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GEOGRAPHIC INTELLIGENCE REPORT

SOVIET EXPLORATION AND RESEARCH IN THE ANTARCTIC
A Preliminary Appraisal

CIA/RR-GR-84
2 November 1955

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

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Approved For Release 2000/05/11 : CIA-RDP79-01009A001100090009-2

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S-E-C-R-E-T

Addendum to Soviet Exploration and Research in the Antarctic, CIA/RR-GR-84, 2 November 1955:

The entire air operation for Antarctica is to be under the direction of I. T. Spirin, senior Soviet polar navigator whose study and research on polar navigation dates back to participation with Papanin in the Arctic expedition of 1937 and who, in addition to other duties, is Professor of Polar Navigation at the Soviet Air Academy im. Voroshilova. (See Section III-B, Personnel, pp. 32-35.)

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SOVIET EXPLORATION AND ENDEAVOR IN THE ANTARCTIC
A Preliminary Appraisal

Foreword

The Soviet participation in the program of the International Geophysical Year represents a precedent-breaking event in Soviet scientific-international relations. Although Imperial Russia in 1882-83 participated in the First International Polar Year and the Soviet Union in the Second in 1932-33, this is the first time that the Soviet Union has extended its participating interest into areas beyond the Soviet frontiers. Moreover, for the first time, the USSR has decided to join the International Union of Geodesy and Geophysics. The full implications of these about-face changes in Soviet policy have both political and scientific aspects that require the most careful analysis, particularly if United States policy is to give adequate consideration to the degree of Soviet sincerity in the fulfillment of free-world obligations that such international participation implies.

This report presents a preliminary description and analysis of Soviet participation in the Antarctic studies program of the IGY. In Part I, brief background information is provided on the overall IGY program, Soviet pre-IGY interests in Antarctica, and the development of Soviet interest in the Antarctic program. In Part II, a description and analysis of the Soviet Antarctic program is primarily oriented toward a consideration of the political and general scientific implications of that program. Part III summarizes the probable Soviet operational organization, methods, and logistics, and describes some

of the operational equipment that may be employed. No attempt is made to provide a full analysis of the Soviet scientific program or instrumentation owing to (1) the brief period of time that has elapsed since the closing of the IGY Brussels meeting on 14 September 1955, at which Soviet plans were first presented in detail; (2) the incompleteness of the information received on the most recent IGY program; and (3) the lack of time for a more detailed analysis because of the urgent need for some evaluated information by the members of US Navy Task Force 43 before its departure on Operation Deep Freeze I in November 1955. In view of the shortage of time it has not been possible to coordinate this report fully with other components of CIA or other departments of the Government interested in the IGY program.

It is hoped that this report will serve as a basis or a starting point for subsequent more definitive appraisals of Soviet political intentions as implied by their direct scientific participation in a worldwide collection of basic physical environmental data. To this end, comments and criticisms of readers are solicited.

I. Background

A. Soviet Pre-IGY Interest in Antarctica

Soviet political interest in Antarctica is predicated on the policy, first annunciated in an official note of 27 January 1939 protesting a Norwegian claim to Peter I Island, that no settlement or resolution of sovereignty claims in the Antarctic can be made without Soviet participation since the USSR claims that the continent south of the Antarctic Circle was discovered by the Russian Bellingshausen-Lazaryev Expedition of 1819-21. In addition, it is claimed that this expedition was the first to circumnavigate the Antarctic Continent, and that it discovered two islands and surveyed two others previously discovered by Cook. This policy position was reaffirmed in a note delivered 7 June 1950 to the United States, United Kingdom, France, Norway, Australia, Argentina, and New Zealand. The note took cognizance of the intention of the United States, expressed in the fall of 1948, to discuss the settlement of the sovereignty of Antarctica with representatives of these countries without Soviet participation. The note also made reference to (1) the economic importance of the continent and its adjacent waters not only to the claimant countries but also to other countries of the world, and (2) the scientific importance of Antarctic meteorological observations to the entire Northern Hemisphere. To cloak these views in a semblance of scientific objective reasonableness and to give them the weight of Soviet public opinion, the note made reference to a 1949 resolution of the All-Union Geographical Society, in which the great significance of

the Russian discoveries was underscored. As far back as 1931 the Society had shown occasional interest in reporting on the various Antarctic activities of other countries, but postwar articles on Antarctica first began to appear in 1946 with the publication of articles on Soviet whaling activities. These articles inevitably related the current successes to the earlier accomplishments of the Bellingshausen Expedition. Following the United States expedition of 1947-48, Soviet writings increased considerably in volume and generally expressed concern about (1) the military character of US expeditions, (2) the meagerness of their scientific activity, and (3) the comments made in US sources concerning the strategic importance of Antarctica. The Society's propaganda and publication activities reached a peak in 1949 with a commemoration of the 130th anniversary of Bellingshausen's expedition and the adoption by the Geographical Society of a resolution outlining the basis of the Soviet Union's claim to a voice in the settlement of questions of Antarctic sovereignty.

The USSR has despatched a 16-vessel Antarctic whaling expedition -- the Slava -- each operating season since 1946, following the Soviet adherence to the International Whaling Convention. Whether political, economic, or scientific interests motivated this planned systematic activity, it is difficult to say. Economic gains are claimed by the Soviets to be substantial, and some political use has already been made of the importance of the regularly conducted whaling expeditions

through reference to it in the Soviet note of 1950. The Soviets also claim that the scientific benefits from the work of the expeditions are substantial in view of the general paucity of meteorological, geographic, geological, biological, oceanographic, ionospheric, and other geophysical data on the Antarctic area. The collection of some scientific data was begun with the first whaling expedition of 1946-47. Beginning with the second expedition of 1947-48, the whaling expeditions have included the ship Slava-15 in each flotilla as a special scientific-research vessel. A hydrographic-oceanographic report of the second expedition was presented at a 2-day scientific meeting of the State Oceanographic Institute (Gosudarstvennyy Okeanograficheskiy Institut -- GOI) in November 1948. The third, or "Stalin Expedition", is described as having "enriched Soviet science with new data on weather, the ice regime, and about the biology of the marine life." The fourth expedition of 1949-50, with oceanographers and hydrobiologists aboard, continued adding new information to the Soviet fund of Antarctic data. Nothing significant concerning the nature and value of later expeditions has appeared in the Soviet press and publications to date. The ninth expedition of 1954-55 still had the Slava-15 attached to it as a special scientific-research vessel, its first officer being the Young Communist League member Vladimir Tkachenko. Radio contact was established between the Soviet Arctic drift station NP-3 and the Slava fleet during this season, and Soviet propaganda publicized the fact "that the Slava fleet

visits places where explorations were carried out 135 years ago by the Russian expedition...." According to recent Soviet announcements, a special chart of the Antarctic region has been compiled, utilizing data "of all expeditions up to 1954." It is believed that much of the data was obtained from Soviet whaling expeditions. The explicit plans made for utilizing future observations of the whaling expeditions during the IGY leave no doubt of the value of the data-collection activities in Antarctic waters during the past 9 seasons. The Antarctic data, combined with the vast Arctic experience, have been of inestimable value in improving Soviet capabilities for undertaking their IGY and exploration programs in Antarctica.

B. The International Geophysical Year

The International Geophysical Year is a worldwide program of special observations of various earth-science phenomena to be undertaken in 1957-58. It is a successor to two earlier and far less extensive international geophysical observation programs, the First International Polar Year conducted in 1882-83, and the Second International Polar Year in 1932-33. In concept the IGY differs from the previous two programs primarily in its plan for worldwide synoptic observation and analysis. The IGY program was first recommended in 1950 by the Mixed Commission on Ionosphere to its sponsoring unions, who in turn made the recommendation to the International Council of Scientific Unions (ICSU).

The period 1957-58 was selected to coincide approximately with a sun-spot maximum of the solar cycle and the 25th anniversary of the Second International Polar Year.

The ICSU appointed a Special Committee for the International Geophysical Year (Comité Spécial de l'Année Géophysique Internationale -- CSAGI) with responsibility for planning and coordinating the programs of the international unions and of the national committees of participating countries. At a provisional organizational meeting in Brussels in October 1952, the CSAGI recommended the formation of national committees by the interested nations of the world and requested the formulation of plans and proposals by the national committees, the sponsoring unions, and the World Meteorological Organization (WMO).

