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UNCLASSIFIED- INFORMATION ON SOVIET BLOC INTERNATIONAL GEOPHYSICAL COOPERATION

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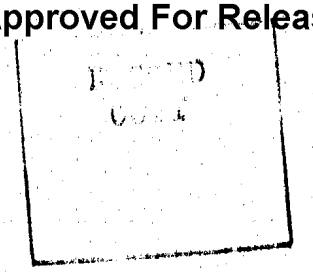

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INFORMATION ON INTERNATIONAL GEOPHYSICAL COOPERATION -- SOVIET-BLOC ACTIVITIES

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I. ROCKETS AND ARTIFICIAL EARTH SATELLITES

Satellites Promise to Expand Astronomical Knowledge

Professor D. Martynov, Director of the State Astronomical Institute im. Shternberg, foresees a tremendous advance in astronomical knowledge following the introduction of telescopes on satellites -- especially manned satellites. Astronomical observations made without the interference of the Earth's atmosphere will be far more revealing than those made in the past. ("New Prospects Facing Astronomy," by Prof. D. Martynov, Nauka i Zhizn', No. 9, 1960, p. 5)

Why the Spaceship Carried its Many 'Passengers'

Nauka i Zhizn', in its "Answers to Readers" Section, has recently explained why the spaceship carried its wide range of living 'passengers.' The article lists a good number of the forms of living matter carried aboard and specifically states the research purpose for the inclusion of each. ("Zoological Garden in Space," by N. Aleksandrov, Nauka i Zhizn', No. 9, 1960, pp. 77-78)

Soviet Scientist Comments on Return of the Spaceship

B. S. Danilin has written an informative article of the technical problems of space flight, although part of his data is from non-Soviet sources. Danilin is one Soviet spokesman who often has more than a few unkind words for the American space effort. He conveys to his Soviet audience the information that new American satellites are substitutes for the "U-2" and that this is acknowledged with "cynical frankness" in the American press. He draws unfavorable comparisons between the "Discoverer XIII" and the latest soviet spaceship. ("The Spaceship Has Returned to Earth," by B. S. Danilin, Nauka i Zhizn', No. 9, 1960, pp. 2-4)

The Use of Space Vehicles for Terrestrial Geological Prediction

It is only recently that aircraft have been used in the execution of geological exploration; it is now suggested that artificial earth satellites be used for this same purpose.

The "heavier" is the mass of the Earth in the area over which a satellite is flying, the greater the attraction will be on the satellite; as a result, its velocity will increase somewhat. Where the Earth's mass is less dense, the satellite will travel a little more slowly. Thus, satellites can be used to study gravitational anomalies. This is especially important for the inaccessible areas of the Earth, for example, the world ocean. ("Cosmic Explorers of the Earth's Interior," by N. Varvarov, Ekonomicheskaya Gazeta, 29 October 1960, p. 4)

II. UPPER ATMOSPHERE

Meeting of the Commission on the Physics of Stars and Nebulae

An expanded plenary session of the Commission on the Physics of Stars and Nebulae of the Academy of Sciences of the USSR has now ended. The meeting was held at the Byurakan Astrophysical Observatory. The plenary session devoted special attention to the luminescence of gaseous and dust nebulae which fill the space between the stars. Doctor of Physical-Mathematical Sciences G. A. Gurzadyan has developed a new theory of the luminescence of cometary nebulae.

The plenary session displayed great interest in reports concerning the discovery of nonstationary processes in nebulae and the results of their observation by new equipment and methods.

The plenary session discussed plans for the operation of the astronomical observatories of the Soviet Union for investigation of problems relating to the investigation of problems of physics of the stars and the dynamics of gaseous and dust nebulae. ("Revealing the Secrets of the Universe," Ekonomicheskaya Gazeta, 7 October 1960, p. 4)

Another Article on the Yardymlinskiy Iron Meteorite

A new report has appeared in a Soviet journal relative to the falling of an iron meteorite near the Azerbaydzhan village of Yardymly on 24 November 1959. This article confirms previously published data. ("The Yardymlinskiy Iron Meteorite," by M. A. Kashkay, G. F. Sultanov, T. A. Eminzade and V. I. Aliyev, Priroda, No. 9, 1960, pp. 109-110)

The Problem of Water on Mars

The Soviet journal "Priroda" has recently carried a 5-page article on the problem of how much water there is on Mars and what form this water assumes. It is known that there is no water vapor in the Martian atmosphere, but how much surface and ground water is there?

The author has a striking hypothesis to offer: he suggests that there may be great layers of subsurface ice on Mars, underlain (perhaps) by vast oceans of water in liquid form. The existence of a great subsurface hydrosphere covering almost the entire surface of the planet could explain why the surface of Mars is so surprisingly level.

