

Meetings and Conferences*FIFTH ASSEMBLY OF THE SPECIAL COMMITTEE OF THE INTERNATIONAL
GEOPHYSICAL YEAR AND MODERN PROBLEMS OF GEOPHYSICS*

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THE fifth Assembly of the Special Committee of the International Geophysical Year (SC IGY) was held at the Moscow State University from July 29 to August 9, 1958.

The preceding assemblies of 1953 through 1956, including the fourth assembly in Barcelona in September 1956, dealt essentially with planning and organizing the investigations and observations of the IGY, the division of duties among the participating countries, standardization of instruments and methods, and organization of the gathering and exchange of IGY data, which should be accessible to all engaged in geophysical science. Particular attention was paid then to expansion of the observations in the Antarctic, in which many countries participated besides the U.S.S.R. A set of special practical conferences (1955-1957) was devoted to this problem.

Since the Barcelona conference, the IGY has been in progress for almost 13 months. World centers for the gathering of IGY were opened in Washington, Moscow, and Geneva; centers for special types of observations were opened in other cities. As part of the IGY program, the first earth satellites in history were launched and yielded the first important information on the density and ionization of the previously inaccessible upper layers of the atmosphere. Many research rockets were launched from various points on the earth, many expeditions were organized, etc. Many important discoveries were made, such as the seasonal and geographic variations of the structure of the upper layers of the atmosphere, new glacier regions in the Sayany mountains, and the ice structure of the greater part of the Antarctic. Publication of reports of the research planned and performed in the IGY has begun.

The fifth assembly was already in position to estimate the rate of fulfillment of the IGY, to summarize some of the scientific works, and to raise the question of how far the observations started during the IGY should be continued, and to reinforce the established scientific collaboration

between the geophysicists of various countries. Its work was guided by the president of the SC IGY, Professor S. Chapman (England). The assembly was preceded by a session of the Bureau of the International Geodetic and Geophysical Union — the principal international scientific organization on problems of geophysics.

Attending the assembly were 226 foreign delegates, representing 34 countries. The U.S.A. was represented by 53 delegates and the U.S.S.R. by 179. The assembly was also attended by 38 representatives of the Soviet and foreign press, among whom mention should be made of A. Crum, who has been running a regular chronicle of the most important events of the IGY in the British Journal "Discovery."

In addition to several organizational meetings of the operating groups, of the SC IGY, the publications committee, the consultative council of the IGY (under the chairmanship of the West German representative Professor Bartels) and others, several symposia were held during the time of the assembly to discuss certain of the more important scientific problems. The foreign delegates visited the Moscow Geophysical Institutions such as the Institute of Earth Physics, the Institute of Atmospheric Physics, the Scientific Institute for Terrestrial Magnetism, etc.

The most important among the general topics discussed at the assembly were the extension of the IGY, the work of the world center for data collection, the publications of the IGY, on the future structure of its organizations.

Concerning the first topic, the Soviet Union proposed to extend the IGY for another year. This proposal was adopted in that sense, that the SC IGY recommended that the observations and gathering of data be continued during 1959 in accordance with the preceding plans, under the leadership of the SC IGY, at the same level and in the same fields as outlined by the National Committees of the IGY. It was noted that the need for creating in the future a suitable international system of coordination in geophysical research,

which would supersede the SC IGY for a long time. In particular, it was proposed that a committee on the utilization of the results of the IGY be created.

Concerning the second topic, it was recommended to convert the world centers into permanent institutions, which would store and disseminate the materials of IGY and which would gather all the pertinent scientific literature.

It was next resolved to publish, in centralized order, approximately 30 volumes of the "Annals of the IGY," reporting on the principal results obtained, in parallel with the publications issued by the national committees.

V. V. Belousov of the U.S.S.R. was elected vice president of the SC IGY replacing L. Berkner of the U.S.A., who resigned.

SYMPOSIA OF THE FIFTH ASSEMBLY

In the meteorology section, which accounts for the largest portion of the investigations of the IGY, symposia were organized on numerical (hydrodynamic) methods of forecasting (I. A. Kibel', U.S.S.R. Chairman) a symposium on silver clouds (V. V. Sharonov, U.S.S.R., Chairman), and on Antarctic research (B. L. Dzerdzeevskii, U.S.S.R., Chairman). At the first symposium, the chairman of the British weather service, O. Sutton has reported the acquisition of "Mercury," a high speed computer (analogous to the Soviet "Strela"). G. Wechsler (U.S.A.) reported that in the U.S.A. telegraphed weather data are inserted directly into an IBM-704 high-speed computer (similar to the Soviet BESM), which analyzes the meteorological elements, forecasts their fields, and prepares prognostic maps. Many reports on individual topics were made by A. M. Obukhov and A. S. Monin (Theory of Adaptation of Meteorological Fields), by I. A. Kibel' and V. P. Sadokov (Forecasting Temperature with Account of the Turbulent Heat Conduction, and Development of a New Iteration Method), Hinkelman (Hydrodynamic Forecasting for the Non-Geostrophic Case), and by N. I. Buleev and G. I. Marchuk (New Iteration Method of Solution).

