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Memorandum

To: Assistant Secretary—Energy and Minerals
From: Director, Geological Survey
Subject: Justification for USDI management of operational Earth resources
satellite systems

The enclosed paper, "Department of the Interior, Lead Agency for Operational Earth Observation Satellite Systems," is submitted in response to your request.

If you approve the substance, the paper should be provided to Dr. Gordon Law who is serving as the Department's representative on the Integrated Remote Sensing Systems Study (IRS²), Phase 2. That committee, chaired by Tony Calio of NASA, is considering the institutional arrangements for future satellite systems. USDI must take some position with regard to its role in Earth observation satellite systems. We have recommended that USDI assume lead agency responsibility which would be implemented by the EROS Program in the Geological Survey.

H. W. MENARD
Director

Enclosure

cc: Gen. files, MS114
Dir. chron, MS114
J. Balsley, MS104
EROS RF(2), MS730
LIA chron, MS730
Subj. files, MS730

EROS:FJDoyle:mam:7/24/79:860-7881

7/23/79

DEPARTMENT OF THE INTERIOR
LEAD AGENCY
FOR
OPERATIONAL EARTH OBSERVATION SATELLITE SYSTEMS

1. Background

In response to the President's Space Policy Statement in October 1978, Presidential Directive NSC-42 commissioned several interagency groups to study technical and management issues of the United States Earth Resources Satellite Systems Programs.

The Private Sector Involvement Study (PSIS) concluded that, regardless of the magnitude of eventual commercial involvement, a single Federal agency should be assigned responsibility for operational satellite systems for remote sensing of Earth resources.

The Integrated Remote Sensing System Study (IRS³), Phase 1, considered the technical and budgetary implications of various levels of integration of:

- o NOAA polar orbiting meteorological satellite systems
- o DoD polar orbiting meteorological satellite systems
- o NOAA geosynchronous meteorological satellite systems

- o NASA-NOAA-DoD oceanographic satellite systems
- o NASA-USDI Landsat type satellite systems
- o NASA Large Format Camera (LFC) and Shuttle Imaging Radar (SIR-B) missions

A memorandum dated February 1, 1979, from McIntyre (OMB) to Frosch (NASA) requested that IRS³ "examine an alternative which would provide for the designation of a single lead agency within the Government that could assume operating responsibilities for civil remote sensing activities." Although IRS³ deferred consideration of this request to Phase 2 (scheduled for completion August 15, 1979), it is evident that the programs divide naturally into three categories:

- a. Meteorological systems
- b. Oceanographic systems
- c. Land observation systems.

From the preliminary discussions of IRS³ Phase 2, it is already clear that the meteorological systems and the oceanographic systems will be managed by some combination of NOAA and DoD. Candidates for management of the land observation systems are USDI, NOAA, and the private sector.

If the Administration does not come to an early decision regarding operational remote sensing systems, proposed Congressional legislation (S 663) will designate a single lead agency (NASA, according to current drafts) to operate an "Earth Data and Information Service" for an interim period of seven years during which the "institutional, financial, technical, and market structure" would be developed

2. Purpose

The intent of this discussion paper is to provide justification for designating the Department of the Interior (USDI) as the lead agency for management of operational land observation satellite systems. This designation is appropriate either as a result of IRS³ Phase 2 or as an alternative to NASA in S663.

3. Justification

USDI should be designated as the lead agency for operational land observation satellite systems because it has a deeper involvement and commitment to the use of space remote sensing data than any other agency in the Federal Government. In particular USDI has:

A. Historical commitment to space remote sensing.

USDI provided the original impetus for the Landsat program by announcing the creation of the EROS (Earth Resources Observation Systems) Program in the Department in September 1966, with the avowed intent to develop and fly an Earth resources observation satellite. In October 1966, the EROS Program transmitted to NASA the performance specifications for the satellite; shortly thereafter, NASA requested authorization for a new start for ERTS (later Landsat). The system was built essentially to meet USDI data requirements.

From the beginning of the Landsat Program, USDI was recognized by NASA as the spokesman for the geology, water, cartography, and geography communities of users. Prior to the launch of the satellite, USDI committed to the construction of the EROS Data Center (EDC) at Sioux Falls, S.D., to process, archive, and disseminate remotely sensed data to meet Departmental needs and serve the public sector. EDC has maintained a partnership role with NASA, disseminating the vast majority of Landsat data on a worldwide basis to non-NASA users, upgrading image processing equipment to keep pace with technology, transferring to users the required technology to apply the data, and acting as a spokesman for the Landsat data user community.

B. Experienced staff and high technology capability.

USDI has broad expertise in the development of sensor and spacecraft specifications, ground data processing hardware and software systems, and applications technology. Developments at EDC and the Center for Astrogeology at Flagstaff have put USDI at the forefront of digital image processing and image analysis technology. The USDI centers at Reston, Rolla, Denver, and Menlo Park represent the largest part of the nation's capability to convert satellite remote sensing data into useful information products. New facilities are currently being planned for Alaska.

C. Broad responsibilities for land and resource management.

Since its creation in 1849 USDI has faced the challenging mission of being custodian of the Nation's natural resources. USDI is directly responsible for management of 30 percent of the land area of the United States, including the administration of over 600 million acres of Federal land and 300 million acres of subsurface lands where mineral rights have been retained by the Federal Government. Interior's responsibilities include (1) the conservation and development of mineral and water resources, (2) the promotion of mine safety and efficiency, (3) the conservation, development, and utilization of fish and wildlife resources, (4) the coordination of Federal and State recreation programs, (5) the preservation and administration of the Nation's scenic and historic areas, (6) the reclamation of arid lands in the west through irrigation, and (7) the management of hydroelectric power systems. USDI has major resource management responsibilities in the 200-mile zone of the Continental Shelf, the vast and mostly uncharted areas of Alaska, the Trust Territories of the United States, and Antarctica, as well as cooperative efforts in foreign countries on behalf of the Agency for International Development.

