

**STUDY FAIR VOLUME 5. OBSERVATION SATELLITES FOR ARMS
CONTROL: SOME IMPLICATIONS AND POLICY CHOICES**

INSTITUTE FOR DEFENSE ANALYSES ALEXANDRIA VA

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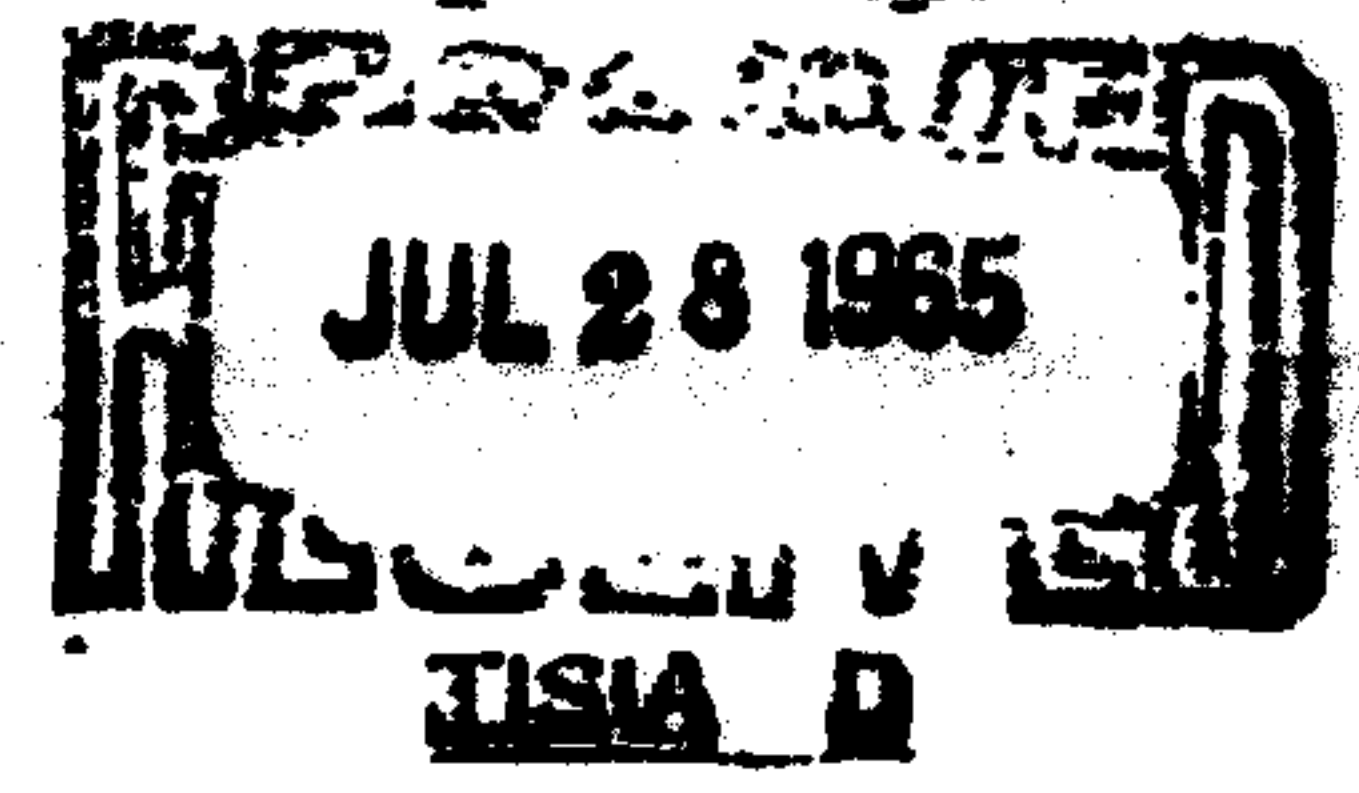
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Study FAIR Volume V

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OBSERVATION SATELLITES FOR ARMS CONTROL:
SOME IMPLICATIONS AND POLICY CHOICES (U)

Rosemary Klineberg



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SOME IMPLICATIONS AND POLICY CHOICES (U)**

Rosemary Klineberg

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**INSTITUTE FOR DEFENSE ANALYSES
ECONOMIC AND POLITICAL STUDIES DIVISION**

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FOREWORD

The following paper on the policy implications of an observation satellite system represents one part of Study FAIR: Focus on Arms Information and Reassurance. The author, Rosemary Klineberg, is a former member of this division and a specialist in international relations.

Partial financial support for Study FAIR has come from the US Arms Control and Disarmament Agency, the Office of the Assistant Secretary of Defense for International Security Affairs, and Project Michelson of the US Naval Ordnance Test Station, as well as from IDA Central Research funds.

JAMES E. CROSS
Acting Director
Economic and Political
Studies Division

iii

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PREFACE

The five principal parts of Study FAIR are entitled: Studies on Information and Arms Control; Studies on Accidental War; Unilateral Arms Control; A Survey; Observation Satellites for Arms Control; Technical Capabilities, Concepts, and Applications (U); and Observation Satellites for Arms Control: Some Implications and Policy Choices (U). The first three papers are not classified, the latter two are classified "Confidential" and "Secret," respectively. All five papers are based on unclassified sources.

The paper which follows examines implications of an observation satellite system for general United States policy.

JOHN PHELPS
Leader, Study FAIR

v

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CONTENTS

	<u>Page</u>
I. INTRODUCTION AND BACKGROUND	1
History	
Present Policy	
II. PEACEFUL APPLICATIONS	7
Area Coverage	
Possible Fields	
III. MILITARY CONSIDERATIONS	12
The Targeting Question	
Physical Vulnerability of Satellites	
IV. LEGAL ISSUES	20
Space Photographs/	
Outer Space and the High Seas	
Satellites and U-2s	
Sovereignty, Secrecy, and Satellites	
V. POLITICAL-PSYCHOLOGICAL FACTORS	27
US Image Abroad	
The Public Press	
VI. THE CHOICES	33
Maintenance of Secrecy	
Legitimization of Observation from Outer Space	
Direction and Control	
VII. SUGGESTIONS	41
First Steps	
General Climate of Opinion	

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OBSERVATION SATELLITES FOR ARMS CONTROL:

SOME IMPLICATIONS AND POLICY CHOICES


I. INTRODUCTION AND BACKGROUND

This is the last in a series of three papers¹ on the utility of observation satellites for arms control. The first examines the technical capabilities of the satellites, and the second specifically deals with arms control concepts and applications. The purpose of this third paper is to investigate the further implications of an observation satellite system for general US policy, with only peripheral reference to arms control as such.

Individual aspects of the satellite system may be emphasized in turn by US policy-makers. In the long run the goal is to develop and exploit the system so that its full potential for usefulness may be realized. Thus, in the following sections, after a brief review of the history of the satellite program and the nature of present US policy toward it, we first examine the little-known peaceful applications of observation satellites, including their economic benefits. Then we take up the relevant military, legal, and political-psychological factors affecting the program. Finally, we outline the main choices open to policy-makers, and make certain

1. The other two make up Study FAIR Volume 4, Observation Satellites for Arms Control: Technical Capabilities, Concepts, and Applications (1), CONFIDENTIAL (IDA Research Paper P-87, May 1963).

