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PLEASE NOTE

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SOVIET BLOC INTERNATIONAL GEOPHYSICAL YEAR INFORMATION

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I. GENERAL

Regional Conference on Problems of Organizing the Announcement of Special World Interval Observations Held in Moscow

A conference on problems of organizing the announcement of special intervals of observations in the European-Asiatic IGY region was held in Moscow 7-8 May 1957. A report of the conference as presented by N. V. Pushkov follows.

Participating in the conference were representatives of the national committees of the countries of the region: Bulgaria, Dr Krustanov; Hungary, Dr Bela Bell; German Democratic Republic, Dr Philipps and Docent Lauters; Mongolian People's Republic, Chiminbardzhi and Ninzhbadgar; Poland, Docent Parczewski; Rumania, Dr Stoenescu and Dr Popovici; USSR, Pushkov and Mogilevskiy, Candidates of Physicomathematical Sciences; and Czechoslovakia, Mrazek, Candidate of Technical Sciences.

The conference was under the direction of Yu. D. Bulanzhe, Doctor of Physicomathematical Sciences, regional secretary of the European-Asiatic Region. Attending the conference as representatives of CSAGI (Comite Special Annee Geophysique Internationale) were V. V. Belousov, member of the bureau and Dr A. N. Shapley, member of the committee and reporter for world days and communications.

Leaders of working groups of the Soviet IGY Committee and some of the leading workers of the Ministry of Communications and of the communication services of the Main Administration of the Hydrometeorological Service and the Main Administration of the Northern Sea Route took part in the conference as experts (consultants).

The conference considered the following problems:

1. Problems of the European-Asiatic Communication Center and its work during the week of test announcements (report of N. V. Pushkov).

2. Work of the national communication centers during the week of test announcements (report of the representatives of national committees of the IGY).

3. The draft of a plan for the collection and dissemination of daily summaries of solar and geophysical data (report of E. I. Mogilevskiy).

The conference was very timely. It made it possible to establish a personal contact between the leaders of the regional and national communication centers. Participants in the conference visited the Scientific Research Institute of Terrestrial Magnetism, Ionosphere, and Radiowave Propagation and the Main Administration of the Hydrometeorological Service.

The following resolutions of the Regional Conference on Problems of Organizing the Announcement of Special World Interval Observations were adopted:

1. The regional conference noted that national IGY committees of the region countries conduct much work on the organization of communications for announcements of alerts and special world intervals. Results of the week's test announcements which were conducted showed that in the majority of the region countries effective systems for the transmission of announcements by stations were already established. Particularly accurate and quick-acting transmitting systems were created in the German Democratic Republic, Hungary, Rumania, the USSR, and Czechoslovakia. The meteorological services and the ministries of communication of the region countries render great service to the national IGY committee in ensuring the transmission of announcements.

The test transmissions of the announcements showed that alerts and notices of special world intervals declared at 1600 GMT were carried through to the majority of the region stations in time. However, there were cases when isolated stations received the warning after 2400 GMT. Such cases occurred as a rule in stations located at great distances from the national centers of communication. The conference recommends that the national committees of the region countries analyze cases of tardiness which would be detrimental to the fulfillment of the program of observations and take measures to eliminate them in the future.

2. For ensuring continuity in the transmission of announcements, the conference considers it necessary that regional and national centers of communication should receive telegrams through two unrelated channels. In this connection the conference recommends that the regional and national centers use warnings received through Frankfurt-on-Main and through the English station "GFA." The conference, in addition, recommends that the announcements obtained through Frankfurt-on-Main from Potsdam and Paris be transmitted into Warsaw, Sofia, Bucharest, Budapest, and Moscow and requests the meteorological service of the GDR and the Czechoslovak People's Republic to take the necessary steps for this measure. The conference also considers it useful to organize the reception by the national centers of communication, where this is possible, of messages from centers of communication of other regions. National centers, which receive reports from other regions, can receive messages from Moscow by teletype or telegraph only, that is, through one channel.

