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UNCLASSIFIED- SOVIET BLOC INTERNATIONAL GEOPHYSICAL YEAR INFORMATION

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PLEASE NOTE

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Table of Contents

I. GENERAL

Theories on the Formation of Continents

V. A. Kornilov, scientific associate of the Institute of Geography of the Academy of Sciences USSR, considers certain theories on the formation of continents.

Attempts to explain the mechanism of the development of the Earth's crust have been made repeatedly. One of the first of these hypotheses attempting to explain the origin of the Earth's relief was the theory of compression (contraction). It and many of its variations assumed that the intensive deformations of the Earth's crust arose as a result of the continuous cooling and compression of the original igneous-fluid body of the planet. Modern science has rejected this hypothesis, and today, it is of only purely historical interest. A new hypothesis concerning deep contraction explains the constant or periodic (pulsational) lessening of the Earth's radius as being caused by the extremely complex physical and mechanical processes of condensation of the matter composing its nucleus. A number of Soviet geologists, among them, V. A. Obruchev and M. A. Usov, adhere to this viewpoint.

In the first quarter of the 20th Century, numerous hypotheses on the horizontal displacement of continents have appeared. The one enjoying the most popularity is A. Wegener's displacement theory of the drift of light granitic continental masses on a heavier basalt shell. It is based on the principal difference in the structure of continental masses and the bottom of the oceans. Factual material collected by scientists during recent years refutes these assumptions. It was established that a number of geological structures begin in the continents and continue in the two oceans.

It is completely obvious that the problem of the formation of continents cannot be reduced to mechanistic presentations concerning their displacement: this is a more complex phenomenon. Thus, V. V. Belousov, corresponding member of the Academy of Sciences USSR, proposes that the leading process determining the development of the Earth's crust is an irregular and complex physical-chemical process of the Earth's material.

"The presented hypotheses," says Kornilov, "as many others, do not solve the problems of the formation of continents. The continents and oceans of the present day arose as a result of a complex process of the development of the Earth's crust and of the Earth as a whole." (Nauki i Zhizn', No 4, Apr 58, p 79)

Moscow State University in the IGY

Prof G. D. Vovchenko, Prorector of Moscow State University imeni M. V. Lomonosov, reports the following regarding the university's role in the IGY program.

The collective of the Moscow State University imeni M. V. Lomonosov has an important place in the investigations of the IGY.

Work on 19 aspects of the Soviet IGY program is conducted in the laboratories of the university's scientific institutions. Scientific workers of the physics, geographic, and geological faculties; the Astronomical Institute imeni P. K. Shternberg; the Scientific Research Institute of Nuclear Physics; and other research institutions are engaged in this work. In addition, over 300 upper-class students are also engaged in this work.

In addition, in the process of preparing for the IGY, five scientific stations were built and equipped in various regions of the country, 11 scientific expeditions were organized, and new, modern instruments for observations of geophysical phenomena were built by the university. Now, these investigations are spread over a wide front, and the first substantial results have been obtained.

The study of atmospheric ozone has an important place in the program. The reasons for changes in the ozone content of the atmosphere with altitude are brought to light by the physics faculty with the aid of instruments specially developed in the university. There is basis to assume, states Vovchenko, that these investigations introduce an important contribution to the study of this problem.

Observations of aurorae are of special interest. IGY workers built instruments which make it possible to photograph all of the sky from horizon to horizon. New, modern equipment has been delivered now to all of the stations of the Soviet Union conducting observations on aurorae. At present, Soviet physicists are preparing for future independent investigations of aurorae in the Arctic. During the long polar night, it will also be possible to follow in detail the process of the formation and disruption of ionospheric layers, the absorption by the ionosphere of radio waves, and the determination of the ionosphere's temperature. Such observations are already being conducted on Dickson Island by workers of the Physics Faculty together with the Arctic Scientific Research Institute. Equipment for studying the calm and disturbed states of the ionosphere has been installed here. Investigations of the heterogeneity of the ionosphere are conducted at three separate points: in Moscow and Moscow Oblast, Chashnikov, and Krasnaya Pakhra. The results of these observations will make it possible to determine the sizes of separate ionospheric layers and the velocity of chaotic movements in the ionosphere. Similar measurements have been made in the Soviet Union for the first time.

