

NASA REMOTE SENSING DATA POLICY

Lisa Robock Shaffer
Deputy Director,
Earth Science Modeling, Data, and Information Systems Program Office
National Aeronautics and Space Administration
U.S.A.

ABSTRACT

The National Aeronautics and Space Administration (NASA) is the lead U.S. agency in the development of the Mission to Planet Earth, whose centerpiece is the Earth Observing System (EOS). NASA also was recently directed to assume responsibility for operations and data management for Landsat-7. NASA has developed a data policy for Earth science data from NASA missions, and has taken the lead in establishment of data exchange principles for the U.S. Global Change Research Program. These policies call for the widest distribution of data for research purposes at the lowest possible price, in principle no more than the marginal cost of filling a specific user request. NASA is working with its international partners to develop similar data exchange principles for all Earth observations satellites through the Committee on Earth Observations Satellites (CEOS) and on a more comprehensive and detailed basis for the International Earth Observing System (IEOS). The IEOS comprises the NASA EOS program, ESA's Polar Orbit Earth observation Mission (POEM), Japan's Advanced Earth Observation Satellite (ADEOS), the Japanese-NASA Tropical Rainfall Measuring Mission (TRMM), and the polar-orbiting operational environmental satellites operated by the U.S. National Oceanic and Atmospheric Administration (NOAA).

KEYWORDS: Data policy, Earth observations, remote sensing, NASA, EOS, Landsat.

1. INTRODUCTION

The future of satellite remote sensing is being shaped by the renewed awareness of the complexity of the global environment and a new appreciation for the value of satellite observations in understanding the Earth system and monitoring changes that are taking place. Many nations are now committed to a program of research to develop comprehensive Earth system models and to separate human-induced changes from natural variations in the complex processes that shape our planet.

With this objective as a backdrop, Earth remote sensing satellite programs and the policies for processing, archiving, and distributing the data produced by them are being re-examined. U.S.-led initiatives of the late 1970s and early 1980s to shift the costs of remote sensing satellites from the public sector to the private sector through "commercialization" and "privatization" have, in the U.S. Government's view, not been fully successful, and have worked to the disadvantage of important Earth science research objectives.

This paper gives the status of NASA's Earth science data policy activities. These include Change Research Program and the experience with attempts at commercialization.

2.1. NASA Management Instruction. NASA builds and operates experimental remote sensing systems in pursuit of its Earth science and applications program objectives. Distribution of Earth science data are governed by a NASA Management Instruction (Ref. 1) which states that, except as otherwise provided in specific program agreements,

"spaceborne remote sensing data acquired by the Earth Science and Applications Program as part of its experimental remote sensing programs, and data from related experimental or research programs, will be made available to all users and other entities for use in Federally-funded research, development, and application programs and cooperative research programs. This data will be made available as soon as practical after acquisition and without any period of exclusive access for any user group. Access terms will specify that such users may not engage in commercial applications of NASA-provided data without authorization.... Data will be provided to research users ... at a price not to exceed the marginal cost of reproduction and distribution."

2.3 SeaWiFS NASA is conducting an experiment with the Sea Wide Field Sensor (SeaWiFS) Ocean Color Mission to be launched in 1993 on the SEASTAR satellite. For the first time, NASA conducted a competitive procurement to purchase an ocean color data set for research purposes. The Orbital Sciences Corporation was selected and NASA paid an agreed amount of money in the form of a data purchase contract. In exchange, NASA has the right to use all SeaWiFS data for research purposes, including direct reception and distribution, once data are more than 14 days old, and provided all users are restricted from non-research data use. NASA also has limited rights to use data in real-time for research purposes.

Orbital Sciences Corporation will pursue the market for commercial and operational data distribution while the data are "fresh" in hopes of supplementing corporate income beyond the NASA payment. This commercialization model has yet to be tested. For data with a high "perishability," such as ocean color information, it will be an interesting experiment. For less specialized land surface data, the combination of research and commercial objectives in a data purchase agreement may not be viable, since many of the uses are valid for a long period after the data are acquired.

3. GLOBAL CHANGE RESEARCH

Dr. Allan Bromley, the President's Science Advisor, issued a statement of national policy regarding distribution of data for global change research in July 1991 (Ref. 3). This statement applies to all U.S. Government agencies, including NASA and NOAA, and establishes the framework within which agencies should work. It states:

"The overall purpose of these policy statements is to facilitate full and open access to quality data for global change research. They were prepared in consonance with the goal of the U.S. Global Change Research Program and represent the U.S. government's position on the access to global change research data.

- o The Global Change Research Program requires an early and continuing commitment to the establishment, maintenance, validation, description, accessibility, and distribution of high-quality, long-term data sets.

- o Data archives must include easily accessible information about the data holdings, including quality assessments, supporting ancillary information, and guidance and aids for locating and obtaining the data.

- o National and international standards should be used to the greatest extent possible for media and for processing and communication of global data sets.

- o Data should be provided at the lowest possible cost to global change researchers in the interest of full and open access to data. This cost should, as a first principle, be no more than the marginal cost of filling a specific user request. Agencies should act to streamline administrative arrangements for exchanging data among researchers.

