five to nine times higher than EOSAT's.

- **Progress on the researcher access problem through public/private cooperation.**

The precipitous drop in sales to academia in the late 1970s and early 1980s, the low level of Landsat utilization by researchers in the mid-1980s before commercialization began, and

the continued low level after commercialization demonstrates that neither the public sector nor the private sector has been able to address the problem of researcher access on its own. EOSAT is eager to work with appropriate government agencies, especially NASA, to increase data availability to researchers. To get the dialog moving on a research data policy for the Landsat 6 and 7 era, we have proposed to NASA an interim plan to be followed for the remainder of fiscal year 1992:

- EOSAT will dedicate up to 25% of our productive capacity to the collection of research data selected by NASA.
- NASA will pay 50% of the list price for this data set and will distribute data to researchers for noncommercial use.
- EOSAT will use all revenues from these NASA purchases to make grants to researchers.

I am happy to report that NASA has responded favorably to this proposal, and has itself proposed some modifications to strengthen the grant activity. EOSAT and NASA are meeting weekly to work out the details.

- **Evolution of a digitally based market.**

In the last ten years user preference for Landsat data has shifted decisively in favor of digital data. The amount of data contained in a TM scene compared to an MSS scene has made photographic analysis less adequate, while technological advances and falling prices in computer hardware and software have put digital analysis within the reach of even low budget users. It is important to note this change because it has significantly restructured the market for Landsat data. When the market is driven by photographic analysis, the total number of photographs sold is extremely high because the analyst needs many photographs made from the data contained in one Landsat scene. In contrast, the digital analyst needs but one digital scene. Thus, while today's sale of digital data appears low in comparison to the sales volume of photographs a decade ago, this does not reflect a collapse in the market, but a technological revolution that has changed how the data are used.

- **The pending launch of a commercially oriented satellite, Landsat 6.**

The launch of Landsat 6 has been delayed many years because of the loss of its original intended launch vehicle (the space shuttle), erratic government funding for the Landsat program, and delays in the construction itself. We anticipate delivering the satellite to the government for launch late this fall. The actual launch should take place in January 1993.

We expect that the market will respond very favorably to the data generated by Landsat 6 because we have added 15-meter panchromatic data coregistered with our seven-band multispectral data. Unlike previous Landsat satellites, Landsat 6 was designed not as an experimental satellite but as a commercial satellite. Thus it relies on proven technology to reliably deliver the data that operational users need.

Proven technology, however, does not mean obsolete technology. Like most other space-based land remote sensing systems that are in operation today, Landsat 6 is based on the technology that was pioneered by earlier Landsats and is dependent on the market created by the data they generated. But Landsat technology has continued to advance, and none of the alternative technologies that some have proposed can fully duplicate the data stream that will flow from Landsat 6. And it is the data stream, not the manner by which it is collected, that is important to users. Designers of other systems, such as SPOT's, have not seriously tried to compete in Landsat's main market, multispectral data, but rather have designed

satellites to fill data needs not met by Landsat. This has served to expand the total market, not to displace Landsat. Nevertheless, we would like a larger share of that growing market. That is why we designed the Enhanced Thematic Mapper on Landsat 6 to compete head on against SPOT's specialty (high resolution panchromatic data) while preserving our own advantages.

## SUGGESTIONS FOR FINE-TUNING COMMERCIALIZATION

Allow me to turn now to the question of what EOSAT would like to see come out of the current effort to adjust the commercialization process. As I have already stated, we believe that most of the adjustments can be accomplished under the existing law through dialog and cooperation, but some legal modifications are necessary.