He suggests that linear cracks in this subsurface layer of ice are reflected on the surface by the famed Martian canals. Water reaches the surface, and the area immediately along the cracks is the most favorable environment on Mars for the growth of vegetation. His theory also explains the peculiar ice caps in the polar areas of Mars. ("Is There Water on Mars?" by V. D. Davydov, Priroda, No. 9, 1960, pp. 73-77)

Cosmic Ray Research in Progress on Mount Aragats

Mount Aragats, rising to 3,200 m above sea level, is now the site for cosmic ray research by scientists from Moscow State University. The three man team is headed by N. Grigorov, Doctor of Physical-Mathematical Sciences. They have developed an "ionization calorimeter" which measures the energy of every particle coming from outer space. Also successfully used at this Armenian station is another powerful apparatus which "fixes" cosmic particles which possess thousands of billions of electron-volts.

The article then continues with a discussion of cosmic rays in general and the work at the station in particular. The report concludes with the description of the physical plant and research program of a cosmic ray laboratory in Moscow; the director is S. Vernov, Corresponding Member of the Academy of Sciences of the USSR. This laboratory is situated at Moscow State University.

The Aragats station and the university laboratory are both shown in large photographs. ("Guests from Space," by A. Presnyakov, Ekonomicheskaya Gazeta, 6 October 1960, p. 4)

III. SEISMOLOGY

Brief Notes on the Moscow Seismic Station

The central seismic station "Moskva," situated on one of the quieter streets of the capital, can listen to the "pulse" of the entire continent, and even the remotest parts of the planet. The waves from the Chilean quake arrived at the Moscow station in 16 minutes.

There were only 20 seismic stations in the USSR in 1936; there are now about 100. The Moscow station is connected to outlying stations by teletape and telephone. The station is directed by Ye. F. Savarenskiy, Doctor of Physical-Mathematical Sciences. ("Listening to the Earth's Pulse...," by A. Presnyakov, Ekonomicheskaya Gazeta, 21 October 1960, p. 4)

IV. OCEANOGRAPHY

Geographic Distribution of Microlife in the World Ocean

This article is largely based on microbiological research in the world ocean in the period 1954-1959. Water samples for microbiological research were taken by bathymeter from 19 standard horizons, ranging from 0 to 3,000 m, and each 1,000 m thereafter. The article only briefly describes the methods used. There is a map showing the world distribution of microbiological stations.

The bulk of the article deals with the results of this research. These to a large extent are reflected in the five tables which accompany the text.

Table 1 -- Quantitative ratios of heterotrophic microorganisms in various geographical zones of the Pacific Ocean.

Table 2 -- Quantitative distribution of heterotrophic microorganisms for various latitudes of the Pacific Ocean along 172° E. and 174° W.

Table 3 -- Quantitative ratios of heterotrophic microorganisms in various geographic zones of the Indian Ocean.

Table 4 -- Quantitative distribution of heterotrophic microorganisms for different latitudes in the eastern and western halves of the Indian Ocean.

Table 5 -- Quantitative ratio of heterotrophic microorganisms for various geographic zones of the Atlantic Ocean, the Norwegian and Greenland Seas, and the Central Arctic.

This tabular material is interpreted in the text. ("Geographic Distribution Patterns of the Distribution of the Microbe Population (Heterotrophs) in the World Ocean," by A. Ye. Kriss, S. S. Abyzov, M. N. Lebedeva, I. Ye. Mishustina and I. N. Mitskevich, Izvestiya Akademii Nauk SSSR, Seriya Geograficheskaya, No. 5, 1960, pp. 34-41)

Soviets Study the Sounds Emitted by Fish

An article recently appearing in Priroda describes Soviet research in the study of the sounds emitted by fish. The purpose of such study is to develop rational methods for the exploitation of the food resources of the sea. Research has shown that each species can be associated with a characteristic set of sounds. Apparatus has already been developed to pick up and record these sounds. A majority of these sounds are associated with feeding, breathing and movement, but research is continuing to discover whether the fish in any way communicate with one another. ("'Voices' of Fishes," by V. R. Protasov, Priroda, No. 9, 1960, pp. 97-98)

Review of Marine Microbiological Research

The award of the Lenin Prize in 1960 to A. Ye. Kriss for his book "Marine Microbiology (Deep Water)" has evoked a number of articles on marine microbiology, of which the one cited below is one of the more recent and better written. ("Microbes in the Depths of the Sea," by M. I. Gel'din, Nauka i Zhizn', No. 9, 1960, pp. 37-40.

V. GLACIOLOGY

Review of Glaciological Research During the IGY

A newly received article in a Soviet journal covers the subject of glaciological research during the IGY. As is pointed out, however, it is premature to write about the scientific results of this research, much less about any generalized conclusions or new theories.

But this 11-page article contains a wide array of preliminary data. The article deals exclusively with the work of Soviet researchers; much of this data deals with Eastern Antarctica.

It would appear that most of this data has been published previously; this article has the advantage of collecting the most significant information from a large number of sources and incorporating it under a single title.