3. The conference considers it untimely to adopt a resolution on the necessity of sending "no alert" telegrams before the end of the IGY test month (June 1957). It is possible that such communications could be used in certain regions and in separate countries. "No alert" messages in case of their introduction should be transmitted by national centers of communication according to whose judgment they will be transmitted by the station.

4. The conference turns the attention of the national centers of communication on the additional difficulties connected with the irregular transmission of messages in the test month, and reveals the necessity of carefully preparing the means of communication for the dissemination of messages and ensuring their receipt by interested countries.

5. The conference recommends to the World Communication Center that the standard text of warnings be curtailed as much as possible without impairing its clarity after the end of the test month. The conference has no objection to the use of the English language in messages for the European-Asiatic Region.

The conference considers it undesirable to introduce changes in the standard text without extreme necessity. In case the World Communication Center during the IGY desires to introduce some changes in the standard texts of the telegrams, it should communicate such changes to the regional and national centers of communication beforehand so that these in turn can notify stations by post or telegraph.

6. The conference considers it very desirable that CSAGI establish forms of observations needed in messages concerning Special World Intervals. Recommendations of CSAGI in this connection must be included in supplements to the manual on world days and communications. For its own part the conference considers it expedient to send messages of Alerts and Special World Intervals to stations conducting the following types of observations:

a. Aerological (in aerological stations near cosmic ray stations).

b. Ozonometric.

c. Geomagnetic.

d. Observations of auroras and airglow.

e. Ionospheric (including atmospheric disturbances and meteor observations).

f. Solar (optical and radio observations).

g. Observations for cosmic rays.

h. Longitude measurements (in those cases when they are connected with measurements of the speed of radiowave propagation).

7. The conference requests the regional communication center to generalize data concerning the times of receipt of warnings by the region stations in June 1957 and to circulate them for general information. For this the national centers of the region countries must present data on the maximum, minimum, and median times of the receipt of the warnings, and also the number of cases of receiving telegrams after 2400 World Time for each station.

8. The conference in principle approves the system of collection and dissemination of summaries of solar and geophysical data recommended by the regional centers of communication. The daily exchange of these data among the region countries must be done through the regional centers of communication using the communication facilities of the meteorological services. In the exchange the data of a limited number of stations and observatories, a list which is approved by the national IGY committees and the regional centers of communication must be included. The summaries of data compiled by the regional centers of communication must be transmitted by the national centers of communication to the meteorological services of the region by teletype once or twice daily and disseminated among other organizations and stations interested in them. This can be done by including the summaries in meteorological forecasts, radiotelephone transmissions, etc. The national IGY committees must quickly make a decision on the transmission codes recommended by the regional center of communication so that they can be introduced during the test month.

9. The conference supports the proposal of the regional center concerning the wide circulation in the region countries of the following bulletins which are published in the USSR: "Solar Data," "Monthly Review of Cosmic Data," and "Monthly Radio Forecasts," and also concerning the insertion in them of the most important data of observations obtained from solar, magnetic, and ionospheric stations of the region. The conference recommends that the national IGY committees have translated into the appropriate language the permanent part of texts and explanations to bulletin tables and have these translations circulated among the organizations interested in them.

The conference also recommends to the national IGY committees that the mutual exchange of bulletins for the various IGY disciplines published in the region countries be organized, and that, in accordance with the recommendations of CSAGI, forms be produced for the presentation of data.

10. The conference requests the regional center to consider the possibility of the rapid dissemination of preliminary descriptions and materials concerning unusual solar and geomagnetic phenomena by means of inserting them in the "Monthly Review of Cosmic Data" or publication of information letters. (Mezhdunarodnyy Geofizicheskiy God, Informatsionnyy Byulleten', No 4, 1958, pp 108-111)

Activities of East German Geophysical Observatory at Leipzig

The Geophysical Observatory of Karl Marx University, Leipzig, the only university institute of its kind in Europe, is situated on the north side of the Collmberg mountain near Oschatz. Under the direction of Professor Dr Schneider-Carius, director of the Geophysical Institute of Karl Marx University, the observatory is doing research work on the physical properties of the earth (Erdkoerper) and of the atmosphere. A total of 250 stations are receiving series of geophysical measurements from the observatory.