No less substantial problems confront the oceanologists of the Soviet Union. With the spread of typhoons, storms, and cyclones over the ocean, vertical waves arise on the surface of the water which produce so-called microseismic waves in the Earth's crust. The movements of typhoons and cyclones can be traced according to these oscillations. Therefore, their study is extremely important in the compilation of weather forecasts. A method for determining the location of cyclones and storms according to microseismic waves was developed by the Physics Faculty of the university, and instruments for this purpose were designed. Observation stations of the Soviet Union, the Peoples Republic of China, and Poland are now equipped with these instruments.

It is extremely important to know how quickly heat and radioactive and other elements are circulated from the surface of the ocean to its depths and back again. Exchange of this kind is caused by the irregular motion of sea water. For the study of this motion, which is not continuous, but has short pulsations measured in tenths of a second, very accurate and highly sensitive instruments are necessary. Oceanographic observations in the complex antarctic expedition on the ship Ob' and in the Atlantic expedition on the Lomonosov will be made using these instruments.

Finally, broad investigations will be conducted in the field of cosmic rays. The study of radiation reaching us from outer space is extremely important for understanding the structure of the atomic nucleus and the components of its elementary particles. An automatic underground station at a depth equivalent to 60 meters of water was established at Moscow State University for observation of cosmic rays penetrating the Earth's surface from the atmosphere and for studying the degree of variation of their intensity in relation to altitude.

Interesting results on longitude determination are obtained by workers of the Time Service of the Astronomical Institute. All of the time services of the world are now working on this problem. Soviet scientists study the irregularity of the Earth's rotation around its axis, compare data obtained by other observatories, and examine the hypothesis concerning the movement of continents. The establishment of more accurate star coordinates according to which time is determined, will be of great value. All this will considerably improve methods of determining and keeping accurate time.

Observation of solar activity is the responsibility of astrophysicists of the Astronomical Institute. These workers have begun a study of the radiation lines in the Sun's spectrum. Observation of similar lines will make it possible to compare the state of the atmosphere, day or night. In addition, a special station was organized for observation of latitudinal variations and movement of the Earth's geographic poles. The purpose of the observations will be to determine accurately the coordinates of the pole and a detailed study of the connection between its movement and the general circulation of the atmosphere.

The Geographic Faculty will conduct three expeditions during the IGY. One of them is already in the region of eastern Pamir. During the Indian monsoon period, the faculty will carry out a number of extremely important meteorological observations here and in the zone of the 75th meridian in western Tibet.

The other two expeditions, of glaciological nature, will study the spread and state of present-day glaciers. They will bring to light the reasons for changes of glaciers and their effect on changes of climate and trace the movement of ice in glaciers. One of the expeditions will conduct observations on glaciers of El'brus and the other, in Khibini. A number of scientific workers, aspirants, and student-geographers of the Moscow State University will be in the complement of the Antarctic expedition of the USSR. An expedition of the Geological Faculty is occupied with the study of the structure of the Earth's crust in the region of the Pacific Ocean in the Kurile-Kamchatka depression. These operations will be conducted together with the Institute of Physics of the Earth of the Academy of Sciences USSR.

"Many important and interesting problems still remain to be solved by our investigators in the remaining 8 months of the IGY. Ahead of us are many difficulties. But we are firmly confident that in the matter of furthering the development of geophysical science, which stands before all of the participants of the IGY now, Soviet scientists, and among them their associates of Moscow State University, will make a substantial contribution." (Nauki i Zhizn', No 4, Apr 58, pp 17-18)

Hungarian Participation in the IGY

"Hungarian scientists will conduct investigations according to the IGY program in the fields of meteorology, the Earth's magnetic field, the ionosphere, the Sun, cosmic radiation, seismology, and gravimetry.

"Twenty four stations will conduct meteorological observations. Together with synoptic investigations on the surface of the Earth, the temperature, pressure, and moisture content of the air are determined twice a day. The intensity of the wind at a determined altitude is measured four times a day. Radiations of the Sun and celestial bodies are registered regularly at 20 stations.

"The Tihany Observatory of the State Institute of Physics imeni Eotvos Lorand is the center for magnetic measurements. Earth currents are measured here.

"The observatory in Tihany belongs to the most modern scientific institutions in Central Europe. It is excellently equipped and has a good scientific staff. In addition to the observation station, it is planned to build still three more points of observation -- in Aggtele, Debrecen, and in the region of Baja.

"In the field of ionospheric investigations, vertical sounding of the ionosphere in a frequency range of one to 20 megacycles occupies a central position. The Meteorological Institute and the Pestlorinc Observatory organize these operations. The Heliophysics Division of the Astronomical Institute observes the phenomena taking place on the Sun.