The first formal plenary session of CSAGI was held in Brussels, 30 June-3 July 1953; the second was held in Rome, 30 September-4 October 1954; and the third in Brussels, 8-14 September 1955. The purpose of these meetings was essentially to coordinate programs, note deficiencies and defects, urge their correction, and organize the necessary working groups for detailed coordination of plans and operational control of field activities.

To date, some forty-odd countries have joined in sponsoring various activities of the IGY. Soviet Bloc participating countries, in addition to the USSR, include East Germany, Poland, Czechoslovakia, and possibly Hungary and Communist China. Other than listing the stations to be set

up within the country, none of these satellites submitted any national program of participation. Czechoslovakia, with a single delegate, was the only one represented at the Rome and Brussels (1955) meetings. Of the entire Soviet Bloc, only the USSR is known to have established a national committee and associated working groups (see Attachment A).

In the USSR, 14 working groups are responsible for the conduct of scientific research and for the coordination of the activities of Soviet establishments engaged in IGY work. Of the 16-man Soviet delegation present at the 1955 Brussels CSAGI conference, 11 are members of the 24-man USSR National Committee. Of the 11, 6 are members of a working group, and 5 are members of neither the National Committee nor one of the working groups.

The program of work proposed by CSAGI for the IGY was initially organized into nine general scientific areas: meteorology, latitude and longitude determination, geomagnetism, ionosphere, aurora and airglow, solar activity, cosmic rays, glaciology, and oceanography. Although not scientific areas, rockets and World Days were adopted as topics of activity -- the former as an important research tool and the latter for special intervals of simultaneous concentrated observations. Later the list was increased to include gravity measurements and seismology. The rockets activity was expanded into rockets and satellites with the US announcement of the launching of an earth satellite for the IGY program.

The grouping of observation stations was generally arranged by CSAGI into geographic regions defined as follows: the Arctic Region, the Antarctic Region, the Equatorial Belt, the 10°E Meridian Line, the 140°E Meridian Line, and the 80°-70°W Meridian Line. At Brussels, 1955, the 110°E Meridian Line was added. In addition, other groupings of stations have been developed to accommodate the special interests of some of the individual disciplines.

It is important to note that the IGY program evolved primarily as a voluntary international cooperative effort of scientists. Nevertheless it is dependent, in the final analysis, on the will, interests, and financial means of the individual participating countries that assume the financial responsibility for the program. Some countries are not joining the program at all, while others are joining on a limited basis. On the other hand, some countries are concurrently undertaking additional earth-science studies that are not a part of the IGY program. The CSAGI operates in a coordinating and advisory capacity capable only of recommending those measures that will insure the most productive program of data collection throughout as much of the world as possible. Thus, the CSAGI has no veto or policing powers for any enforcement of its recommendations.

The voluntary cooperative basis of the IGY will merit particular attention in the future in connection with the exchange of data among participating nations. The unsatisfactory Soviet past record of

unwillingness to make most of its geophysical data on the USSR available to the West raises reasonable doubt of its willingness to share all of its IGY data with the non-Communist world. The doubt is even greater with respect to the exchange of the other physical-environmental data and studies to be made by the Soviets over and above the IGY program. It has been learned that a split developed within the Soviet delegation as to whether the exchange of data would be free and total or on a quid pro quo basis. It has been promised that the former view will ultimately prevail.

For the exchange of data, the CSAGI established Working Group XV, Publications and Publicity, whose duty at the last Brussels Conference was to seek agreement on (1) what data are to be interchanged, (2) how and when the interchange will occur during the IGY, and (3) the form of data publication to be made after the IGY. To date, no information has been obtained on the results of this group's deliberations at Brussels.

C. Development of Soviet Participation in the IGY

The declaration of Soviet intentions to join the IGY did not follow a clear-cut pattern. First indications were made to the World Meteorological Organization in connection with its IGY program. Formal announcement of participation in the IGY as a whole was not made until 4 October 1954, several months after the Academy of Sciences, USSR, had formed what appears to have been a national organizing committee.

The circumstances of the formal announcement were rather unusual. A 7-man delegation appeared, for the first time, at the Xth General Assembly of the International Union of Geodesy and Geophysics held at Rome, 14-25 September 1954. Although it soon became apparent that the USSR would participate in the IGY, the announcement was delayed by Moscow until the last day of the CSAGI plenary session, 4 October 1955. Even then, no national program was presented. The only expression of interest concerning programs was a briefly worded request for an expansion of the gravimetry and seismology programs. The disconcerting failure of the Soviets to give the CSAGI advance notice of the composition of their IGY delegations has been a serious deterrent to a closer exchange of ideas and examination of plans.

Although the formal organization of a USSR national committee was accomplished by the decrees of the Praesidium of the Academy of Sciences, USSR, of 21 January and 8 April 1955, little international publicity was given to this significant step. No other significant indications of Soviet intentions and plans were disclosed until the Antarctic Conference in Paris, 6-10 July 1955. The lack of adequate prior communication concerning Soviet intentions was again evident. In a letter dated 29 June 1955, the President of the Academy of Sciences, USSR, announced Soviet intentions of occupying one or two stations on a list of "gap stations" compiled some time earlier by the CSAGI.

The 24-man Soviet National Committee for the IGY was established under the auspices of the Academy of Sciences, USSR. Since the Academy is the highest scientific organization in the USSR, is under the direct control of the Council of Ministers, and is wholly supported by the Government, the Soviet IGY program is assured the highest prestige and support. Moreover, the nature and extent of direct governmental participation -- through the institutes of at least three All-Union Ministries and two Chief Administrations attached to the Council of Ministers, USSR -- indicate that the Soviet Government attaches unusual importance and weight to the program. A recent Soviet source reports "that many ministries and departments and over 100 enterprises of the country are taking part in equipping and organizing the expedition."

The committee includes top-level Soviet geophysicists and astronomers from the leading scientific research institutes, the foremost explorers, and outstanding applied scientists from a number of governmental organizations (see Attachment B for some of the organizations). Together, they are authorized to develop and conduct a comprehensive worldwide program that will be supported with, as one Soviet IGY delegate stated, "practically unlimited funds." In this connection, individual Soviet delegates were repeatedly dismayed by the modesty and limitation of funds available for the United States program, particularly since this restricted desirable expansion of parts of the IGY program.

The Chairman of the Soviet Committee is the Vice President of the Academy of Sciences, a metallurgist who is believed to be merely a nominal head.

The working leadership is divided among 5 vice chairmen, of whom 2 (Yu. D. Bulanzhe and M. A. Obukhov) are research scientists associated primarily with the Academy of Sciences, USSR, and the other 3 (F. F. Davitaya, I. D. Papanin, and N. V. Pushkov) are employees of the Chief Administration of the Hydrometeorological Service and the Chief Administration of the Northern Sea Route, both of which are attached directly to the Council of Ministers, USSR. A preliminary analysis* of the 24-man committee reveals that at least 9 have direct governmental affiliations, including a Vice Minister of the Ministry of Communications and the Vice Chief of its Research Institute. Keen interest in the Arctic and Antarctic is further revealed by the inclusion in the committee of such leading polar explorers as I. D. Papanin, Ye. K. Fedorov, and M. Ye. Ostrekin.

Among the 18 participating organizations mentioned to date, over one-half are governmental. Three are All-Union Ministries -- (1) Maritime Fleet, (2) Geology and Conservation of Natural Resources, and (3) Communications. The Council of Ministers, USSR, is represented by two Chief Administrations that are directly attached to it. To emphasize the importance of achieving the fullest possible success, the Soviet IGY research program has been included among the most

*More complete analysis of the IGY personnel will follow at a later date.

important of problems of the Academy of Sciences, thus assuring it first-priority consideration and the widest possible research support. To effect this, a Council for Antarctic Research has been organized and attached to the Praesidium itself. The chairman is Academician I. D. Shcherbakov, a specialist in minerals exploration.

In approving the topical scope of Soviet participation, the Academy of Sciences laid stress on its providing "for the analysis and study of actual problems in each of the listed fields." This participation, as formalized in the establishment of and appointments to the 14 working groups, includes most of the disciplines and regional programs of the IGY. Three exceptions are World Days, rockets and satellites, and the 140°E Meridian Line program. Shcherbakov in a broadcast of 13 October 1955, however, specifically mentions "high-altitude rockets" among the means to be used for meteorological research in Antarctica. One additional field represented among the Soviet working groups -- meteors -- might to some extent be complementary to rocket and satellite activity.