The observatory is equipped with all kinds of the most modern instruments and installations for meteorological and ionospheric measurements and recordings of data. For some time the observatory has had four modern receiving installations through which the propagation of ultrashort waves can be traced and the dependence of ultrashort-wave reception on the condition of the lower atmospheric strata can be examined. The East German government allotted considerable funds for the modern ionosphere-research installations which are playing a great role also in the research tasks during the International Geophysical Year.

The ionospheric tests are based on observations of the condition of and changes in the outer layers of the atmosphere (Hochatmosphaere). A number of ionosphere direction finders in the 26-meter-high tower of the observatory are registering the propagation conditions of long and medium waves with regard to their dependence on the condition of the outer layers of the atmosphere. These measurements are being coordinated with Kuehlungsborn Institute for Ionospheric Research and the Prague Geophysical Institute. There is a regular exchange among these institutes for the study

of the propagation of ionospheric disturbances. The three institutes have receivers for the recording of the so-called Moegel-Dellinger effect which is caused by intensified ultraviolet radiation of the sun in periods of increased solar activity. In that case, the short waves during daytime are being temporarily absorbed by the additional ionization of the atmosphere so that short-wave radio transmission suffers complete or temporary interruptions.

Further installations of the Collm Observatory are three newly established observation points whose receivers are tuned in to the Prague medium-wave station and which register the minimum and maximum values of the space-waves at specific times, thus measuring the direction and speed of the wind at an altitude of 90 kilometers. The magnetic observatory of the Collm institute is one of the few which also have ionospheric control equipment in the same location and thus can examine the connections between magnetic and ionspheric disturbances. Visual magnetic recording makes it possible to register northern lights so that there is no need to wait for an optical evaluation. (Berlin, National-Zeitung, 6 May 58)

Soviet Scientific Expeditions in Siberia

The creation of a Siberian Branch of the Academy of Sciences has already made it possible this year to considerably increase the volume of scientific research work in the region of Siberia.

The Scientific Research Institute of Geology and Geophysics alone is sending out 28 expeditionary crews. This is twice the number that worked last year.

Large thematic investigations of the physical fields and mountain systems of western Siberia will be conducted. A large detachment of scientists is departing to uncover oil- and gas-bearing structures in the central part of the western Siberian plains. Also of interest to these scientists are regularities in the distribution of useful minerals in the Altay mountains and the nature of the coal deposits of the Kuzbass and other Siberian regions.

Among the leaders of the expeditionary detachments are V. A. Kuznetsov and F. N. Shakhov, Corresponding Members of the Academy of Science USSR. (Moscow, Pravda, 30 Jun 58)

II. ROCKETS AND ARTIFICIAL EARTH SATELLITES

CPYRGHT

Stalin Prize Winner Discusses Returning Satellite Crews to Earth

P. Isakov, Candidate of Biological Sciences, Stalin Prize Winner, in the article, "The Problem of Returning Satellite Crews From the Cosmos," discusses some of the problems confronting scientists in such an undertaking.

Isakov reduces the means of accomplishing the safe return of crews from cosmic space to two: the first is to return the satellite and crew together, and the second, to return the crew only. He says the second method will be simpler.

Ejection apparatus and hermetically sealed capsules may be used for catapulting crews from satellites or rockets which have been slowed sufficiently with the aid of powerful retro-rockets or by means of the so-called braking ellipses. Isakov says that, if the velocity of the satellite can be successfully lowered to the desired degree, the ejection of its crew can be accomplished by methods already in use in aviation. However, he continues, the practical development of such a method is still needed in obtaining supplementary data. In particular it is necessary to obtain information concerning temperatures arising during different braking intensities, on cooling the satellite under different conditions, etc. Also required is a solution to the problem of the effect of high temperatures on the crews and the development of protective equipment. At present, says Isakov, man is in a position to withstand surrounding temperature increases of up to and over 100° centigrade for short periods. Clothes of special types have already been developed which permit a man to be in a temperature of 300° centigrade. Here Isakov refers to such equipment which has been developed in "other countries" than the Soviet Union.