("Glaciological Research in the Period of the International Geophysical Year 1957-1958-1959," by G. A. Avsyuk, Izvestiya Akademii Nauk SSSR, Seriya Geograficheskaya, No. 5, 1960, pp. 11-21)

VI. ARCTIC AND ANTARCTIC

Radio Reports from Antarctic for February 1960

The Chief of the Fifth Continental Expedition, Ye. S. Korotkevich, reports the following about work in Antarctica in February 1960:

Beginning of the Fifth Continental Expedition. On 1 February 1960 the Fourth Continental Expedition departed from the shores of Antarctica and the Fifth Continental Expedition arrived to begin scientific observations.

Field work in Queen Maud Land was terminated in February. During this same month Vostok station was supplied by air and a sledge tractor train was organized and set out for Komsomol'skaya. Intensive preparations for winter continued at these stations.

Mirnyy Observatory. Aerological research. In February the mean values at the Earth's surface were: atmospheric pressure -- 985.2 mb; air temperature -- -5.1°; wind velocity -- 9.4 m/sec; relative humidity -- 67%. Total cloud cover was 5.5. The mean height reached by radiosondes was 23,569 m. During the month air temperature varied from -16.4° to 5.2° (the highest reading in five years), atmospheric pressure -- from 973.7 to 995.7 mb, wind velocity did not exceed 24 m/sec.

The work of the expedition's weather service got underway. The Czechoslovakian meteorologist O. Kostka is serving as forecaster.

Atmospheric charts for Antarctica have been drawn up and analyzed, as well as tentative vertical cross sections of the atmosphere, based on radiosonde data for Mirnyy. Also compiled were near-surface synoptic charts of the Southern Hemisphere, primarily for regions of the temperate and high latitudes.

A group of meteorologists from the German Democratic Republic, under the direction of Doctor G. Skayb, have made measurements of the near-surface atmospheric content of ozone. These measurements have been made 4 or 5 times daily. Measurements of carbon dioxide in the near-surface layer have shown fluctuations from 0.297 to 0.303 ml per 1 liter of air. This does not exceed the limits of the natural component of carbon dioxide gas in the atmosphere. Experimental measurements of the radioactivity of the air have shown that its value is insignificant.

Actinometric and gradient observations have been made.

Atmospheric processes over Eastern Antarctica in general have corresponded to the pattern of summer circulation established by preceding Soviet expeditions. The prevailing typical location of cyclonic regions was in the maritime zone of Queen Maud Land, Mackenzie Gulf and the Knox Coast. At the same time ridges of high pressure were more frequently observed in Enderby Land and over the Davis Sea.

Geophysical research. The condition of the magnetic field in February was characterized by intensive daytime disturbances; there were none at night. A magnetic storm was observed in the period 17-20 February.

The condition of the ionosphere during the month was relatively calm. At the beginning of the month an unstable condition was observed with rapid changes in the characteristics of the regular layers and brief absorption. At night a sporadic layer often appeared with a frequency ranging up to 12 mc. During the daytime the characteristics of the ionosphere followed the daily march of electron density.

Sixteen earthquakes were recorded. The coordinates of the epicenter were determined for four of them.

Beginning in February regular comparator observations were initiated of an artificial earth satellite on a frequency of 20 mc for four revolutions each day. Signals were monitored from 94 revolutions.

Glaciological research. Observations were made of the formation of the upper horizons of the snow-firn layer. Snow measurement observations were made along the profile Mirnyy - Kilometer 23. Simultaneously with thermophysical measurements at Mirnyy on 9 February, the temperature was measured on Drigalskiy Island in a drilled hole 44 m deep. A group of glaciologists flew to the Western Shelf Ice in the middle of the month to investigate the thickness of the glacier at 10 points. A repeated aerial survey in the vicinity of Mirnyy at a scale of 1:5,000 was made for the purpose of studying the movement of the ice cover.

Vostok Station

In February the mean values at the Earth's surface were: atmospheric pressure -- 627.5 mb; air temperature -- -43.7°; wind velocity -- 5.2 m/sec; relative humidity -- 78%. The mean height reached by radiosondes was 20,600 m. The maximum height reached by radiosondes was 33,250 m. During the month atmospheric pressure varied from 609.5 to 642.5 mb; air temperature -- from -64° to -25.1°; relative humidity -- from 71% to 86%. A WSW wind predominated.

The condition of the magnetic field was relatively calm during the month. No magnetic storms were observed. Short-period fluctuations were observed whose amplitudes (for the horizontal component) attained 30γ.

The February characteristics of the ionosphere were those typical of summer. A disturbed condition was observed daily, as was true in January. There were cases when reflections not only disappeared from the F2 layer, but from the F1 layer as well.

