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INTERNATIONAL GEOPHYSICAL COOPERATION PROGRAM--SOVIET-BLOC ACTIVITIES

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I. ROCKETS AND ARTIFICIAL EARTH SATELLITES

Latest Issue of "Artificial Earth Satellites"

The third of a series of publications by the Academy of Sciences USSR, titled Iskusstvennyye Sputniki Zemli, No 3, 1959, contains 13 articles on artificial earth satellites and related subjects, abstracts of which are given below.

"On the Problem of Capture in a Restricted Circular Three-Point Problem," by V. A. Yegorov

A theorem is proved, according to which, in a restricted circular three-point problem in the case when one attracting mass is rather small in relation to the other, a point of zero mass arriving from infinity cannot remain forever in the sphere of attraction of the smaller mass, i.e., become its satellite.

An approximate consideration of the problem concerning the possibility of capture by the Moon and planets of a missile launched from the Earth is given. The above theorem is not considered applicable to the Earth—Moon system. If the trajectory beginning at the Earth enters the Moon's sphere of influence on its very first turn around the Earth, then it is possible to show, ignoring perturbations, that this trajectory must leave the sphere of influence on its first turn around the Moon. The capture of a missile by the Moon is impossible for such trajectories because portions of them are located inside the sphere of influence of the Moon in a shifting selenocentric system of coordinates always close to hyperbolas. Thus, within the boundaries of the sphere of influence, the selenocentric velocity exceeds the local parabolic velocity by 383 meters per second, that is, by more than two times. At initial velocities less than parabolic for Earth, the upper limit of the transverse component of the entering geocentric velocity does not exceed 200 meters per second. Inasmuch as the angle formed by the velocity of the Moon with the entering geocentric radius differs little from a right angle (not more than 10 degrees) and the Moon's own velocity is about one kilometer per second, then one component of the entering selenocentric velocity, the orthogonal and geocentric radius-vector of the point of entry in the sphere of influence, already is, at the least, about 0.8 kilometer per second.

At initial velocities, larger or equal to the parabolic for the Earth, the radial component of the entering geocentric velocity exceeds one kilometer per second, and the value of the entering selenocentric velocity, as before, is more than twice as large as the local parabolic velocity.

Perturbations from the Earth cannot noticeably change such a sharply expressed hyperbolic motion inside the sphere of influence, and the missile entering the sphere of influence must leave it on its first turn around the Moon, unless it hits the lunar surface.

It is possible to show in a similar way that for a planet-Sun system, ignoring perturbations, the capture of a missile launched from Earth by a planet on its first turn around the Sun cannot occur. The error resulting from not considering perturbations, i.e., the influence of the planet outside its sphere of influence and the influence of the Sun in the planet's sphere of influence, in this case, will be much less than in the problem of the flight to the Moon. The hyperbolic velocity of a missile launched from Earth, in the sphere of influence of a planet, is much larger than in the sphere of influence of the Moon. The entry velocity of a missile launched from the Earth in the sphere of influence of a planet will be least for Mars and Venus. They will, however, also be three times larger than the local planetocentric parobolic velocities at the boundary of the planet's sphere of influence. Thus, the capture of a missile from the Earth by a planet on its first turn around the Sun is also impossible.

"Librations of a Satellite," by V. V. Beletskiy

The conditions for the existence and stability of the position of relative equilibrium of a satellite, i.e., the equilibrium in a system of coordinates connected with the radius-vector of the satellite's center of mass, are examined. The libratory motion about a position of relative equilibrium is also studied.

It is stated that a number of small perturbing factors act on the actual libration of an artificial satellite. These are the moments of aerodynamic forces, perturbing moments caused by deviations of the Earth's field of attraction from the normal, regression of the orbit because of the oblateness of the Earth and aerodynamic resistance, moment of electromagnetic forces, etc. Investigation shows that if the basic conditions for stability (for stability of the relative equilibrium of a solid body in a circular orbit in a Newtonian central force field, it is sufficient that in unperturbed motion the major axis of the ellipsoid of inertia of the body be directed along the radius-vector of the orbit, and the minor axis, along a normal to the plane of the orbit) and certain additional natural conditions are fulfilled, then the librations in the presence of the indicated perturbations will differ very little from the unperturbed librations.

