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PLEASE NOTE

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SOVIET BLOC INTERNATIONAL GEOPHYSICAL YEAR INFORMATION

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1. GENERAL

Review of Contemporary Thought on the Heat Regime of the Earth's Crust

A review of the work on problems concerning the source and distribution of heat in the Earth is presented in an article by I. D. Dergunov, Institute of the Physics of the Earth, Academy of Sciences USSR.

The heat regime of the Earth's crust is described as caused by the heat of radioactive decay. Theoretical conclusions in this matter agree with experimental data. The principal difficulty which arises in the solution of certain problems related to the heat regime of the Earth's crust is that the depth of the distribution of radioactive elements, how their concentration changes with depth, and how the process of the variation of the concentration of radioactive elements throughout the Earth occurred and how it continues are not known.

Experimental investigations for studying the heat regime of the Earth's crust as a whole, especially the study of heat flows, are very few.

Dergunov says that, considering the importance of studying the heat regime of the Earth's crust for using the heat energy in the nation's economy and for increasing the knowledge of the Earth's internal structure, it is necessary to considerably expand study in this field in the Soviet Union. (Izvestiya Akademii Nauk SSR, Seriya Geofizicheskaya, No 1, Jan 58, pp 65-74)

Hungarians Establish Medal for Geophysicists

The Association of Hungarian Geophysicists has established a new medal the purpose of which is to spur the research efforts of Hungarian geophysicists. The medal, to be known as the Lorand Eotvos Scientific Medal, will be awarded every 3 years to scientists who have performed outstanding work in some field of geophysics. The medal is not accompanied by a cash award. (Budapest, Nepszabadsag, 5 Sep 57, p 5)

Moon Is Key to Conquest of Outer Space

"The Moon is the first station on the way to conquering the solar system," says Prof V. Sharonov in a recent Soviet newspaper article on "The Moon and Flights Into the Cosmos."

Sharonov discusses our lack of knowledge of the nature and composition of the Moon, some of the methods currently used to study the Moon, what a successful flight to the Moon can hope to accomplish, and some of the immediate difficulties involved in unmanned flight to the Moon.

Manned flight to the Moon and back is a matter for the future. "Our immediate problem," he says, "is to send an artificial cosmic body to the Moon. Like the first two artificial earth satellites, it will not return to Earth. For example, it may be an artificial satellite which will leave the Earth and fly around the Moon."

Achieving the required velocity for flight to the Moon is a far from simple task, according to Sharonov, even though it means a mere increase of from 8 km/sec to 10 km/sec.

Unmanned flight to the Moon with a satellite equipped with television sets which will be able to transmit to the Earth a picture of surrounding space will enable us to solve one of the most difficult problems of the science of the Moon, namely, the study of the other side of the Moon.

"At present," says Sharonov, "it is still difficult to say with any certainty in which direction the practical investigation of the Moon will be developed during the next 10-15 years. There is no doubt that the period of investigations will be followed by a period of mastering of the Moon. Man will create guided interplanetary ships of such type that he will be able to reach the Moon, land on its surface, and set up, at first, temporary scientific stations supplied with air and food from the Earth; then, permanent observatories and institutes; and, in the future, even industrial enterprises which will extract and process the natural resources

[redacted] (Moscow, Izvestiya, 2 Feb 50)

Soviet Scientist Says Rocket Will Be Launched to Moon in Year or Two

Professor Fedorov, a member of the Soviet Committee for the International Geophysical Year, recently told a Moscow correspondent of the Italian Communist daily L'Unita that a Soviet rocket to the Moon may be launched in a year or two. Giuseppe Garritano, writing in the 28 February 1958 issue, interviewed Fedorov, a Corresponding Member of the Academy of Sciences USSR and director of its Institute of Applied Geophysics. The last two questions and answers of the interview were as follows.

Q. When do you believe it will be possible to send a rocket to the Moon?

A. The flight to the Moon of a rocket which will fall on the Moon's surface is a matter of a year or two. It is also possible to launch a rocket which will become for a certain period the satellite of the Moon and the Earth. What has not been technically solved is the flight of a rocket which will land on the Moon and then return to the Earth.