"Interesting investigations are conducted in the Central Research Institute of Physics. The registration of the meson components of cosmic radiation are conducted here, using special telescopes. Seismologists and gravimetrists, together with the usual seismic service, study the structure of the Earth's crust in the territory of Hungary, and earth tides. The thorough investigation of these phenomena will aid in formulating a more complete hypothesis concerning the physical properties of the Earth's crust." (Nauki i Zhizn', No 4, Apr 58, pp 19-20)

Rumanian Scientists in the IGY

The role of Rumanian scientists in the IGY is explained by G. Demetrescu, Academician, chairman of the National Committee of Geodesy and Geophysics, Rumanian Peoples Republic (Bucharest).

"Together with scientists of 64 countries participating in the IGY, Rumanian scientists will conduct complex geophysical investigations according to a single and coordinated program. The management of these operations is centered in the National Committee of Geodesy and Geophysics, created in 1956 under the Presidium of the Academy of Sciences of the Rumanian People's Republic. Into it entered the country's greatest specialists in meteorology and seismology, astronomy, physics, and geology.

"The circle of problems on which the scientists of our country are working is extremely varied. Scientific workers of the Bucharest Astronomical Observatory will conduct interesting observations, for example, on the Sun's activity. With the aid of solar telescopes, special cameras, and monochromatic filters, spots, protuberances, eruptions, and other processes taking place on the surface of the Sun are studied.

"Results of these investigations are transmitted every 3 hours by a teletype network to the Europe-Asia forecasting center in Moscow in the Scientific Research Institute of Terrestrial Magnetism, Ionosphere, and Radio-Wave Propagation.

"Complex investigations of the Vrancha Mountains and the structure of the Earth's crust in the Carpathian zone will be conducted by seismologists, associates of the Academy of Sciences, together with the Committee on Geology.

"In the field of terrestrial magnetism, the widest investigations are organized in the northwestern part of the country. Along with these, gravimetric measurements in the Carpathian zone and geomagnetic observations in the region of Surlari will be made.

"In the Central Meteorological Institute, aerological radio observations are conducted, and the regime of winds at great altitudes is studied. Investigations of ozone in the upper layers of the atmosphere and observations on the propagation of light in the atmosphere occupy a special place here. Specialists in the field of atmospheric physics study the types of clouds, their direction and velocity of movement, and determine their altitude.

"Rumanian geophysicists maintain close scientific ties with the scientists of the USSR, the countries of the People's Democracies, and also with the International Seismological Society in Strasburg and with the International Branch of Solar Observations in Zurich.

"These simultaneous geophysical observations yield much that is of interest. They widen considerably hypotheses concerning different phenomena taking place on our planet and around it and make it possible to establish a number of new important scientific rules. Moreover, the coordinated observations of the scientists of the different countries undoubtedly will contribute not only to scientific progress in all the fields of knowledge, but also to strengthening mutual understanding and communications between the scientists of the world." (Nauka i Zhizn', No 4, Apr 58, p 19)

II. ROCKETS AND ARTIFICIAL EARTH SATELLITES

Soviets Request Recordings of "Mayak" Signals

A request by the Academy of Sciences USSR for recordings of radio signals from the "Mayak" transmitter aboard Sputnik III appears in an Izvestiya article on the third Soviet satellite. It is directed mainly to Soviet scientists, foreign scientists, and observers in such areas of the southern hemisphere as Australia, the Antarctic, South America, and South Africa and concerns transmissions from "Mayak" while Sputnik III is in the shadow of the Earth. Such recordings must have accurate time indications and should be directed to Moscow, "Sputnik."

According to Izvestiya, Sputnik III has been circling the Earth for 3 weeks, and, as of 1800 hours on 6 June, it had completed 295 orbits. The rocketcarrier is ahead by 1.3 orbits. Results from data processing in Moscow and aboard the diesel-electric ship Ob' indicated that all instruments were functioning normally. It is expected that the transmitter "Mayak" will continue operating for a considerable time, providing meteor erosion does not put the solar batteries out of action. (Moscow, Izvestiya, 6 Jun 58)

III. UPPER ATMOSPHERE

Solar Eclipse Observed by Soviets in China

V. M. Sobolev, Candidate of Physicomathematical Sciences of the Main Astronomical Observatory (Pulkovo), reports the departure of an expedition of Soviet radioastronomers of the Pulkovo Observatory and the Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR, for China to observe the 18 April 1958 annual eclipse of the Sun. Included in the program of observations are measurements of the polarization of radio emissions of the Sun in certain wave lengths of the centimeter band, the distribution of the radio intensity of the solar disk, the determination of local sources of radio emissions, and a number of other problems.