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suggestions for specific action. The effect of a US observation satellite program on the maintenance of Soviet secrecy--potentially a highly significant aspect of the program--is analyzed under the other headings as it relates to them.

History

It has been generally, if unofficially, known for several years that the United States has been developing a reconnaissance satellite program. In the early stages, launchings were announced in some detail. Thus, the first two MIDAS [Missile Defense Alarm System] launchings (26 February and 24 May, 1960) were identified, as were several in the Discoverer series (28 February, 1959, to 29 June, 1960).¹ Then, after the U-2 incident of May 1960 and the consequent US decision to refrain in the future from overflights of Soviet territory, newsmen took to describing the observation satellites as "spies in the sky," successors to the U-2. In March of 1962 a new policy was introduced aimed at reducing the information about all satellite launchings to the same common denominator. At that time, the launchings themselves and the booster rocket were identified and sometimes related to an over-all space program, but all else was considered classified information. In April 1963, there was a further publicity clampdown requiring all satellite launchings by

1. The Discoverer satellites were designed for engineering development and test purposes; the results of their flights were to be applied to operational satellite systems.

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the military services to be done in secret. This move came about despite the virtual impossibility of hiding an orbiting satellite from a modern tracking network.¹

In any case, the earlier, more specific press releases remain on the public record, forming a history of activity which the press consistently integrates in some fashion, not necessarily accurate, into its current articles. Thus a reporter may speculate that a satellite launched with an Atlas-Agena booster combination "known to have been used in previous SAMOS-MIDAS shots" must be one or the other,² and a British aeronautical weekly may announce that of "twenty unidentified satellites" launched by the US Air Force between November 1961 and August 1962 six were probably SAMOS reconnaissance satellites, twelve were Discoverer-type satellites "presumably carrying SAMOS or MIDAS equipment," and one was a MIDAS early-warning satellite.³ Careful perusal of the public press and the more knowledgeable aerospace journals may therefore suffice to keep the interested citizen moderately well informed of the extent of US observation satellite activity.

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1. "Clampdown," Newsweek, April 22, 1963, p. 67.
 2. The Washington Post, 6 August 1962, p. A-1. SAMOS stands for Satellite and Missile Observation System.
 3. Flight International (Official Organ of the Royal Aero Club), Vol. 82, No. 2788 (16 August 1962), p. 253. The twentieth of the group was described as "either a SAMOS or a MIDAS . . . possibly unsuccessful."

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Present Policy

In response to specific queries about the observation satellite program, which (except for low-resolution meteorological satellites)¹ continues to be the exclusive responsibility of the armed services, US spokesmen now restrict their comments to a statement that the Air Force is endeavoring to develop a capability to conduct military reconnaissance from space. They neither deny nor confirm that the United States may have such an operational capability at the present time.

Conducting the satellite program in total secrecy--thereby mitigating public speculation--does not appear to be practical in the "open society" of the United States, since it is impossible to conceal the visibility of launchings altogether. Furthermore, compliance with UN General Assembly Resolution 1721 (XVI) of 20 December 1961 requires states launching objects into orbit or beyond to register all such launchings with the UN Committee on the Peaceful Uses of Outer Space. This the United States has been doing since mid-February 1962. The earlier reports included

1. Resolution is a measure of the ability of an optical or photographic system to distinguish detail. Roughly, a resolution of ten feet means that an object ten feet across can just be detected, whereas a smaller object cannot be. Low resolution means that only large objects can be traced; high resolution, that small objects and greater detail are visible.

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ification only of those satellites which were still in orbit at the end of the two-week reporting period; those which had been launched but were no longer in space were not mentioned. The information given included orbital characteristics, the name of the launch vehicle, the launch date, and a general description of the kind of space program being undertaken.

Another limitation on the maintenance of secrecy was manifested when the Soviets claimed to be giving full information in the registration reports, whereas it was evident that the United States was not reporting all its launchings, as called for by the General Assembly resolution. Comparing the US reports with the brief Air Force releases regarding satellite launchings, the Soviets noticed that the latter were not always reflected in the reports to the United Nations. The US position was that the satellites in question were no longer in orbit at the time of the reports and therefore did not need to be registered. However, in order to be consistent, the reports would not have been able to cover the flight by Lt. Col. John Glenn on 20 February 1962, since his capsule was orbited and returned to earth in the middle of a reporting period. Therefore, a new scheme of reporting was developed and put into effect shortly thereafter.

Now the US reports give the same information for both civilian and military launchings, viz: the name of the launch vehicle,

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the date, and the satellite's nodal period, inclination, apogee, and perigee. In addition, they disclose into which of four main categories the function of the satellite falls: development of space-flight techniques and technology; space research and exploration; practical applications of space-based technology; and "non-functional objects," a heading which covers satellites that have not gone into orbit or have otherwise not behaved as planned.¹ Furthermore, information on scientific experiments in space continues to be reported to the world scientific community through the international Committee on Space Research [COSPAR] and in various publications, as has been customary for several years.

In sum, the present US information policy with regard to observation satellites--insofar as can be judged on the basis of unclassified sources--consists in announcing as little as possible about individual launchings consonant with (a) the impracticability of attempting to conduct launchings in total secrecy, and (b) the obligations incumbent upon members of the United Nations. Implementation of the policy has been complicated by the earlier practice of informing the public in greater detail.

1. The Soviet Union, meanwhile, has continued to report only the space shots which have succeeded and been widely publicized. The Soviet reports on twenty-one launchings during 1962 give the date and partial orbital information, but not the launching vehicle or satellite category.

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II. PEACEFUL APPLICATIONS

With one exception, public and official interest in observation satellites seems to have centered on their military intelligence applications. The exception is the TIROS [Television and Infra-Red Observation System] weather satellite, the first of which was launched on 1 April 1960. The TIROS system--using very low-resolution photography, high altitudes, and picture transmission by television--has been notably successful in providing large-area cloud cover data, helping to identify and track dangerous storms, and generally advancing the science of meteorology. By 1964 the more advanced Nimbus system is expected to take over some of the functions of TIROS.

But observation satellites may be applied to a variety of other important peaceful purposes, and these should figure prominently in any consideration of the future role of observation satellites and the policies associated with them. It should be noted, by the way, that the term "peaceful" is not necessarily to be equated with "non-military" as in the Antarctic Treaty. A possible ban on weapons in space, for example, need not be automatically extended to include a general ban on military activities in space, some or which, at least in the opinion of US officials, may well have a long-run "peaceful" effect. Communications satellites, moreover, have obvious military and non-military

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applications at the same time. The application of satellites to arms control--itself part of over-all security policy--is, of course, the peaceful function which is stressed in Study FAIR,¹ but it is far from being the only significant one.