To solve this last problem one must find a method of braking the rocket when it lands. The braking action can be done by an engine, but that would require more fuel, which complicates matters. One could also use something resembling wings or large parachutes, but even this is quite difficult. Another difficulty is that of reducing the weight of the instruments and the sources of power: The solution lies in the exploitation of solar energy to feed the various instruments. Lastly, the problem of the engine itself must be solved, which must impart a still greater velocity to the rocket. The solution of these and many other problems offer remarkable difficulties.

Q. Will the USSR soon launch other satellites?

A. Other sputniks will be launched during the International Geophysical Year. Our technology can launch satellites of various types. (Rome, L'Unita, 28 Feb 58)

Sputnik Uses Surveyed

In an article titled "Scientific Investigations Using Artificial Earth Satellites," G. A. Skuridin, Candidate of Physicomathematical Sciences, Institute of Physics of the Earth imeni O. Yu. Shmidt, Academy of Sciences USSR, and L. V. Kurnosova, Candidate of Physicomathematical Sciences, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR, review in general terms the difficulties in putting a satellite into orbit and the research potential existing in an orbiting sputnik, remarking that the launchings now being accomplished in the USSR are merely the stage of the new investigations and that artificial satellites will become a common research tool in the scientist's hands and will help in solving the cosmic flight problem.

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Shuridin and Kurnosova proceed then to a discussion of some of the problems already outlined, opportunity for whose solution exists in principle now by using a satellite.

The study of the short-wave region of the solar spectrum is of interest in astrophysical studies and is of importance in a number of problems of upper atmosphere physics, playing a significant role in the formation of the ionosphere. Measurement of the 1215-angstrom line in the H spectrum and variations in its intensity is of interest since a large part of the Sun's ultraviolet radiation is concentrated in it. A block diagram of a device for recording solar radiation is shown, consisting of a filter, photoelectron multiplier with battery-feed, and a radio circuit with output to a transmitter.

The study of cosmic radiation centers primarily on two problems, according to the authors -- study of the spectrum of nuclei with respect to charge in primary cosmic radiation, and study of cosmic ray variations. Study of the composition of the nuclear component and energy spectra of different groups of nuclei in primary radiation is essential to the theory of the origin of cosmic rays. A particular question related to the composition of the nuclear component is that of the quantitative relationship between streams of the light nuclei of Li, Be, B and the C, N, O, and F nuclei. Planned experiments to investigate the nuclear charge spectrum beyond the atmosphere provide for recording the differential spectrum of nuclei in the interval from helium to oxygen. A photograph on page 11 of the source shows an instrument described as a "typical apparatus for investigating the composition of primary cosmic radiation. Particle counters are placed on the outside. The casing contains a Cherenkov counter."

Soviet theorists V. L. Ginzburg, I. S. Shklovskiy, and others developed a theory which explains the formation of cosmic radiation by way of acceleration of particles due to the static mechanism in the expanding turbulent envelopes of supernovae. The theory dictates that the ratio of Li, Be, B to C, N, O nuclear streams be $\geq$ 0.1. The value may be several times greater, in view of uncertainty in the case of some of the parameters used; But if the value is much less than 0.1, the theory would be contradictory to actuality.

There are extremely contradictory representations on the structure of the atmosphere at high altitudes. Much light can be thrown on this problem with the use of an artificial satellite, say the authors.

Corpuscular radiation of the Sun, they note, causes ionization of the upper atmosphere and sets up geomagnetic perturbations and the aurorae. Hence, the study of solar corpuscular radiation is also a "very important scientific and practical problem." A method of studying the phenomenon would be to use several different screens of substances which fluoresce under solar corpuscular radiation, and use photomultipliers to pick up the screens' emanations.

In discussing geomagnetic measurements, the authors note the advantages of a polar orbiting satellite as opposed to an equatorial orbiting satellite with regard to data spread, coverage of highly active areas, etc. They point out that geomagnetic measurements using a satellite will broaden and make more reliable our data on longitudinal and latitudinal distribution of constant and variable currents in the equatorial and polar regions.