The temperature barrier is not the sole difficulty standing before scientists. The problem of the increased G-effect due to deceleration also must be solved. The effect of increased Gs is studied at present by many medical specialists. It has been established that man can withstand a force of 3-5 Gs for short periods with no harmful aftereffects. However, if the forces continue for several minutes serious changes in a man's condition arise which sharply limit his efficiency. In this connection scientists are persistently seeking effective means to protect man from these forces.

Isakov mentions the experiments of Italian scientists who subjected animals to "overloads" [G-forces] when submerged in water. Such a method, he says, was proposed during Tsiolkovskiy's time. The present experiments showed that under these conditions animals could withstand much more overload than under the usual conditions. Thus, he continues, scientists are presented with still another means of ensuring man's safety during his return from cosmic flight.

Isakov also discusses the danger to man's organism due to rapid and irregular rotations of the body in all possible planes. Such rotations can cause serious aftereffects. It is known that if a man is rotated with a speed of 2-3 revolutions per second he loses consciousness after 10-15 seconds. Loss of consciousness due to the body's rotation during delayed parachute jumps is not unknown.

The experiments of Soviet scientists were devoted to developing life-saving systems in the rocket flights of animals up to altitudes of 200 kilometers. These showed that the animals' lives could be successfully preserved after the containers in which they were housed were ejected from the rockets. The results of these investigations undoubtedly will have great value also for the future development of recovery systems from still greater altitudes, among them for man's return from cosmic flights.

"The methods of ensuring man's return from cosmic space presented above do not eliminate all the problems. There are a number of other problems, no less important. However, modern science has the capabilities to solve all these problems." (Moscow, Krasnaya Zvezda, 3 Jul 58)

Space Ship Utilizing Electric Fields Suggested

"Cosmic Space -- Storehouse of Limitless Energy Reserves," by G. I. Pokrovskiy, as told to A. Petrov is a discussion of the various forces in space which could be used to drive a space ship. The author proposes that "cosmic electromagnetic fields" may be used for controllable power. Such a ship must have special equipment to utilize this energy source, and although such equipment has not yet been developed, its elements have already been designed for other applications.

"Two particle accelerators comprise the basic element of this equipment. One of these is intended for the acceleration of positively charged particles, hydrogen ions; the other, for the acceleration of the negatively charged electrons. If the first accelerator is operating, a positive

charge leaves the ship and the whole ship is negatively charged. If the ship is located in a cosmic electric field, it will move toward the positive pole. Similarly, if the electron accelerator is operating, the ship will move toward the negative pole. By changing the sign and magnitude of the charge, the cosmic ship can change acceleration and direction. Protons and electrons must be emitted from the ship into cosmic space with sufficient energy to prevent their falling back on the ship.

"If the ship is divided into two electrically isolated parts, then the ship may be turned in space by charging each of them with some charge or other. If the whole ship, or some individual part of it, is made to rotate rapidly, the ship turns into a magnet which can be oriented by some method in the cosmic magnetic field.

"The forces arising under these conditions will not be very large in most cases. However, considering the limitless extent of cosmic space and the possibility of prolonged acceleration, one can conclude that electromagnetic fields in interstellar space make it possible, within wide limits, to drive a space ship at least when there are no large heavenly bodies close by. Only small supplies of ionized material are necessary for such a drive. The energy to emit the ions may be obtained from irradiation or from a small supply of fuel. The energy of this fuel will be inconsiderable in comparison with the energy latent in cosmic magnetic fields which can be used to drive a ship. . . ." (Tekhnika Molodezhi, No 6, Jun 58, pp 5-13)

Sputnik III Over Moscow

On the night of 27-28 June 1958, visual and photographic observations of Sputnik III were made at the State Astronomical Institute imeni Shternberg in Moscow. Before this, visual observations have been impossible because of unfavorable weather conditions. Two photographs were made of the carrier rocket; one showing its trail is reproduced with the article. (Moscow, Izvestiya, 29 Jun 58)