Komsomol'skaya Station

In February the mean values at the Earth's surface were: atmospheric pressure -- 626.5 mb; air temperature -- -41.8°; wind velocity -- 3.1 m/sec; relative humidity -- 77%. The cloud cover of the central layer was 3.9. Atmospheric pressure varied from 610.1 to 641.8 mb; temperature fell to -60.6°.

At the end of the month preparations were begun to put the station on a stand-by basis.

Lazarev Station

In February the mean values at the Earth's surface were: atmospheric pressure -- 984.6 mb; air temperature -- -9.8°; wind velocity -- 6.8 m/sec; relative humidity -- 84%. The height of the tropopause was 8,590 m with a temperature of -54.0°. The mean height reached by radiosondes was 20,410 m. During the month atmospheric pressure varied from 971.1 to 998.0 mb; air temperature -- from -20.4° to +2.1°; maximum wind velocity did not exceed 18 m/sec.

The geological-geographical detachment in the vicinity of Lazarev Station explored 10 points. The explorers encountered the rocks of an ancient metamorphic complex with numerous intrusions. Four astronomical stations were determined in the mountains and two near the station: on the Universitetskiy ice dome 40 km to the east of the station. An aeromagnetic survey was made in the vicinity of the station. A reconnaissance exploration was made of the entire region. A large-scale map of the Lazarev Station was compiled at a scale of 1:5,000.

Progress of the Sledge-Tractor Trains

By 7 February the western train had covered 113 km and was stopped by crevasses at 70°24' S and 12°44' E. At that point progress stopped for the winter. The scientific group made seismic soundings and magnetic observations.

On 26 February a sledge-tractor train departed from Mirnyy for Komsomol'skaya. It consisted of three tractors and sledges. The purpose of the trek was the delivery of fuel for the spring trek into the interior of the continent. By the end of February the train had covered 260 km.

Flight from Lazarev to Mirnyy

During the period 11-13 February the pilot A. T. Barabanov, with 17 men aboard his LI-2 aircraft, made a flight from Lazarev to Mirnyy; baggage was also carried. Landings were made at the Japanese station Showa and the Australian station Mawson. Soviet polar specialists were received warmly at both stations.

Oceanographic Work of the Fifth Antarctic Expedition

The objective of the marine detachment of the Fifth Antarctic Expedition was the accomplishment of oceanographic work enroute during the voyage aboard the diesel-electric vessel Ob' in Antarctic waters. As reported by I. V. Maksimov, Chief of the Marine Detachment, the scientific group has accomplished a great amount of hydrological work in a relatively short period of time. The principal observations were made during the period 1 February-15 March during the voyage of the vessel around the Antarctic Continent.

The unusual thing about the route of the diesel-electric Ob' during 1959/1960 was that most of the route was south of the 60th parallel. This cruise ranks first in length among the voyages made in the low latitudes by all Soviet Antarctic Expeditions.

During the period of the voyage there were 23 hydrological stations; at these stations considerable attention was devoted to biological work. The transparency of the sea was determined on 26 occasions. For a distance of 5,000 miles the temperature of the surface layer of the sea was continually recorded. Echo sounding measurements were made along the entire route of 7,000 miles. A great number of observations were made with the electromagnetic current measurer; 250 determinations were made over a distance of 2,000 miles.

As on all preceding voyages, the vessel made observations of the ice along the entire route. A radar survey of icebergs was made.

One of the important results of the work of the marine detachment was a description of Peter I Island, situated at 68°50' S., 90°35' W. The island was discovered on 10 January 1821 by the first Russian Antarctic expedition of F. F. Bellingshausen and M. P. Lazarev.

On 10 March 1960 the Ob' circumnavigated Peter I Island. Visibility was excellent. A marine description was made of the shores and depths were measured. The contours of the island were mapped by means of radar and photographic surveys. As a result of these observations a new and more precise map of the island has been compiled. The island is a three-peaked volcano with a height of 1,200 m -- completely covered by ice. The shores of the island drop off very steeply to the sea or constitute the high faces of glaciers which are creeping seaward. It has been established that the configuration of the island on Norwegian maps has a number of inadequacies. Its area on those maps is shown as 1/3 less than it is in reality. In the vicinity of the island there are strong tidal currents and a great number of icebergs.

On passing through the Bellingshausen Sea and Drake Strait, the Ob' sailed northward, completing a circumnavigation of Antarctica.

("By Radio from Antarctica," Ye. S. Korotkevich, Informatsionnyy Byulleten' Sovetskoy Antarkticheskoy Ekspeditsii, No. 19, 1960, pp. 47-50)

Radio Reports from Antarctica for March 1960

The Chief of the Fifth Continental Expedition, Ye. S. Korotkevich, reports the following about work in the Antarctic in March 1960:

Mirnyy Observatory

Aerometeorological research. In March the mean values at the Earth's surface were: atmospheric pressure -- 977.8 mb; air temperature -- -13.1°; wind velocity -- 11.5 m/sec; relative humidity -- 62%. Total cloud cover was 5.9. The mean height reached by radiosondes was 21,857 m. The maximum air temperature was -5.4°, minimum -- -29.0°. Atmospheric pressure varied from 957.0 to 988.8 mb.