D. Major uses of space remotely sensed data

USDI requires space remote sensing technology to fulfill many of its major responsibilities for inventorying resources, managing public lands, and protecting the environment. USDI has demonstrated the applicability of space remote sensing technology to:

- Actual and potential land use/cover mapping.
- Impact assessment of man's actions on vegetation, soil, and cultural resources.
- Survey of vegetation productivity, condition, and trend.
- Predicting occurrences of geothermal energy resources, petroleum deposits, energy mineral deposits, and metallic/nonmetallic mineral deposits.
- Inventories of surface/subsurface water resources.
- Assessment of lake, river, reservoir, estuary, and Outer Continental Shelf conditions.
- Communications of data, voice, and video for monitoring both normal events and disaster situations.

Specific high priority applications of space remote sensing technology within USDI bureaus are:

BUREAU OF RECLAMATION

Water Management
Irrigated Land Inventory
Agricultural Crop Inventory
Hydrometeorological Data Relay
Mesocale Cloud Analysis

NATIONAL PARK SERVICE

Vegetation/Land Cover Inventory
Resource Condition Monitoring
Environmental Quality Monitoring
Emergency Communications
Environmental Education

BUREAU OF LAND MANAGEMENT

Natural Resource Inventory
Natural Resource Monitoring
Telecommunications Improvement
Geographic Positioning

GEOLOGICAL SURVEY

Land Cover Mapping
Water Management
Cartographic Mapping
Geologic & Mineral Assessment
Conservation & Regulation

FISH AND WILDLIFE SERVICE

Migratory Bird Management
Habitat Inventory and Analysis

Although these major activities relate primarily to Federal areas administered by USDI, space remote sensing technology is equally applicable to areas under the jurisdiction of State and local agencies and areas being explored and developed by mineral and petroleum industries, both domestically and internationally. USDI has had a major role in developing the applications and transferring the technology of satellite remote sensing to these organizations.

E. Recognized responsibility for national information systems

USDI is the principal Earth science agency in the Federal Government. Scientists within the Bureaus of USDI have made significant contributions to the application of satellite remote sensing data to produce major geographic information systems for use internally and by other Federal agencies, State and local governments, industry, and the general public. These include manual, graphic, and computerized systems of substantial complexity. Examples are topographic, planimetric, land use, and geologic maps, water resources data

information systems, information on energy and mineral reserves, and environmental impact projections and assessments.

F. Interest in global information and a developed capability to work with other countries

With a diminishing worldwide base of energy, water, mineral, and land resources, USDI interest has continued to broaden and includes global resource information systems.

Estimates of national energy and mineral reserves and projections for future supplies are irrevocably related to international information and estimates. USDI works with other countries in cooperative activities through the Office of International Geology (OIG), the Agency for International Development (AID), and other organizations. The varied Earth science capabilities of USDI are directly applicable to the requirements and needs of other countries.

4. Program operations

USDI responsibility as lead agency for operational Earth resources satellite systems would be centered in the EROS Program within the U.S. Geological Survey. This organization would:

A. Consolidate requirements

So long as Earth observations have been designated "experimental" with all major costs borne by NASA, scientists from USDI and other agencies have submitted "requirements" which are really only "wish lists" with the consequence that enormously expensive systems like Landsat D and Landsat E (designated in IRS³ Phase 1) with complicated sensors like the Thematic Mapper (TM) and High Resolution Pointable Imager (HRPI), and enormous data rates and ground processing costs have been proposed and funded. With the transition to "operational" systems in which a reasonable portion of the cost of data will be borne by the programs using it, much simpler and more productive systems can be anticipated. USDI will consolidate the real requirements of Federal, State, and local government users, and the private sector. It is anticipated that an external review and control system must be established to assure both (1) the validity of other agencies' requirements, and (2) adequate consolidation by USDI of other agencies' requirements. This interdepartmental review and control function might be placed in OSTP with representation of OMB, other concerned Federal agencies, State and local government, and appropriate spokesmen from the private sector.

B. Specify sensors, spacecraft, mission profiles, and ground data processing

Iteration of data requirements and system design is essential to arrive at cost-effective solutions to remote sensing problems. USDI will be responsible for arriving at specifications for all parts of the Earth observation systems. For the most part these studies will be conducted by commercial enterprise under Government contract and supervision.

C. Prepare and defend budgets for operational Earth observation systems

With agreement on requirements and system design, USDI will prepare and defend budgets for the proposed systems. These would be submitted as a Departmental line item, not constrained to Geological Survey resources. It is envisioned that the program would require approximately \$100 million per year which would be a part of the \$450 to \$500 million per year which the 1978 OMB crosscutting exercise suggested as an appropriate level of expenditure for civil Earth observation programs.

D. Procure operational Earth resource observation systems

USDI will be responsible for procurement, installation, and operation of the complete Earth resource observation system. This will include sensors, spacecraft, integration, launch services (procured from NASA), command and control, data communication, processing, archiving, and dissemination. Most of these functions will be performed by private enterprise under Government contract and supervision. This will reduce the requirement for large buildup of civil servant staffs.

Design and implementation of experimental sensors and satellites will remain with NASA, with strong cooperative input from USDI. Shuttle sortie missions should be used for these purposes.

5. Conclusion

The U.S. Department of the Interior has the requirement, the ability, and the will to provide lead agency responsibility for the definition, development, and management of operational Earth observation satellite systems. It should be assigned this responsibility.