III. UPPER ATMOSPHERE

First Tests at Potsdam On Soviet Diffraction Grating

A review of a paper titled "Test Results on a New Diffraction Grating of the Potsdam Astrophysical Observatory, Produced at the Leningrad Optical Institute," read by E. H. Schroeter, of Potsdam, at the fifth Conference on Spectroscopy of the Physics Society of East Germany, held 14-16 November 1957 in Halle, gives the following information:

The diffraction grating is a present of the Academy of Sciences USSR to the German Academy of Sciences in Berlin and has been in use in Potsdam since March 1957 in connection with the large spectrographic installation (autocollimation, f = 12 m) of the Einstein Tower for the recording of solar spectra. The 150-mm-diameter and 21-mm thick glass disk coated with aluminum has a divided surface of 90 x 100 mm^2 (600 lines per mm). The "blaze" property of the grating, emphasized by the manufacturers, was tested on the large autocollimation spectrograph through photoelectric measurements of the intensity of intrafocal images of Hg-lines in various arrangements on both sides of the grating normal. There was one "blaze" direction on each side of the grating normal. On one side, 65 percent of the incident monchromatic radiation was measured in the second order at λ = 4,900 Å at maximum intensity distribution. The entire half-width of the bell-shaped intensity distribution in the spectrum amounts to 2,600 Å, so that the total visual spectral range can be observed in this order of greatest light intensity at a dispersion of 1 Å = 1.52 mm. On the other side of the grating normal the maximum intensity distribution is obtained with about 35 percent light yield at λ = 4,000 Å in the 6th order (dispersion up to 1 Å = 8.2 mm). An approximation formula from the diffraction theory, derived under the assumption of a triangular grating groove profile, satisfactorily agrees with the measured distribution of intensity in the spectrum of the grating.

The ratio of the theoretical spectral resolution to the practical resolution was investigated up to the 6th order by means of photographs of the hyperfine structure of appropriate Hg-lines. In the second order, the component pair A and B (see H. Schueler and J. E. Keyston, Z. Phys., Vol 72, 1931, p 423) of the Hg-line λ = 5,461 Å with $\Delta\lambda$ = 46 mÅ could still be resolved in spite of the great difference in the intensity ratio. This corresponds to a practical resolution of 119,000 (the theoretical value amounts to 120,000). Another photograph showed that, in the 6th order, the component pair g and e of the Hg-line λ = 4,358 Å, with a spacing of only 11 mÅ corresponding to a $\Delta\lambda$ = 390,000, could still be clearly resolved. The fact that the theoretical value, which is based on the Rayleigh criterion, is exceeded, shows, on the one hand, that this criterion can be exceeded by photographic recordings and, on the other hand, that the Leningrad refraction grating retains its full

performance rating up to the highest useable order. The intensity of the Rowland ghosts is extremely low. In the second order, the total intensity of the two ghosts of the first order is less than 0.04 percent of the line itself. Ghost of a higher order could not be detected. In the 6th order only the four ghosts of the two first orders appear with noticeable intensity. Their total intensity is equal to or less than 2 percent of the line itself.

A detailed determination of the vertical and horizontal apparatus function of the spectral installation, the focal error of the grating, its polarization properties, etc., is now being made at Potsdam.

(Berlin, Experimentelle Technik der Physik, Vol 6, No 1, 1958, pp 26, 27) CPYRGHT

First Data Obtained With Soviet Diffraction Grating at Potsdam

A second paper, titled "The First Results of Solar Observations With the New Diffraction Grating of the Einstein Tower," by E. H. Schroeter, Potsdam, which was read at the 5th Conference on Spectroscopy of the Physics Society of East Germany, held 14-16 November 1957 in Halle, gives the following information: CPYRGHT

The excellent quality of the grating, especially the increased light intensity based on the "blaze" property, in connection with the use of higher orders, makes possible the spectral investigation of the granulation-induced Doppler effects on Fraunhofer lines of the solar spectrum. The theory of solar granulation, according to which the bright granules represent turbulence elements rising adiabatically out of the hydrogen convection zone, and the dark intermediate spaces represent descending turbulence elements, demands that each solar absorption line have a zig-zag structure as a result of the Doppler effects of changing direction.