The eclipse will be visible in a belt passing through Hindustan, Indochina, and along the southern shores of China and Japan. (Priroda, No 4, Apr 58, p 110)

Formula for Day Sky Brightness Derived

In the article "Change With Altitude of the Indices of the Scattering of Light in the Earth's Atmosphere and Brightness of the Day Sky," by G. Sh. Livshits, which appeared in Izvestiya Astrofizicheskogo Instituta Akademii Nauk Kazakhskoy SSR, Vol 5, No 7, 1957, pp 123-128, a formula for the brightness of the day sky is considered, which was revealed by the calculation of second order scattering of light in the Earth's atmosphere for arbitrary change of the indices of scattering and density of the air with altitude. The formula is composed of known formulas of the brightness of the day sky, brought out with these same simplifying conditions and for a homogeneous atmosphere. For points of the sky located in the almucantar of the Sun, both formulas have a similar form. If the observations are freed from the repeatedly scattered light, then, in a given case, the index of light scattering in the atmosphere may be determined by means of the use of the formula of the brightness of the sky, not considering the changes of the indices with altitude. For points of the sky lying outside of the Sun's almucantar, the formulas have a different form.

The problem concerning the possibility of determining the indices at different altitudes by means of observation of the brightness of cloudless day sky from the Earth's surface is examined. (Referativnyy Zhurnal -- Astronomiya i Geodeziya, No 2, Feb 58, Abstract No 1006, by G. Sh. Livshits)

New Type Soviet Radiosonde in Series Production

Series production of the new type "A-22" radiosonde was begun in Riga. The new instrument is being used in stratosphere research and has so far proved itself to be superior to those previously used.

The instrument is very simple. Substitutes possessing advantageous qualities were successfully used in certain component parts. Thus, for example, an animal membrane, which is particularly sensitive at low temperatures, is used to measure moisture. Furthermore, the coding mechanism of the new radiosonde is very peculiar; 300 grooves, which can hardly be seen with the naked eye, are located on a very thin membrane. All data is spontaneously noted on the thin membranes; the data is transmitted by the radiosonde in the form of radio signals to the earth. The new radiosonde can rise to a height of 30 kilometers. (Bucharest, Neuer Weg, 13 Feb 58, p 2)

Spectrograph Series for Study of Weak Luminesce·. ·s

A series of three high-power diffraction-grating spectrographs have been built by the Soviets for investigation of such weak luminescences as night glow and aurora during the IGY. These spectrographs, designated as SP-48, SP-49a, and SP-50, are reported on by N. G. Gerasimova and A. V. Yakovleva of the State Optical Institute.

Spectrograph SP-48 was designed for photographing individual portions of the visible region of the spectrum in limits not greater than 1,000 Å. Change of section to be photographed is accomplished by changing the position of the diffraction grating, the slit, and the inclination of the spectrum image through adjustments of corresponding micrometer screws. Visual observation of the spectrum can be made through the frame window of the case. This instrument is designed for operation with 16-millimeter film taking three frames per film. Spectrum length for each frame is 15.3 millimeters and the spectrum is received on a cylindrical surface with a radius of curvature of 90 millimeters. Filter BS-8, which eliminates ultraviolet light, is used to prevent level overlapping.

Spectrograph SP-49a was designed for photographing the portion in the ultraviolet region of the spectrum from 2,750 to 3,950 A. The spectrum is received on a cylindrical surface with a radius of curvature of 264 millimeters. This instrument is designed to operate with 8-millimeter film taking two frames per film. The length of the spectrum for each frame is 17 millimeters.

Spectrograph SP-50 was designed for photographing separate sections in the infrared region with limits not greater than 1,000 Å. The section to be photographed can be changed by an adjustment of a micrometer screw which moves the diffraction grating to a certain angle. The spectrum is received on a flat surface which is perpendicular to the axis of the camera's objective lens. An electron-optical transducer serves as the sensing element in the infrared region of the spectrum. Filter KS-14 is used to eliminate overlaps of second-level spectra.