II. Current Political Overtones and Scientific Plans

A. Possible Political Overtones in Scientific Planning

Up to the present, no citizen of the Soviet Union has set foot on continental Antarctica. Through participation in the IGY program, the USSR will gain its first entry in connection with a scientific program. Whether the Soviets will attempt to develop this entry into a Soviet territorial claim is not known. The only known fact is that the Soviets have reserved the right to participate in the settlement of Antarctic sovereignty problems. It therefore becomes necessary to examine the Soviet attitude on the basis of the statement of intentions concerning the Antarctic program, the selection of IGY sites, and its scientific plans in order to discover any possible clues to Soviet political intentions.

The Soviet statement of Antarctic intentions at the Paris Antarctic Conference of 6-10 July 1955 included an unusual attempt to link Soviet political interests with their scientific activities in the region. The letter of intention stated:

> Soviet science has been linked to the Antarctic for more than 100 years, beginning with the first Russian scientific expedition in the Antarctic by Bellingshausen and Lazaryev (1819-1821), who discovered the continent and a series of Antarctic islands ...

In a USSR radio broadcast of 11 January 1955 entitled "Soviet Scientists' Materials on the Study of the Antarctic," the following statement was made:

> During the course of many recent years, Soviet scientists and sailors paid annual visits to the higher latitudes of the Southern Hemisphere and carried out there large-scale observations in the field of meteorology, hydrology, and biology. They have thus raised the question of the enormous services and primacy of Russian sailor-explorers in the discovery of the Antarctic and the scientific study of the seas and lands of the South Pole.

Whether the choice of Soviet station sites bears any relation to political intentions is difficult to say at this time. It is significant, however, that thought has been expressed among the Soviets that the IGY activities of the different countries in Antarctica have been allocated by "sectors." V. Akkuratov, Chief Navigator of the Polar Aviation Administration, writing in Izvestiya of 11 September 1955, makes a categorical statement that --

> The Antarctic has been divided among the countries into sectors for studies during the International Geophysical Year.* A very interesting sector has been assigned to the Soviet Union whose northern boundary is the Knox Coast, and whose apex lies at the South Pole. This is a large territory in which man has not yet set foot -- where no one has yet flown.

Since the "sector concept" for staking out Antarctic claims has been adopted by some of the claimant countries, it is not inconceivable that the notion of sector claims may become a part of Soviet political planning on the sovereignty problem, even though at least one non-governmental Soviet source has recorded a disavowal of the principle.

*This is a manifest distortion of fact. Site selection was initiated by individual countries. The CSAGI review of these sites was limited to their adequacy for the scientific objectives of the IGY (see p. 9).

B. IGY Station Site Selection

The selection of Soviet station sites for the IGY was made in a somewhat unusual manner. The original Soviet statement to the Paris Conference indicated the desire for establishing a site either on the Knox Coast at 67°S-105°E or on Princess Astrid Land at 70°S-10°E, the former in Australian-claimed territory and the latter in an area of Norwegian claims. Also included was a proviso for locating a station at a point along the coast where favorable landings could be achieved. Subsequently, during the Paris Conference, the Soviets expressed their additional intentions of establishing an intermediate station between the Knox Coast and the South Pole, and a third at or in the vicinity of the Pole. The Conference, noting that the United States planned to establish a station at the Pole, recommended that the third Soviet station be located somewhere within the interior in the African quadrant. The most recent Soviet plans, disseminated at the latest Brussels meeting, indicate that a wide choice of area rather than a specific site has been suggested. The Knox Coast station, for example, may be located at 67°S anywhere between 80°E and 105°E. With respect to the polar station the Soviets will conform to the Paris recommendation by locating a base at 82°S somewhere between 50° and 60°E; but, at the same time, they will establish a temporary study site for glaciological observations at or near the Pole. The one station that is definitely located in the latest Soviet plan is at the geomagnetic pole, 67°30'S-107°E.

The wide choice of sites, coupled with Akhuratov's remarks, strongly suggests that the Soviets developed their IGY and supplementary geological-geographical program in terms of a "sector concept." The emphasis on the fact that the area had not been explored previously in combination with plans that include surveying and mapping, suggests that the USSR may be attempting to develop a record of prior exploration and mapping in this sector for use in the eventual establishment of a claim to sovereignty. No attempt is made here to discuss the merits of such a claim.

C. Soviet Scientific Plans and Their Motivation

The Soviet scientific plan for Antarctica includes not only the very detailed and comprehensive program outlined for the IGY but also a wide range of non-IGY activities in the fields of exploration, surveying and mapping, physical geography, geology, and biogeography. These supplementary activities are particularly significant to the problem of claims and near-term military capabilities. Since most of Antarctica is unmapped and since mapping plays an important role in the support and definition of national claims, Soviet mapping plans require surveillance in order to evaluate the possibility of their use in support of territorial claims.

Although no specific mention has recently been made of undertaking topographic mapping, there is ample evidence that the Soviets are planning such activity. At both the Paris and the last Brussels meetings, the Soviets raised the question of the exchange of maps and mapping data.

The detailed program released at Brussels explicitly lists plans to prepare general and special maps -- geological, glaciological, and geomorphological -- for which data are to be obtained by "routine (aerial and ground) geographical explorations and aero surveys." Such activities require ground-controlled base maps. No specific mention is made of plans for astronomic position determinations, but they are essential, for example, for the glaciological investigations to be undertaken "by means of aerial and ground routine expeditions [also aerial surveys], systematically describing and charting the investigated ice forms ..." Of particular significance may be the Soviet plan for undertaking glaciological studies at and near the South Pole. This suggests that mapping of one type or another will cover the extremities of the so-called "Soviet sector" from its polar apex to the coastal periphery. Final confirmation seems to be provided by Academician D. I. Shcherbakov, Chairman of a newly formed Council for Antarctic Research under the Presidium of the Academy of Sciences, USSR. On 18 October the following remarks were included in a USSR Home Service broadcast: "Much work will be done by geographers. They will have to map the mountain ranges of the Antarctic in order to achieve more precision in the mapping of the coast ..."

Another activity that may be used for Soviet mapping is the gravimetric program of the IGY, which is specifically mentioned in the Soviet plans. The Soviets are known to have developed and applied widely an astro-gravimetric method of converting astronomic ground

control into geodetic control by correcting astronomic position values for deflection of the vertical.* The Soviets have also developed a gravimeter-altimeter that makes possible rapid, simultaneous determination of gravity values along with barometric elevations. The scientific interests of the Soviets, thus, give every indication that they can and will undertake all of the activities that are essential for eventual compilation of topographic and basic physical maps. An assessment of the extent of the Soviet areal coverage is not possible at this time.

The geological terrain studies, which are not a part of the IGY program, will provide the Soviets with the basic information that is essential to possible future economic and military developments, such as the exploitation of mineral resources and the construction of airfields.

The implications of the information to be obtained by the Soviets from the geophysical program of the IGY can be appreciated only in terms of the overall importance attached to geophysics by the Soviet Union. The roots of this interest reach deeply into basic Communist philosophy, which maintains that Communist man is the sole master of his physical environment. This concept underlies the favored position accorded to scientists in Soviet society, as well as the heavy emphasis on

*In terms of worldwide considerations, the Soviets stand to gain additional relative advantages from the gravimetric survey not only of Antarctica but of other areas. In addition to the nearly completed gravimetric survey of their own country, which has not been released to Western scientists, the Soviets may be able to make significant advancement toward the achievement of a world geodetic system based on a world gravity survey.

scientific training in the Soviet educational system. Further evidences of this attitude are (1) the unique high-level role assigned to the Academy of Sciences, USSR, for the planning and coordination of all theoretical and applied research and development; and (2) the financing of Academy activities by the national budget. Practical application of the concept is evident in the early recognition by Soviet planners that the success in the development of Soviet heavy industry could be proportional only to the success of geological and geophysical prospecting for mineral resources. Similarly, the precariousness of Soviet agriculture, associated with the moisture-deficiency over most of the country, early provided a stimulus for geophysical exploration and research encompassing the entire range of geophysical studies from ground water to upper air.