By means of several diapositives, it could be shown that the solar spectrograms recorded with the new Leningrad diffraction grating are on an equal footing with those obtained on the McMath-Hulbert. The quantitative evaluation of these photographs is now in progress. With the aid of a method described by E. Lau and W. Krug (Die Aequidensitometrie, Akademie-Verlag, Berlin 1957), curves of constant density, so-called "equidensities," were prepared for individual Fraunhofer lines. These curves were then admeasured in a coordinate-measuring apparatus. The velocity of ascent and descent of the granulation elements ($\emptyset$ = 3" = 2,250 km on the sun) resolved by the Potsdam apparatus was on the order of 0.3 km/sec, thus in agreement with the results obtained by Richardson and Schwarzschild (Astrophysic.J. 111, 1950, 351). The first measurements already indicate a dependence of this average granular velocity on the type of line. For a Ti I line the result was 0.35 km/sec, for a Cr-line with excitation potential χ = 0.9 ev, a velocity of 0.28 km/sec. If this connection should be confirmed in the case of additional lines, it would afford a means of deriving the relationship between the velocity of the granulation elements and the altitude in the solar atmosphere.

By means of photographs of equidensities it could be shown that Fraunhofer lines exhibit an, albeit slight, asymmetry. Such an asymmetry has already been predicted (E. H. Schroeder, Z. Astrophysik, 41, 1957, 141) and measured (H. H. Voigt, Z. Astrophysik, 40, 1956, 157) on the basis of observations of the influence of the granulation elements which are either irresolvable or blurred by atmospheric scintillation on the line absorption. (Berlin, Experimentelle Technik der Physik, Vol 6, No 1, 1958, pp 27-28)

Soviet Sun Service Laboratory

A photograph published in Izvestiya bears the following caption:

"Five years have passed since the day the Laboratory of the Sun Service of the Far East Affiliate of the Siberian Branch of the Academy of Sciences USSR was organized. The laboratory is located on the summit of a high bald mountain 45 kilometers from the city of Ussurka. It conducts observations of the physical processes taking place on the Sun's surface."

The photograph is said to show V. G. Banin, head of the Laboratory of the Sun Service, preparing the station's chromosphere-photosphere telescope for photographing the solar disk. (Moscow, Izvestiya, 11 Jun 58)

IV. SEISMOLOGY

Use of Isoline Method for Determining Epicenter Coordinates

An article by Z. Z. Sultanova discusses the "Applicability of the Isoline Method." This is a new method for determining the coordinates of the epicenters of earthquakes previously described by Sultanova in "A Study on the Seismicity of the Territory of the Azerbaydzhan SSR," Candidates dissertation, Geophysics Institute, Academy of Sciences USSR, 1956, and in "The Isoline Method," Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No 3, 1957.

The basis of the isoline method is the approximation equation (1)

$$\frac{\Delta i}{\Delta k} = \frac{(Ts - Tp)i}{(Ts - Tp)i} = m_{ik}$$

where Δ is the epicentral distance, T_s, T_p are the arrival times of longitudinal and transverse waves, and k and i, the indexes.

The equation is correct (with a permissible error) in the case of monotypic waves. The identification of waves, however, is one of the most difficult problems in seismology. The limiting distances at which a certain wave can still be observed depends on the structure of the medium through which the seismic wave is propagated. For this reason the isoline method is of interest.

The reduction of a general analytical expression of error permissible in the use of the equation is not considered possible, since the value of the latter depends on the type of wave used in the determination of the coordinates of the epicenter. For this reason the author considers only several special cases using different waves.

In using direct waves the equation (1) is correct for epicentral distances having a zero focal depth. If the focal depth varies from zero the equation holds for $\Delta \gtrsim h$, where h is the focal depth. This results from the equation for the differences in the times of arrival of longitudinal and transverse direct waves.

In the case of waves diffracted by the sedimentary-granite boundary, an equation expressing the difference $T_s - T_p$ is given.