The number of clear days was 4; there were 9 overcast days. Atmospheric processes were distinguished by low activity of circulation. This led to a weakening of meridional transfers of air masses.

Geophysical research. In March the magnetic field was characterized by intensive disturbances during the day. The number of cases of disturbances increased during the night hours in comparison with February. The condition of the ionosphere was unstable. Brief absorption recurred repeatedly, as did rapid fluctuations of critical frequencies. Between 0700 and 1200 hours world time there was complete absorption; a magnetic storm began at 0300 hours, continuing until 18 March.

Observations were made on a more frequent basis for two days before the solar eclipse and for two days afterwards. In processing the ionograms no special phenomena were observed for the period of the eclipse. On 20 March a disturbed condition of the ionosphere was noted with absorption up to 4 mc. A magnetic-ionospheric storm began on 31 March with a full absence of reflections. The most active period of the magnetic storm continued from 0300 to 1100 hours on 1 April. Sharp changes in the intensity of cosmic rays were noted during the time of the ionospheric-magnetic storm.

Eleven earthquakes were recorded in March against a strong background of microseisms. Tremblings were noted which were caused by the destruction of the ice barrier in the vicinity of Mirnyy.

The brightness of auroras, observed visually, did not exceed 1 on the scale. Ray-like auroras were the type most commonly observed.

Observations were made of the radio signals of a satellite for 128 revolutions on a frequency of 20 mc; 101 cases of comparison were made and there were 1,512 measurements of the field intensity by terrestrial radio stations.

Hydrological research. Aerial ice reconnaissance established that at the beginning of the month the Davis Sea was almost completely free of ice. Total break-up of the shore ice ended in the period 5-10 March. Intensive ice formation began on 10 March.

By 20 March the sea to 60° S. on the west and 64°30' S. on the east was already covered with young ice with a compactness of 8 to 10 on the scale. Near Mirnyy the thickness of the shore ice has attained 30 to 50 cm. However, scattered openings remained in the ice until the end of the month.

Geographical research. An aeromagnetic survey was made in the vicinity of Mirnyy, between 66° and 70° S. An aerial photographic survey at a scale of 1:60,000 was also made from Farr Bay to Mount Gausberg and from Cape Maksimov to Karelin Bay (a zone with a width of 16 to 19 km). The ice dome of Drigal'skiy Island was also included. A repeated triangulation of the glaciological polygon was initiated to determine the velocity of movement of the glacial cover.

Biological research. Periodic observations were made of birds and fish.

By the end of the month the only birds remaining on Haswell Island in any considerable numbers were silver stormy petrels and individual doves. The Adele penguins remained in small groups in the open patches of water. The first Emperor penguins arrived in the vicinity of Mirnyy on 20 March. By the end of March there were about 500 of them. Five species of fish were caught in the vicinity of Mirnyy. Such species as Trematomus borchgrevinki and Trematomus hermachii are caught in considerable numbers. Eggs were discovered in some of the fish caught -- sometimes well-developed.

Movement of the Sledge-Tractor Train

During March the eastern sledge-tractor train travelled 260 km from Mirnyy; on 7 March the train arrived at Pionerskaya and on the 22d, at Komsomol'skaya. On 26 March it headed back.

Vostok Station

In March the mean values at the Earth's surface were: atmospheric pressure -- 612.4 mb; air temperature -- -61.9°; wind velocity -- 5.7 m/sec; relative humidity -- 74%. The predominant direction of the wind was SSW. The maximum velocity of the wind attained 11.2 m/sec. Atmospheric pressure varied from 624.7 to 596.0 mb; relative humidity -- from 71% to 78%. The amount of precipitation was 0.7 mm.

The low activity of circulation in March led to a weakening of meridional transfer and to an intensive cooling of the central regions of Antarctica.

The maximum height reached by radiosondes was 25,810 m. The extreme temperature values were extraordinarily low: maximum -- -46.9°, minimum -- -74.0°. It was characteristic that the pressure for March was also low.

The magnetic field in March was characterized by moderate activity. The mean value for diurnal disturbances was 1 on the scale. There were no magnetic storms.

The condition of the ionosphere was somewhat disturbed. The diffuseness of the reflected signals increased, especially from the F2 layer. Maximum diffuseness was observed during the night hours. The F2 layer was completely absent at night. There was a considerable decrease in the critical frequencies of the E layer; reflections from this layer often disappeared at night. A flat-lying sporadic layer was observed in the region of the E layer at night. The ionosphere was sounded every five minutes for two days before the solar eclipse and for two days after. On the day of the eclipse, 27 March, no anomalies were observed in the state of the ionosphere.