A few examples will provide an indication of the depth and magnitude of Soviet progress in the field of geophysics. A general magnetic survey of the USSR was begun in 1930. By 1947 the first installment of a multivolume catalog that included data for about 22,000 points had been completed. A general gravimetric survey, initiated in 1932 to provide a minimum coverage of one gravimetric position for each 1,000 square kilometers, is reported to be nearing completion. A widespread seismological survey has been underway for many years, and work has begun on the compilation of an atlas of seismic regions in the USSR. The Geophysical Institute of the Academy of Sciences, USSR, is said to have a staff of over 1,000 scientists and

scientific workers. The related growth in personnel, the expansion of research institutions, and the advancement of geophysical studies over the vast area of the USSR would inevitably lead Soviet geophysicists to broaden the "frontiers" of their activity into a program of worldwide studies.

The IGY provides an opportunity for Soviet participation in an organized, coordinated, and systematic worldwide program that will bring in a vast fund of data that otherwise could not have been obtained. The appreciation of this gain is evidenced by (1) the assignment of top governmental and academic scientists to the Soviet National Committee, (2) practically unlimited financial support, (3) the repeated offer made by Soviet IGY delegates to underwrite and staff (with Soviet scientists) the IGY activity of any observatory or station in any country in the world if that country could not effort to participate, (4) the willingness of the Soviet Academy's Institute of Scientific Information to undertake the accumulation and periodical publication of the bibliography and indexes of all the materials of the IGY on condition that each country send in all of its materials, and (5) the desire to organize a joint center for the publication and dissemination of all types of information.

It is difficult to say whether the motivation for Soviet expansion into a world-studies program is scientific or military. The fact is that the unwillingness of the USSR to join the International Union of

Geodesy and Geophysics (IUGG) prior to the 1954 Rome meeting is symbolic of a general Soviet unwillingness to share any of its significant and voluminous data (other than in meteorology) with the rest of the world. The abrupt about-face represented by the participation in the IGY and the joining of the IUGG could mean any of several things: (1) another phase of the Soviet "new look," with Soviet scientists playing their role in an overall attempt to reduce anti-Soviet anxiety abroad; (2) a manifestation of confidence that Soviet science is capable of achieving a position of preeminence, thus contributing to the overall Soviet effort to demonstrate the superiority of the Soviet way of life; (3) realization that geophysical data, in the final analysis, must be worldwide in areal magnitude, whether they be used for peaceful or military purposes; (4) a recognition of the worldwide scale of values in military strategy, since worldwide operations require corresponding basic environmental data for continued progress in air-weapon, submarine, BW, CW, and radiological-warfare development; or (5) simply a scientifically motivated search for data needed for work on domestic physical-environmental problems.

Whatever the motivation, however, the fact remains that equal benefit will not accrue to the Western World unless the Soviet Union demonstrates its peaceful scientific intentions by an unlimited sharing of its basic compendia of observational data in geodesy, gravimetry, magnetism, seismology, oceanography and oceanology, meteorology,

ionosphere studies, solar radiation, and cosmic rays -- which cover one-sixth of the world's area, plus the Soviet Arctic. Current evidence indicates that the Soviets may adhere to only a quid pro quo exchange of IGY data.

The overall Soviet Antarctic program is noteworthy not only for its comprehensive topical scope but also for its areal extent and concentration of effort. The oceanographic, oceanological, and meteorological programs will begin in earnest with the first sailing of the Expedition in November 1955, during which observations will be made "from the USSR ports to the Antarctic." Supplementary observations will also be made by the Soviet whaling flotilla. These observations will provide data additional to those of the expeditionary ships along special routes "that are planned according to the IGY scheme." The plan for linking observations made along the entire route from the USSR to Antarctica was affirmed in the course of informal conversations of some Soviet IGY delegates, who repeatedly mentioned the importance of studying the "approaches to the Antarctic." This appears to be reflected further in the overall Soviet oceanographic plans, described by Dr. George Deacon, British oceanographer and Secretary of the Working Group for Oceanography, as "very ambitious" and "greater than those of any other nation," and states that the plans include intensive surveys of the Barents, Norwegian, and Greenland Seas, the North Atlantic, the Bering and Chukotsk Seas, and several regions of the West

Pacific, as well as the Antarctic waters around the South Pole between latitude 40°S and the edge of the ice.

III. Operational Plans

A. Organization and Methodology

The Soviet Expedition plans five voyages to Antarctica to be carried out as follows: November 1955 to June 1956, September 1956 to May 1957, September 1957 to February 1958, May 1958 to October 1958, and January 1959 to April 1959. Somov in a recent statement (16 October 1955) describes the program as follows:

> The immediate task of our expedition [presumably the first] is to set up a scientific research station on the Antarctic coast and to begin meteorological, aerological, geomagnetic, seismic, ionospheric, and other research. At the same time it is necessary to carry out, in good time and on a large scale, careful preparations for developing in 1957 of a complex of scientific research as envisaged by the International Geophysical plan. The next immediate goal of our expedition is to carry out oceanographic research in the Antarctic waters.

In accord with these plans, the first voyage will set up the main base in the Knox Coast area and undertake preliminary surveys for the establishment of the two continental stations. Airlift activities to set up the latter two stations presumably will not begin until the following spring, that is, about October 1956. An abbreviated observation program will be undertaken during this first season -- by a staff of scientists at the Knox Coast base and by another staff on board the Ob' while it is operating in the Antarctic waters. Additional observations

are expected to begin at the two continental stations by November 1956, and by January 1957 the full observation program will get underway. Compared to the 7-vessel voyage of US Navy Operation Deep Freeze I, it obviously would be impossible to achieve a program and schedule of such magnitude using only the 12,600-ton icebreaker Ob' and one other ship, the Lena. Other details concerning overall operational plans on the continent, however, have not been provided. It is necessary, therefore, to examine Soviet Arctic activities and experience in order to obtain some idea of the basic methodology that might be adopted in Antarctica.

The Soviet decision in 1932 to develop an Arctic shipping route launched a series of activities to obtain detailed information on the ice, weather, and hydrography, as well as other geophysical data for not only the coastal zone but also the entire central Arctic basin. In 1937 the first expedition was launched into the central basin in the form of a combined airlift to the North Pole and a drift station* under I. D. Papanin, which was to secure oceanographic, metecrological, and other geophysical data. Four 4-engine ANT-6 planes landed nearly 12 tons of apparatus, equipment, and provisions. The drift station covered 1,500 miles during a period of 274 days. In 1941, I. I. Cherevichnyy, who

*later this was designated SP-1.

will be in charge of the Antarctic air detachment, took a "flying observatory" on 3 trips into an area called the "Pole of Relative Inaccessibility," where it landed a number of times to make meteorological, hydrological, oceanographic, solar, and magnetic observations.

After World War II, the flying-laboratory technique was expanded, and observational flights were made in 1945, 1948, 1949, 1950, and 1951. The 1948 expedition included a 3-week drift on ice, with additional hops from the drifting base to areas up to 25-30 miles distant for 3-day observation periods. On a hop to the North Pole, 18 men participated in the observational work. In 1950-51 another combined expedition was launched under Dr. M. M. Somov. Flying-laboratory hops were combined with the operation of a drift station, which was ultimately named the SP-2. The drift station was manned for a year, during which time it covered a linear distance of 360 miles over a drift route of 1,500 miles. The development of the airlift and drift-station technique reached its highest point in the launching of the 1954 High Latitude Air Expedition, which included the drift stations SP-3 and SP-4. So successful was the 1954 expedition that its methods are now being incorporated into a standard research program that will include continuous drift-station observations combined with radiating airhops and scientific air detachments. SP-5, launched in late April 1955, is earmarked for the IGY program.

The objective of the combined airlift--drift-station research method is to secure in otherwise inaccessible areas (1) the widest possible areal coverage, and (2) simultaneous observations over as wide an area as possible for a brief period, using the flying laboratories to approximate simultaneous conditions. Since the Arctic and Antarctic have similar problems of inaccessibility, the research and observational techniques are generally comparable for the two regions. It is reasonable to conclude, therefore, that the methods used in the Arctic will be adapted to observational requirements in the Antarctic.