An idea for an experiment consists in simultaneous measurement of magnetic field intensity at the satellite and on the Earth's surface, for the purpose of revealing the presence of currents below and above the satellite's trajectory. The experiments require a large number of ground stations for reliable data on magnetic field intensity at the surface of the Earth, and the location of these stations will depend on the orbit selected.

To determine field variations with an accuracy of not less than 15 gamma (1 gamma = 10^{-5}gs), they continue, in the case of a satellite altitude of 500 km the satellite's position on orbit must be found with an accuracy to one km. In addition, a magnetometer with small measurement error has to be used. Such accuracy can be achieved by an instrument based on proton resonance.

On the subject of investigating the solid component of interplanetary matter, the authors point out that the employment of artificial earth satellites for direct investigation of the solid component of meteoric matter is aimed at measuring total flux of particles and their energy spectra at various altitudes.

Visual observations of meteors at velocities of 10 to 100 km/sec, they say, permit sighting of meteors with a mass down to 0.002 g, and with optical instruments smaller particles can be observed. Radio methods based on recording of meteors by reflection of radio signals from the meteor trail -- a column of ionized gas -- extend the limits still further; and rocket investigations permit recording of particles in collision with the rocket shell or special membrane elements. A photograph is included here showing a polished plate which was "subjected to bombardment by micrometeors."

The authors remark, finally, that from the geophysics point of view the study of microparticles is important to clarify their role in the processes occurring in the upper atmosphere, particularly in the formation of the sporadic E layer, noctilucent clouds, and atmospheric glow.

In conclusion, the writers remark that they have by far not covered the areas of investigation in which sputniks can be put to work, citing as a particular example the biological investigations in the case of Sputnik II.

"Now that a breakthrough into the cosmos has been accomplished, it can be said that the opportunities for scientific research are indeed inexhaustible here.

"The launching of the first artificial earth satellites is a triumph of Soviet science and engineering, a shining witness of the fact that the tremendous program of scientific investigations to which Soviet science has addressed itself will be carried out and mankind will be enriched with new knowledge of the processes which take place on Earth and in the Universe and, by the same token, still another step will be made in man's mastery of the forces of nature." (Moscow, Priroda, No 12, Dec 57, pp 7-14)

III. UPPER ATMOSPHERE

First Soviet Ozonometric Laboratory at Main Geophysical Observatory

The first Ozonometric Laboratory in the Soviet Union was opened in November 1956 at the field base of the Main Geophysical Observatory imeni A. I. Voyeykov, located in Leningradskaya Oblast.

M. I. Budyko, director of the observatory, told a Tass correspondent that a group of young engineers under the supervision of G. P. Sushchin, a scientific associate of the observatory, are measuring the ozone content at 20- to 30-km altitude. Observations are conducted directly from the ground, and balloons and sounding balloons are not used. The associates at the laboratory have a unique instrument at their disposal which with the aid of a heliostat is aimed at the Sun. Light rays passing through a special device in the instrument are broken down into the spectra. Then, according to the intensity of the ultraviolet light in the spectrum the ozone content of the atmosphere is determined. This new instrument quickly and with perfect accuracy measures the quantity of ozone in the air.

It has been demonstrated that the increase or decrease of ozone in the upper atmosphere is usually connected with the origination and movement of cyclones on the Earth's surface. Therefore, the study of ozone is of great value for accurate weather forecasting.

At the beginning of 1957, ozonometric laboratories will be opened in Vladivostok, in the Caucasus, on Dikson Island, in Central Asia, and in other regions of the country. (Leningradskaya Pravda, 25 Nov 56)

Southernmost Soviet Observatory Actively Engaged in IGY

Members of the Institute of Physics and Geophysics of the Academy of Sciences Turkmen SSR are actively participating in the International Geophysical Year. Before them have been placed tasks of great importance -- the investigation of meteor activity and the upper layers of the earth's atmosphere, study of air currents in the ionosphere, and the conducting of electrometric observations and the study of other geophysical processes. In connection with such a program radar, photographic, visual, and telescope groups are working in the Astrophysics Laboratory.