Area Coverage

The most conspicuous advantage of satellite photography, even compared with the highest-flying airplanes, is its coverage of very large areas (hundreds or thousands of square miles) in a single picture. A satellite photograph, furthermore, may combine this breadth of view with faithful depiction of details.² As in the case of TIROS, it clearly lends itself to applications in which large-area views are themselves of interest, and also to the location and selection of spots for more intensive study, as in prospecting for minerals. In this second kind of application, the satellite photograph can often tell the conventional aerial photographers where to fly and what to look for. Satellites also make possible resource surveys on a regional, national, or international scale. These surveys of the earth's supplies of

1. See the accompanying paper, "Observation Satellites for Arms Control: Concepts and Applications."

2. See the accompanying paper, "Observation Satellites for Arms Control: Technical Capabilities," for documentation and elaboration.

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food, fuel, and materials can take on special importance as new nations, some with burgeoning populations, strive to develop as rapidly as possible.

A satellite photograph not only covers a large area; it captures the area at a known instant of time in a picture which can be studied at leisure. Stereo pictures lend themselves to topographic mapping and other applications where depth is important to photo-interpretation.

Possible Fields

Despite the almost exclusive emphasis on the utility of observation satellites for military intelligence and weather information, it is instructive to note that there are as many as thirteen additional fields, not counting arms control, where satellites may be useful. These are: cartography, geography, geology, soil science, engineering, forestry, wildlife management, hydrology, agriculture, urban and regional planning, archaeology, public administration, and disaster analysis.¹

In cartography, satellites offer the great advantage of bridging over relatively unknown regions and plotting accurate positions in relation to known points for shorelines, islands, glaciers, and ships. Within the broad area of geology,

1. We are grateful to the Itek Corporation for this listing.



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satellites can be applied to geologic reconnaissance, geomorphology, glacial geology, lithology, structural geology, and mineral exploration. Satellites can help construction engineers take a regional viewpoint in planning dams, construction sites, or highways. In forestry, inventories that might take weeks of flying can be accomplished with one or two satellite pictures, especially in relatively inaccessible areas. In hydrology, snow cover and glaciers can be seen "at a glance" from satellites. Optical and infrared pictures of vegetation may yield much information of value in forestry, wildlife management, hydrology, and agriculture. For urban planning, regional pictures permitting individual automobiles to be located and counted could be made. Archaeological discoveries through aerial photography have attracted much attention in recent years; satellites would provide more pictures of relatively unexplored areas. In the area of public administration, satellites could in some circumstances be used advantageously for tax assessments and law enforcement (for instance, in the case of fishing in ocean waters).

Any sampling of applications of observation satellites should be considered no more than illustrative at this point. In the light of experience in the still rapidly growing field of aerial photography, we may judge that, once the satellites were operating and the pictures widely available, important new applications would



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be discovered and new benefits realized. It is often assumed that satellite photographs have the great advantage of large area coverage, but that they cannot match conventional aerial photos when high resolution and detail coverage are desired.¹ So far as the limiting capabilities of the two systems are concerned, this is true. But it is not generally realized that the satellite resolutions achievable now are as good as those of a large fraction of useful aerial photographs made so far. One informed study² indicates that satellite photographic coverage becomes cheaper than aerial photography for areas greater than about three million square miles (the land area alone of the earth is about 50 million square miles). If either (a) the cost of launch vehicles is paid by governments, or (b) economies associated with frequent launchings become possible, or (c) the areas of interest are particularly inaccessible (like Antarctica), this cost comparison shifts strongly in favor of satellites.

It seems evident that realization of the peaceful advantages of observation satellites depends more on overcoming some political

1. We may note, however, that, given reasonable technological progress, by 1970 the maximum achievable satellite resolution should be limited only by the turbulence of the atmosphere, a problem with which very high-flying aircraft also must contend. See the accompanying paper, "Observation Satellites for Arms Control: Technical Capabilities."

2. Conducted by the Itek Corporation.



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problems and making the right policy choices than it does on technical capabilities. Because they cover the whole earth and all nations can benefit from them, observation satellites should ideally be operated, and the data obtained from them distributed, on an international basis. The United Nations might, for instance, operate a central repository for satellite photographs which would be available to all nations. But as a practical matter it may be necessary for the United States, initially at least, to undertake some applications and establish some precedents through unilateral actions. On this score we have some suggestions toward the end of this paper (see below, pp. 41 - 45).

III. MILITARY CONSIDERATIONS

It is clear that observation satellites can provide intelligence information of military value, and it seems reasonable to assume that gathering such intelligence has been their main mission so far. Within the scope of Study FAIR, one additional point relating to the military intelligence role of satellites stands out: there is often not much difference between the type of information which is useful for military intelligence purposes and that which is useful in an arms control context.

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The Targeting Question

There is, however, one type of intelligence information which seems to require special attention here, viz: strategic targeting data, particularly on missile sites and bomber bases, which figure importantly in the over-all strategic equation. In the context of US attempts to retain some kind of counterforce capability, it is conceivable that, if the United States had accurate targeting data, and the mathematics of force sizes and exchange ratios were sufficiently in its favor, it could launch a preventive strike against the Soviet Union (presumably in the hope of forestalling a Soviet attack) and destroy its forces sufficiently to save US cities from retaliation. From a military standpoint the United States might indeed want such a capability; on the other hand, the Soviets would most certainly prefer that the US not have it and from their standpoint the situation would seem very dangerous. It is possible that they might eventually be frightened into reckless action, perhaps in the form of a preventive strike of their own. This the United States would surely not want. A more likely outcome to the situation may be Soviet efforts to make their forces less vulnerable.

Steps toward less vulnerability could include hardening and dispersal of Soviet forces, or concealment of them, or an



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increased emphasis on mobility of strategic forces. Hardening and dispersal would serve to change the mathematics of a US strategic counterforce strike to mitigate the US advantage. Concealment would do the same, presumably by leaving the United States ignorant of the locations of some part of the Soviet force, but it would be made difficult if there were operating observation satellites overhead. Even if the missiles could be carefully concealed and camouflaged before the satellite system went into operation, the concealment might not be completely successful because of the difficulties of removing altogether earth scars and other evidences of construction, such as roads to out-of-the-way sites. Also, a program which aimed at concealing a large part of the Soviet strategic force from satellites would certainly be more expensive than if no such concealment were necessary.

These considerations suggest that the most generally satisfactory course open to the Soviets may be to make their strategic forces increasingly mobile, mainly with submarines but also possibly with land-mobile missiles. In other words, it seems likely that a large-scale US observation satellite program would tend to force the Russians toward mobility in their strategic forces. Sufficiently mobile forces would greatly reduce the threat of observation satellites as an aid to a pre-emptive strategic strike by the United States.