"First-Order Perturbations in the Motion of Artificial Satellites Caused by Oblateness of the Earth," by V. F. Proskurin and Yu. V. Batrakov

The problem of the motion of a satellite in the field of attraction of an oblate planet is examined on the assumption that the satellite's orbital plane can have any inclination to the plane of the equator of the planet. It is also assumed that the planet has the form of an ellipsoid of rotation and that the oblateness of the planet is rather small. As a result of this, in the expansion of the perturbation function in terms of powers of the oblateness, it is possible to restrict the expansion to terms containing the first power of the oblateness. The portion of the perturbation function being considered is expanded in a series of powers of the eccentricity; coefficients of the series are very simply expressed by trigonometric functions of the angle of inclination. Integration of ordinary Lagrange equations gives an analytical expression of the first-order perturbations relative to the oblateness of all of the elements of the orbit with an accuracy up to the fourth degree of the eccentricity inclusively.

"Perturbations of Artificial Satellite Orbits Caused by the Resistance of the Air," by Yu. V. Batrakov and V. F. Proskurin

A general form of first order perturbations in the elements of the elliptical orbit of a satellite caused only by atmospheric resistance is sought. It is proposed that the Earth's atmosphere has a strictly spherical density distribution and that the Earth's attraction can be substituted by the attraction of a material point located at its center of inertia and having the same mass as the Earth. Short period perturbations, the periods of which do not exceed the period of one revolution of the satellite, are obtained, together with secular perturbations. These short period perturbations caused by the resistance of the air medium have still not been studied, according to the authors. A numerical example, showing the comparative value of first order perturbation caused by the resistance of the air, is also given.

"Observation of Artificial Satellites by the Expectation Method," by B. M. Vakhnin and V. V. Beletskiy

A method is proposed which permits making repeated observations of a once-observed satellite if its orbital period is unknown. Proposed initially is that the orbital inclination, the longitude of the node, and the location of the perigee are constant. This holds true sufficiently well for orbits which are close to circular polar orbits. In this case, it was felt possible to formulate the following "rule of local time."

"If the inclination of the orbit of a satellite is not equal to zero, then the intersection of any given latitude by the satellite will always occur at one and the same local star time."

This rule continues to function even if the period of revolution, eccentricity, or position of the perigee changes. For example, with a change in the period of revolution, the point of intersection is shifted, but the time of intersection, calculated for local time has the same value in the new point as it had in any other in which the satellite crossed this same latitude.

The rule is not considered accurate for a real orbit in which exists precession of the plane of the orbit and the motion of the perigee in the plane of the orbit and can be applied only for small intervals of time and for observations with a sufficiently wide angle of view. However, an "expectation graph" can be calculated for orbits with changing orientation.

Formulas for plotting the "expectation graph" for various sets of known data are given. It is essential that one variable factor, the rate of precession of the orbit, be taken into account for successful application of the method.

"Dependence of Secular Variations in Orbit Elements on Air Resistance," by P. Ye. El'yasberg

The effect of air resistance on secular variations in the orbit elements of artificial earth satellites has been considered in three earlier papers by I. M. Yatsunskiy; D. Ye. Okhotsimskiy, T. M. Eneyev, and G. P. Taratynova; and G. P. Taratynova, all of which appeared in Uspekhi Fizicheskikh Nauk, Vol 63, No 1a, 1957. The present work is the development of an idea advanced in the first of these papers. The idea concerns the series expansion of the secular variations in the orbit elements in terms of Bessel functions of an imaginary argument. This technique produces simple descriptive formulas which can be used to solve a number of problems, such as determining the dependence of secular variations in orbit elements on the magnitude of these elements and evaluating the accuracy of air density determinations on the basis of measurements of the secular variations in the orbit elements.

Analytical expressions are obtained for changes caused by air resistance in the latus rectum of the orbit, the eccentricity, the major semiaxis, the period of revolution, and the distance from the preigee to the center of the Earth. It is assumed that air density is a function of altitude alone. The error in the formulas resulting from various approximations made for the sake of simplicity is 1-2% when the eccentricity is greater than 0.04, increases to 6% when the eccentricity is 0.023, and continues to rise for smaller eccentricities.

It is further shown that the rate of increase in air density with altitude is a function of only two orbit parameters, the period of revolution and the distance from the perigee to the center of the Earth.

"Problem of Piercing at Cosmic Velocities," by Academician M. A. Lavrent'yev

The problem of the puncture of a metallic plate at velocities of 50-100 kilometers per second is studied. A model of an incompressible medium is proposed for which it is possible to conduct calculations up to the desired limit.