### 1) Finalize the commitment to construct Landsat 7.

The Administration is moving forward with its plan to procure Landsat 7 competitively. Although this was not foreseen in the 1984 Landsat Commercialization Act, it is consistent with the intent of that law, which called for the federal government to finance the first two satellites after Landsat 5. The Congress must ratify the Administration's plan — or suggest some other appropriate method — and then authorize and appropriate adequate funding. EOSAT is prepared to work within whatever framework the government deems most suitable — quite frankly, because we view ourselves as a space-age information company and not an aerospace company, our principal focus is not building satellites, but receiving, processing, and marketing data. That is the main role the government entrusted us with in 1985 and we hope to continue fulfilling it into the next century regardless of how Landsat 7 is built. While failure to build Landsat 7 obviously would mean that there would be no data to distribute in the future, even a short-term delay in committing to Landsat 7 will hurt data sales from Landsats 4, 5, and 6. Procrastination will undermine confidence on the part of users that the data stream will continue into the future and remain commercially available as promised by the 1984 Landsat Commercialization Act. The United States will needlessly lose market share to foreign commercial systems.

### 2) Maintain flexibility in data policy.

I have already noted that Landsat 6 is the real initiation of the commercialization experiment. Until it is launched commercialization depends on data generated by what were essentially experimental satellites. Because we anticipate a strong market response to the data from Landsat 6, we believe that Landsat 6 will radically change the dynamics of the commercial market, demonstrate the viability of commercialization, and open new possibilities for solving current problems. Thus, in considering the Administration's proposal to change the oversight agency for the Landsat program, Congress should allow the oversight agency sufficient authority to formulate a data policy based on the experience that will flow from Landsat 6. We should do nothing now that will preclude continued commercialization when Landsat 7 is launched or that would abort current U.S. preeminence in commercial land remote sensing. If EOSAT's confidence proves ill-founded, this same flexibility will allow the development of a suitable new policy based on the experience that will have been gained. Nothing is gained, however, by setting in stone now data policy for a satellite that will not fly for at least five years, or by cutting short commercialization before it really begins.

Central to the continued viability of commercialization is exclusive data rights. In the absence of exclusive marketing rights, no mechanism exists for the government to transfer land remote sensing to the private sector and free the taxpayer of the burden of subsidizing data users. EOSAT has been the government's partner in this transfer, and we hope to con-

tinue working with the government through Landsat 7. Unfortunately many researchers and government agencies see EOSAT's exclusive rights not as the means for reduced federal outlays but as a barrier to their access to data. Obviously, if commercialization is to work, then we must work together to find real solutions to the dissatisfaction of these researchers and government users while preserving exclusivity.

We hope that our talks with NASA that are laying the foundation for a research data policy for Landsat 6 and 7 will serve as a model for the dialog that is needed with other government agencies. EOSAT believes that the existing legislation offers a flexible framework for addressing their problems. The polarized atmosphere of recent years, however, hindered the dialog that is necessary to make use of that flexibility, but we see signs that that polarization is easing. Among government users, for example, some of the dissatisfaction is the result of their having to contribute to NOAA for the operation of Landsats 4 and 5 in addition to buying data from EOSAT. Full commercial operations beginning this fall will eliminate this irritation. Part of the objections to current data policy from government agencies, however, also arises from prices and data use restrictions. Specific ideas that need to be explored in order to reduce the cost of data to government agencies include bulk data purchases, guaranteed data purchases (as NASA has done with the SeaStar satellite), and price differentials to reflect the level of data preprocessing.

This last option has been ignored completely because of the focus on price reductions for certain user categories. EOSAT believes it would be more appropriate to tie reduced prices to the level of data preprocessing. EOSAT's standard, unenhanced products include a high level of preprocessing, which many users need. Large volume data users, such as those in government and research, may not need such preprocessing, or are capable of doing it themselves. EOSAT's arrangements with the international ground stations could serve as a model for a pricing policy based on the level of data pricing because they pay a flat fee for the right to receive truly raw data in unlimited quantities from the satellites.

Although caution must be exercised in modifying use restrictions to ensure that the commercial value of Landsat data is protected, EOSAT also believes that greater freedom can be accorded to government agencies. Blanket efforts to lift use restrictions through legislation, however, are likely to make protection of the data's commercial value more difficult. Thus we see dialog between EOSAT and the affected agencies, not the halls of Congress, as the best venue for resolving this problem. As a model for the type of solution that is possible, I would like to point to our statewide coverage program. Under this program a state can purchase coverage of the entire state and then make the data available to all government agencies and contractors without violating the use restriction.