An ionospheric disturbance was observed on 30 March; full absorption was noted on 31 March. In this period the magnetic field was also highly disturbed. Radar observations of auroras began on 26 March.

Lazarev Station

In March the mean values at the Earth's surface were: atmospheric pressure -- 972.5 mb, air temperature -- -12.0°; wind velocity -- 10.5 m/sec; relative humidity -- 83%. The maximum air temperature attained -3.2°, the minimum -- -25.4°. Atmospheric pressure varied from 951.2 to 990.1 mb. The number of clear days was two; there were 18 overcast days.

The intensity of auroras did not exceed 3 on the scale.

Observations of the crevasse in the ice in Voronin Bay showed that it is continually and evenly expanding at a rate of 1.5 to 2.0 cm per day.

The remainder of the winter shore ice has been torn away and was carried off to sea on 8 March. Winds prevented the growth of new shore ice.

Komsomol'skaya Station

On 3 March the station was put on a stand-by basis for the winter. During the past summer season it continually operated from 20 October.

("By Radio from Antarctica," by Ye. S. Korotkevich, Informatsionnyy Byulleten' Sovetskoy Antarkticheskoy Ekspeditsii, No. 20, 1960, pp. 49-51)

The Fifth Voyage of the Ob'

The diesel-electric vessel Ob' departed from Leningrad on 12 November 1959. Aboard was the Fifth Continental Expedition, headed by Ye. S. Korotkevich, Candidate in Geographical Sciences. The expedition included a small marine detachment headed by I. V. Maksimov, Doctor of Geographical Sciences. On 8 October the diesel-electric Ob' departed from Capetown and headed for the shores of Antarctica for oceanographic work. On 18 December, after completing work along the traverse South Africa - Antarctica, the Ob' approached the Lazarev shelf ice and entered into the shore ice of Leningradskiy Gulf.

After meeting with the polar specialists at Lazarev station, the ship's crew and the entire complement of the expedition began the unloading of the freight belonging to the expedition and the replacement of the personnel assigned to the station. During this time the scientific workers of the marine detachment conducted oceanographic and geographical research in Leningradskiy Gulf.

On 28 December, after completing work in the vicinity of Lazarev station, the Ob' again set sail and headed for the general area of the Japanese Antarctic station Showa. After unloading fuel at this station for the aircraft of the Soviet air detachment, the vessel headed for the Kemp Coast, for the Australian station Mawson. Gasoline was also unloaded at that point. Then the diesel-electric Ob' headed for Mirnyy. The Ob' arrived at the roadstead of Mirnyy on 14 January.

The expedition's loading and unloading operations were completed at Mirnyy on 1 February. The Ob' then sailed eastward, completing its prescribed plan for sailing around the shores of Antarctica.

On 1 March, after a meeting with the Soviet whaling flotillas "Sovetskaya Ukraina" and "Slava," the Ob' entered the Ross Sea, then proceeded eastward into the Amundsen Sea, and on 10 March approached Peter I Island in the Bellingshausen Sea. After completing work on the marine description of the island, the expedition passed through Drake Strait into the Atlantic Ocean and visited the port of Montevideo (Uruguay) for replenishment of its fuel supply. On 22 March, on departure from Montevideo, the Ob' headed for the Motherland. The vessel arrived in Odessa on 18 April.

During the time of its voyage around Antarctica the expedition travelled 8,000 miles along the coastline of the continent. The voyage was made immediately along the coast from 10° E. to 60° W.

During the period of the voyage the marine detachment did interesting oceanographic and geophysical work. This was the sixth expeditionary voyage around Antarctica. It was distinguished from previous voyages by its high-latitude character. The entire voyage was made to the south of the 60th parallel; more than half -- to the south of the 65th parallel. The vessel sailed 2,000 miles amidst heavy ice. During this interesting voyage the ship was commanded by Captain A. I. Dubinin. ("Fifth Voyage of the Diesel-Electric Ob'," by I. V. Maksimov, Informatsionnyy Byulleten' Sovetskoy Antarkticheskoy Ekspeditsii, No. 20, 1960, p. 47)

Voyage of the Diesel-Powered "Kooperatsiya"

On 25 November, soon after the departure of the diesel-electric Ob', the diesel-powered Kooperatsiya set sail from the port of Leningrad. It was the second vessel of the Fifth Continental Expedition. In addition to participants in the Soviet expedition, the vessel carried both Czech and German scientists. The ship set sail under the command of Captain V. V. Beloshistiy.

The diesel-powered vessel arrived in Capetown after a 26-day voyage. After taking on fuel and loading food supplies for Mirnyy, the vessel headed into Antarctic waters. The American glaciologist Dewart was taken aboard at Capetown; he was to participate in the work of the Soviet expedition. On 7 January 1960 the Kooperatsiya moored at the shore ice in the vicinity of Mirnyy. The expedition staff and the ship's crews began unloading work under severe conditions. The diesel vessel periodically changed its position due to break-up of the shore ice.