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From the US standpoint, a mobile Soviet capability might be considered militarily undesirable, since it would tend to rule out any chance of protecting the homeland by striking hard and decisively at Soviet strategic forces. But from the standpoint of longer-term strategic stability, it is clear that much can be said for mobile Soviet strategic forces.¹ The Russians would feel a relative sense of security which might leave them less apt to undertake reckless action such as installing medium-range missiles in Cuba to redress the strategic balance. They might similarly be less inclined to compete with the United States in numbers of bombs or delivery vehicles, though they cannot realistically be expected to accept the notion of permanent numerical inferiority.

A significant benefit of a Soviet emphasis on mobility, compelled in substantial part by US observation satellites, might be a net decrease in Soviet dependence on other forms of secrecy as a military asset. Other papers of Study FAIR point out that anything which tends to diminish the Soviet emphasis on secrecy may generally be considered to be desirable. That is, if the Soviets can make their strategic forces secure through mobility instead of concealment, so much the better from a Western standpoint.

1. For corroborative statements, see the interview by Stewart Alsop with Secretary of Defense Robert S. McNamara in the Saturday Evening Post, 27 November 1962, p. 18.

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Physical Vulnerability of Satellites

For the purposes of this inquiry, a crucial question is whether the Soviets have the capability physically to disable observation satellites, and, if so, whether they would use it. The discussion and comments in the United States following the Vostok III and IV flights implied that the Soviets might try to destroy or disable US observation satellites if they had the capability. This is not self-evident.

First of all, the Soviets would need to know at which satellites to shoot. They might be able to decide this largely on the basis of US launching data. At the present time the United States may be facilitating this task for the Soviets by launching some satellites conspicuously labeled "secret," thereby distinguishing them from other satellite launches. Or, the Soviets may be able to develop some kind of satellite inspection capability on their own. This would seem to be where the recent Vostok experience would be most applicable; given some very considerable further development, the Soviets probably could arrange to put one of their satellites in the vicinity of an unidentified US satellite for the purpose of inspecting the latter and determining the nature of its mission. But this capability is by no means a simple thing to achieve. It was evidently intended that Vostok III should be in precisely the

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right timing and position for the launching of Vostok IV, but such conditions for the launch of an inspection satellite would almost certainly not be met by non-Soviet satellites that the Soviets might want to inspect. Thus, a capability for rapid launch, extensive maneuvering in space, and other technically difficult feats would be needed before the Soviets could count on inspecting unidentified satellites. Furthermore, it is not at all clear how close the inspecting satellite might have to come to the unidentified satellite to examine it carefully enough really to determine its mission, as the observation satellite could be made with relatively little trouble to look like another kind of satellite.

If the Soviets knew exactly which satellite they wanted to destroy, their task might be comparatively easy, although still perhaps expensive. Once they had picked out the objectionable satellite, they could compute its ephemeris and make plans for destroying it at a time and place most favorable to the intercepting weapon. It might not be difficult for them to propel a nuclear weapon up to the satellite altitude at just the right time with a comparatively simple rocket. The situation might alter, however, if decoy satellites were used by the United States. It is theoretically possible to distinguish decoys from actual observation satellites by calculating the effects of air drag,

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but at satellite altitudes this drag is minimal, and a waiting time of several days might be required before the actual observation satellite could be distinguished. This would be certain to make the task of the satellite destroyer more difficult and probably more expensive.

So much for capability. Should the Soviets become able physically to destroy or disable US observation satellites, it is still uncertain when or whether they would do so. The Soviets would seem most likely to shoot at US observation satellites if it were clear to them and, also, they would hope, to the rest of the world that what they were shooting at was truly a military reconnaissance satellite. Therefore, one task with which the United States should be concerned is how to arrange that the situation will never become quite so clear to the Soviets. If the missions of the satellites can consistently be made ambiguous, the Soviets may be less likely to shoot.

Furthermore, the Soviets must always take into account the possible consequences to their own space program of an assault on US satellites. The United States would presumably consider itself free to retaliate at least one-for-one. But it would be very difficult to draw a line between, say, a manned research flight and an observation satellite carrying a man. The Soviets would have no way of telling where the practice of shooting at satellites

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would stop once it started. If each side decided to exercise its military option, rather indiscriminate destruction of satellites and space vehicles could result in fairly short order, to the point where neither side would be able to carry on its longer-range space program. One may judge that such a program is very important to the Soviets in view of the efforts which they have put into it and the extent to which their prestige has been involved. They would have relatively more to lose in seeing their space program defeated than would the United States, and this is a fact which they are not likely to overlook when they first consider whether or not to shoot at US observation satellites.

In summary, the main military considerations with regard to observation satellites are the following: (a) the intelligence information which satellites can provide may well be of military value; (b) US acquisition of precise targeting data for the Soviet Union may encourage the Soviets to emphasize mobility and hardening in their strategic forces, thereby reducing the threat to them of observation satellites as an aid to a US pre-emptive strike, and at the same time allowing the Soviets to feel relatively more secure and thus less apt to undertake certain kinds of reckless action; (c) this increased Soviet emphasis on mobility and hardening may be accompanied by a net



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decrease in Soviet dependence on other forms of secrecy as a military asset; and (d) the physical vulnerability of observation satellites may be inconsequential in view of the obvious Soviet need to consider the possible consequences to the Soviet space program of an attack on US satellites.

IV. LEGAL ISSUES

The dearth of space law at the present time may provide the United States with the opportunity of consciously creating such law. Many questions remain, of course, open or partly so: Is it legal to orbit observation satellites? Are some legal and some not, depending on their functions? Is there a distinction between photography by instruments and photography by human beings in outer space? Where is the line between "airspace" and "outer space"? To what extent is national sovereignty infringed by observation satellites? Some of the answers may derive from analogies, others from the development of precedent, and still others from unilateral efforts to impose solutions. Probably there will never be universal agreement, though significant strides in that direction may eventually be made. The present survey does not attempt to examine the legal issues in depth or in great detail, but rather to highlight those which may be of most immediate or obvious import to US policy-makers.

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Space Photography

The first analogy which might be emphasized is that between human photography and instrumental photography from space. After all, the results obtained by both means can be very similar. The fact that both the United States and the Soviet Union have orbited men who have taken pictures argues in favor of acceptance of the legitimacy of the procedure, a status which may then be extended to the orbiting of photographic instruments. It is not certain that the USSR has orbited optical satellites, but the film made of Major Titov's flight included some of the photographs which he took in the course of his seventeen orbits, and there may be similar releases based on subsequent flights. Even though the Soviets may insist that these pictures were "peaceful" and innocuous, they will, regardless of their intentions, have strengthened the legitimacy of photography from outer space.

Outer Space and the High Seas

Another possible analogy is that between outer space and the high seas. US spokesmen at meetings of the Legal Subcommittee of the UN Committee on the Peaceful Uses of Outer Space, for instance, have compared the US satellites to Soviet trawlers hovering off US coasts with electronic equipment just beyond the three-mile territorial limit. While the United States certainly does not

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"approve" of this activity, it does not consider it illegal and does not try to terminate it. The Soviets, however, have never publicly conceded that these vessels are, in fact, engaged in electronic reconnaissance or surveillance.

