

Appendix D: A Brief Policy History of Landsat

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After winning a policy dispute with the Department of the Interior (DOI) over which agency should operate a land remote sensing satellite,¹ NASA developed the Landsat system during the 1970s, made the data widely available at low cost, and funded a variety of demonstration projects.² After determining that the system was ready for operational status, Congress and the Carter Administration decided to transfer operational control to NOAA, which had a successful history of managing the weather satellites. Eventually, experts believed, remote sensing technology and the user base would mature to the point that private firms could fund, develop, and operate their own remote sensing systems for government and private markets. In their view, additional experience with the 30-m-resolution data from Landsats 4 and 5 would help pave the way.

In the early 1980s, the Reagan Administration attempted to hasten the commercialization process by transferring to a private firm operational control of the satellite and responsibility for collecting and marketing data. In 1983 and 1984, Congress held a series of hearings on the issue, concluded that Landsat was ready for a phased transfer to private-sector development and operation, and passed the Landsat Commercialization Act in 1984.³ After holding a competition, NOAA selected the Earth Observation Satellite Company (EOSAT) in 1985. NOAA retained overall responsibility for system operation. Administration officials



¹P. Mack, *Viewing the Earth: The Social Construction of the Landsat Satellite System* (Cambridge, MA: The MIT Press, 1990), ch. 5.

²Data were either free or delivered at the cost of reproduction.

³P.L. 98.365 (15 U.S. C. 4201, et seq.).

and Congress expected that EOSAT, assisted by the value-added industry, would be able to generate sufficient market for data to assume full responsibility for funding future Landsat satellites. According to the plan, government officials would work with EOSAT to develop Landsat 6 and 7, which EOSAT would operate. EOSAT would put some of its capital at risk by providing partial funding for both satellites, each of which would be designed to last 5 years. In 1985, officials expected that Landsat 6 would be ready for launch in 1990 or 1991, followed 5 years later by the launch of Landsat 7.

During the late 1980s, Congress, the Administration, and EOSAT made several abortive attempts to find a funding plan acceptable to all parties. Although the Landsat Commercialization Act supported the concept of providing sufficient subsidy to ensure commercial success of the program, the operation of Landsat was nearly terminated several times for lack of a few million dollars in operating funds. Ultimately, the three parties resolved the confused commercialization effort by agreeing to develop only Landsat 6, to be launched in 1992. The federal government provided most of the funding for Landsat 6. Assuming that Landsat 6 successfully reached orbit and operated as designed, this plan still left the United States with the prospect of entering the late 1990s with no capability to collect Landsat data. Three circumstances helped convince government officials of the importance of continuing to provide Landsat data. First, multispectral data from Landsat and France's *Système pour l'Observation de la Terre* (SPOT) proved extremely important in the 1992 Gulf War. These data provided the basis for creating up-to-date maps of the Persian Gulf.⁴ Second, global change researchers began to realize how important Landsat data are for following environmental changes. Third, failing to develop

Landsat 7 would leave SPOT Image in control of the international market for remotely sensed data from spacecraft.

As a result of these and other pressures to continue collecting Landsat data, in 1992, the Administration, with the strong support of Congress, moved to transfer operational control of the Landsat system from NOAA and EOSAT to DOD and NASA. Under the Landsat management plan negotiated between DOD and NASA, DOD would have funded development of the spacecraft and its instruments and NASA was to fund construction of the ground-data processing and operations systems, operate the satellite, and provide for distribution of Landsat data. The Land Remote-Sensing Policy Act of 1992,⁵ passed by Congress and signed into law in October 1992, codified the management plan⁶ and provided for approximately equal funding for the operational life of Landsat 7. The act reaffirmed Congress's interest in the "continuous collection and utilization of land remote sensing data from space" in the belief that such data are of "major benefit in studying and understanding human impacts on the global environment, in managing the Earth's natural resources, in carrying out national security functions, and in planning and conducting many other activities of scientific, economic, and social importance."⁷

Initial NASA and DOD plans called for Landsat 7 to carry an Enhanced Thematic Mapper Plus, an improved version of the Enhanced Thematic Mapper that was aboard the failed Landsat 6 (table 3-3). Later, the two agencies began to consider including a new multispectral sensor, the High Resolution Multispectral Stereo Imager (HRMSI). Cost estimates for developing, launching, and operating Landsat 7 for 5 years equaled \$880 million (1992 dollars). Including the HRMSI sensor on the spacecraft would have cost an additional \$400 million for procurement of the instrument and the

⁴ Maps and other data products made from these civilian systems have the advantage that they can be shared among U.S. allies in a conflict.

⁵ P. L. 102-555, 106 Stat. 4163-4180.

⁶ 15 U.S.C. 5611.

⁷ 15 U.S.C. 5601, Sec. 2. Findings.

ground operations equipment. Because of the high data rates expected for the HRMSI, operating the sensor would have added significant costs to NASA's yearly ground operations budget.

The September 1993 loss of Landsat 6 left the United States with a substantial risk that continuity of data from Landsat would be lost. Although the TM sensors on Landsat 4 and Landsat 5 continue to operate, both have suffered data-transmission-subsystem failures and the spacecraft are substantially beyond their projected operating lifetimes.⁸ They could fail completely at any time.⁹ Hence, to maintain the potential for continuity of data delivery, DOD and NASA had to act expeditiously to develop and launch Landsat 7. However, in September 1993, NASA decided that the costs of operating Landsat 7 with HRMSI were too large compared with the benefit NASA researchers would receive from HRMSI data. HRMSI was of greater interest to DOD and other U.S. national security agencies because it would have provided 5-m-resolution stereo data of sufficient quality to create high-quality maps. Hence, NASA decided that it could not support the ground operations of HRMSI and did not include sufficient funds in its FY 1995 budget request to begin developing the data system. In December 1993, DOD decided that it could not fund the re-

sulting Landsat 7 budget shortfall. As a result of their disagreement over the Landsat 7 requirements and budget, NASA and DOD subsequently decided that each agency should go its own way. NASA would fund development of Landsat, carrying the planned 30-m-resolution ETM Plus.¹⁰ DOD would decide later whether or not to develop a 5-m-resolution sensor on its own.¹¹

Still undetermined in early 1994 was the question of whether NASA or some other agency would operate Landsat 7. NASA needs Landsat data to support its global change research program. However, Landsat data support many government operational programs and the data needs of state and local governments, the U.S. private sector, and foreign entities. Hence, Landsat data have both national and international value that extends far beyond NASA's requirements for global change data.

In May 1994, the Administration decided to resolve the outstanding issue of procurement and operational control of the Landsat system by assigning it to NASA, NOAA, and DOI. Under the new plan, NASA will procure the satellite, NOAA will manage and operate the spacecraft and ground system, and DOI will archive and distribute the data at the marginal cost of reproduction.¹²

⁸Both satellites were designed to operate for 3 years. Landsat 4 was launched in 1982; Landsat 5 was launched in 1984.

⁹However, it might still be possible to retrieve data from the MSS aboard both satellites because the MSS sensor is still capable of operating and it uses an S-Band transmitter that is also still operational.

¹⁰DOD transferred \$90 million to NASA for the development of Landsat 7.

¹¹Letter from Undersecretary of Defense John Deutch to Congressman George Brown, December 1993.

¹²Presidential Decision Directive NSTC-3, May 5, 1994.