

NASA/NRO/DOD STAFF ANALYSIS

OF

REMOTE EARTH SENSING ACTIVITY

INTRODUCTION

This report reviews some of the technical and political considerations involving the relationships between military and civil earth sensing programs and technologies. The review was accomplished by an ad hoc committee from NASA, DOD, CIA and NRO.

PROBLEM

There is a Defense Department concern that civil space-borne earth sensing is perceived by many to resemble classical satellite reconnaissance activity. Even without regard to the quality or information content of data being returned from space, the overt civil programs of routine overflight and data acquisition (especially from denied areas) is considered by DOD to be a reconnaissance-like activity that could lead to international political confrontations that in turn could impact the current free exercise of the space environment by the NRO for intelligence collection or by NASA for scientific activity. Defense also believes that there is a risk that civil programs may adversely impact the interests of the NRO and DOD through premature release of reconnaissance-related technology and/or release of data of military or intelligence value to other nations. DOD recognizes that NASA, working with other civil agencies has the responsibility for scientific research in space and for developing space applications to meet the economic, social, and policy objectives of the United States.

BACKGROUND

The current national policy is contained in the report of the NSAM 156 Committee on the "Political and Security Aspects

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of Non-Military Applications of Satellite Earth Sensing," July 11, 1966. The report recommended:

- a. Continued protection of the NRP by continuing consideration of the political and security effects of unclassified earth sensing activities.
- b. Continued development of civil earth-sensing programs looking toward operational systems of economic value.
- c. Restriction of civil space-acquired imagery to 20-meter resolution and restriction of future capabilities discussion to 10-15 feet.
- d. Consideration of the relative merits and costs of manned space systems, unmanned satellites, aircraft, and other alternatives for civil earth resources surveys.
- e. Establishment of security procedures covering civil use of NRP-developed sensors.

NASA ACTIVITIES

NASA has undertaken a broad range of experimental earth resources survey activities using both aircraft and spacecraft. LANDSAT-1 (ERTS-A), the first dedicated earth resources satellite, was launched in 1972. The primary sensing instrument is a four-channel multispectral scanner. The earth imagery from this instrument is built up from individual pixels each covering a ground area of some 80 meters by 80 meters; the resultant imagery therefore has a ground resolution of about 150 meters in the classical photographic sense. LANDSAT-2, a duplicate of LANDSAT-1, was launched in January of 1975 to replace the first satellite and to provide continuing experimental earth coverage. LANDSAT data are returned by direct telemetry to ground stations within line of sight of the satellite or stored on-board for later read out. In addition to the several U.S. ground stations, there are LANDSAT ground receiving and data processing stations in operation or under procurement by the governments of Canada,

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Brazil, Italy, Iran and Zaire; several other foreign governments are expected to invest in similar stations in the near future. All LANDSAT data, whether received in the U.S. or abroad, are in the public domain and any individual is free to purchase copies thereof. In the U.S., the Interior Department, NOAA, and the Agriculture Department sell LANDSAT data through established data centers. Release of all NASA-acquired earth survey data to the public domain has been a hallmark of the civil space program of the United States; this policy was established to blunt concerns about potential unfair U.S. exploitation of the data and to encourage wide utilization of this new resource management tool.

Many investigators, foreign and domestic, are involved in the continuing analysis of LANDSAT data for scientific and operational purposes. Foreign and domestic commercial interests are also using these data for their own investigations. A number of U.S. agencies are using the data for resource investigations. In addition, the United States Government is experimenting with the LANDSAT data to help improve estimates of U.S. and overseas crop production. For this experiment, LANDSAT-2 is routinely acquiring data from all major wheat-producing areas of the world, including the Sino-Soviet region. The Secretary of State, at the World Food Conference in November, 1974, described this experiment as potentially contributing to solution of the world's food problem. NASA expects LANDSAT-C to be launched in 1977 and to operate through early 1980. LANDSAT-C will have some added capabilities over those of the first two LANDSAT vehicles. Recent cost-benefit studies, although not conclusive, indicate that an operational earth resources survey system could yield positive economic benefits. NASA is continuing its broadly based R&D program in sensor development, data handling and processing techniques, and information delivery to establish the feasibility of such an operational civil system.

NATIONAL RECONNAISSANCE ACTIVITIES

The satellite reconnaissance program has evolved since 1961 into a sophisticated program stressing advanced technology

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and long-lived imagery and electronic collection systems. The U.S. has no other dependable means of acquiring strategic intelligence data from within the heartland of the Soviet Union and China. Since 1972, the classified satellites have become the principal means of verifying the SALT agreements. In addition, the military services have become increasingly dependent upon the classified satellites for strategic warning and for providing intelligence information to tactical commanders. In 1973, the President authorized the DCI to release much of the satellite photography to the intelligence community at the SECRET level. Because of the critical importance of maintaining this unique and vital intelligence asset, extraordinary security measures are employed to protect the U.S. reconnaissance program against international imposed political constraints and from revelation of its technical capabilities and limitations.