On 1 February 1960, after taking aboard the members of the Fourth Continental Expedition, the Kooperatsiya set sail from Mirnyy. On the way back to the Motherland the diesel vessel visited Durban, East London and Port Elizabeth, all South African ports. After taking on commercial freight for delivery in Rostok, the vessel headed for the shores of the homeland.

The Kooperatsiya arrived in Riga on 27 March 1960 with the members of the Fourth Antarctic Expedition aboard. ("Voyage on the Diesel-Powered Kooperatsiya," by Ye. B. Leont'yev, Informatsionnyy Byulleten' Sovetskoy Antarkticheskoy Ekspeditsii, No. 20, 1960, p. 48)

Abstracts of Articles from the "Information Bulletin of the Soviet Antarctic Expedition," Issues 19 and 20

The following brief abstracts are intended to give only a very general idea of the contents.

Issue 19:

(1) "Change in the Level of the World Ocean in Connection with Change in Thickness of Continental Ice in Antarctica," by I. V. Maksimov, Doctor of Geographical Sciences, pp. 5-7.

A careful study has shown that in the period 1900-1950 the mean level of the world ocean increased by 6.10 cm. This is only explainable by a secular decrease in the area and thickness of the continental ice on the Earth. Eighty percent of the water added to the world ocean is of Antarctic origin; this would equal a layer of ice 126 cm thick covering the entire Antarctic continent. But most of this decrease in the thickness of the Antarctic ice mantle has occurred in the peripheral areas.

(2) "Absolute Age of Rocks in the Vicinity of Mawson Station," by M. G. Ravich and A. Ya. Krylov, pp. 8-9.

Three determinations were made of the absolute age of certain rocks near Mawson. The argon method was used. Their age is on the order of 490 to 555 million years. Comparisons are made with several other Antarctic areas.

(3) "New Data on the Thickness of the Ice Mantle in the Central Parts of Antarctica," by A. P. Kapitsa, pp. 10-14.

This article describes the latest data collected in Antarctica for the thickness of the ice overlying the land surface. The seismic and gravimetric procedures used are described.

(4) "Approximate Calculation of the Rate of Movement of Glacial Flows from the Width of Resultant Icebergs," by S. A. Yevteyev, pp. 15-17.

The author contends that the mean width of newly formed icebergs has a direct correlation with the rate of movement of the glacial currents from which they were calved.

(5) "Sliding on the Snow at Low Temperatures," by S. N. Kartashov, pp. 18-20.

Physical-mechanical properties of the snow, especially structure, are very important at low temperatures in determining to what extent it is possible to slide over a given snow surface. Significant conclusions are drawn in respect to the types of aircraft skis and sledge runners that should be used to minimize friction.

(6) "Air Masses Over the Central Regions of Eastern Antarctica," by Ye. I. Tolstikov, pp. 21-25.

This article is brief, but the map, table and graphs provide valuable data on the circulation of the atmosphere, mostly for Eastern Antarctica.

(7) "Comparative Characteristics of the Wind Regime at Mirnyy and on the Drift Station Severnyy Polyus-8," by I. M. Dolgin and S. I. Sokolov, pp. 26-30.

Text, table and graphs in this article provide a comparison of the wind regimes over the Arctic and Antarctic.

(8) "A Case of Regeneration of a Cyclone on the Antarctic Front," by V. M. Shapayev, pp. 31-34.

Observations were made simultaneously at Pionerskaya and aboard the Ob'. Considerable detail is cited.

(9) "The Influence of the Heat Reserve in Water on the Time of Freezing of Davis Sea and the Adjoining Part of the Indian Ocean," by N. P. Shesterikov, pp. 35-38.

Computations indicate that there is a close dependence between the time of freezing of the sea and the thermal reserve in the water. This is important in forecasting. By making observations of the condition of the ice in the sea during the summer period it is possible to compute the heat content of the water and thereby judge the time and intensity of freezing of the sea during the fall and winter period.

(10) "On Gravimetric Work in Antarctica in 1957," by I. E. Zommer and A. O. Caynanov, pp. 39-42.

This article describes the GAK-3M gravimeter -- a four pendulum instrument -- and its use under Antarctic field conditions. The gravimeter can be used for the study of subglacial relief.

(11) "On the Principles for a Phytogeographic Division of the Antarctic Pelagic Region," by K. V. Beklemishev, pp. 43-46.

The author reviews the phytogeographic literature and makes recommendations for a phytogeographic regionalization in which the distribution of species will be the determinant, not environmental conditions.

(12) "Obstacle Clouds," by Yu. S. Chernov and P. D. Astapenko, pp. 51-54.

The highly dissected coast line of the Antarctic ice barrier, in combination with the broken terrain in the coastal zone and the sharply rising slope of the ice continent, give rise to interesting and rare forms of clouds. A number of these are described and illustrated and an analysis is made of the causative factors.