A one-dimensional case is considered. The problem of the impact of a plate of a thickness flying at a speed of v_0 on the end of a cylinder with a length of l is studied. The thickness a is considered small in comparison to l. The problem consists in determining the impulse which the rod acquires as a result of the impact. The plate-block is considered as incompressible and absolutely solid. The shaft is considered as a limited case of a collection of absolutely solid infinitely thin plates located infinitely close to one another. Under an inelastic impact, the block of the first plate retains a quantity of motion, and as a result of the increase of mass, a loss of kinetic energy occurs. This will occur with the involvement in motion of each succeeding plate. Calculations are conducted in the limited case, of the distribution along the rod of the loss of kinetic energy of the system.

The three-dimensional case involves the impact of a pellet against a plate-hemisphere of given radius. As a result of the impact, the mass of the pellet (hammer) will increase in accordance with the concept of inelastic collisions; with the increase of mass, the amount of motion will be preserved, but the kinetic energy of the system will be converted into heat.

"The Determination of the Density of the Atmosphere at an Altitude of 430 Kilometers by the Sodium Vapor Diffusion Method," by I. S. Shklovskiy and V. G. Kurt

A comparison of data on atmospheric density at an altitude of 430 kilometers obtained during the first use of the sodium-cloud method on 19 September 1958 with similar data obtained for 450 kilometers with Explorer I shows very good agreement (($6.7 \pm 2) . 10^{-15}$ grams per cubic centimeter and $9 \pm 6) . 10^{-15}$ grams per cubic centimeter,) respectively). However, on the basis of data on electron concentration in the outer region of the ionosphere, based on radio signals of Sputnik I (and assuming ionization equilibrium at 400 kilometers), the concentration of neutral atoms was found to be $5 . 10^{8}$ per cubic centimeter. When extrapolated for 430 kilometers, this value is 30-40 percent higher than the sodium-cloud data. A comparison of atmospheric density data obtained with various Soviet and American satellites and with the sodium-cloud method also shows a considerable divergence of values, apparently resulting from a considerable space-time variation of particle density at the altitudes involved. The sodium-cloud method can be used to record this variation and can also be used for a much greater altitude range, the lower limit of which is at an altitude (about 200 kilometers) where, during the period of observation (about 10 minutes), sodium atoms will not disappear into the atmosphere as a result of chemical reaction. At this lower altitude, a much smaller amount of sodium (only tens of grams) would be required. The upper limit of measurement by the sodium-cloud method is 500-600 kilometers and perhaps even higher, provided the hydrogen content is considerably greater than that ordinarily recorded. The sodium vapors should be released into the atmosphere near the peak of the rocket trajectory, not in the course of its flight as reported by Edwards, et al. (The Airglow and Aurorae, London, 1956, p 122) and Bedinger, et al. (J. of Geoph. Res., Vol 63, No 1, 1958, p 19).

"Methods for the Control of Interfering Currents Originating at the Input of an Electrostatic Fluxmeter During Its Operation in a Conducttion Medium," by I. M. Imyanitov and Ya. M. Shvarts

A brief description is given of the operation of a rotation-type electrostatic fluxmeter used for measuring the natural charge of a satellite and methods for controlling interfering currents at the input of the meter.

Noise currents appearing at the input of the measuring circuit and raising the lower limit of the recorded natural charge of the satellite may be the result of the following:

1. Velocity of the satellite relative to the thermal velocities of ions and electrons.

2. The difference between the potential of the satellite at the position of the fluxmeter and the equilibrium value of potential.

3. Exposure to various types of photoemission.

4. Directed movements in the ionosphere.

One method for decreasing interfering currents uses a synchronous detector at the output of the measuring circuit of the fluxmeter and is based on the fact that a 90° phase difference exists between the operating and interfering currents.

Another method for decreasing noise involves designing the measuring and screening plates of the fluxmeter so as to decrease both the modulation of the flow of charged particles reaching the surface and the absolute value of current falling on the surface of the measuring plate. Experiments performed by the author indicate that this may be accomplished by making the measuring and screening plates in the form of metal grids having specific electrical and optical transmittances. Details are given of the experiment and apparatus used.

The use of negative feedback on the noise voltage is suggested as another method for controlling interfering currents. The two parallel-connected detectors, one tuned to the operating voltage and the other to the noise voltage, are connected to the output of the measuring circuit. The detected noise voltage is applied as negative feedback to the d-c voltage at the input, thus decreasing the amplitude of interfering a-c voltage at the input of the operating synchronous detector.