In these groups, which are headed by Igor Stanislavovich Astapovich, more than 12 people are engaged in work. Many of them are young scientific associates. Basically, they are students at Ashkhabad State University -- Aman Khanberdyyev, Khalbay Gul'medov, and others.

I. S. Astapovich says that he is satisfied with the work of these young students and that they are inquisitive, capable, and extremely sincere.

In addition to the Astrophysics Laboratory, such groups as the astrophotometric, ionosphere-wave, earth currents, and seismic service were organized in the institute.

The study of such geophysical processes as the phenomenon of antiglow in the night sky is of extreme interest. As is known, by day the atmosphere is irradiated by the Sun and accumulates great energy which at night "fluoresces."

"This complex geophysical process can be recorded by various sensitive instruments such as, for example, a spectroelectrophotometric instrument," says Lidiya Georgiyevna Astapovich, the scientific associate who is responsible for observations of these processes.

It is interesting to note that the phenomenon of antiglow of the night sky was recorded for the first time in Ashkhabad by the Astrophysics Laboratory in 1953. Six years later Academician Fesenkov, during observations of geophysical processes in the region of Alma-Ata, confirmed the presence of a similar phenomenon with the aid of a photometer.

The precision instruments are set up in Keshi Garden at a great height. The interesting work of determining the velocity of meteors is being conducted by Anatoliy Belous and Aman Khanberdyyev, junior scientific associates of the Astrophysics Laboratory. At night they conduct exhaustive observations and intently examine the traces of meteors recorded on a photographic film by a special apparatus.

Near the little town of Firyuza at an altitude of 600 meters above sea level, a plateau stretches out. On the plateau is situated the new observatory of the Academy of Sciences Turkmen SSR. Here are installed and already operating various instruments and scientific equipment with whose aid observations according to the IGY program are being conducted. Some of the instruments consist of a large meteor patrol, portable binoculars, and spectrographs for studying night glow.

It is as if nature especially created the plateau for these purposes. The plateau in many respects is of great interest, for near it is the "Pole of Brightness" in the USSR. On the average during the year there are 308 bright days.

Khalbay Gul'medov is one of the students who operates the meteor patrol which photographs numerous meteors during the night.

The twin telescope is a binocular portable installation with whose aid K. Lyubarskiy, a junior scientific associate of the Astrophysics Laboratory, observes the ionosphere. The results of these observations are sent to the Scientific Research Institute of Terrestrial Magnetism, Ionosphere, and Radiowave Propagation of the Ministry of Communications USSR, which is the basic center where data of all observations from all over the country are collected and stored. (Ashkhabad, Turkmenskaya Iskra, 8 Sep 57)

Effectiveness of Meteor Cameras

The text of a report on meteor cameras, titled "The Effectiveness of Meteor Cameras in Relation to Their Light [Gathering] Power," by I. S. Astapovich of the Institute of Physics and Geophysics, Academy of Sciences Turkmen SSR, reads as follows:

"If there are two cameras with identical relative openings φ = D:f, but with different focal lengths f, we shall obtain different results in photographing meteors, since, with large f, the image of the meteor passes more rapidly over the photosensitive layer, and for each grain the time of the action of the light is shorter. On the other hand, the amount of light gathered is proportional to the square of the available aperture of the objective D. The usual shape of cassettes, however, limits the area S of the field of vision to a greater degree than do longer focal lengths. A majority of authors agree that, other conditions being equal, the effectiveness of meteor photography is proportional to D^2:f - φ. D. D. Maksutov emphasizes that an extremely small defocusing leads to a loss of an entire star magnitude and more. From our own point of view, we emphasize the enormous role of the quality of the photograph image when the same amount of light is concentrated on a smaller area of the emulsion, which increases the "penetrating" power of the camera. For the purpose of obtaining experimental data on the effectiveness of various cameras in photographing meteors, we employed already published material, namely, the well-known catalogue of Fisher and Olmstead on meteor photography. These data were obtained with cameras with φ = 1:14.6 to [illegible] - 1:4. We divided the cameras into groups according to the light [gathering] power. In the first group were three cameras with 1:φ = 14.6, 10.5 and 10.2; the second group had three cameras with 1:φ = 8.7; in the next group there were 3 cameras with 1:[illegible] - 7; then two cameras with 6.2; two with 5.5 and 5.6; two with 5.2; two with 4.5; and, finally, in the eighth group, two cameras with 1:[illegible] - 4.