The Expedition ships and the whaling ship Slava-15 will probably supplant the drift station in function, but they will be able to secure a much larger number of observations over many more routes and over much longer distances. The continental operations will be modeled after the 1954 Arctic air operations. The Antarctic air detachment will be engaged in logistic missions to move personnel, equipment, and supplies. It will also be used for scientific research, with "flying laboratories" making sweeps over the research area and "special scientific detachments" making hops to as many points as possible to set up observation stations of several days to several weeks duration. From the standpoint of distance, the program presents no special problems since the distances involved in the Antarctic are well within the range of those flown in the Arctic. The major difference

between the two regions is the higher elevation within Antarctica, which will make operating conditions more difficult because of the attendant lower air pressure and temperatures and higher wind speeds.

Not enough is known of the operational records of the Soviet Arctic expeditions to permit any estimate of the number of observations that might be made or the number of points that might be established in Antarctica. Some indication, however, may be gleaned from the following brief summary of the observations obtained by the SP-3 and SP-4 drift stations over a 7-month period:

(1) 3,000 radio sondes and balloon launchings
(2) 20 deep-water hydrological stations established
(3) 1,000 ocean soundings
(4) 18,000 observations of ocean currents
(5) 700 determinations of magnetic declinations
(6) 1,700 magnetic observations
(7) 500 solar radiation (actinometric) observations
(8) 1,300 aerometric observations
(9) 10,000 meteorological observations
(10) 700 astronomical fixes

The probability of adopting this general scheme of operation was increased when it was learned -- though not as yet publicized -- that the Soviets are planning to establish two 9,000-nautical-mile routes to expedite the movement of personnel, equipment, and non-bulk supplies.

Further testimony of the importance attached to the Antarctic program and to the desire to secure a maximum of effort is provided by a grandiose scheme to establish regularly operating air routes between Moscow and Antarctica. Informally, in the course of discussions in the IGY Working Group on Logistics, the Soviets showed maps of two planned routes, each about 9,000 nautical miles in length -- one through Africa, and the other through India, Singapore, and Australia. Informal approaches were also made by Soviet IGY delegates to the Australian and New Zealand IGY delegates. The latter was asked whether New Zealand, in connection with flights to Antarctica, could accommodate Soviet jet aircraft requiring 9,000-foot runways. The Soviets further indicated that diplomatic negotiations were getting underway.

The motivation for such an expensive, ambitious effort is undoubtedly related to the Soviet operational methodology* for Antarctica, based on experience derived from their Arctic research expeditions. It would seem hardly justifiable, however, to conclude that this was the sole consideration. This air plan will give the Soviet Union its first opportunity for long-range intercontinental transoceanic air exercises without incurring the reciprocal risk of permitting foreign aircraft to fly long distances over the Soviet Union. Moreover, the Soviets can hardly be expected to neglect the propaganda opportunity of making a worldwide show of Soviet air capabilities in connection with a peaceful international

*See Section III for additional details on the methodology of Soviet Arctic exploration.

scientific program for the "benefit of mankind," and of pointing out its marked contrast to the military intercontinental exercises of the USAF Strategic Air Command.

B. Personnel

The execution of so complex and concentrated a program would not be possible without an adequate number of trained personnel. The long history of intensive Arctic air operations and the growth of an elaborate structure of Arctic research institutes, polar stations, and observatories of the Chief Administration of the Northern Sea Route, the Chief Administration of the Hydrometeorological Service, and the Academy of Sciences, USSR, have provided the Soviets with a highly experienced corps of Arctic research specialists and service personnel. Operational planning, administration, and direction will be in the hands of scientist-explorers who combine advanced scientific training with specialized Arctic field experience. Dr. M. M. Somov, chief of the Soviet expedition, is a graduate hydrologist who has devoted all of his professional career to Arctic exploration and research. One of the five Vice Chairmen of the Soviet National IGY Committee is Dr. I. D. Papanin, who in 1937 led the first long-term Soviet ice-drift station, SP-1, toward the North Pole. The National Committee includes Ye. K. Fedorov, who accompanied Papanin, and M. Ye. Ostrekin, who headed the group of scientists in 1941 on the first "flying observatory" into the Arctic "Pole of Inaccessibility."

The number of participating personnel has not been revealed. An early report indicated that "about 200 scientists" will participate in work on the continent, but the more recent broadcast of 17 October 1955 states that, "apart from the crew, about 1,000 scientific workers will participate in the voyage, as members of the Expedition" and that "more than 70 scientific workers from various research institutes of the country will take part in the expedition on board the icebreaker Ob'." In addition to a construction crew, there will be two staffs of scientists -- one on the Ob' making observations in Antarctic waters and the other at the main base engaged in continental observations and studies. The only top-level assignments named thus far are: (1) the director, Dr. M. M. Somov, Deputy Director of the Arctic Research Institute, Chief Administration of the Northern Sea Route; (2) the director of oceanographic research in Antarctic waters, Dr. V. G. Kort, Director of the Oceanological Institute, Academy of Sciences, USSR; and (3) the director of air operations on the Antarctic Continent, Ivan Ivanovich Cherevichnyy, an Arctic veteran with 20 years and 3,000,000 kilometers of Arctic flying experience -- as pilot supplying drift stations and as chief of the scientific research detachments (air) during the 1954 expedition. It is likely, however, that most of the members of the Soviet IGY delegation will participate at one time or another. These include: Yu. D. Bulanzhe, F. F. Davitaya, A. M. Obukhov, E. Z. Pinus, Yu. D. Kalinin, V. I. Krasovskiy, N. V. Pushkov, S. Vorob'yev, G. A. Avsyuk, V. G. Kort, Ye. F. Savarenskiy, E. R. Mustel', I. T. Spirin, and V. V. Belousov.

According to a Soviet broadcast on 19 October 1955, Somov reported that the following personnel of earlier Arctic drift-station service will participate: Poreyev, Shchekin (probably Shchelkin -- hydrologist on SP-4), Boborykin, [M.S.?] Komarov, and L. F. Ovchinnikov (Chief of the Meteorological and Hydrological Group, SP-4). Other specialists of SP-4 and SP-5 are also scheduled to visit the South Pole "since it will afford them an opportunity to see better the peculiarities of processes in the areas of the two opposite poles." In the same broadcast, Somov reiterated his expectation of seeing some of the present staffs of SP-4 and SP-5 in Antarctica in the spring of 1957.

The use of experienced Arctic personnel to ensure successful operations will be further supplemented on the substantive level by flying in various research and technical specialists according to a set program. This procedure may explain, in part, how the "1,000 scientific workers will participate in the voyage, as members of the Expedition." Many of these men presumably would be flown in and then transshipped to the vessels as needed. The 1954 Arctic expedition developed this system of rotating scientific personnel, principally from the Academy of Sciences, USSR. In July 1954, for example, Dr. V. G. Kort reported that a "brigade" of scientists from the Academy had spent two weeks at the Arctic stations. These included oceanologists, microbiologists, and senior medical authorities. With the system of rotation, a wide range of experience can be exchanged between field and laboratory research, to the benefit of both. Furthermore, technicians can be

brought in as needed to meet operational emergencies. Air movement is essential in order to obtain a sizable rotation, without the waste of research time that surface travel would require.

Another method of securing the largest number of observations from a given expedition roster has also been observed in Soviet Arctic research activities. Wherever possible, scientists are used also for general service duties, and service personnel are trained to double in observational capacities. As an example, Somov, a graduate hydrologist and Deputy Director of the Arctic Scientific Research Institute, functioned as oceanographer on a 3-week drift in 1948 and in 1950-51 served as expedition director of the SP-2. His dual role is reflected in his collaborative studies with M. M. Zubov on ice drift and the variations of barometric averages. In another instance, a doctor of medicine was used in a parachute team dropped over the North Pole to reconnoiter and mark out a landing area for a plane load of scientists who were to set up a temporary observation station.

C. Logistics

The most spectacular part of the Soviet program is the plan to establish two 9,000-nautical-mile air routes from Moscow to the Antarctic -- one via Africa and the other via India, Singapore, and Australia. This service will probably provide the principal transport of personnel and equipment, as well as most of the non-bulk supplies. On the continent, the air detachment will provide the long-distance

transportation. Tractors, cars (probably GAZ-69), and dog sleds will be used for local haulage. Heavy equipment, shelter, and some of the food will be moved by the two expeditionary ships -- the Lena, supplemented by the Ob'. The Lena, a refrigerator ship, will carry canned goods, dried sour milk, dried sour cream, and over 300 tons of other food products, together with a construction crew to assemble and build a "scientific town." Whale meat and liver, as supplementary food, will be provided by the 15-vessel Soviet whaling flotilla, which will continue to operate during the IGY.