"Certain Results in the Determination of Structural Parameters of the Atmosphere With the Aid of the Third Soviet Artificial Earth Satellite," by V. V. Mikhnevich, B. S. Danilin, A. I. Repnev, and V. A. Sokolov

Results from the processing of manometric measurements conducted on the 15th pass of the third Soviet satellite are given which represent the state of the atmosphere at altitudes from 225 to 500 kilometers on 16 May 1958. Values for different altitudes corresponded to measurements obtained at different times of the day (1300 to 1900 hours local standard time) and at different latitudes (57°N to 65°N). Design and operation of satellite-borne manometric equipment and the method for determining atmospheric values are described. Calculations of the altitude of homogeneous atmosphere, temperature, and pressure were performed on the assumption of the applicability of normal barometric formulas to a rarified gas in the presence of temperature gradients. Structural parameters of the atmosphere (given in a table for 5-kilometer intervals in the range from 225 to 500 kilometers) at 225 and 500 kilometers, respectively, are: number of particles per unit volume, 6.01×10^9 and 8.24×10^7 per cm^3; density, 2.12×10^{-13} and 2.21×10^{-15} grams per cm^2; altitude of homogeneous atmosphere, 40.0 and 119.0 kilometers; temperature, 936 and 1953°K; pressure, 7.76×10^{-4} and 2.22×10^{-5} dynes per cm^2; and pressure, 6.25×10^{-7} and 1.94×10^{-8} mm Hg. Data are presented on the values of density at different altitudes as obtained by the Soviets and the US through manometric measurements and satellite drag. Surveyed information bears out the fact that the state of the upper surface of the atmosphere can change sharply, depending on such factors as outer disturbances (i.e., solar disturbances), as well as the season, time of day, and geographical latitude.

"Radio-Frequency Mass Spectrometer for Investigation of Ionic Composition of Upper Atmosphere," by V. G. Istomin

The ionic composition investigation of upper atmosphere was begun in the USSR in 1957, and the data on the mass spectrum of positive ions in the ionosphere at an altitude up to 855 kilometers obtained from Sputnik III, and various other high-altitude rockets. A radio-frequency mass spectrometer used in these investigations consisted of three basic units: mass-spectrometer tube (radio-frequency mass analyzer) with a preamplifier, electronic unit of the device, and power supply unit. The mass-spectrometer tube was in the form of a three-stage analyzer. One of the construction peculiarities of the device is the single-file grids made from tungsten wire wound on "kovar" rings. Five such grid rings are placed in the ion-source unit and 15 in the analyzer. The diameter of the grid ring is 30 mm, and the winding pitch is 0.5 millimeter. The 15 analyzer grids perform the following functions: 1 and 2 are the ion pull-in grids; 3, 4, and 5 are first-stage grids; 6, 7, and 8 are second-stage grids; 9, 10, and 11 are third-stage grids, 12, 13, and 14 are retarding grids; and 15 is the protective grid. The mass-spectrometer housing has a flange for mounting on the rocket or sputnik. The ion-source unit of the tube serves only for the purpose of laboratory calibration. The tube of the device is filled with a mixture of argon and neon at a pressure of 3.10^{-5} millimeters of mercury. The electronic components of the device consist of a dc amplifier, high-frequency oscillator, voltage rectifier, saw-tooth pulse generator, 600-volt dc voltage converter, and output switching system.

The mass-determination range of the device is from 6 to 48 atomic mass units, and the scanning time for the whole range is 1.7 seconds.

"Manometer Error Caused by Slight Flows in the Shell of a Sputnik," by S. A. Kuchay

Among the instruments in Sputnik III were manometers capable of measuring static pressures of 10^{-6} - 10^{-9} millimeters of mercury. When measurements are made in the upper atmosphere, molecules which have arrived with the satellite and entered the upper atmosphere by means of gas separation from the surface of the satellite or leakage can invade the manometer. The desorption by the surface will cease at a relatively rapid rate, but the leakage from within remains practically constant during the time the instruments are in service. Thus, the manometer error depends on the hermeticity of the shell. The molecules of gas located inside the shell are "intrinsic" molecules. To compute the absolute manometer error, it is sufficient to know the normal component of flow of these "intrinsic" molecules over a cross section of the intake pipe. The calculation involves various types of diffuse and point flow, for which the manometer error varies from 2.7×10^{-15} to 3.5×10^{-8} millimeters of mercury.

"On the Problem of the Interaction of a Satellite With the Magnetic Field of the Earth," by Yu. V. Zonov

The interaction of a satellite with the Earth's magnetic field is considered. Among the effects of the field are currents due to the constant motion of the satellite relative to the magnetic field, a change in the velocity of rotation of the satellite around its axis caused by eddy currents, and perturbing forces which the magnetic field exerts on a satellite that does not have its own rotation. Of the above factors, eddy currents which arise in the metal shell and produce a considerable decrease in the angular velocity of the satellite's rotation are the most significant. Charges and currents which arise as a result of the satellite's motion do not exert any considerable effect on its motion and need be considered only with respect to experiments conducted on the satellite.