"The table below shows the effectiveness of these camera groups. First, the average 1:o is given, then the approximate value of the area of the field of vision S, as determined from the catalogue, then the number of photographed meteors n_h for each camera during one hour of exposure, the number of photographed meteors per hour on one square degree of the field of vision of the camera, and, finally, the values $P_1 = n_h \cdot (1:o) \cdot 10^2$ and $P_2 = n_h (1:o)^2 \cdot 10^2$.

Average 1:	11.8	8.7	7	6.2	5.5	5.2	4.5	4.0
Meteors, n	1	5	6	16	6	5	8	14
Meteors per hour $n_h \cdot 10^5$	92	204	315	87	388	556	763	1,160
Field of vision S	4.0	200	130	27.4	23	8.6	36	1,280
$(n_h:S \cdot 10^6$	230	10	24	32	169	641	212	87
$P_1 = (1:o) \cdot n_h \cdot 10^2$	1.0	1.8	2.2	(0.54)	2.1	2.7	3.5	4.6
$P_2 = (1:o)^2 \cdot n_h \cdot 10^2$	12	15	15	(3.3)	12	14	15	19

"First of all, the well-known rule, that the number of observed meteors increases with an increase of the relative aperture φ, was confirmed. This dependence, however, is directly proportional not for φ, but for φ^2. It is sufficient to look at the last line in order to be convinced of the practical constancy of P_2 0.13 or $n_h = 0.13 \cdot \varphi^2$. Let us remember that the above-mentioned catalogue values were obtained with photographic emulsions of the first quarter of this century, which provided an average numerical coefficient of 0.13.

"Thus practice shows that, when the field of vision of the camera is taken into account, the number of photographed meteors is proportional not to $D^2:f$, but to $D^2:f^2$. The coefficient of proportionality for cameras with greater light [gathering] power, and also for more light-sensitive modern emulsions, should be determined through further investigation."
(Izvestiya Akademii Nauk Turkmenskoy SSR, No 6, 1957, pp 99-100)

IV. METEOROLOGY

Digital Computers Used in Preparation of Daily AT-700 Maps

The experience of programing one of the problems of dynamic meteorology, the prognosis of pressure fields, on a digital computer, is described in a Soviet periodical. A. Yu. Birkgan and A. N. Lyubimov present the system for the numerical solution of the problem. The system was developed by S. L. Belousov on the BESM computer and by the authors on a Strela computer. The arrangement and procedure of the scheme were especially designed for use in daily forecasts. Its simplicity and low machine time enable the compilation of daily precalculated AT-700 maps. The computer program for this problem is included in the article. Some information on the potentialities and the programing elements in the Strela are discussed. (Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No 1, Jan 58, pp 93-104)

V. OCEANOGRAPHY

Study of Temperature Oscillations in Sea's Surface Layer

A method of measuring temperature pulsations in the surface layer of the sea using a semiconductor resistance thermometer is described in an article ("Measurement of Temperature Pulsations in the Surface Layer of the Sea") by N. V. Kontobytseva, Moscow State University imeni M. V. Lomonosov. Some data concerning the microstructure of the temperature field in the offshore waters of the Black Sea (an analysis of the temperature pulsations according to amplitude and frequency) are presented. (Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No 1, Jan 58, pp 86-92)

VI. GRAVIMETRY

Gravity Measurements at Sea by Pendulum Method

The third in a series of articles by V. Romanyuk, Institute of Physics of the Earth, Academy of Sciences USSR, entitled, "Determination of Gravity at Sea by the Pendulum Method," recently appeared in a Soviet geophysics periodical.