Several papers read at the symposium on silver clouds by Westhain (Canada), Hoffmeister (East Germany), I. A. Khvostikov (U.S.S.R.), V. A. Bronshten (U.S.S.R.) and others — were related to the problem of the origin and nature of silver clouds. It was noted that the distribution of the brightness of the light scattered by silver clouds has a Rayleigh spectrum, but that the distribution by scattering angles does not. The lectures gave

arguments both in favor of the condensation hypothesis and for the dust origin of silver clouds, and noted that only IGY data obtainable by all-out observations in the upper layers of the atmosphere can solve this basic problem.

The symposium on antarctic meteorology was devoted to a discussion of the problems of general circulation. W. Gibbs (Australia) advanced the opinion that the principal feature of the latter is not so much the cold central anticyclone, as the motion of the cyclones that travel from west to east and penetrate there sometimes from the lower latitudes. O. G. Krichak described the principal, geographically-produced, system of six semistationary cyclones over the Antarctic and of the crest that separate them, and called attention to the considerable role of meridional circulations (according to Gibbs, the cold-fronts in Australia reach 28° southern latitude). He showed (in contradiction to preceding hypotheses) that the Antarctic anticyclone is high and reaches a level of 300 mb ($\cong 7$ km). It was noted simultaneously in the paper by G. Wechsler (U.S.A.) that strong advection of warm air is frequently produced in the troposphere towards the Antarctic, and only in the upper atmosphere do the strong streams that surround the latter insulate it from the external influences and cause very low temperatures in the wintertime.

Of general interest was the symposium on the ionosphere, geomagnetism, and earth currents, which opened with a paper by the Chairman of the SC IGY, S. Chapman (England), on "The Outer Atmosphere of the Earth." He concluded that the atmosphere extends quite far, possibly half the distance to the moon.

In many papers (by Pfister, Hown and Wright, and others) touched upon the popular topic of winds in the upper layers, detected through the motion of ionospheric irregularities.

Two papers by A. P. Nikol'skii (U.S.S.R.) dealt with magnetic disturbances in the arctic, their daily variation, and geographic distribution, and showed that their properties are well described by Stoermers theory, down to many details.

Many papers (A. G. Kalashnikov, V. A. Troitskaya, etc.) concerned a new problem in short-duration geomagnetic disturbances, arising simultaneously over large areas, mostly whenever the earth passes through weak cosmic corpuscular streams. These short-duration disturbances are typical of a whole class of basic magnetic storms. V. A. Afanas'eva has shown that magnetic disturbances are due not to floccules alone passing through the projection of the earth on the sun, but to floc-

cules together with spots, while B. M. Yanovskii noted (based on observation made in Mirnyĭ) the connection between the disturbances and the occurrence of a shielding sporadic E_S layer.

Closely related to these topics were the papers on "Polar Aurorae and the Glow of the Night Sky." Thus, A. P. Nikol'skiĭ has shown that the complex form of the double maxima in the lights in the arctic is also explained by the Stoermer theory. A. I. Lebedinskiĭ, Gerloefson (Sweden), and others considered the procedure and the results of the analysis of the geographic distribution of polar lights, and K. Hartline (U.S.A.) and Jaqua (Australia) investigated, using IGY data, its connection with the overall magnetic field of the earth. I. S. Shklovskii and, in greater detail, Yu. I. Gal'perin considered the hydrogen emissions in the spectra of the polar aurorae in the glow of the night sky, while D. Barbier (France) reported on the connection between the red oxygen line of the night sky and the state of the ionospheric F_2 layer. Roberts (U.S.A.) reported on observations (made by the method of the astronomer Kozyrev at Pul'kovo) of polar aurorae on Venus.