Following are optical specifications of the instruments:

		SP-48	SP-49a	SP-50
Collimator:	Relative aperture	1/4.7	1/15	1/6.8
	Focal length (mm)	630	2370	820
Camera:	Relative aperature	1/0.8	1/1.25	1/1.5
	Focal length (mm)	70	170	135.13

		SP-48	SP-49a	SP-50
Grating:	Grooves per mm	1,200	600	600
	Dimensions of grooved portion in mm	136 by 90	150 by 140	121 by 94
	Concentration of light	Visible region first level	Middle ultraviolet region first level	Red region
Linear dispersion:	Å/mm	~100	~80	~100
Resolving power:	Å	~3	~2	~5
Spectrum operating range:	Å	3,800 to 8,000	2,750 to 3950	8,000 to 11,000

(Pribory i Tekhnika Eksperimenta, No 1, Jul-Aug, 56, pp 83-86)

Meteor Trails Observed at Vannovskiy in 1957

Tabulated data on the ten meteor trails observed in 1957 at Vannovskiy appear in a Turkmen scientific journal article by Kh. D. Gul'-medov, a member of the Institute of Physics and Geophysics, Academy of Sciences Turkmen SSR. Entitled, "Meteor Trails of 1957 According to Observations at the Astrophysical Observatory in Vannovskiy," the article reads as follows:

"Observations of meteor trails in 1957 were conducted at the new Astrophysical Observatory in the settlement of Vannovskiy (37°56'4" N, 58° 6'4" E; at an elevation of 600 meters) simultaneously with a program of double visual count of meteors with free-mounted Hertz 6 by 8 binoculars. A total of ten meteor trails was recorded in 1957. Of these, trail No 9 was observed by I. L. Genkin in Vannovskiy and I. S. Astapovich in Ashkhabad. In addition, one trail of a telescopic meteor (No 3) was observed by K. A. Lyubarskiy and I. N. Latyshev from a 505-meter base line. Observations were performed according to the method of V. V. Fedynskiy for trails observed from one point and according to the Newton-Denning method for those observed from base lines.

"All data from the observations are presented in the following table. In this table, m stands for star magnitude of the meteor; Stream, appurtenance to a given stream (Aq - δ Aquarids; P - Perseids; Or - Orionids); λ, angular length of the meteor; a_1, z_1, a_2, z_2, horizontal coordinates for the beginning and end of the trail, respectively; Δa and Δz, angular displacement according to azimuth and zenith distance respectively; τ duration of trail visibility; [H], altitude accepted for unilateral trails; V_d, velocity of drift; a_d, direction of drift; δ, linear diffusion; and d_s, distance to the middle of the trail's projection to the surface of the Earth.

[Adjoins page 13 here]

Meteor Trails of 1957, According to Observations at the Astrophysical Observatory in Vannovskiy

Trail No	Date	GMT	m	Stream	λ	a_1	z_1	a_2
1	26 May	18 6'	-1		8°	302°9'	42°7'	302°8'
2	22 Jul	23 9'8"	-1		10°	225°6'	37°0'	222°6'
3	25 Jul	20 47'	6.2		3°	--	--	--
4	29 Jul	22 13'6"	-0.5		15°	335°5'	11°2'	343°5'
5	31 Jul	20 56'9"	-1.5	Aq	7°	354°8'	85°6'	354°7'
6	4 Aug	21 21'	-1	P	10°	31°9'	19°3'	39°7'
7	4 Aug	22 56'	-2	P	8°	297°3'	38°3'	299°6'
8	19 Oct	21 37'	-1		3°	22°2'	35°1'	21°9'
9	20 Oct	00 38'	-3	Or	4°	142°1'	16°3'	143°5'
10	28 Oct	23 21'	-0.5		8°	307°2'	36°6'	307°9'

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z_2	Δa	Δz	τ (sec)	[H] (km)	V_d	a_d	δ (sec)	d_s (km)
43°4'	176'	32'	120	87	40	243°2'	2.2	75
49°8'	1'1"	--	3	85	20.6	180°	--	79
--	--	--	2	62	42	355°	--	--
23°8'	--	--	10	85		Yu-V	18.9	28
88°4'	64	16'	60	87	120	339°6'	7	1036
28°2'	4'6"	--	20	87	53	250°		37
41°3'	32'	56'	30	87	65.4	43°1'	20	73
35°5'	120'	--	240	87	17.3	133°8'	0.7	61
	176'	178'			47.4	11°		
	54'	90'			17.8	285°5'		
19°3'	201'8"	366'9"	420	79	26.0	297°5'	--	25
41°3'	160'	--	90	85	63.5	218°5'	--	70
	144'	--			57	"		
	136'	--			54	"		
	160'	--			58	"		
	200'	--			44	"		

[adjoins page 12 here]

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Remarks for the table are as follows:

Trail No 1 -- "The trail drifted from its center to its end. A bulge of about 807 m diameter formed after 2 minutes."