The problem of determining inclinations and accelerations in a pendulum instrument is set up and solved with the aid of inclinometers and accelerometers. Approximate differential equations of the motions of these instruments with a consideration of second order corrections are compiled. Permissible errors of measuring the acceleration and inclination components of the pendulum supports in relation to their size are determined. Expressions for U_0^2, V_0^2, and W_0^2 (amplitudes of the components of the absolute acceleration of the supports) are compiled, and practical examples of these in calculations and second order corrections for points determined on surface vessels are discussed. (Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No 1, Jan 58, pp 54-64)

VII. SEISMOLOGY

Formulas for Elastic Wave Intensities in Heterogeneous Media Derived

V. M. Babich and A. S. Alekseyev, Academy of Sciences USSR, Leningrad Branch of the Mathematics Institute imeni V. A. Steklov, in an article ("Radiation Method of Calculating Wave Front Intensities") appearing in a geophysics periodical describe a radiation method of calculating the intensities of seismic wave fronts.

Formulas for the geometric approximation of the intensities of nonstationary elastic waves in a heterogeneous medium are derived with the aid of the theory of generalized functions. Hypotheses are formulated with which, using the formulas derived in the article, the intensities of waves in a wide variety of cases can be calculated. (Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No 1, Jan 58, pp 17-31)

Soviets Preparing Tectonic Maps of the Globe

With the help of foreign scientists, Soviet geologists are preparing tectonic maps of the globe. The maps will illustrate the formation and development of the Earth's crust, the distribution of various soil deposits, and the influence of tectonic movements.

The maps will be helpful in determining the location of mineral deposits.

The first map will include all of Europe. The committee in charge of the work is also compiling a dictionary of special tectonic terminology.

(Budapest, Nepakarat, 22 Dec 57)

Propagation of Elastic Waves in Metal Rods Studied

In 1956, O. I. Silayeva and O. G. Shamina conducted experiments on the propagation of elastic waves in rods, in the Laboratory for Modeling Seismic Phenomena of the Institute of Physics of the Earth, Academy of Sciences USSR. These experiments were conducted under the supervision of Yu. V. Riznichenko.

These experiments, on the propagation of elastic impulses in cylindrical metallic rods, are described in an article appearing in a Soviet periodical. An ultrasonic impulse method (using a BI-4 instrument) was used for creating the elastic waves. A method of longitudinal profiling was used in selecting samples.

It was found that longitudinal waves could be propagated in the models in two wave velocities: V_{PM}, which is equal to the velocity of the propagation of longitudinal waves in an infinite medium, and V_{PCT}, equal to the velocity of the propagation of longitudinal waves in a thin medium (rods). An explanation concerning the relation of the measurements of the cross section of the cylindrical rods to the length of the longitudinal waves, which is necessary in determining velocities of longitudinal waves in models, is given.

The investigations have a practical value in that, using the results obtained, an experimenter can choose the measurements of the models studied in such a way that, in the range of the working frequencies measured in samples of a given material, the velocities of the longitudinal waves will, at his discretion, correspond either to the velocity of the propagation in an infinite medium V_{PM}, or to the velocities in a thin rod V_{PCT}. (Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No 1, Jan 58, pp 32-45)

Study of Wave Fields in Prefrontal Zones

The second in a series of articles by N. V. Zvolinskiy, Institute of the Physics of the Earth, Academy of Sciences USSR, entitled "Reflected and Head Waves Originating in the Plane Boundary of Separation of Two Elastic Media," has been published. In the second article, Zvolinskiy studies a reflected wave (PS) and head waves (PPP,PPS) arising in the plane boundary of separation of elastic media. From exact solutions, asymptotic formulas suitable to the prefrontal zone are obtained. (Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No 1, Jan 58, pp 3-16)

Soviet Study of Latitude Variation and Pole Precession

Soviet activities in latitude variation and pole precession studies are reviewed by N. M. Aksent'yeva in a leading Ukrainian scientific journal. Special attention is given to the operations of the Poltava Gravimetric Observatory and its role in the IGY.