In the symposium on meteors many papers [F. Whipple, L. Jaccia (U.S.A.), V. Guta (Ukrainian S.S.R.), D. Davis (England), E. L. Krinova (U.S.S.R.), and others] considered, on the basis of both photographic and radar data, the spatial distribution of meteor streams that concentrate approximately in the plane of the earth's orbit at relatively short distances from the sun (most frequently their aphelion is near the orbit of Jupiter). It was shown that meteoric matter is concentrated in general near the plane of the earth's orbit and that during the day one observes three maxima in the number of the meteors encountered by the earth. Of particular interest are observations of meteoric dust on the earth, including the recently observed particles of the Tunguskiĭ meteorite in the U.S.S.R. Particles 0.3μ in diameter were observed during filtration of samples of air, gathered on an airplane over the U.S.A. In the Czechoslovak republic the settling of particles of nickel iron was observed during a month after large meteoric streams, which confirms indirectly the Bowen hypothesis concerning the connection between the latter and the precipitation.

At two sessions of the symposium on solar activity, numerous papers were delivered on the physics of stellar phenomena — chromospheric flares, magnetic fields, radio waves, etc. In particular, American data were reported on the observation of x-rays ($\lambda = 1 - 8 \text{ \AA}$) and short ultraviolet spectrum of the sun during ascents of rock-

ets. Unfortunately, much less attention was devoted to problems of the connection between the solar activity and the geophysical phenomena.

Many papers were also devoted to research on cosmic rays during the IGY. Dorman (U.S.S.R.) told of an investigation of variations of cosmic rays by stratospheric, surface, and underground observations. Forbush (U.S.A.) reported on the observation of cosmic rays in the U.S.A. and particularly on the secular decrease in the neutron component, which reached 25% during the period from 1954 through 1957. Less attention was devoted in this group of papers to the connection with terrestrial phenomena. Very great interest was shown by the large audience to symposia on rockets and satellites, carried out in the main hall of the Moscow State University. Most papers were presented by Soviet and American investigators, but there were also reports of British and Japanese work. G. Newell (U.S.A.) reported on the results of 160 launchings of rockets in the U.S.A. during the time of the IGY, which reached considerable altitudes. The program of observations was quite extensive, covering polar aurorae, the ionic composition and charge density, the chemical composition, etc. Richter (U.S.A.) told of the investigation of cosmic rays, micrometeorites, and other elements on American satellites Explorer I and Explorer III. Many reports were devoted to the procedure (particularly the use of the Doppler effect) of determining satellite orbits (including orbits of Soviet satellites observed in England, U.S.A., and other countries). Observation of cosmic rays on two Soviet and three American satellites have displayed a new type of cosmic radiation (presumably electrons) of high energy, arising near the earth. V. I. Krasovskiĭ reported also on the discovery of corpuscular radiation of very high intensity, while American observations mention probable existence of gamma radiation from the sun with energies of approximately 1 Mev. Observations on satellites have made it possible for Soviet researches (Ya. L. Al'pert and others) to propose a new scheme for the structure of the ionosphere.

The symposia on seismology were devoted to the study of the seismicity of the arctic and antarctic, to the structure of the earth's crust and new procedures for its investigation, and also to microseisms caused by meteorologic factors. Of great interest was a joint symposium with the working group on glaciology, at which papers were delivered on the investigation of icecap of the antarctic. Both Soviet (O. G. Kondrat'ev) and foreign investigators have shown that the antarctic

is not a continent, but comprises several islands. However, as shown by Robin (England) the procedure of seismic sounding of thick ice and its results still require refinement.

At a session devoted specially to glaciology, G. Wechsler (U.S.A.) reported on an experiment of calculating the heat balance of the ice of the antarctic with allowance for the internal heat of the earth and the age of the ice.

Oceanographic investigations were devoted essentially to the difficult and still unstudied problem of circulation in the depth of the oceans (including the antarctic waters), which Deacon (England) reported, and to the chemistry of sea water (including radioactive contamination) which was the topic of a paper by Miyake (Japan).

At the Symposium on Nuclear Radiation, several papers of foreign scientists were heard. Many reports (Sheppard, Ramanathana, etc.) were devoted to the influence of large-scale at-

mospheric motion on the propagation and precipitation of natural and artificial radioactive impurities in the atmosphere.

On the whole it can be said that at the Symposia of the Fifth Assembly of the SC IGY, many new results and new trends of IGY research were brought to light, and the methods used in the observations were evaluated. What was even more important, they pointed out the prospects of further, more extensive development of data of the IGY and confirmed the need of further work in the spirit of international cooperation and coordination.

In his concluding address, the president of the Special Committee of the International Geophysical Year, S. Chapman, expressed the very deep and important idea, that the principles of the International Geophysical Year be extended also to other fields of science and culture.

Translated by J. G. Adashko