### **3) Provide adequate research funds for global change and new technology.**

I have already discussed EOSAT's proposals to NASA for facilitating researchers' access to Landsat data. Low data prices by themselves, however, are not enough to stimulate increased utilization of the data for global change studies: the sharp decline in sales of Landsat data to academic institutions throughout the late 1970s and early 1980s does not mirror rising data prices, but falling federal research grants. EOSAT believes that commercialization is compatible with wide access to Landsat data by researchers, but the government must do its part both to ensure that researchers respect the need to protect the integrity of the commercial market and that adequate research grants are made available. Knowing the interest of the chairman of this subcommittee in bringing about the widest possible use of the data that have been gathered by the U.S. space program, I am confident that the Senate will give serious consideration to the needs of researchers for more grant programs for global change analysis, as well as for the development of new technologies.

## ENSURING LANDSAT'S SUCCESS IN THE 1990S AND BEYOND

EOSAT believes that these three steps will help ensure the continuing availability of Landsat data for all users, maintain U.S. preeminence both technologically and commercially in land remote sensing, and greatly facilitate the use of Landsat data for important environmental studies on both the global and the local levels. These recommendations are based on the experience we gained since signing our contract in 1985. EOSAT made its share of mistakes during those years as we tried to rigidly push commercialization forward under less than optimal conditions. But we have learned from both the failures and the successes, and we have built up an important reservoir of information and experience about Landsat, the needs of Landsat data users, and the commercial market. No government agency currently possesses this same in-depth knowledge of the Landsat program. Unless the United States wants only to be a leader in remote sensing technology, and to subsidize foreign commercial land remote sensing systems through technology demonstration projects without being an active player in the commercial market itself, the country can not afford to overlook or ignore our expertise and experience. It is true that EOSAT has a direct stake in seeing commercialization continue. Yet for that reason we are motivated to understand and serve our customers in a way that no government agency ever can be motivated. That is why commercialization was begun, and that is why it must continue if the United States is to remain a leader in land remote sensing in the fullest sense.

What I am saying is "Do not reinvent the wheel." The commercial framework established in 1984 remains sound and the investments that the taxpayers have made in commercialization are about to pay off. EOSAT has expanded sales to the level where revenues can cover Landsat operations, one of the fundamental goals of the 1984 Landsat Commercialization Act. We will be taking over responsibility for Landsat operations even before the launch of Landsat 6, the target date for reaching this goal. Reversing Landsat commercialization now will simply burden the government with expenses that the private sector is willing to cover. Backtracking on commercialization will cost the taxpayers more money.

More attention, of course, must be given to the needs of researchers. In 1984 the dangers of global environmental change did not weigh heavily in anyone's plans for the Landsat program. Public awareness fortunately has changed since that time. But based on our recent conversations with NASA that I have already mentioned, EOSAT believes that the data needs of global change researchers can be met under the existing commercial structure as it was amended in 1987. Facilitating researcher access to data does not require that the taxpayer pick up the tab for operations — thereby duplicating what EOSAT has already created — as some have suggested. Rather we should support research grants and invest in technology for the future.

The important thing is to fine-tune the existing commercialization act so as to capitalize on our collective investments in Landsat and to provide moral support to EOSAT's efforts to expand the market. Wavering government commitment to Landsat undermined commercial confidence in the continued availability of Landsat data, hurt sales, and damaged our reputation as a world leader in remote sensing. The market for Landsat 6 data is already being damaged by endless repetition, both in the United States and abroad, of the refrain declaring commercialization dead. Let us not continue to repeat mistakes of the past. Despite the delays that have occurred in commercialization, EOSAT believes that the Landsat 6 era will demonstrate that land remote sensing is a viable and growing business, that the United States can be the world leader in this high technology field, and that a broad commercial market will help reduce the cost of supplying Landsat data to the research community. This can only be accomplished, however, if the public and private sector are willing to work together. As allies and not as enemies, we must jointly dedicate ourselves to progress, not regress.

Thank you.