The observatory was commissioned by the Interdepartmental Committee of the IGY to investigate the problem, "Latitude Variation and Pole Precession of the Earth," in the Soviet Union. In addition, the observatory is performing scientific research according to the Five-Year Plan for further development of studies on tidal deformations of the earth. The moon is also being photographed for the solution of certain problems of an astronomical-geodesic character which are pertinent to the rotation and shape of the earth.

The Soviet Latitude Service has expanded during the IGY, with the addition of three more latitude stations which have become operational in Moscow, Irkutsk, and Blagoveshchensk on the Amur. Of particular importance are the observatories of Irkutsk and Blagoveshchensk, which are located far from existing latitude services. It will be possible to calculate pole coordinates more accurately on the basis of data from these stations.

Pole precession and latitude variation observations will be conducted at the Poltava observatory with two tested instruments, the Zeiss (with an objective diameter of 135 mm) and the Bamberg (with an objective diameter of 110 mm). A new zenith telescope designed by the Pulkovo Observatory and having an objective diameter of 180 mm will be tested in the Soviet Union. The Poltava latitude program is complete with star observations for the adjustment and control of instruments.

Azimuth observations will be conducted, in addition to those on latitude, in the study of pole precession. The special transit instrument APM-10 has been installed in an elongated specially constructed metal pavilion. The role of the land marker, the azimuth fluctuations of which will be measured by this instrument, is represented by a "measure" which appears as a fundamental column with a light point. This column is located on a hill 373 m from the APM-10 instrument in a brick pavilion. During operations, "measures" of various types and programs of stars will be tested. This project is aimed at the perfection of the method of azimuth observations which have been little used to date.

Work will be conducted in Poltava with the impersonal Danjon astrolabe, which can be used for latitude and time observations. This instrument is well known abroad and is claimed to be the best for latitude observations.

During the IGY, the impersonal astrolabe will be used in all of the foreign observatories. A special pavilion of original design has been completed in Poltava for this instrument, and observations will begin as soon as the observatory receives the instrument.

It is the task of the observatory to collect, process, and generalize latitude observation materials from all stations of the Soviet latitude Service and combine them with results of the International Latitude Service and other foreign observatories. For this purpose, the Poltava observatory is exchanging data on latitude observations with certain foreign observatories and also with the Central Bureau of the International Latitude Service.

The abundant materials on latitude observations collected during the 18 months of the IGY will make it possible to (1) obtain accurate data on the principles of pole precession; (2) determine the principles of non-polar variations of latitude; (3) clarify the principles which cause changes in the amplitude and the initial phase of free movements of the earth's sphere; (4) clarify questions of the existence, character, and continuous movement of the poles of the earth; (5) solve important geophysical problems, for example, the connection between ordinary circulation of surface atmosphere and precession of the poles; (6) clarify certain theoretical problems connected with the internal structure of the earth and others.

The task of the observatory in the study of the tidal fluctuations of the force of gravity and tidal deformations of the earth depends on the general progress of universal science in this branch of knowledge.

The program of operations for the study of terrestrial tides during the IGY, as adopted by the gravimetric group (Group 13) of the Special Committee for the IGY (CSAGI) in Paris in August 1956, contains the following recommendations:

1. Attain maximum accuracy in measurements of the values of γ and β.

2. Study the effect of the elasticity of the earth on various tidal waves for 24- and 12-hour periods.

3. Study the indirect effects which complicate terrestrial tides and are dependent on principles of technical and geological character.

4. Investigate problems on the possibility of the existence of tidal variations with time as dependent on principles of seasonal and seismic character.