- o For those programs in which selected principal investigators have initial periods of exclusive data use, data should be made openly available as soon as they become widely useful. In each case, the funding agency should explicitly define the duration of any exclusive use period".

4. LANDSAT

Presenting the status of Landsat is quite difficult, since the situation is under considerable discussion and will change soon. Unfortunately all the answers are not known at the time this paper is written, but legislation is expected to be in place by the

time of the International Society of Photogrammetry and Remote Sensing (ISPRS) Convention. National Space Policy Directive #5, signed by President Bush on February 5, 1992, (Ref.4) states:

"A remote sensing capability such as is currently being provided by Landsat satellites 4 and 5 benefits the civil and national security interests of the United States and makes contributions to the private sector which are in the public interest. For these reasons, the United States government will seek to maintain continuity of Landsat-type data."

The policy goes on to say that the U.S. Government will

"... make Landsat data available to meet the needs of national security, global change research, and other federal users; and promote and not preclude private sector commercial opportunities in Landsat-type remote sensing."

Through this policy, President Bush directs NASA and the Department of Defense (DOD) to develop and launch a Landsat-7 satellite, to define alternatives for maintaining data continuity beyond Landsat-7, and to prepare a plan which addresses operations, data archiving and dissemination, and commercial considerations associated with the Landsat program. The President also assigns the Department of the Interior the responsibility for maintaining a national archive of Landsat-type remote sensing data.

In parallel, both houses of Congress are considering legislation to change the existing Landsat Act to find a way to ensure the continuation of the Landsat system. The changes to the law should make it consistent with the new national policy direction. The resulting legal framework for data policy is not yet defined either for current and future publicly-funded Landsats or for potential future privately-financed remote sensing satellite systems.

What is clear is that the U.S. Government and related organizations have very large needs for Landsat data for non-commercial uses, both research and operational. The United States has determined that the attempt at commercialization of Landsat has not satisfactorily met these needs, evidenced by the sharp decline in data purchases by research users, and the sharp decrease in data acquired by the Earth Observation Satellite Corporation (EOSAT), the current operator of Landsat under contract to the Department of Commerce.

During the next three to six months, the various actors within the U.S. Government will be resolving the outstanding issues, moving forward with a plan to build and operate Landsat-7, and proposing changes to the current arrangements as they apply to Landsats-4, 5, and 6. The ultimate data regime for Landsat-7 may not be defined for some time, or it may be mandated explicitly by Congressional action later this year.

5. INTERNATIONAL COOPERATION

5.1 International Earth Observing System

For the Earth Observing System, NASA has been working with the European Space Agency (ESA), the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), NOAA, and Canadian and Japanese partners to establish a set of international data exchange principles. These principles will be embodied in formal memoranda of understanding among the partners, and will apply to those programs designated by the managing agencies as part of the International Earth Observing System (IEOS). As the draft principles stand, the IEOS elements include EOS; the Polar Orbit Earth observation Mission (POEM), beginning with POEM-1; the polar orbiting operational environmental satellite series after NOAA-N; the Tropical Rainfall Measuring Mission (TRMM); and the Japanese Advanced Earth Observation Satellite (ADEOS). These principles provide for exchange of IEOS data among the participating agencies, and the ability for each partner to provide appropriate data to users the partner designates for research, non-commercial operational use for the public benefit, and applications demonstrations at no more than the marginal cost of filling the specific user request. The principles give the agency responsible for a particular data set the ability to impose certain restrictions, such as non-reproduction and non-distribution, to protect potential commercial market opportunities and guard against unauthorized use. Agencies that prefer and have the authority to make their data more openly available may waive such restrictions

These principles will be included in bilateral memoranda of understanding between pairs of partners who have instrument exchange agreements, as part of the conditions for cooperation. NASA is developing such memoranda or other agreements with ESA, the Canadian Space Agency (CSA), EUMETSAT, the Japanese National Space Development Agency (NASDA), and the Japanese Ministry of International Trade and Industry (MITI) for various aspects of the IEOS. Other partners may exchange letters or otherwise formalize their commitments to the data exchange principles. It is NASA's intention to sign these agreements before the end of 1992. NOAA and EUMETSAT are also developing a memorandum of understanding for their cooperation in operational polar-orbiting environmental observations and will include a compatible data policy in their agreement.

5.2 CEOS The Committee on Earth Observations Satellites (CEOS) is endeavoring to develop a set of data exchange principles which would cover the full range of remote sensing missions. To date, agreement has been reached on data exchange principles in support of global change research. A meeting is planned for the fall of 1992 to continue development of the CEOS data principles beyond research use.