Trail No 2 -- "The trail drifted in its center portion (2°). Drift was absent in the beginning and end portion of the trail. $a_d = 180°$ was noted during observation."

Trail No 3 -- "Total displacement was 4'7"."

Trail No 4 -- "Drift direction of Yu-V was noted visually."

Trail No 5 -- "The trail drifted along its lower portion. A bulge formed in the middle of the trail with a brightness four times greater than that of the trail."

Trail No 6 -- "The trail drifted in its center portion (3°). Weak drift in the same direction was noted for the beginning and end portions."

Trail No 7 -- "The trail drifted in its upper portion (3°5'). Near the end of visibility, $\mathcal{S} = 10$ m/sec."

Trail No 8 -- "Drift of the trail formed a ring. In the middle portion the drift approached $a = 11°$. Drift in the beginning and end portions was in opposite directions."

Trails 9 and 10 -- "Base line observations: for Keshi, $a_1 = 128°5'$, $z_1 = 23°2'$, $a_2 = 132°6'$ and $z_2 = 26°5'$, for Vannovskiy, $H_1 = 85,877$ km, $H_2 = 72,558$ km. In Vannovskiy, the trail was observed visually and in Keshi, with binoculars. $\lambda = 10°$. Three layers were observed. In the middle layer, $V_d = 54$m/sec. On the lower boundary of the lowest layer, $V_d = 44$ m/sec."

"Method for Observations: The original method for observation of meteor trails was developed by I. S. Astapovich in 1926 in Nikolayev and then, in 1933, in Stalinabad. It was discussed by V. P. Tsesevich in 1934 and further developed by I. S. Astapovich (1938) and V. V. Fedynskiy (Fedynskiy, V. V., "Night Shining Meteor Trails," Trudy Tadzhikskoy Astronomicheskoy Observatorii, Vol 2, 1941).

"The existing method is based on telescope observation of the portion of the sky after the flight of bright meteors by means of mounted or unmounted instruments.

"Our observations were performed with a mounted instrument. The position of the trail and its drift relative to the stars in the visual field of the instrument were sketched on paper. Later, the stars were identified according to an atlas. Drawings were made for several positions of the trail and the time for each position was given by a stop watch which was started at the moment of a meteor's flight. This drawing includes an accurate position of the trail, its width at various sections, its shape, changes of form, bulge formations, etc.

"In cases of trails of short duration, it is better to make the drawing after disappearance of the trail. In these cases, small displacements were observed with could give the direction and sometimes even the speed of drift. The magnitude of displacement is determined by comparison with known distances between components of double stars, and the direction is estimated visually and denoted orally (SE, NW, etc.).

"Estimates of trail width at different sections of the trail indicate the diffusion at different altitudes. Change of the rate of diffusion with altitude was established by I. S. Astapovich during 1943-1945 in Ashkhabad.

"During observations, the color, brightness, changes in brightness and other characteristics are noted. Complete observations on the meteor which produced the trail are also necessary according to the 'program-maximum.'

"Basically, observations were conducted in accordance with this program.

"Typical Forms of Meteor Trails: The classification given by V. V. Fedynskiy (in the above-mentioned reference) was adopted for typical forms of meteor trails.

"P -- 'stripe' [poloska] -- trail disappears without changing its form (trail No 4)

"M -- 'cape' [mys] -- break in a trail due to varied currents in the upper atmosphere.

"K -- 'ring' [kol'tso] -- (trail No 8).

"Form P was noted for two trails, M for eight, and K for one.

"Practically all of the trails changed their form. This again points out the laminar character of air currents in the upper atmosphere and the presence of currents at different altitudes with different speeds and directions of movement.

"Results and Conclusions: The changes in the forms of meteor trails indicate stratification of air currents in the zone of meteor trails. For trails No 1 and 2 (at the beginning), No 7 (at the end), No 2 and 6 (at the beginning and end), only a weak drift was detected, or drift was entirely absent. This shows the presence of quiet zones. According to data from our observations during 1955-1956 (Gul'medov, Kh. D., "Observations of Meteor Trails in 1955-1957 in Ashkhabad," Izvestiya Akademii Nauk Turkmenskoy SSR, No 1, 1957), such a region is located at an altitude of 80 to 84 kilometers in the E-layer of the ionosphere. In the case where drift was visible at these altitudes (trail No 9), its speed was much lower than at other altitudes (26 meters per second as opposed to 63 meters per second average for the highest and lowest altitudes of the E-layer.