To date, the instruments for measurement of crustal fluctuations in the Soviet Union were, in most cases, located at a small depth. From a long series of observations with these instruments, it was possible to

derive the main monthly 13-hour wave M_m and accordingly find the factor for a given point with great accuracy. Other tidal waves are individually difficult to point out in connection with the disturbing action of deformation of the earth which appears due to uneven heating of the ground by the sun and various meteorological principles. Also of great interest, as pointed out by Jeffreys, are the results of the calculations of the values of α according to 24- and 12-hour tidal waves in the study of the elastic properties of the earth and especially in the behavior of its core. During favorable conditions, it is possible to find the tidal waves M_2, N_2, O_1, S_2 and K_1. Such favorable conditions can be found far below the surface, where the effect of local climatic and meteorological factors is not perceptible.

Interesting locations for observations of terrestrial tides can be found in the Ukraine in mines of the Donets Basin, Krivoy Rog, the Carpathians, and deep caves of the Crimean Mountains. With instruments installed for observations of crustal fluctuations in various geological formations, it is possible to expect that the problems on the effect of geological conditions on the magnitude of terrestrial tides will be solved.

A terrestrial tide station organized by the Poltava Gravimetric Observatory will begin operation in the very near future in one of the Krivoy Rog mines at a depth of 200 m. Crustal fluctuation observations will be performed in a suitable chamber with horizontal pendulums. Similar stations will be in operation in the Donets Basin, the Carpathians, the Crimea, and other parts of the Ukraine. These stations will be equipped with highly sensitive self-recording gravimeters for the study of gravity fluctuations.

The well-known scientist N. S. Molodenskiy pointed out in his theoretical investigations that these variations are of particular importance in the study of the elastic properties and internal structure of the Earth.

In 1958, the observatory will begin preparations for photographing the Moon. This will assist in the solution of certain astronomical-geodetic problems.

The observatory is equipped with an astrograph installed in a revolving dome turret and is equipped with special photographic cameras. Operations will be conducted simultaneously with the Main Astronomical Observatory of the Academy of Sciences USSR.

In conclusion, it must be noted that the programs and methods for latitude observations and particularly the methods for locating pole coordinates, as developed by the active participation of the observatory and being adapted in the Soviet Union, are more progressive and effective than those being used by the International Latitude Service and foreign scientists. It is not accidental that the most significant results from analyses of long series of observations collected during the past 50 years were obtained in

the USSR, along with fundamental theoretical investigations for determining the mechanical properties of the earth according to data on pole precession and tidal changes of the force of gravity. It is the goal of Soviet scientists to familiarize the wide circle of foreign scientists with these methods and add to the work of foreign scientists and directors of the International Latitude Service in reorganization of the programs and methods utilized by the service in performing observations. Soviet astronomers have expounded on this problem at international astronomical conferences and in the press since 1948 and have attained some success. This is at least illustrated by the fact that the International Temporary Latitude Service created in 1955 and the International Time Bureau have begun using the data of latitude observations not only of the International Latitude Service in calculations of pole coordinates, but also from a series of isolated stations among which are Poltava and Pulkovo.

The release of the works of A. Ya. Orlov which have been prepared for publication by the Poltava Gravimetric Observatory will be of great significance in latitude problems. Moreover, a major role in this matter will be played by Soviet astronomers in preparations for a symposium on rotational precession of the Earth, which is supposed to take place in 1958 in Moscow during the conference of the International Astronomical Union. (Visnyk Akademii Nauk Ukrains'koi RSR, No 11, Nov 57, pp 42-51)

IX. ANTARCTIC

Hydraulic Integrators Used By Antarctic Heat Physicists

Heat physicists of the Second Antarctic Expedition of the Academy of Sciences USSR have been using a two-section hydraulic integrator for making necessary various complex calculations. The hydraulic integrator was manufactured by the Ryazan Plant for Calculating Machines in 1956. (Leningrad, Leningradskaya Pravda, 25 Nov 56)

Soviets Mapping the Antarctic

Greatly improved maps of the Antarctic are being made as the result of aerial photography undertaken by the Soviet expedition to the South Pole. Members of the expedition, aboard the Lena, surveyed 3,000 kilometers of coast in 40 days and determined the depth of the ocean along an area 7,500 kilometers long. (Budapest, Technika No 6, Aug 57, p 10)

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