

Review of Data Exchange Policy in IGY Rockets & Satellites Program: Report to NASA

Space Science Board, National Academy of Sciences,
National Research Council

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NATIONAL ACADEMY OF SCIENCES
NATIONAL RESEARCH COUNCIL
OF THE UNITED STATES OF AMERICA

SPACE SCIENCE BOARD

December 22, 1960

Dr. Hugh L. Dryden
Deputy Administrator
National Aeronautics and Space
Administration
1520 H Street, N. W.
Washington 25, D. C.

Dear Dr. Dryden:

As a result of the questions raised in your letter of November 23, 1960, we have conducted a thorough review of our files on data interchange. I enclose for your use a brief report and some related documents. The origins of the U. S. IGY earth satellite program and its data interchange agreements are described. In addition, two related programs are noted: (i) Rockets (because of its inclusion with satellites in Chapter XI of the CSAGI Data Guide) and (ii) Latitude and Longitude (because of its application to the geodetic problem). The general philosophy of the International Geophysical Year as a world-wide research effort founded on the publication of results and general availability of the data, together with the origins of the agreements on data exchange and the methods utilized in developing the discipline data guides, is discussed.

I believe that the attached report and its supporting documents provide collateral evidence from which you can draw affirmative answers to your questions. In the following I shall try to be as specific as possible in replying to your questions, here paraphrased or quoted.

1. Is it correct, as implied by Dr. Whipple, "that there was formal agreement through the government, and in particular at the very highest level, that the Baker-Nunn station position /derived from satellite observation/ data would be published in the open literature?" The U. S. National Committee engaged in what we consider appropriate discussions at appropriate levels of government on this matter. The level and formality of agreements is a matter of interpretation, and the attachments are submitted to afford you an opportunity to determine this. The improvement of geodetic data was one of the objectives of the IGY earth satellite program and was in fact one of the basic reasons for the establishment of the precision optical tracking network. Consequently, it seems implicit that coordinates of the Baker-Nunn stations were to be distributed as part of the IGY program. This statement is based on section 1 of the attached memorandum report, and attachments 1 to 20 thereto. See specifically attachments 1, 2, 3, and 20, paragraph 16.

2. Is it correct "that the basic observational data from the IGY satellite optical tracking stations would be made available to the scientific community, including the international community, for any research or geodetic deductions they might wish to make from these data?" This question must be answered in the affirmative since as stated above, improvement of geodetic data was one of the objectives of the IGY earth satellite program. Thus, results were expected to be published in the open literature for use both domestically and internationally. Moreover, the photographic plates themselves were expected to be available for study at the Smithsonian Astrophysical Observatory on application by any qualified research worker, either domestic or foreign. See attachment 20, paragraphs 17 and 18.

3. Is the assumption correct that "the IGY plan also calls for making accurate positions of the observing stations available to the international scientific community?" To the extent necessary for scientific use of the satellite data, including research using the original plates, I believe it must be stated that sufficiently accurate station position coordinates would be made available to research workers. Please see attachments 12, 20 and 21.

In summary, we believe that the record says: (i) communication between the Committee and the government was extensive, detailed, and intimate so that there can be little doubt as to the nature of the program plans, (ii) interchange agreements were based on documents submitted for review to designated officials of several government agencies, (iii) responsibility for concurrence in matters touching upon possible sensitive areas rested with government agencies (e.g., Smithsonian, NRL, and the U. S. Naval Observatory) who proposed the interchange agreement positions in their fields, (iv) no individual or agency involved in the IGY could have been unaware of the nature of the interchange positions.

I hope you will find this information helpful and responsive.

Sincerely yours,

Hugh Odishaw

Enclosures

December 22, 1960

MEMORANDUM ON SATELLITE TRACKING POSITIONS AND IGY DATA INTERCHANGE

It is necessary to review (i) the US IGY Earth Satellite Program and the guide to satellite data exchange developed and subscribed to by all participating countries (some examples of station location information US and USSR are included); (ii) the program in disciplines closely related to satellites and geodesy; and (iii) the IGY program philosophy and development of the framework of the data interchange structure, domestic and international.

I. The US IGY Earth Satellite Program

1. The Earth Satellite Program portion of the US IGY effort and a discussion of its general objectives is contained in attachments to the Summary Minutes of the Eighth Meeting of the USNC, May 16, 1955, (Attachment 1). These generalities are sharpened and clearly stated objectives appear in Minutes of the Working Group on Internal Instrumentation of the Satellite Panel, March 6, 1956, (Attachment 2), wherein agreements reached in a February 24, 1956, discussion are reported. The second objective (of three) for the program relates directly to the geodetic requirement for precision optical tracking information. The satellite program was discussed in testimony before a subcommittee of the House Appropriations Committee in February 1956, (Attachment 3). Pages 446, 453, 454, 460 and 526 are of particular relevance.

Further consideration of the geodetic needs of the program was stimulated by a Department of the Army letter of February 15, 1956, and subsequent discussion of the Working Group on Tracking and Computation, of April 21, 1956, (Attachments 4-9). Also approved by WGTC on April 21, was the SAO proposal to establish the optical satellite tracking network for "many types of geodetic measurements", etc., (Attachment 10) which was forwarded by the Chairman, USNC to NSF for funding on May 28, 1956.

Plans for tracking station locations were requested by the USNC in order to facilitate cooperation, June 27, 1956. Typical of the negotiations of the period is the August 1, 1956, letter from F. L. Whipple concerning the possibility of an Australian precision optical station (Attachment 11), which notes the international character of the observation data. The quality of the optical station geodetic locations was verified with the Air Force on April 15, 1957, (Attachment 12). Precision optical station lists were provided to the USNC by SAO on September 30, 1957, (Attachment 13). Minitrack Station coordinates to .001 seconds are contained in NRL Report #5198, September 1958 (Attachment 14).