On the first voyage of the Ob' and the Lena, it is reported that 6,500 tons of cargo will be delivered. Although no information is available on bulk shipments of fuel, it will undoubtedly be provided through the refueling service developed for the whaling flotilla -- by increasing either the number of tankers or the number of runs. The Soviet tanker Tuapse completed two trips in one season in 1953-54 in addition to the run by the Volga-Don. Other tankers that have serviced the whaling flotilla are the Pamir and the Kreml' (7,661 GRT), which serviced the 1946-47 trip. The latter also provided service during the 1948-49, 1950-51, and 1951-52 seasons. The Gergo (7,596 GRT) was used in the 1948-49 season, and the Polish tanker Karpaty (6,478 GRT) in 1951-52. In the 1952-53 season a new large tanker, the Apsheron (8,839 GRT), performed the service.

Air freight capabilities cannot be estimated because no information is available on the specific intercontinental routes, on the location of

transshipment points, or on the names and types of planes to be used. Four planes and two helicopters will make up the unit for the Antarctic area proper. It is necessary, therefore, to examine again available information on the Soviet Arctic airlift operations in order to obtain some idea of their logistic capabilities for scientific purposes. When SP-1 was set up in 1937, nearly 12 tons were flown in. In 1950, the aircraft for SP-2 included 4-engine planes with 5-ton freight capacities, and 2-engine planes with 1-ton capacities. At the time the station was set up, 50 tons were flown in, and 20 more 6 months later. Included in the 70-ton haul was a "GAZ-67" tractor for use at the station. In the 1954 expedition, supplies and equipment were flown in on a continuing basis. In slightly less than a year, 200 tons of freight were lifted to each of the two stations. The planes used included the LI-2, IL-12, the AN-2 biplane, the Pe-8 four-engine bomber converted into a transport, and the MI-4 helicopter.

D. Operational Equipment

Only a limited amount of information concerning the Soviet operational equipment has been announced to date. The Ob', a diesel-electric icebreaker, has been modified for the Expedition by the assembly of 6 laboratories (including meteorological, hydrobiological, microbiological, and chemical) and by the addition of a deep-water trawl, 5 deep-water winches, special deck facilities for helicopters and planes, the newest navigational instruments, and a complete radio installation.

The ship has been described as resembling a house. It has 5 decks, and its height from keel to the upper bridge is 24 meters (79 feet). Metal frames have been built on deck to hold two LI-2 planes. The LI-2 "will be taken on pontoons with the help of tugs either onto the ice or to the shore." There is also an area for a helicopter. It may be assumed that the Lena will be similarly equipped for carrying planes.

Tractors, cars, amphibious craft (tugs?), and dogs will also be provided, but no information on type or number is as yet available.

Eighteen to twenty collapsible houses of light insulated material and designed to shelter from 4 to 6 men will be brought to the Antarctic the first season. These are probably the type of tents developed for the 1954 Arctic expedition. The tents have been modeled after the Chukchee yarang and are made of aluminum tubes covered with two layers of canvas separated by an air space, the outer layer dark in color and the inner one white. The basic unit appears to be a divided hemisphere, which can be elongated by inserting a semicylindrical section between the two parts of the hemisphere. The floor consists of a layer of waterproof fabric that is covered with reindeer hides, over which plywood sheets are laid down. These tents are believed to be used primarily for working purposes.

A prefabricated hut has been developed for living quarters. Walls consist of panels made of a wallboard called "penoplast" and wood pulp, which are said to be one-sixth the weight of wood and have three times

its insulating quality. With outside temperatures of -76°F, indoor temperatures can be maintained at 60°-70°F. As a result, sleeping bags can be replaced by cots for greater comfort. Windows are of plexiglass. The huts, delivered in 17 sections, are 15 feet long, 8-1/4 feet wide, and 11-1/2 feet high, and consist of a living room, a kitchen, and a hall large enough for 4 men. The huts are mounted on runners that do not freeze to the snow and can be moved by manpower, even though they weigh about three-fourths ton.

A recent Soviet news release appears to confirm the report that both types of buildings will be used. It also adds that the houses will be provided with steel foundations if they must be built on ice. Coal stoves are used for heating purposes and liquid-gas ranges for cooking. Conveniences are provided in the form of electric lights, motion pictures, and libraries. Recent Soviet news broadcasts state that a "scientific town" will be built in Antarctica and will include warm dwellings, laboratories, a garage, and a power station.

Each station of the 1954 Arctic expedition was equipped with a GAZ-69, a Soviet modification of the American jeep, and a KD-35 diesel tractor equipped with a blade and weighing 4 tons.

In order to cope with the navigation problems that are unique to the South Polar region, the Soviets have prepared a special celestial map and special magnetic and gyro compasses. Mention is also made of "powerful radio direction finders and sensitive radio compasses [that]

will facilitate navigators' tasks." The grid developed for Antarctica may be a "grid of false meridians" developed by the Soviets in 1937, which overcomes the disadvantages of the convergence of meridians found on common projections.

Mention has previously been made of the use of aircraft as "flying laboratories" and of the logistical use of aircraft. Special mention, however, should be made of the use of MI-4 helicopters and their value for research purposes, particularly geological surveying.

E. Radio Communications

An elaborate coordinated radio-communications program for Antarctica was proposed at the Paris Conference in July 1955. A Working Group on Radio Broadcasts, with representation for each participating country, was organized to undertake the preparation of plans and the coordination of facilities and services. Participants were requested to submit information on stations, frequency ranges, power, transmission, type of service, and orientation of antennas, as well as other technical details and the techniques used in establishing the polar stations.

Four types of traffic are envisaged: (1) general information on the coordination of work, (2) exchange of operational scientific information, (3) expedition liaison, and (4) emergency calls.

Three categories of stations are planned: (1) mother stations, (2) daughter stations, and (3) auxiliary relay stations. Call signs for a regional IGY service are to be assigned by the International

Telecommunications Union. Frequencies needed for the radio liaison network, which will operate for only brief periods of time, may be provided either by the participating countries out of their own international locations, or by the assignment of special international frequencies by the International Telecommunications Union. In order to reduce interference, the Conference recommended a continuing exchange of information among stations and expeditions on radio frequencies employed and the quality of reception. The United States offered to compile, publish, and disseminate periodically revised lists and other details.

Special arrangements are planned for emergency calls. Mother stations and ships at sea are to listen in on frequencies during hours prescribed by international convention. Land and air activities, including departure and arrival, will be followed continuously by the daughter stations.

Attachment C provides a preliminary list of information on Soviet radio communications submitted at Brussels to the Working Group on Communications. The attachment also gives information assembled on other countries for the Paris Antarctic Conference, July 1955. Attachment D is a provisional list of stations being planned for the Antarctic IGY network.

It is expected that public radio communication for morale and propaganda purposes will be established between Moscow and Antarctica,

as well as between the Soviet Arctic and Antarctic expeditions. Precedence has been established for such a link, since radio communication was established as early as 1930 between a station on Franz Joseph Land and an Antarctic expedition near the Ross Barrier. More recently the UPOL-3, the radio station on SP-3, established contact with the Soviet whaling expedition of 1954.