In the third case, the author proposed using waves diffracted by the granite-basalt boundary in two seismic stations. An equation is presented for the difference of the time of arrival (or run) of longitudinal and transverse waves of this type.

In the fourth case waves diffracted by the basalt-ultrabasalt boundary are used. An equation for the difference $T_g - T_p$ is given.

Sultanova concludes, saying that for determining the coordinates of epicenters it is possible to use methods based on the original equation (1). The error resulting in its use is less than the permissible error for determining the coordinates of an epicenter.

The case is presented, when through an error, one of the pair of stations used the wave diffracted by the granite-basalt boundary while the other used the wave diffracted by the basalt-ultrabasalt boundary. Several examples which are presented show that the use of different type waves results in a considerable error when equation (1) is used. Therefore, it is natural that a curve (not the isoline) constructed according to the differences in the run of the various waves does not pass through the epicenter. This makes it possible to reveal errors in the identification of seismic waves (or phases), which is very important in the interpretation of seismic recordings. (Doklady Akademii Nauk Azerbaydzhanskoy SSR, Vol 14, No 6, Jun 58, pp 429-432)

V. OCEANOGRAPHY

Soviet Pacific Ocean Expedition

Members of the Pacific Ocean Complex Geophysical Expedition of the Academy of Sciences USSR have left for the Far East, where in accordance with the program of the International Geophysical Year, they are studying the depth crust structure in the transition zone from the Asiatic continent to the Pacific Ocean. Scientific stations with the most accurate seismic apparatus are set up in special ships at the very edge of the continent. All of the expedition's equipment and the methods of observation were tested in the Caspian Sea for 2 years.

The nature of this work was described in an interview with Ye. V. Karus, director of the Institute of the Physics of the Earth, Academy of Sciences USSR, published in Pravda.

Karus described the method of seismic sounding employed as follows: A deep-water charge is dropped from the stern of a ship far at sea. The resulting explosion sends infrasonic waves, that is, waves with low frequency oscillations, "running" to the bottom of the ocean, and tens of kilometers into the depths of the Earth. In the bowels of the Earth's crust they are refracted and reflected, like an echo, from the denser layers and on returning again to the water's surface, are recorded by the apparatus of the land and ship stations. According to the nature of the recordings it is possible to make judgments concerning the speed of propagation of the vibrations in the different layers of the Earth, and consequently, concerning the rocks of which they consist and the structure of the Earth's crust. This, said Karus, gives science new data on the foci of earthquakes. It is known that the regions of the Kurile-Kamchatka ridge are subjected to earthquakes more frequently than other regions. Presentations concerning the processes of the formation of the Earth's crust are also expanded.

Last season, the expedition using eight specially equipped ships conducted deep seismic soundings on a line extending 3,500 kilometers. The expedition traversed the southern part of the Okhost Sea, the Kurile ridge, the deep-water depression and 650 kilometers into the ocean from the Kuriles. This year a vast region north of the places where the expedition worked last year will be investigated. (Moscow, Pravda, 3 Jul 58)

VI. ARCTIC AND ANTARCTIC

First Results of Polar Investigations Prepared by Soviets

The Arctic Institute has summed up the first results of 12 months work under the IGY program by the polar observatories, shore, island and scientific drift stations. During this time, more than 70,000 meteorological and radiation observations were made by these stations. (Moscow, Izvestiya, 1 Jul 58)

Effects of Extreme Cold Reported by Soviets

On 15 June 1958, a temperature of minus 80.1 degrees centigrade, was recorded at the Soviet antarctic station Vostok. Prior to 15 June, the lowest temperature, recorded at the station Sovetskaya, was minus 79 degrees centigrade.

So far, the lowest temperature registered in the Northern Hemisphere was minus 71 degrees centigrade in the region of Oymyakon, near the upper course of the Indigirka River.

Soviet scientists have made observations regarding the effects of extremely low temperatures at Vostok and Sovetskaya.

These temperatures represent a transition zone from the lowest temperatures observed under natural conditions to the zone of extremely low temperatures created by artificial means. This type of cold has a special effect not only on the human organism, but also on metals and other materials. For example, as a result of a decrease in volume of solid substances, the strength of metals under static loads is increased. At the same time, the strength of metals under the influence of impact loads is greatly diminished. Brittleness of steel, especially, is increased.