While CEOS has no formal legal standing, it was created by agreement of the Heads of State at the Group of Seven Economic Summit in 1984 in Williamsburg, Virginia, and endorsed at the 1989 Paris G-7 Summit. The operating principle of CEOS is to enable individual agencies with responsibility for Earth observations satellites to plan and allocate resources in compatible and complementary ways through intensive exchange of information, joint technical studies and demonstrations, and other forms of coordination. The data policy principles developed by CEOS are not legally binding, but represent the consensus of the participating agencies and reflect the common appreciation of the value of coordinated and harmonized approaches in the interest of improved service to users,

6. FUTURE DIRECTIONS

In the United States, there are no private sector satellites in operation and none with announced plans, besides SeaWiFS, which is principally funded by the NASA data purchase contract. The view from many sources in the government is that the principal opportunities for private commercial involvement in Landsat-type capabilities remain in the value-added domain. With the public sector the dominant consumer of satellite remote sensing data in the United States, it may be necessary and desirable for the government to continue to contract for the space segment as a government-managed service to ensure that it is responsive to public sector needs.

The broad availability of affordable data in minimally processed form will provide vast opportunities for the development of applications, and for thriving business in sale of hardware, software, and services associated with the use of such data including federal government use. This effort is supported by programs such as NASA's Research Announcement series for applications demonstration projects in remote sensing. With a clearly defined government role, private sector entities can also evaluate the commercial potential of filling certain space segment niches not addressed by government systems.

Congress is expected to ensure that public sector, non-commercial uses of data are supported through data distribution on a marginal cost basis, both for future Landsat data distribution and for data from experimental satellites. The debate may continue for some time on whether all users can or should be provided data from federally funded missions on this same basis in a nondiscriminatory manner, or whether we will maintain some attempts at recovering user fees from commercial users in the future. The question includes consideration of the equity of charging taxpayers for the use of a system that they already financed. It involves international reciprocity, and the desire to ensure that, if the U.S. offers a valuable information resource to the international community on a non-commercial

basis, comparable contributions are offered by others. There are perceptions that inexpensive data from government sources might inhibit investment in possible alternative private space systems of which government users could become customers.

The most significant issues related to the distribution, pricing, and applications of remotely sensed data, in my view, are ensuring that whatever the level of public investment, it is justified by public return. This requires identifying the public interest remotely sensed data can serve, and then designing systems (space and ground) or establishing cooperative agreements with the private sector and/or international partners that best meet those interests.

While commercial interests are served by promoting the widest possible use of the data in some cases, others have asserted that the ability to sell data on an exclusive basis is an important factor in raising private capital for commercial systems. This ability is illegal in the U.S. under the current Landsat Act. If the U.S. were to permit exclusive access to remote sensing satellite data, foreign system operators might follow this U.S. example as well, and make data available on an exclusive basis to users within their own countries and exclude U.S. customers. This is not desirable in my view. Policies can be defined that protect the ability of commercial operators to pursue business objectives while retaining important U.S. foreign policy positions. NASA and the Department of Commerce have been working together to articulate such policies and advocate them in the Landsat Act deliberations.

The Government must be clear as to what its interests and requirements are, and act in the public trust to pursue those interests. The trade-offs between development of commercial space capabilities and public sector requirements must be recognized, debated, and resolved. From my perspective, there are solutions that reasonably address these needs. While some individual entities may suffer from the currently proposed changes in policy, the broader public interest and the free-market competitive environment can be strengthened and preserved through the proposed new approach.

7. CONCLUSIONS

The data policy situation in the United States for Earth remote sensing satellites is in transition. The increased importance of research and monitoring to understand global environmental conditions, physical processes, and change has highlighted the importance of full and open access to all relevant data by the widest scientific and operational community on an international basis. No individual nation can afford to develop and maintain the necessary observation and analysis capability, nor can all the scientific progress be confined to one set of researchers. Thus, the global community depends on this open access to data to support and sustain our commitment to improved understanding and monitoring of the condition of our planet.

Past efforts to offset some of the cost of this undertaking through mixing commercial opportunities with public service functions have met with mixed success at best. Some programs may be collecting enough revenue through data sales to offset a portion of the operating costs of ground systems. To date, we have failed dramatically to generate enough revenues from a commercial approach to sustain a full space-based observing capability. The unsuccessful U.S. model has been adopted in other programs with uncertain results, at least seen from the United States.

Governments generally want to improve the cost/benefit ratio of their programs by reducing their budget obligations. However, another approach to improving cost/benefit ratios is maintaining the same cost while increasing the benefits. This is the approach pursued through the proposed Landsat amendments and other policy modifications to ensure that programs are operated and data are provided in a way that maximizes the public return on the investment. We will be able to recover operating costs and maintain discipline through charging marginal cost for data access, but we will not be driven to program decisions which may not be in the interest of the broad community, but solely based on profit motives.

The scientific and operational requirements of the government and the international community are the drivers in defining data policy approaches and resulting legal structures. The movement away from viewing publicly-funded data as an economic resource to be protected, and toward a public good to be shared widely makes the legal structure less critical to our success.

8. REFERENCES

1. NASA Management Instruction 8000.3, dated March 22, 1991, NASA Headquarters, Washington, DC.
2. Public Law 98-365, July 17, 1984, "Land Remote Sensing Commercialization Act of 1984."
3. Executive Office of the President, "Data Management for Global Change Research Policy Statements," July 2, 1991, Washington, DC.
4. Executive Office of the President, National Space Policy Directive #5, Land Remote Sensing Strategy, issued February 5, 1992, Washington, DC.