The Soviet position, as expressed in May 1962 at the Geneva meetings of the Legal Subcommittee, appears to be that the orbiting of satellites or other space vehicles is in itself legitimate; the question of legality or propriety arises only in connection with the function of the satellite. In other words, while in the Soviet view the United States may orbit anything it chooses (with the probable exception of weapons), observation of territory belonging to a sovereign nation is illegal and aggressive behavior. Thus, in their draft "Declaration of Basic Principles" submitted to the meeting, the Soviets declared the collection of intelligence from space to be "incompatible with the objectives of mankind in: the conquest of outer space."

One of the difficulties with the high seas analogy is that of definitions. It is universally accepted, for instance, that waters more than twelve miles off-shore are outside the limits of national sovereignty (and some nations, including the United States, restrict territorial waters to six or even three miles). The United States may, however, prefer not to define the lower limits of "outer space," inasmuch as "airspace" is internationally

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agreed to be within the jurisdiction of the underlying state.¹
Another problem might result from attempts to apply the law of piracy to outer space, as the United States may wish to avoid the implication that an inspection satellite, designed to ascertain that observation or reconnaissance satellites are not carrying weapons of mass destruction, might be considered a "pirate."

Satellites and U-2s

Some of the suspicion of illegality surrounding the use of observation satellites clearly derives from public identification of satellites with U-2 reconnaissance aircraft. This equation was buttressed by the early official assurances in 1960 that curtailment of the activities of the latter would not adversely affect the national security, inasmuch as satellites would perform the same function and provide the same information.² In strictly legal terms, the equation is ill-founded. While as an aircraft (that is, a non-orbiting vehicle) the U-2 went through airspace

1. Vehicles at current orbiting altitudes are generally agreed to be in outer space, not in airspace, but unless there is a relatively low ceiling on airspace some countries may not be able to get in and out of space without violating another nation's "sovereignty." See Richard N. Gardner, "Cooperation in Outer Space," Foreign Affairs, Vol. 41, No. 2 (January 1963), p. 345.

2. See, for example, the article in The New York Times, 12 October 1960, p. 27, by Richard Witkin.



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and unmistakably came within the jurisdiction of the sovereignty of the underlying state, this concept is not automatically applicable to outer space. The UN General Assembly, in its Resolution 1721 (Part A) of 20 December 1961, commended to States the principle that "outer space and celestial bodies are free for exploration and use by all States in conformity with international law and are not subject to national appropriation." Thus such use by the United States for the orbiting of observation satellites is not, in the absence of more specific injunctions, necessarily illegal. Still, so long as the military reconnaissance function of the observation satellites is emphasized at the expense of non-military functions, the identification of U-2s with satellites is likely to continue, especially since the Soviets find this to their advantage.

Sovereignty, Secrecy, and Satellites

Even if it is concluded that there are no existing legal barriers to observation from space, either by instruments or human beings, objections to the practice may still be raised. It is not only the Soviets who claim that determination of how much information about one's society will be furnished to other nations is an inherent attribute of sovereignty; many US allies and neutral countries are equally jealous of their supposed prerogatives.



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But certainly it is the Soviets who are most articulate about their concern, and who feel most threatened by US insistence on the right to orbit photographic satellites. Some US spokesmen, on the other hand, have criticized the Soviet Union for maintaining maximum secrecy as the foundation of its entire society, and have warned that such secrecy is becoming obsolete in the face of contemporary technological developments. One of the subsidiary purposes of the satellite program, in fact, may be to prove to the Soviets that their concepts of secrecy are outmoded and impossible to perpetuate.

The above-cited General Assembly resolution may be interpreted as implying that the orbiting of observation satellites is not in and of itself illegal.¹ To expect the Russians to agree at the present time is clearly unrealistic. But it is not necessary that they should agree now. Soviet society is changing rapidly, and what holds true today may no longer be true tomorrow. At the same time it must be recognized that the rest of the world is not standing still either, so that a significant international consensus on matters of law and political philosophy, while certainly a distant dream, may not be unrealizable.

1. Cf. the comments by Leonard C. Meeker of the Department of State in "Observation in Space," address at the Institute of Air and Space Law, McGill University, Montreal, Quebec, Canada, 13 April 1963 (Department of State Press Release No. 191, Revised, 12 April 1963).

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The question of sovereignty remains an open one. The Soviets may depend on secrecy for their security, but the United States seeks certain kinds of intelligence information for its security, and the two convictions are incompatible. This is inevitable in a world of disunity and disagreement. In the absence of a world government to resolve such questions and enforce its decisions, it is each nation's task to implement its conviction to the best of its ability, in the light of the limitations imposed by the opposition of other nations.

Thus we may tentatively answer the questions raised at the beginning of this section as follows: (a) the free use of outer space, implicitly including the orbiting of observation satellites, appears to be accepted by the UN General Assembly as legitimate, although the Communist countries do not agree; (b) the legitimacy of manned or weather satellites is more universally accepted than that of reconnaissance satellites; (c) even if there is a distinction between photography by instruments and photography by human beings, the United States may wish to de-emphasize it; (d) the line between "airspace" and "outer space" has not yet been drawn, though the U-2 is clearly in the former (and therefore illegal when over countries objecting to it) and satellites are clearly in the latter; and (e) national sovereignty may be infringed by observation satellites in that they may impede



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the maintenance of widespread secrecy, but it may also be upheld to the extent that they assist in the self-defense of the country doing the orbiting. In general, the legal picture is clouded and obscure, which leaves open the possibility that the United States might be able to set unilateral precedents for the accepted international law of the future.

V. POLITICAL-PSYCHOLOGICAL FACTORS

The political and psychological factors involved in an observation satellite program are of rather more immediate import than the legal issues, and are perhaps as significant as the military considerations. They relate to the over-all image which the United States presents to the world, and which the US Government presents to its citizens. The problem faced by US policy-makers in this area is, essentially, one of obtaining information in such a way as to provoke as little opposition as possible from other nations, especially the Soviet Union, while eliciting the widest possible national and international support.

The concept of "provocation" is an elusive one. With reference to the USSR, it may fairly be said that almost anything which the US does affecting Soviet society is bound to be "provocative" in some way. Of course, the Soviets may consider some actions more threatening than others, but it is often impossible to judge

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or predict Soviet reactions with any degree of accuracy. In the long run it would seem useful to accustom the Soviets to being observed from above, as part of a many-faceted campaign to erode secrecy as a foundation of Soviet society, thereby encouraging the development of a greater sense of world community. This is hardly a goal which Soviet leaders would endorse at the present time, though ultimately it may be less unpalatable than it is now.