Under a temperature of minus 80 degrees centigrade, the so-called modulus of elasticity of ice is 50 percent higher than at a temperature of zero degrees centigrade; the ice becomes harder and cannot be sawed apart. At the same time, the ice becomes much more brittle.

It is interesting to observe that a drop of water sprinkled on ice, which has been cooled to minus 80 degrees centigrade behaves in the same manner as though it were sprinkled on a red hot frying pan, i.e., it is transformed into a small globule. This globule freezes instantly, but it does not freeze to the cooled ice surface.

Soviet scientists at interior antarctic stations have reported that under the influence of extreme cold the self-recording devices of their instruments cease to work; ink freezes despite the addition of antifreeze; metal tanks with fuel can easily be chipped with an ax; and kerosene freezes and has the appearance of wet snow.

Special mention should be made of the effect of such low temperatures on the behavior of humans and animals. Extreme frost causes great loss of body heat; exposure to the surrounding air causes a change in the peripheral tissues of human beings, and the coordination between the flow of arterial and venous blood is disturbed. The cold also has a direct effect on the tissues, causing a sharp decrease in their temperature and a disturbance in the exchange of substances by the tissues. Changes have been observed in the structure of the thyroid gland and of the suprarenal glands.

Soviet scientists in the Antarctic are well prepared to face the extreme winter cold. The quarters at all stations are roomy; they have a permanent, normal temperature of 17-20 degrees centigrade, and can be ventilated. The scientists do not work outdoors for more than 20-30 minutes at a time; they use protective face masks, special glasses, and corrugated hose from oxygen equipment to enable them to breathe air from under their clothing; of course, oxygen equipment itself is also used.

The scientists conducting meteorological and aerological work outdoors are equipped with 40-watt electric heaters, which are used to warm their feet, hands, and chest.

Gradually the people become adapted and their organism becomes adjusted to the low temperatures. Naturally, a prolonged stay outdoors under such temperatures is dangerous and the length of time spent in outdoor work is reduced to a minimum.

It is possible that the temperature in the region of the interior stations may drop even below minus 80 degrees centigrade, since the antarctic winter has only just begun. (Moscow, Pravda, 17 Jun 58)

New Low Temperature Recorded in Antarctic by Soviets

On 16 June, a temperature of minus 80.7 degrees centigrade was recorded at the Vostok station. During the first 25-30 days after the onset of minus 60-dgreee temperatures, the men who had worked outdoors for about an hour suffered from frequent headaches, shortness of breath, accelerated heartbeat, and sudden attacks of breathing difficulties during the night. Efficiency dropped sharply. Later on these symptoms disappeared, and all the expedition members are now feeling well. Some of them have lost weight, but there are a few who have gained a little weight.

The staffs at Vostok and Sovetskaya are working according to program and have not voiced any complaints regarding physical hardships. Both stations have favorable working conditions. There is enough fuel and the buildings are centrally heated; the indoor temperature is never below 10 degrees centigrade, it is usually 17-20, and sometimes even 25-30 degrees centigrade. The stations have electric kitchens, pressure cookers (skorovarki), and well-heated bath houses. There is a strict rule that no one is allowed to work outdoors for more than 15-20 minutes at a time.

Scientific observations are conducted at the Vostok station by P. Maysuradze, engineer-magnetologist; G. Shamray and P. Mitin, aerologists; V. Kosukhin and D. Chabanov, mechanics; M. Rybchenko and V. Chernov, radio specialists; K. Lapkin, physician; and O. Kolomiytsev, scientific associate. The station staff is headed by V. Sidorov, an experienced polar scientist.

The staff of Sovetskaya station which is headed by V. Babarykin, includes G. Mayevskiy, aerologist; A. Zotov and A. Rogozhin, mechanics; G. Malikov, radioman; and V. Konstantinov, physician, who doubles as a cook. (Moscow, Vodnyy Transport, 19 Jun 58)

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