2. Satellite data interchange. The satellite discipline portion of the data interchange guide was based on a preliminary draft prepared by the CSAGI Reporter for Rockets and Satellites from recommendations of the TPESP on December 5, 1956, circulated to the Panel members for review on January 8, 1957, and provided to additional representatives of some interested Government agencies on April 12, 1957 (Attachments 15 and 16). An example of written comment is contained in NRL letter of February 5, 1957 (Attachment 17), and a NRL internal relevant memorandum for record of February 4, 1957 (Attachment 18). This draft constituted the basis for discussion by CSAGI Rockets and Satellites Conference, Washington, D. C., October 3, 1957, and was, with minor modification, accepted. The product of this Conference was provided to all members, consultants, and Department of Defense representatives for review and comment on June 27, 1958 (Attachment 19), and with explanatory footnotes by CSAGI Reporter appears in Vol. VI, IGY Annals (Rockets and Satellites Manual); CSAGI Meeting V (August 1958) approved the current version, incorporating these footnotes (Attachment 20).

The Vice Chairman of USNC recommended implementation of the draft CSAGI Guide (see Attachment 18) on March 17, 1958, with a memorandum of instructions (Attachment 21). The desire of the USNC was communicated to the Soviet IGY Committee, CSAGI Coordinator and the Reporters for Rockets and Satellites and World Days and Communications on March 19, 1958 (Attachment 22). Necessary implementing instructions were transmitted to the IGY Radio and Optical Networks (NRL and SAO) and to the IGY World Warning Agency AGIMANN (Attachments 23-25). Informal discussions of these plans were held with various Government agencies, including the Department of State. Full texts, including SAO letters requested by USNC instructions (Attachment 25) were provided to the Department on June 6, 1958 (Attachment 26). The station lists provided with the USNC March 19, 1958, letter (Attachment 22) was used by CSAGI Coordinator in preparation of Vol. VIII, IGY Annals, Geographical Distribution of the International Geophysical Year Stations. Of interest is the Soviet response to a November 17, 1958, U. S. request for coordinates of their tracking stations on December 12, 1958 (Attachment 27) which the USNC provided to SAO for use. Please note the precision of coordinates.

II. Related IGY Programs

Further insight into U. S. IGY data interchange and program development can be provided by reference to other IGY programs, e.g.: (i) Development of publication plans for rocket results specifying both national and international distribution (Attachment 28); and (ii) a brief history of the Moon Camera program of the U. S. Naval Observatory, which was included, without revision, as the U. S. IGY Longitude and Latitude program (Attachment 29). The Moon Camera work had as its objective the more precise location of points on the Earth, with accuracies of the order of 40 m possible (Attachment 30).

III. IGY Program Philosophy and Data Exchange

1. General. The free exchange of all IGY data, and the timely publication of results of experiments in the open scientific literature of general availability was the very foundation of the IGY program. Budget documents and other reports of the National Science Foundation continued to expand on this principle, e.g., in January 1954 (Attachment 31). The January 1955 IGY appropriation request of the Foundation described the national importance of IGY, the governmental review processes followed and the needs for international cooperation and coordination (Attachment 32). Further amplification was contained in the IGY presentation to NSF in justification of supplemental estimates FY 1956, November 1955 (Attachment 33) which described in some detail the organization and agreements on Data exchange and World Data Center functions. The reaction of the Congress to these presentations was favorable.

2. Data Interchange. The question of data exchange and publication was first discussed at Rome, CSAGI Meeting II, October 1954. Recommendations of this meeting were circulated to National IGY Committees, and in the U. S. to all Technical Panels as well for information and discussion. By letter of April 1, 1955 (Attachment 14), USNC members, Government representatives, and members of all technical panels were requested to formulate plans for the CSAGI III Brussels Meeting, wherein "data exchange" was the major agenda topic. Responses were based on Panel discussions and written reports, compiled into a document "U.S. Working Papers for CSAGI Brussels Meeting", and distributed to the USNC/IGY complex for review and comment by Memorandum dated August 19, 1955 (Attachment 35); distribution included the National Science Foundation, the Department of State, Department of Defense, etc. It should be noted at this point that the broad plans for data exchange were discussed with a subcommittee of the House Committee on Appropriations, 84th Congress in February 1955, e.g., pages 317 and 318 (Attachment 36). Testimony before the subcommittee on Foreign Aid, etc., of the House Committee on Appropriations, Pgs. 900-01, 910, 913, 914, and 933 (Attachment 37) is also of interest.

Work on the problem continued; the CSAGI Meeting IV in Barcelona, 1956, discussed and authorized World Data Centers, details were to be worked out by discipline reporters and National Committee so that CSAGI Coordinator, Vice Admiral Sir A. Day, could complete work on the Draft Guide to World Data Centers. After extensive review and revision by the scientists of the Technical Panels in the manner apparent above (e.g., Attachments 38, 39), the formal Guide to World Data Center's was finally issued by CSAGI as Vol. VII, Annals IGY, in 1959.

During this period and more recently, documents presented to committees of the Congress, as well as testimony in support of National Science Foundation budget requests and program reports, discussed data exchange, world data centers and our national interests and responsibilities (Attachments 40-44). Attachment 41 indicates that the earth satellite data exchange had been specifically checked with the Government by the NSF.