In the meantime, however, US policy-makers are faced with several complex questions. To what extent, for instance, will the United States be threatening the stability of the Soviet political system by compelling less secrecy vis-a-vis the outside world? In order to accelerate the evolution of the system, does the United States want to advertise to the Soviets the decline in their secrecy or would this be excessively "provocative"? How can the United States erode Soviet secrecy and yet keep its threat to the USSR (or the Soviet perception of that threat) within bounds? It might be useful to stress the "impersonal" nature of observation satellites in contrast to the "personal" impact of on-the-spot inspectors or observers; that is, satellites clearly cannot subvert individual Soviet citizens or increase their knowledge of and sympathy with the West through actual contact and interchange of opinions. Probably it would be better in the long run not to emphasize in US declaratory policy the decline in Soviet secrecy,

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at least until it becomes evident in the structure of Soviet society itself. De-emphasizing the military reconnaissance aspect of satellite observation in favor of its non-military potential might be reassuring not only to the Soviet Union, but also to other countries where concern has been expressed about US belligerence.¹

US Image Abroad

This brings us to consideration of the image which the United States may be presenting to the rest of the world. It has made a public commitment (in the United Nations and elsewhere) to support the peaceful uses of outer space. The general identification of "peaceful" with "non-military" inevitably brings the United States under suspicion of using space for belligerent purposes, since the reconnaissance satellite program is the exclusive responsibility of the armed services. Turning the program in toto over to a civilian agency might result in a de-emphasis of the military aspects of satellite development. However, it

1. See, for example, the results of polls in the United Kingdom and France conducted by the United States Information Agency in May 1960, which were published in The New York Times on 27 October 1960, p. 28. Forty-eight per cent of 1,150 British respondents, and forty-nine per cent of 1,000 French respondents, held that the US was not doing all it should to prevent a new world war (vs. thirty-three per cent and twenty-nine per cent, respectively, who held that it was). Sixty-two per cent of the British and fifty-nine per cent of the French believed, similarly, that the USSR was not doing all it should to prevent war (vs. thirteen per cent and eighteen per cent who believed that it was).

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would have two obvious disadvantages: first, it would suggest, erroneously, that the military was incapable of being useful in peaceful activities, and second, it might simply transfer suspicions already aroused to other programs carried on by the civilian agency which had taken over. The reputation for honesty and accuracy of the National Aeronautics and Space Agency, for instance, was not helped by its having to provide cover for the U-2. Furthermore, it is doubtful that transfer of the reconnaissance program away from official or direct control by the Air Force would truly impress the country or the rest of the world as an indication of diminished interest in the military applications of observation satellites. One possibility would be an initial and temporary division of the satellite development program into two parts, one to remain essentially military and classified and the other to be civilian and open (see below, pp. 44 ff).

It is probably unwise in any case, when dealing with public relations, to try to treat one aspect of US policy as entirely separate from others. De-emphasis of the military uses of satellites, for example, can hardly be successfully undertaken at the same time as stress continues to be publicly placed on the degree to which observation satellites enhance US strategic power. The

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problem is not really one of peaceful observation, but rather of the peaceful uses of the knowledge gained through observation, and this is something which can only be demonstrated over a period of time, not proved by propaganda or pronouncements.

The Public Press

There is one aspect of US policy, however, which is a thing apart, and that is the press relations of the satellite program. Its special nature derives from the change in policy in 1962 which drastically reduced the information available to the public (see above, pp. 2 - 3). Thus newsmen, in the absence of detailed and specific information, tend to incorporate recent releases into what they learned in 1960 and 1961, when such information was being disclosed. The resultant speculation is frequently of such a nature as to create more apprehension and uncertainty among the various audiences and readerships than might be the case if more authoritative or official data were distributed.

The most obvious solution seems to be to make such data available to the news media. The spy-in-the-sky image of US observation satellites could not be changed overnight, but it is certainly in order to begin thinking about the ways in which a gradual modification might come about. We do not intend to

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suggest that the satellite program should be declassified immediately, with all details disclosed to the public; it would be useful, however, as a first step, to replace some of the speculation by actual fact.¹

In any case, it may perhaps be assumed that the scope and extent of the US observation satellite program will eventually be known. This could come about in any of several ways: the USSR might, for reasons of its own, decide to disable or destroy an objectionable satellite; the United States might wish to offer the satellite system to help inspect an arms control agreement; there might be disclosures to certain elements of the press by individual government officials; or, perhaps most realistically, in order fully to exploit the peaceful potential of the satellite system the United States might in time find it advisable to reveal or demonstrate the value of the program. When this happens, the United States will somehow have to cope with the "history" of secrecy and even defensiveness which will have been created.

In sum, the United States must pay some attention to the image which it presents to the rest of the world when determining a policy for its observation satellite system. Impressions of undue belligerence should be countered by demonstrations of peaceful

1. See below, pp. 41 ff., for specific suggestions as to how this might be done.

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intent and utility. While it is not essential to deprive the military of participation in or even direction of work in peaceful (though not necessarily non-military) areas, it is important to de-emphasize the military aspects of the system as a whole. Relations with the press may be particularly difficult to handle, due to past changes in policy which have left reporters less informed today than they once were. It is to be hoped that greater cooperation between press and program directors may be achieved in the future, especially in light of the likelihood that the scope of the program will someday become known.

VI. THE CHOICES

The alternatives open to US decision-makers in terms of the emphasis of the satellite program are, broadly, two: the United States may attempt to maintain secrecy insofar and as long as possible; or it may make a carefully planned and widely based effort to legitimize the principle of observation from outer space. There are certain further choices regarding direction and control of the program. We shall consider these possibilities in turn, in the light of the various factors covered in the preceding sections.

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Maintenance of Secrecy

To the extent that the military and intelligence agencies have never been obliged to announce in detail what they are doing, there may be sound precedent for maintaining secrecy with regard to the observation satellite program. There are, of course, certain limitations on secrecy, especially in the United States, one being the impossibility of concealing the launchings altogether, and another, the obligation to report launchings to the UN General Assembly (see above, pp. 4 - 6). However, as long as there is no official acknowledgement of the observation satellite program, there are arguments in favor of maintaining a certain amount of discretion. For one thing, official acknowledgement of the program might compel the Soviets to react to it in some way, perhaps by challenging its legality in the United Nations. Then the United States might find itself under pressure to reduce the program, as happened in the case of the U-2. In addition, the sorting out of satellites by mission would certainly make the development of countermeasures easier. Finally, by maintaining secrecy, the United States also maintains the greatest possible amount of flexibility and, similarly, of imprecision, thereby making it difficult for the Soviet Union, or any other country, to know exactly what is going on.

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Other pressures in favor of a policy of secrecy include a reluctance to assist the Soviets in determining the relative value of information obtained by the United States from observation satellites compared to that obtained from other sources.¹ In other words, while the Soviets probably know generally what the United States is doing in this area, it is unlikely that they know precisely what information comes from where. It would seem advisable to keep them ignorant of this fact as long as possible, and certainly one way of doing this would be to treat even "innocuous" launchings the same way as actual launchings of reconnaissance satellites. Also, US policy-makers would prefer to avoid embarrassing the Soviets unduly, should the extent of US surveillance become known as happened with the U-2. A policy of secrecy minimizes the involvement of national prestige on either side.