ISSUES

International Political Considerations

The United States policy is to employ space for legal and peaceful purposes in accordance with its interpretation of the doctrine of the United Nations Treaty on Peaceful Uses of Outer Space. Russia and the United States accept the fact that the other is conducting satellite reconnaissance activities but neither nation publicly acknowledges that it conducts such programs. The basis of acceptance of the classified reconnaissance program has, therefore, been tacit. The U.S. has for many years kept certain heads of friendly governments aware of the classified program and, for example, shares intelligence data with the U.K. Because of minimum program visibility, no third party has had a diplomatic or legalistic basis for challenging this activity and the classified program has not been seriously threatened to date with international constraint. The United Nations Outer Space Committee has proved to be a benign forum for nations to debate space matters. From 1963 until very recently, there had been little serious debate concerning the use of space for information gathering purposes. Remote sensing is currently a subject of discussion from two standpoints--the issue of unconstrained distribution by the acquiring nation of potential

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valuable national resources data, and the issue of unilateral acquisition of such data without prior consent of the governments involved. Brazil, (which has a dedicated LANDSAT ground receiving station), and Argentina have tabled a draft treaty which would require prior approval for both acquisition and release of data taken over other countries; other Latin nations have supported this political posture. The Legal Subcommittee of the UN Outer Space Committee discussed these in February with no action being proposed this year. The present United States policies of unconstrained data acquisition and dissemination are being called into serious question. The U.S. would prefer no distribution constraints, but is willing to abide by a consensus on this matter; the U.S. will not accept constraints on acquisition. Because of the nature of the current discussions, however, Defense feels that there is a prospect that unconstrained military space activities will be challenged by inference and that if this challenge becomes codified the U.S. would unilaterally accept some order of accommodation. NASA, on the other hand, believes that the growing foreign investment in ground stations for earth resources data, the inherent value of the civil program to all participants, and the growing sophistication of nations about space capabilities will mandate for global acceptance of unconstrained remote sensing, and that military activities will therefore not be endangered.

Protection of Technology

Technical guidelines used by NASA and the NRO, as described earlier, have been in being since 1965. The limitations on releasable photography were waived by the NSAM 156 Committee when NASA received approval to employ a 10-meter resolution camera system on its SKYLAB vehicle and then to release this imagery to the public. The DOD, NRO and NASA have close relationships in terms of information being exchanged about the nature of earth observing satellite technology and techniques of data acquisition. The formal mechanisms for overseeing this joint technology exchange have, however, fallen into disuse and technology discussions have been handled on an ad hoc basis over the past several years. Since 1966, the

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technology relationship between DOD, NRO, and NASA has become more complex. The Defense Department feels that there has been a growing convergence of NRO and NASA technology and that the proposed use of advanced earth sensing technologies by NASA could lead to compromise of NRO capabilities. First, NASA has undertaken a variety of non-photographic sensor developments which could appear to parallel reconnaissance-oriented developments. An example is a NASA

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NASA is pursuing this definition work as a part of a coordinated scientific interagency program that includes Defense participation. Second, the proposed timing of some of NASA's program activities

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Finally, the industrial base which has had long-term associations with the NRO is becoming more aggressive in pursuing corporate interests by trying to market reconnaissance-developed technology for civil use. For example, NASA is interested in a standard earth observation package for routine use on the Space Transportation System; original proposals from NRO experienced contractors included a 1- to 5-meter quality camera

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Public Release of Space Data and Information

The Defense Department views the present national policy of open release of all civil program space-acquired data as having a potentially adverse impact upon DOD (this policy is at present limited to meteorological satellite and R&D program data only). NASA believes that any significant change in this policy would create world-wide suspicions of U.S. motives and would result in a serious international confrontation on all space programs that then could result in curtailment of classified activities.

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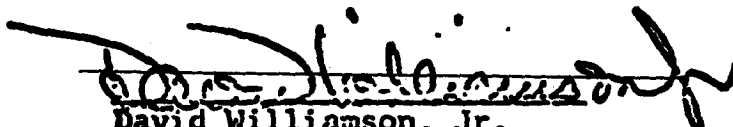
A preliminary DOD contractor survey indicates that, in the absence of alternative data sources, data from current and proposed NASA programs could potentially be of military value to adversary nations. At the same time, there is a growing recognition of the value of civil space information by U.S. civil agencies and by the private sector. The classified programs acquire mainly foreign military intelligence data, most of which is not of use to the civil sector and all of which is classified and not releasable to the public.

SUMMARY AND CONCLUSIONS

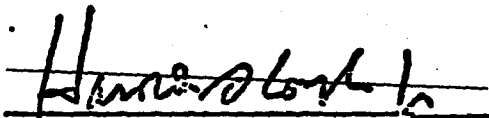
A fundamental concern identified by the DOD appears to be one of a growing convergence in technology and in data quality between the NRP and the civil space programs. It is recognized that there are national and international benefits to be gained from continuing a civil earth observation program which is acceptable to the other nations. The DOD believes that extreme care should be exercised so that NASA's programs, either from technical or political standpoints, do not lead to constraints on the NRP, or in fact, become a reconnaissance activity of serendipitous benefit to other governments. The issues to be considered, therefore, appear to be:

a. How should civil and military programs be coordinated and managed to avoid disclosure of classified capabilities or of military valuable data and information?

b. To what extent do classified programs risk constraint in the event of international opposition to civil remote sensing from space?



David Williamson, Jr.
Assistant Administrator
for Special Projects
National Aeronautics and
Space Administration
24 April 1975



Harold S. Coyle, Jr., Lt Col
Deputy Director for
Plans and Policy
National Reconnaissance
Office
24 April 1975