"All trails, with the exception of No 1, were observed after midnight, local time, and it could have been expected that their drift would be directed toward the eastern sector of the celestial sphere. This was confirmed for all trails except No 7 and 8.

"Diffusion was noted in only five trails. For two of them, increased diffusion was observed (20 and 18.9 meters per second). At the end of visibility of trail No 4, diffusion decreased from 20 to 10 meters per second.

"The author expresses gratitude to I. S. Astapovich for his advice and instructions on observations and their initiation." (Izvestiya Akademii Nauk Turkmenskoy SSR, No 2, Feb 58, pp 110-112) CPYRGHT

Radiointerference Caused by Moon's Atmosphere

In an article entitled "Radiointerference Caused by the Ionosphere of the Moon," G. A. Gurzadyan, Byurakan Astrophysical Observatory, supports the viewpoint that the often-observed increase in the total radio emanation of the sun before and at the end of an eclipse is caused by the refraction of the radio waves in the lunar ionosphere (atmosphere). The author further points out that, in addition to the refraction of radio waves in the ionosphere of the Moon, under certain conditions, influences of an interference character should be observed which result from the fact that two radio beams emanating from a certain element of the Sun's surface reach the observer by two different paths, one direct, and the other through the Moon's ionosphere; depending on the ratio of the differences of the optical paths of the two beams to the length of the wave, a received signal will either increase in intensity or fade: an increase of radio emanation occurs in the first case and a decrease, in the second case. The author presents a quantitative analysis of the described influence, for which the Lloyd interferometer may serve as an optical analog, and makes the following concluding remarks:

"It is interesting to notice that the theoretical increase of fluctuation from the center of the disk to its edge does not take place gradually, but rather abruptly, almost stepwise, even at the edge of the disk. Nevertheless, a calculation of the absorption, in the solar atmosphere, of the radio waves emanating from the edge of the disk should indicate a certain decrease of this abruptness.

"Thus, the refraction and interference of radio waves (emanating from point sources on the Sun) caused by the ionosphere of the Moon are responsible for the increase of the fluctuation of radio emanation before and after an eclipse. Fluctuations of a given source intensity increase with a decrease of its angular dimensions; fluctuations from prolonged sources are less pronounced. The degree of fluctuation differs according to wave length, but on the average increases with an increase of wave length. A study of these fluctuations affords the possibility of evaluating the size and intensity of point sources of radio emanation on the Sun." (Moscow, Doklady Akademii Nauk SSSR, Vol 118, No 5, 11 Feb 58, pp 884-887)

Seeding of "Warm" Clouds

Cloud seeding methods are discussed in an article, "Artificial Precipitation," by G. Ya. Myakishev, Candidate of Physicomathematical Sciences.

The supercooled cloud (with a temperature below zero centigrade), which is the most common form of cloud, lends itself most freely to rainmaking. Such clouds, seeded with dry ice or silver iodide from an airplane, will usually yield precipitations. The use of such methods, however, does not unfailingly lead to the formation of precipitation. For example, the drops which form can evaporate before reaching the surface of the Earth, or the same heat released during the crystallization of water so changes the conditions of convection in the adjoining layers of air to the cloud that it is scattered and generally gives no precipitation.

Experiments connected with the seeding of "warm" clouds and fogs (those whose temperature is above zero centigrade) present still another problem. Such clouds are more stable than supercooled clouds, and the mechanism of the formation of precipitation in them is different. If a sufficiently large drop develops in the upper part of the cloud, it falls and in its downward path, it is still further increased at the expense of its union with other drops (minute drops flow around one another and are not joined). An excessively growing drop in the lower part of the cloud disintegrates and enters into the ascending flow of air which lifts its particles upwards again. After this, the whole process is repeated on still larger scales. An unusual "chain reaction" occurs in the cloud.