The advantages of secrecy must be weighed against the drawbacks and disadvantages of such a policy. Some of these have been noted in previous sections. One is the insistence of the press on handling the launching stories in terms of the record which was created during the relatively open period of 1960-1961. Another is the possible damage to the image of the United States as a country publicly committed to the support of the "peaceful uses

1. A related pressure is the intelligence tradition which rules out identifying the origins of one's information, lest the "sources" be compromised.


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of outer space," as secrecy inevitably raises suspicions about US space activities. An additional public relations problem is that created by the inconsistency of a secrecy-oriented approach in terms of its effect on secrecy in general; it is difficult to see how the very policy which the United States hopes will eventually render secrecy obsolete can itself legitimately be founded in a secrecy as total as possible in an "open" society.

Legitimization of Observation from Outer Space

The chief alternative to the maintenance of secrecy on the observation satellite program appears to be a planned effort to legitimize observation from outer space. Some of the possible courses of action were noted above (see pp. 20 - 27). One is a campaign to equate instrumental and human observation from space, since the Soviets themselves have already practiced the latter. Another is the development of analogies between outer space and the high seas. A third possibility, perhaps most promising, is a new emphasis on, and demonstration of, some of the manifestly peaceful uses of observation satellites.

A gradual disclosure of the scope of an operational US observation satellite program would probably not come as a real revelation to the Soviet leaders. They already have a vast amount of information on US space capabilities in general and may be

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expected to keep up with the unclassified literature in the field. At the same time, the United States would wish not to confront the Soviets with a embarrassing issue which they would find difficult to overlook. This is a further reason for emphasizing the peaceful benefits obtainable from observation satellites rather than their intelligence capability.

The issue of national prestige as a whole, however, may well be irrelevant. To a sophisticated audience, the capabilities of observation satellites may be no more than a minor technical innovation; to an unsophisticated audience, they may be so incomprehensible as to be unimpressive. In terms of any great impact on public opinion, details of the space effort, prior to the stage of interplanetary travel, may be out of date, as each successive space achievement is less newsworthy than the last. Far more important than calling attention to the strict technical capability of taking pictures would be a new stress on the arms control and other peaceful applications of observation satellites. In addition, the general image of the United States as a country practicing openness and honesty in its dealings with the rest of the world would be fostered by attempts to make the satellite program acceptable instead of continuing to conceal its scope as long as possible.

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Direction and Control

While alternatives in the emphasis and presentation of the US satellite program provide the most basic choices for government policy-makers in this field, alternative methods of directing the program also merit some examination. We have suggested above (see p. 30) the possibility of an initial and temporary division of the program into distinct civilian and military spheres, thereby permitting concomitant development of its non-military and military applications. There are also, however, problems of national vs. international control. It has been suggested, for example, that the US transfer an operational satellite system to the United Nations, so that the international community itself might monitor the military threats posed by any one country to another, while simultaneously developing the peaceful uses of the system. In this way, the system itself, at least, need not be construed as a threat. But the United Nations is only the sum of its parts, and sometimes it is even less than that. It is not organized at the present time to administer a system of such technological and political complexity, nor is it reasonable to assume that it will be able to do so in the foreseeable future. The immediate economic and social problems with which the UN Secretariat is



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trying to deal already tax the financial and intellectual resources of the organization to the utmost. Thus, while international control may be an ultimate goal, it is not a realistic alternative for the present.

The possibility may arise again, however, in conjunction with an arms control treaty, where it would be necessary to equip the control organization with all available means for ascertaining that the agreements were being adhered to. Observation satellites could influence arms control efforts, both as a method for verifying compliance and as a unilateral method for obtaining information to affect attitudes toward arms control as such.¹ For instance, it may well be that the technical potentialities of the satellite system would significantly lessen the requirements for verification by other means, to the point of permitting the United States to reach a compromise with the Soviet Union on the degree of additional (ground) inspection which a treaty should specify. The system might eventually also be helpful in another way, namely, by convincing the Soviets that they need have no objection to an international inspection program because of the inroads on their military secrecy which an observation satellite system would already have made.

1. See the accompanying paper, "Observation Satellites for Arms Control: Concepts and Applications." In the context of a negotiated agreement, there may be some inspection tasks which airplanes could carry out more cheaply or more effectively than satellites.

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That satellites could be useful in the context of an arms control treaty seems undeniable; the problem of direction, however, would remain open. Should there be a satellite system exclusively under an International Disarmament Organization [IDO]? Or two systems, one being nationally controlled and another internationally? Or an IDO system operated by one or several countries? Or could the United States merely furnish data to an IDO body? In the long run the requirement would probably be for an internationally operated satellite system, with international teams doing the programming, orbiting, and interpretation of data. These teams would have to be trained and instructed mostly by Americans, but not solely: the Soviets would certainly by that time have developed relevant expertise which could easily be utilized by the instruction program at an early stage. In the shorter run, US claims in favor of maintaining a national system and capability might be founded in the precedent set by earlier Soviet insistence on a national system of inspection for a nuclear test ban. In any case, it is unlikely that the United States would relinquish such a capability soon after developing it.

In sum, the choice of secrecy vs. legitimization facing US policy-makers is a difficult one because of the existence of conflicting requirements. The United States wishes to avoid being unduly provocative to the Soviets--and at the same time prove that



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secrecy in all forms is becoming obsolete. It would like to demonstrate the peaceful uses of observation satellites--without revealing militarily essential information. It wants to set up a legitimate basis for satellite observation--in the face of explicit and adamant Soviet opposition. It would like to reshape its press and public information program--without unnecessarily embarrassing the Soviets. It wishes to create and foster a consistent image of itself as dedicated to the peaceful uses of outer space--even though the military applications of observation satellites are much better known and understood. In essence, the United States wants to continue to develop its observation satellite system--but without incurring international disapproval.

Clearly, all these requirements cannot be reconciled. However, certain beginnings, certain compromises, certain initiatives can be undertaken even now. In the following section we make a number of suggestions regarding steps which might be contemplated in the immediate future.

VII. SUGGESTIONS

On the basis of the foregoing discussion, we wish to indicate certain reasonable first steps in the implementation of a policy designed to develop the full potential for usefulness of the observation satellite system. Rather than attempt to outline a

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complete program, we limit our recommendations to specific actions clearly derivable from the present state of affairs. Further steps may be expected to suggest themselves in the course of time. It is evident that the creation of a generally favorable climate of opinion is as essential as the actions themselves, and to this end the United States would require some kind of public relations program under skillful leadership. Possible actions and the general climate are both discussed below.

First Steps

The National Aeronautics and Space Agency has already released to the press and the popular magazines samples of the photographs taken by our own astronauts in orbit. We would recommend, as a next step, the publication of any additional available photographs of such places as the Mississippi Delta or the California coastline. In fact, this would be a good time to plan on having future participants in space flights take pictures of the most interesting effects and places possible. These need not be restricted to US territory; in those areas where daylight in the orbits permits, the United States should attempt to take and release photographs of regions of other nations, perhaps after informal consultation with them.