ATTACHMENT A

The Organization of the Soviet National Committee and Working Groups for the International Geophysical Year

The Praesidium of the Academy of Sciences, USSR, by decrees of 21 January and 8 April 1955 established an Inter-Departmental Committee for preparations for and conduct of the IGY. The organization of this Committee is as follows:

Chairman: BARDIN, I. P., Vice President of the Academy of Sciences, USSR

Vice Chairmen: BULANZHE, Yu. D., Doctor of Physico-Mathematical Sciences
DAVITAYA, F. F., Doctor of Agricultural Sciences, Vice Director of the Chief Administration of the Hydrometeorological Service
OBUKHOV, A. M., Corresponding Member of the Academy of Sciences
PAPANIN, I. D., Doctor of Geographical Sciences
PUSHKOV, N. V., Candidate, Physico-Mathematical Sciences, Director of the Scientific Research Institute of Terrestrial Magnetism

Scientific Secretary: TROITSKAYA, V. A., Candidate, Physico-Mathematical Sciences

Committee members:

AVSYUK, G. A., Doctor of Geographical Sciences
AL'PERT, Ya. L., Doctor of Physico-Mathematical Sciences
BELOUSOV, V. V., Corresponding Member of the Academy of Sciences
VVEDENSKIY, B. V., Academician
VERNOV, S. N., Corresponding Member of the Academy of Sciences
GAMBURTSEV, G. A., Academician [Deceased 28 June 1955]
GOLYSHEV, G. I., Candidate, Physico-Mathematical Sciences, Director, Central Aerological Observatory, GUGMS

GORDIYENKO, P. A., Candidate, Geographical Sciences, Vice Chief of the Polar Stations Section, Ministry of the Maritime Fleet
GUSEV, A. M., Doctor of Physico-Mathematical Sciences
DZERDZEYEVSKIY, B. L., Doctor of Geographical Sciences
YEVSEYEV, P. K., Director, Central Scientific-Research Hydrometeorological Archives
KALASHNIKOV, A. G., Doctor of Physico-Mathematical Sciences
KALININ, Yu. D., Doctor of Physico-Mathematical Sciences
KOPYTIN, A. A., Vice Chief, Scientific-Research Institute of the Ministry of Communications
KORT, V. G., Doctor of Geographical Sciences
KRASOVSKIY, V. I., Doctor of Physico-Mathematical Sciences
LEBEDINSKIY, A. I., Doctor of Physico-Mathematical Sciences
MIKHAYLOV, A. A., Corresponding Member of the Academy of Sciences
MUSTEL', E. R., Corresponding Member of the Academy of Sciences
OSTREKIN, M. Ye., Candidate, Geographical Sciences, Chief, Arctic Scientific Research Institute
SAVARENSKIY, Ye. F., Doctor of Physico-Mathematical Sciences
TOPURIYA, Z. V., Vice Minister of the Ministry of Communications
FEDOROV, Ye. K., Corresponding Member of the Academy of Sciences
FEDYNSKIY, V. V., Doctor of Physico-Mathematical Sciences

Working Groups:

Meteorology

Chairman: YEVSEYEV, P. K.
Vice Chairman: KITAYTSEV, A. I.
Members: SOBOLEV, L. G.
PINUS, N. Z.
KASTROV, V. G.
DZERDZEYEVSKIY, B. L.
BUBENTSOV, V. P.
ALEKSANDROV, L. A.
KERGIAN, A. Kh.
BUDYKO, M. I.

Terrestrial Magnetism and Earth Currents

Chairman: KALININ, Yu. D.
Vice Chairman: KALASHNIKOV, A. G.
Members: MANSUROV, S. M.
NIKOL'SKIY, A. P.
NOVYSH, V. V.
ORLOV, V. P.
OSTREKIN, M. Ye.
PETROVA, G. N.
TROITSKAYA, V. A.

Aurora and Airglow

Chairman: LEBEDINSKIY, A. I.
Vice Chairman: BAGARYATSKIY, B. A.
Members: FLIGEL', D. S.
ISAYEV, S. I.
KRASOVSKIY, V. I.
KNIZHNIKOV, B. K.
KUZ'MIN, L. A.
NIKOL'SKIY, A. P.
PARIYSKIY, N. N.
FESENKOV, V. G.
SHKLOVSKIY, I. S.

Ionosphere

Chairman: AL'PERT, Ya. L.
Vice Chairman: BEN'KOVA, N. P.
Members: MEDNIKOVA, N. V.
BULATOV, N. D.
GUSEV, V. D.
DRIATSKIY, V. M.
ZHELEZOV, F. F.
ZABORSHCHIKOV, F. Ya.
KAZANTSEV, A. N.
LIKHTER, Ya. I.
SHUMSKIY, N. N.

Solar Activity

Chairman: MUSTEL', E. R.
Vice Chairman: POLOSKOV, S. M.
Members: SEVERNYY, A. B.
KRAT, V. A.

GNEVYSHEV, M. N.
SHKLOVSKIY, I. S.
VITKEVICH, V. V.
RUBASHEV, B. M.
MOGILEVSKIY, E. I.

Cosmic Rays

Chairman: VERNOV, S. N.
Vice Chairman: KOPYLOV, Yu. M.
Members: FEYNBERG, Ye. L.
GRIGOROV, N. L.
ZHDANOV, G. B.
CHUDAKOV, A. Ye.
DORMAN, L. I.
SHAFER, Yu. G.

Glaciology and Geocriology

Chairman: AVSYUK, G. A.
Vice Chairman: YUSHCHAK, A. A.
Members: IZHEVSKIY, G. K.
MOYSEYEV, P. A.
BATALIN, A. M.
SERGIYENKO, G. N.
BELINSKIY, N. A.
GORDIYENKO, P. A.

Gravimetry

Chairman: BULANZHE, Yu. D.
Vice Chairman: FEDYNSKIY, V. V.
Members: MAGNITSKIY, V. A.
ZHONGOLOVICH, I. D.
MOLODENSKIY, M. S.
ALEKSANDROV, S. Ye.
DOBROKHOTOV, Yu. S.
VESOLOV, K. Ye.

Seismology

Chairman: SAVARENSKIY, Ye. F.
Vice Chairman: KIRNOS, D. P.
Members: GAMBURTSEV, G. A. /Deceased/
SHEBALIN, N. V.

Meteors*

Chairman: FEDYNSKIY, V. V.
Vice Chairman: LEVIN, B. Yu.
Members: KATASEV, L. I.
ASTAPOVICH, I. S.
FIALKO, Ye. I.
KRAMER, Ye. N.
GRISHIN, N. I.

Oceanography

Chairman: KORT, V. G.
Vice Chairman: YUSHCHAK, A. A.
Members: IZHEVSKIY, G. K.
MOISEYEV, P. A.
BATALIN, A. M.
SERGIYENKO, N. A.
BELINSKIY, N. A.
GORDIYENKO, P. A.

Arctic Region

Chairman: OSTREKIN, M. Ye.
Vice Chairman: GORDIYENKO, P. A.
Members: KNIZHNIKOV, B. K.
KREMER, B. A.
BASKAKOV, G. A.
DOLGIN, I. M.
NIKOL'SKIY, A. P.
KIRNOS, D. P.

Antarctic Region

Chairman: GUSEV, A. M.
Vice Chairman: TAUBER, G. M.
Members: USHAKOV, S. I.
GRIGOR'YEV, V. V.
KREMER, B. A.
KOROTKEVICH, Ye. S.
BUYNITSKIY, V. Kh.

*This topic is not an explicit part of the IGY program as outlined under the CSAGI.

Latitude and Longitude

Chairman: MIKHAYLOV, A. A.
Vice Chairman: ZVEREV, M. S.
Members: PAVLOV, N. N.
SAKHAROV, V. I.
BELORETSKOVSKIY, D. Ya.
KULIKOV, K. A.
BAKULIN, P. I.
KUZNETSOV, A. N.
BRAND, V. E.
FEDOROV, Ye. P.
SHCHEGLOV, V. P.