Thus, it is possible, in principle, to produce rain from "warm" clouds with the aid of large drops of water scattered from an airplane. However, successes of this measure are connected with the fulfillment of a whole series of conditions. Thus, it was necessary that the velocity of the air flow directed upward was fully determined. The conducted experiments gave positive results in separate cases only. Work in the given direction is continuing. Calcium chloride, also capable of producing precipitation, is used in particular for action on "warm" clouds. (Nauka i Zhizn', No 4, Apr 58, pp 77-78)

IV. OCEANOGRAPHY

Soviet Research Ship Sedov Completes Voyage

The Soviet expeditionary sailing ship Sedov has returned to Kaliningrad after 3 months of research work in the little-studied region of the equatorial waters of the Atlantic. (Moscow, Izvestiya, 7 Jun 58)

"Radioactive Rain in the Pacific Ocean"

According to an article by Prof V. Bogorov, deputy director of the Institute of Oceanology of the Academy of Sciences USSR, which appeared in 6 June Pravda, the Vityaz', an expeditionary ship of the institute, encountered radioactive rain in the Pacific Ocean.

V. P. Petelin, leader of the expedition and a senior scientific associate of the Institute, reported that the Vityaz', while conducting IGY investigations in the region west of the Marianas and north of the Caroline Islands, some 3,000 kilometers west of the Marshall Islands, where the Americans are conducting atom bomb tests, radioactive rain fell on the ship. A special part of the expedition's program requires the study of radioactivity of water, soil, and organisms. In the course of this work, signs of an increase in radioactivity in rainwater began on 23 May. In the beginning, these were not large, but during the day on 29 May they reached a maximum, exceeding the normal by several hundred times. Petelin reported that in view of the danger to the health of members of the expedition, investigations were suspended, bringing to a halt operations according to the IGY program, and the ship left the contaminated area. Preventive measures were taken aboard the Vityaz'.

The article stresses the danger from radioactive fallout of US atom bombs to the inhabitants of the thousands of islands dotting the Central Pacific who depend on rain as their only source of fresh water.

Bogorov comments on the solution to this problem taken by the Soviet Union in its unilateral cessation of tests of atomic arms. (Moscow, Pravda, 6 Jun 58)

V. ARCTIC AND ANTARCTIC

IGY Research on Ostrov Kheysa in Arctic

A fairly large settlement has grown up in a wide semicircle around a fresh-water lake on Ostrov Kheysa. The settlement has been named Druzhnyy. The streets have electric lighting. The houses in Druzhnyy are identical with those built in the Antarctic. Druzhnyy was built for the same purpose as Mirnyy in Antarctica, i.e., for a wide range of scientific observations under the IGY program.

Three rooms in the main geophysical pavilion are at the disposal of a group of specialists studying cosmic rays. The rooms are crowded with tables covered with instruments, counters, and high instrument panels. A neutron monitor is installed in one of these rooms in complete darkness; in another room is a cubic telescope. This is the domain of Oleg Odintsov, Nelentin Bychkov, and Vitaliy Korzov. Next door is the seismic laboratory, where two young specialists, Sergey Fedorov and his wife, Irina, are employed. Earthquakes occurring in different parts of the world are recorded here and reported by radio to Moscow.

Near the shore of the strait is an instrument which records the fluctuations of the ocean level.

Recently, a radiosonde launched at this location reached a record height of 37 kilometers. Observations of aurora were completed not long ago. Hundreds of meters of photographic film were sent away for analysis.

One of the most exciting phases of the work is the launching of meteorological rockets. The rocket-launching site is clearly visible from the whole settlement. The use of meteorological rockets helps to obtain information, supplementing that received from the Earth satellites, regarding gradual changes in temperature and moisture of the air with increasing altitude and other characteristics of the atmosphere.

About an hour before the time set for the rocket launching, a radiosonde is released, which transmits data on wind conditions at various altitudes. These data are given to the rocket launchers. A second radiosonde is released about 10 minutes after the rocket has been launched. The data reported by the radiosonde and the rocket will then be compared.

Immediately after the rocket is launched, the radar antenna on the green roof of the radar van begins scanning. The operators, V. Anan'yev and Ye. Morozov, track the rocket by radio beam. In the adjoining building, Eng V. Iova and A. Kononov, junior scientific associate, operate the telemetering instruments. They receive radio signals reporting on the instrument readings of the rocket.

A few minutes after the launching, the rocket head section descends by parachute to the ocean. A group of people start out on skis toward the spot where the red parachute has dropped. Three hours later, a cross-country vehicle goes out to meet them. The group returns, carrying the rocket head section and parachute. This part of the rocket contains meteorological data and is of great scientific value. (Moscow, Izvestiya, 5 Jun 58)

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