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Great popular interest in these pictures may be expected. Such interest should be fostered by photo interpretation pointing out the most noteworthy features, along with emphasis on whatever scientific value they might have. While the United States would hope to create a maximum favorable impact with the photographs, it should avoid giving the impression that their release is the result of a solemn declassification decision or that there is risk of offending the Soviets or anyone else in publicizing them. If the opportunity arises, the US might let it be known that it would appreciate seeing similar photographs of US territory made by the Soviet cosmonauts.

Another initial step, following the first in a matter of a few months, might be an announcement that the United States is going to map Antarctica with satellites. So far a little over ten per cent of the six million square miles has been covered by a mapping program. Cost estimates for completing the job, with airplanes and over a period of at least several years, are in the \$40 to \$50 million range, and these may run higher when all costs are included. It seems very likely that the job could be done more economically and more efficiently with two or three satellites, using cameras and vehicles that are not even the best available in the present state of the art. Moreover, this would be a first step toward realizing some of the peaceful benefits from observation satellites, of which there will be more in the future.



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For the Antarctica mapping program specially designed satellites would probably be needed, since those built mainly for intelligence-gathering may be neither convenient nor accurate for mapping, which can be carried out satisfactorily with rather low resolution. Despite our earlier observation (see above, pp. 29 - 30) that transfer of the satellite program from the control of the military to a civilian agency is probably not necessary, we would recommend that the launching and operation of the mapping satellites be conducted by the National Aeronautics and Space Agency. In these initial stages of publicizing the satellite system, civilian responsibility is more likely to be a help than a handicap: coordination and eventual amalgamation with the military program can be deferred to a later stage.

It is possible that a Thor booster, as opposed to the more expensive Atlas, would be suitable for launching these mapping satellites. The cost might run to about \$20 million.¹ The satellites would probably have to be launched from Vandenberg Air Force Base in California rather than from Cape Canaveral, but the precedent of plans to launch Nimbus satellites from the Pacific missile range ensures that there need be no special importance attached to another civilian launching from military

1. See the accompanying paper, "Observation Satellites for Arms Control: Technical Capabilities."

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facilities. We would recommend the release of Antarctica maps, perhaps on two or three different scales, making them available through the normal channels for distribution of scientific and Antarctica data. It would be desirable to publicize the utility of the maps and the means whereby they were made, but it should be possible to avoid implying that a policy change had thereby been implemented.

It is important to note here that releasing the Antarctica maps would reveal essentially nothing about US satellite reconnaissance capability. They would represent something less than the maximum results now achievable, and it is certain that the Soviets already know that the United States is capable of conducting such a program. For optimum effect, the available information on the vehicles and cameras should be made as complete as possible; but if it is not possible to disclose all the design details because some of them might relate exclusively to classified reconnaissance satellites, this information should be withheld as inconspicuously as possible. Probably there are some precedents for such a procedure in previous NASA space activity.

General Climate of Opinion

While these first two steps are being taken, efforts must also be made to create a favorable climate of opinion for observation



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satellite activity. In the course of consciously undertaking to legitimize such activity, the United States may expect some unfavorable reactions from the Soviets. It should respond to any complaints clearly but not defensively--stressing the existence of unresolved differences of opinion on the legal issues--and without undue disclosure of information which it might prefer to keep classified. In any case, photographs taken over the Soviet Union should not be released--except in the unlikely event of Soviet consent. The US should not embarrass the Soviets unnecessarily or attempt to criticize or censure them. It is much more important to project the ideas that the US space program is developing the natural peaceful applications of space technology, that the results will be available to everyone, and that the program in no way threatens the Soviets.

If the United States is challenged by the Soviets with regard to its classified space activities, in contrast to the peaceful NASA observation satellites, which it is trying to emphasize, US spokesmen may simply observe that both this country and the Soviet Union have areas of activity which are not open to public discussion at the present time. In addition, the United States might challenge the Soviets to release more data on their space vehicles and boosters. If the dialogue is handled at all skillfully, the United States should acquire the substantial support of all but



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the Communist bloc. In brief, US planners should expect to respond promptly to Soviet challenges, but they should not allow themselves to provoke avoidable arguments.

After the Antarctica maps have been released, the next task might be the mapping of some relatively unexplored parts of the world, perhaps along with some resource studies of these areas. It should not be difficult to do this work at the request of an African, Asian, or South American country. Another possibility would be to chart the waters below the equator near Australia, where many of the reefs and islands are improperly located and thus a hazard to sailors. An additional NASA satellite or even two might be required for these purposes, though the excess filming capacity inherent in the Antarctica mapping satellites themselves should not be overlooked. It should generally be possible to avoid taking, or at least publishing, pictures of areas where US efforts are not welcome, but care should probably be exercised to avoid establishing the principle of photographing only when requested to do so by the nation or nations concerned. Perhaps the occasional release of low-resolution photographs of the Soviet Union or the Chinese mainland would serve to inhibit such a contingency; a picture by Major L. Gordon Cooper of a portion of China, covered by clouds, has already been published.¹

1. Life Magazine, 7 June 1963, p. 29.

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Along with the mapping tasks, NASA might undertake to announce and carry out experimental work on other peaceful uses of observation satellites. With the additional coverage furnishable by one or two more satellites, many results of real value in the various areas noted above in the section on peaceful applications (see pp. 7 - 12) should be obtainable. These should be handled as normal scientific and technological progress, one of the benefits of peaceful space activity.

Up to this point, we have envisaged five or six NASA satellites and a time period of some two years. We may assume that a classified reconnaissance satellite program will have been going forward concurrently. After the establishment of a favorable climate of opinion by means of the manifestly peaceful NASA program, the United States might begin gradually to disclose and utilize some of the capability achieved in the classified military program. We cannot, of course, predict at this time exactly how this may be done, as the determination of what kinds of information can be released will depend on the technical achievements of the period and the nature of the public image which has been created. Probably it would be feasible to accompany the move with a new declaratory policy, namely, an announcement that the United States has decided to take the significant step of releasing some results from the heretofore completely classified program. The change would

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be in accord with the US over-all peaceful aspirations, the already demonstrated benefits of the NASA program, and the realization that technology is carrying mankind inevitably toward a more open and interdependent world.

From this point on it should be possible to bring about a gradual merger of the continuing NASA program and the classified military program. Subsequent developments would depend more on concomitant legal, political, and military considerations than on unilateral decisions by US policy-makers. It may be that the United States could consider at that time doing some work under UN auspices or making some observations explicitly for arms control purposes. The classified satellites may, in any case, have been gathering information of value for arms control even before the transitional period.

In conclusion, there is no need at this time to make a permanent decision between secrecy and legitimization, but neither is there any reason for delay in developing and exploiting the peaceful applications of observation satellites. It is to be hoped that the benefits of the military program may someday be extended beyond their strict intelligence function; in the meantime, real and meaningful progress can and should be made under civilian direction. If, at a later date, the two programs are combined under the same auspices, the demonstrated uses of the civilian program may be expected to counteract some of the suspicion and mistrust which may have arisen around the military program.

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