ATTACHMENT B

Scientific Establishments and Departments of the USSR Known to be Engaged in the Preparation and Conduct of Research on the IGY Program

GEOPHYSICAL INSTITUTE OF THE ACADEMY OF SCIENCES, USSR
(Geofizicheskiy Institut AN SSSR)

CENTRAL FORECASTING INSTITUTE
(Tsentral'nyy Institut Prognozov)

CHIEF GEOPHYSICAL OBSERVATORY
(Glavnaya Geofizicheskaya Observatoriya)

ARCTIC SCIENTIFIC-RESEARCH INSTITUTE
(Arkticheskiy Nauchno-issledovatel'skiy Institut)

INSTITUTE OF GEOGRAPHY, Academy of Sciences, USSR
(Institut Geografii AN SSSR)

SCIENTIFIC RESEARCH INSTITUTE OF TERRESTRIAL MAGNETISM
(Nauchno-issledovatel'skiy Institut Zemnogo Magnetizma)

INSTITUTE OF RADIOTECHNOLOGY AND ELECTRONICS, Academy of Sciences, USSR
(Institut Radiotekhniki i Elektroniki AN SSSR)

INSTITUTE OF PHYSICS, Academy of Sciences, USSR
(Fizicheskiy Institut AN SSSR)

UNIVERSITIES, including those at

MOSCOW
LENINGRAD
KIYEV
TOMSK

CHIEF ADMINISTRATION OF THE HYDROMETEOROLOGICAL SERVICE attached to the Council of Ministers, USSR
(Glavnoye Upravleniye Gidrometeorologicheskoy Sluzhby -- abbreviated as GUGMS)

CHIEF ADMINISTRATION OF THE NORTHERN SEA ROUTE
attached to the Council of Ministers, USSR
(Glavnoye Upravleniye Severnogo Morskogo Puti --
abbreviated as GUSMP)

Establishments of the MINISTRY OF MARITIME FLEET
(Ministerstvo Morskogo Flota)

MINISTRY OF COMMUNICATIONS
(Ministerstvo Svyazi)

MINISTRY OF GEOLOGY AND CONSERVATION OF NATURAL RESOURCES, USSR
(Ministerstvo Geologii i Okhrona Nedr SSSR)

PERMAFROST INSTITUTE, Academy of Sciences, USSR
(Institut Merzlotovedeniya AN SSSR)

INSTITUTE OF OCEANOLOGY, Academy of Sciences, USSR
(Institut Okeanologii AN SSSR)

MARITIME HYDROPHYSICAL INSTITUTE, Academy of Sciences, USSR
(Morskoy Gidrofizicheskiy Institut AN SSSR)

ALL-UNION SCIENTIFIC RESEARCH INSTITUTE OF FISHING AND OCEANOGRAPHY
(Vsesoyuznyy Institut Rybnogo Khozyaystva i Okeanografii)

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PHYSICS AND TECHNICAL INSTITUTE
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TASHKENT ASTRONOMICAL OBSERVATORY
(Tashkentskaya Astronomicheskaya Observatoriya)

KITAB LATITUDE STATION
(Kitabskaya Shirotnaya Stantsiya)

ATTACHMENT C

List of Antarctic Radio Stations Operating During the International Geophysical Year and Their Characteristics

Country	Station	Frequency range	Power	Emission voice (CW)	Type of directional antenna	Principal terminal
USSR*	Main base	(a) 2-25 mc	1 kw	both	Rhombic on Moscow	Moscow
		(b) 2-25 mc	1 kw	both	vertical	planes
		(c) 150-1000 kc	1 kw	both	--	--
		(d) 100-150 mc	300 w	voice	--	planes
		(e) 2.5-12 mc 250-600 kc	80 w	both	vertical	--
	Field party N1	2.5-12 mc 250-600 kc	80 w	both	vertical	Main base
	Field party N2	2.5-12 mc 250-600 kc	80 w	both	vertical	Main base

*Data on the means of radio transmission of the other two stations-satellites to be supplied later. Data for USSR stations were presented at the Brussels meeting in September 1955; all other data were submitted at the Paris meeting of June 1955.

Country	Station	Frequency range	Power	Emission voice (CW)	Type of directional antenna	Principal terminal
Argentina	I. Decepcion	275-550 kc	100 w		Rhombic point.	
	(radio beacon)	1.6-24 mc	100 w	both	North	Melchior
	A. Brown	275-550 kc	100 w		"V" type	
		1.6-16 mc	150 w	both	point. North	Melchior
	Tte Camara	275-550 kc	100 w		Rhombic point.	
		1.6-24 mc	100 w	both	North	Melchior
	Oveadas	275-550 kc	1 kw		Rhombic point.	Melchior
		1.6-24 mc	1 kw	both	North	B. Aires
	Esperanza	275-550 kc	100 w		Rhombic point.	
		1.6-24 mc	100 w	both	North	Melchior
	Melchior	275-550 kc	1 kw		Rhombic point.	
	(weather central)	1.6-24 mc	1 kw	both	North	B. Aires
	General San Martin					B. Aires
	(radio beacon)					Melchior
	General Belgrano					Melchior
						Esperanza
USA	Little America (a) 1/	2-30 mc	1 kw	both	Rhombic on Washington	Washington
	(b)	2-18 mc	500 w	both	vertical	
	(c)	2-30 mc	300 w	both	vertical	
	(d) 2/	100-555 mc	2 kw	CW	vertical	

Country	Station		Frequency range	Power	Emission voice (CW)	Type of directional antenna	Principal terminal
USA	Little America	(e) 3/	115-156 mc	35 w	voice	vertical	
		(f) 4/	HF	300 w	both	vertical	
	HF-D/F	(g) 5/	1.5-22 mc			loop	
	VHF-D/F	(h) 6/	100-156 mc				
	Portables	(10)					
		(i) 7/	2-12 mc	15 w	both	various	
	AIROPPAC	(a) 8/	4-26 mc	1 kw	both	Rhombic	Washington
		(b)	same as at Little America				
		(c)					
		(d)	same as at Little America				
		(e)	same as at Little America				
		(f)	same as at Little America				
		(g)	same as at Little America				
		(h)	same as at Little America				
		(i)	same as at Little America				
	Byrd Land Base 9/		2-30 mc	300 w	both	Rhombic	Little America
	Portable (5) 10/		2-12 mc 0.3-1 mc	15 w	both	various	
	Semiportable	(a)	3-181 mc	100 w	CW	various	
		(b) 11/	HF	300 w	both	vertical	
	South Pole Base		same as Byrd Land base				
	Ground Parties		Portable (5)	MF/HF	D/F		
			350-9050 kc	125 w	both	various	
			one of portables listed above				

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Country	Station	Frequency range	Power	Emission voice (CW)	Type of directional antenna	Principal terminal
USA	Planes	2-12 mc	150 w	both	various	
		100-156 mc	10 w	voice	various	
		LF/DF				
France	P. Geology (FGBZ)	8-18 mc	2 kw		35 E	Nouméa
		2.5-20 mc	400 w			Nouméa
	Fields Advance 12/ 13/		7.5 w			Pte Géologie
			15-20 w			Pte Géologie

1. Crystal controlled
2. Used for beacon
3. Air/Ground
4. Amateur
5. Navigational Aid
6. Navigational Aid
7. Trait(?) nets
8. Crystal controlled
9. Crystal controlled
10. Both
11. Amateur
12. S C R 191
13. A N G R C - 9

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ATTACHMENT D

Provisional List of Radio Stations in the Antarctic During the International Geophysical Year

The following stations are classified as:

Mother Stations (M.S.)
Daughter Stations (D.S.)
Stand-by Relay Stations

M.S. McMurdo Sound

1. D.S. South Pole (United States)
2. D.S. New Zealand Base (New Zealand)
3. D.S. Intermediate Station (United Kingdom)
4. D.S. P. Geology (France)
5. D.S. Intermediate Station (France)
6. D.S. US Station Longitude 110°E (United States)

M.S. Little America

1. D.S. Marie Byrd Land Station (United States)

M.S. Melchior

1. D.S. Peter I Island (Japan)
2. D.S. G. San Martin (Argentina)
3. D.S. Marguerite Bay (United Kingdom)
4. D.S. Argentine Is. (United Kingdom)
5. D.S. Port Lockroy (United Kingdom)
6. D.S. Almirante Brown (Argentina)
7. D.S. Decepcion (Argentina)
8. D.S. Tte Camara (Argentina)
9. D.S. Esperanza (Argentina)
10. D.S. Orcadas (Argentina)
11. D.S. General Belgrano (Argentina)
12. D.S. As may be established in the Southern and West Coast of the Weddell Sea.

S-E-C-R-E-T

M.S. Prat

1. D.S. Pte Gonzalez Videla (Chile)
2. D.S. Deception (Chile)
3. D.S. O'Higgins (Chile)
4. D.S. Admiralty Bay (United Kingdom)
5. D.S. Hope Bay (United Kingdom)

M.S. Mawson

1. D.S. USSR Station at Knox Coast (USSR)
2. D.S. USSR Intermediate Station (USSR)
3. D.S. USSR Polar Station (USSR)
4. D.S. Intermediate Station (Australia)
5. D.S. Norwegian Station (Norway)
6. D.S. Japanese Summer Station (Japan)

Stand-by Relay Stations

1. Trelew Punta Arenas (Argentina and Chile)
2. Capetown (South Africa)
3. Melbourne (Australia)

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