RAR-B-10
RAR-B-16.

March 4, 1968

MEMORANDUM FOR COLONEL WORTHMAN

SUBJECT: NASA's Geodetic Satellite Program

The attached summary is a gist of NASA's program and proposed future plans in the geodesy area as they recently presented it to the Karth Subcommittee. I can find no evidence that they have a thought-out cartographic plan beyond generalized statements of a need for better maps for the world community, etc.

The following conclusions are based on a meeting Lt Col Williamson and I had with DIAMC on 1 March:

a. DOD has given NASA a broad charter in the geodetic area which will enable them to construct a world-wide datum at accuracies of 10-15 meters. There are several agreements on the books, signed by Drs. Foster and Brown, which give NASA a very liberal charter on a completely unclassified basis. We are getting copies of the papers from Col Guinan. They will be difficult to overturn. These agreements were rooted in a conclusion of the scientific community, supported by PSAC, that the Soviets had geodetic data as good as our own.

b. NASA's program plan is detrimental to U.S. security interests. There is evidence that it will tie neatly into Soviet requirements for better geodetic data. This is evident from reports of Soviet attempts to obtain French assistance to tie into the North American geodetic datum system. Moreover, the Soviets are attempting to frustrate our efforts to obtain bilateral agreements to establish geodetic control points in other countries, which confirms their understanding of the military importance of this data.

c. NASA's need for geodetic data is not well defined. They allude to applications in scientific disciplines such as earth sciences, space sciences, earth dynamics, etc., the "benefit to all mankind" appeal. Cost benefits are not shown.

d. NASA's program and that of the DOD geodetic satellites not in the NGSP will inevitably involve a great deal of duplication. Some 25-30 control points of the present NASA NGSP points have already been covered by DOD satellites outside the national system.

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There are several approaches that come to mind for dealing with the problem:

a. Continue the battle in the SACC, using the security implications of releasing the data on an unclassified basis as an argument to alter the agreement. In view of NASA world-wide commitments, however, this may be difficult to accomplish.

b. Alternatively, have DOD drag its feet in supplying data to NASA for use in the National Geodetic Satellite Program (NGSP), and supply only that data which clearly relates to control points in the NGSP system (DIA has a great deal of data which has not been released but which they feel would be difficult to withhold in light of existing agreements, if NASA requested it).

c. Fight the battle on the grounds of duplication of effort as it can be clearly shown that DOD has a sufficient program -- apart from the NGSP -- to do the job.

d. As a minimum, keep the data reduction program wholly within DOD. This would allow the filtering out of militarily significant data and some control of the rate at which any of it is released.

[redacted] has about a one hour briefing which goes into the background of the NASA-DOD relationships and DOD interests. I recommend that you, Colonel Carter and Mr. Kirk hear it before the SACC meeting.

[redacted]

Attachment

THE NASA GEODETIC SATELLITE PROGRAM

NASA's geodetic satellite program was launched in 1962 through a recommendation of the House Subcommittee on Space Sciences. The recommendation was that NASA should prepare, organize, and assume management of a multiagency program to satisfy the requirements of U.S. scientific and military communities in satellite geodesy: the National Geodetic Satellite Program (NGSP).

In the initial stages of the NGSP, interagency agreements were reached concerning program objectives and flight missions required, the Department of Commerce, DOD and NASA being the main participants, supplemented by work of the Smithsonian Astrophysical Observatory.

The NGSP has a twofold objective:

1. To establish a unified earth reference system

2. To determine the gravitational field of the earth

More precisely, the NGSP goal is to:

1. Establish a unified world datum which will permit the connection of existing local datum systems within $\pm$ 35 feet to a common geocentric reference frame based on the earth's center of mass and axis of rotation. In this world-wide geodetic reference system, any two control points will be located within 35 feet of each other using the single set of earth-centered coordinates.

2. Provide a refined description of world-wide variations of the earth's gravitational field.

NASA plans to achieve the datum accuracy of 35 feet by precisely locating 86 geodetic control stations spread through the various existing separate geodetic reference systems. In 1963, only 12 of these station sites had been located; at the end of 1967 this number had been increased to 42, with 20 of these located to an accuracy of $\pm$ 60 feet.

Similarly, NASA reports considerable progress in determining the earth's gravimetric anomalies since the inception of the NGSP. The number of "J" coefficients (constants in a mathematical expression which describe the earth's gravity field) for which estimates are available has increased from 11 in 1963 to 60 at the end of 1967, with a corresponding increase in the complexity with which the gravity field is known.

NGSP Launch Program. The program to date has consisted of five geodetic satellites successfully launched by NASA between October 1964 and January 1968. These were Explorers XII and XXVII, Geos I and Geos II, and Pageos I. NASA has stated in testimony to the House Space Subcommittee that one or more additional flights will be required to satisfy the gravimetric objective of the NGSP. Also, according to the same testimony, NASA is planning one additional mission, Geos-C, to achieve their geometric objectives.

Data Analysis Program. NASA is proposing a full scale effort in FY69 in data reduction and analysis directed to the achievement of their two basic geodesy objectives. They plan to prepare an interim global geodetic system using all data accumulated through calendar year 1968, to provide the scientific community with a provisional unclassified geodetic reference system.

Another significant aspect of NASA's future plans in the geodesy area is the application in support of such scientific areas as marine sciences, space sciences and the solid earth sciences. This proposed work, as you know, has been aided and abetted by the Woods Hole session and by an Ad Hoc NASA Advisory Group. They are talking here about such things as precise ship positioning (100 feet or better), establishing ocean bottom control points, ice movement determination, improved satellite orbit predictions, etc.