Issue 20:

(1) "The Boundary of Central Antarctica," by V. G. Aver'yanov, pp. 5-9.

The area discussed consists of the highly mountainous interior regions of Eastern Antarctica. The article draws definite conclusions as to the boundary at several points where the orographic and climatic boundaries coincide. This boundary is a zone about 100 km wide, roughly passing along the 3,000 m isohypse, deviating to the north and south of it depending on local conditions. The relative simplicity in determining the physical-geographic boundary of Central Antarctica is due to the clearly expressed zonality of natural conditions on that continent. Unfortunately the author supplies no map.

(2) "On the Dating of the Banger Hills Oasis," by S. Z. Rozyeki, pp. 10-14.

The author proposes that the Banger Hills oasis has been freed from its ice mantle on more than one occasion. An episode resembling the current one has been experienced earlier in its geological history, before the subsequent penetration of glaciers over its surface. The present "oasis stage" probably set in at the beginning of the so-called post-glacial climatic optimum, several thousand years ago.

(3) "On the Absolute Age of the Rocks of the Eastern Part of the Mountains of Queen Maud Land," by M. G. Ravich and A. Ya. Krylov, pp. 15-17.

Table 1 lists a number of rock specimens by name, original site and approximate age in millions of years. The argon method was used.

(4) "The Hardness and Density of Surface Layers of Snow in the Coastal Region of Antarctica," by V. M. Kotlyakov, pp. 18-21.

This brief paper is important for a trafficability study. Figure 1, with the additional commentary in the text, is a highly informative picture of conditions along the profile Mirnyy - Kilometer 50. The movement of sledge-tractor trains in this part of the continent is most favorable in spring and the beginning of summer. In summer it is better to travel by night. In winter the best conditions prevail at mid-season. Poorest conditions prevail in the autumn and the end of winter.

(5) "Weather Phenomena Reducing Visibility in the Antarctic and Some Possibilities of Forecasting Them," by P. D. Astapenko, pp. 22-25.

This article discusses marine fogs, blizzards, blowing snow, "frost" fogs, light haze and white fog. The author discusses the methods for forecasting each phenomenon.

(6) "Technique of Observations in Antarctica with Drifting Snow Gages," by V. I. Shlyakhov, pp. 26-28.

This article describes and illustrates a gage for the measurement of drifting snow.

(7) "New Expeditionary-Type Low-Pressure Hydrogen Generator," by M. N. Mal'tsev and I. N. Shpakovskiy, pp. 29-32.

The authors describe a new type of hydrogen generator developed at the Arctic and Antarctic Institute. Figure 1 is a fully instructive drawing of this apparatus. Eight have been shipped to the Antarctic. The apparatus is safe to use, water need not be heated to induce reaction, it is highly productive (the hydrogen for a radiosonde can be produced in 25 to 30 minutes), a wide variety of chemicals can be used, and it is small and easily transported (weighs about 70 to 80 kg).

(8) "Measurements of the Surface Temperature of Water by an Electrothermometer in the Southern Part of the Pacific Ocean," by M. A. Bordanov, pp. 33-37.

Figure 1 shows the distribution of the surface water temperature between southern South America and the area south of New Zealand for March-June 1958. The isotherms have a nearly latitudinal orientation; anomalies are explained textually.

(9) "New Viewpoint on the Nature of the Ninnis Glacier Tongue," by V. I. Bardin, pp. 38-42.

The Soviets have remapped the area between 147° E., and 67°-68° S. The Ninnis Ice Tongue, shown on all former maps, no longer appears as such. Figure 1 shows the new map superimposed on the old. The explanation for this discrepancy is debated in some detail. The character of the Ninnis and Mertz Glaciers are discussed.

(10) "'Disappearing' Glaciers," by Ya. P. Koblentz, pp. 43-46.

This significant article, with its three sketch maps, reports considerable discrepancies between American maps compiled during Operation Highjump and Operation Windmill with the actual contours of the area mapped; some features shown do not exist in reality.
(Abstracts of articles from "Informatsionnyy Byulleten' Sovetskoy Antarkticheskoy Ekspeditsii," Numbers 19 and 20, 1960)

Latest Oceanographic Research in the Arctic Basin

This article begins with a definition of "Arctic Basin." It is by no means synonymous with "Arctic Ocean," but with what has earlier been called the "Central Polar Basin."

Most of the material in this article has been reviewed in previous issues of International Geophysical Cooperation, No. 144, 11 November 1960, inasmuch as Gordiyenko, the author of this article, published most of the same information in Izvestiya Vsesoyuznogo Geograficheskogo Obshchestva, No. 4, 1960, pp. 293-307. ("Main Results of the Latest Oceanographic Research in the Arctic Basin," by P. A. Gordiyenko and A. F. Laktionov, Izvestiya Akademii Nauk SSSR, Seriya Geograficheskaya, No. 5, 1960, pp. 22-33.)

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