An expression for the velocity of rotation of the satellite around its axis caused by the difference of potential on the shell is found:

$$\omega = \omega_0 \exp\left(- \frac{9 \rho h V^2 B^2 \sin^2 \alpha}{8 \rho_0 \pi^2 r^3 c^2} t\right)$$

Where ρ_0 is the density of the satellite, ρ is the specific resistance of the shell, h is the thickness of the shell, r is the radius, c is the electromagnetic constant, V is the velocity of the satellite relative to the magnetic field, B is the magnetic induction, α is the angle between the velocity and induction vectors, and t is time.

Eddy currents in the shell and their effect on the angular velocity are calculated. The perturbing effect of the magnetic field as the satellite passes over the poles is also discussed.

Radio Contact With Soviet Interplanetary Station Fails

Radio contact between ground stations and the third Soviet cosmic rocket has been interrupted for some unknown reason, writes Academician L. I. Sedov, president of the International Federation of Astronautics, in a Pravda article on the Soviet cosmic rockets.

This disruption in communication may be due to a number of different reasons, says Sedov, one of them being the result of the impact of a meteorite. In this case, according to Sedov, the breaking of the hermetic seal of the station's shell would suffice for the stoppage of the on-board apparatus.

Measurements of the third cosmic rocket's trajectory show that it is moving in an orbit which is nearly elliptical, with an apogee of about 500,000 kilometers and a gradually diminishing perigee. The station will complete about 11 revolutions and, toward the end of March and the beginning of April 1960, will enter the dense layers of the Earth's atmosphere and burn. Despite the high perigee of the orbit on the station's first revolution and the absence of atmospheric resistance on its motion, states Sedov, it was found that the station's lifetime is limited. This is unexpected at first glance. The effect is caused solely by Newtonian forces. It is explained by perturbations of the station's movement by the attraction of the Sun and Moon.

The successful attempt of photographing in space and of transmitting pictures by radio to Earth is interesting, not only because of obtaining information on the Moon's far-side, but also because it has great value as a successful test of a new method in modern experimental astronomy, says Sedov.

The launchings of each of the Soviet cosmic rockets is called a new, great stage in the development of rocket flights. The three remarkable flights will go down in history as the principal stages in the investigation of cosmic space and a preparation for interplanetary travel.

The investigations which were conducted, concludes Sedov, are only the beginning. Ahead lies the wonderful prospect of future cosmic flights. ("The Soviet Cosmic Rockets," by Academician L. I. Sedov, President of the International Federation of Astronautics; Moscow, Pravda, 15 Nov 59, p 3)

Lunar Globes Soon To Be Mass Produced

The first lunar globe has been completed in the Moscow Planetarium, reports V. Lutskiy, lecturer. It is a relief globe based on both previous information on the side of the Moon known to us and information gathered from the photographs of the Moon's far side by the third Soviet cosmic rocket. The globe will soon be mass produced by the Experimental-Mechanical Works of the Moscow Planetarium and distributed to all planetariums throughout the Soviet Union. ("The First Lunar Globe Is Created," by V. Lutskiy, Lecturer, Moscow Planetarium; Moscow, Izvestiya, 18 Nov 59, p 3)

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Soviets Allegedly Working on Sophisticated Lunar Vehicle

Generally discussing Soviet outer space accomplishments, including Lunik I and II and touching upon Lunik III, and speaking about cosmic radiation, demonstrated by the instruments aboard Lunik II, the article stresses the importance of this data to future planning of suitable shielding in space flight vehicles. Referring to a statement by A. Topchiev, Vice-President of the Academy of Sciences USSR, in which he said that, "Following the second Soviet cosmic rocket, man is to be the next visitor to the surface of the moon," the article points out that this is not merely a theoretical problem. According to the text of the article, the Soviet Union is already working on a single-stage rocket with a thrust of more than 750 tons. Equipped with 20 such "motors," a five-stage rocket, measuring 70 meters in height and weighing 3,000 tons at blast-off, could transport a two-story cabin with 2-3 persons aboard to the moon and bring it back to earth. For this accomplishment, the article continues, the first three stages of the space rocket would be required for the outward journey, the fourth for deceleration and landing on the moon, and the fifth for the return flight to earth. The [outbound] trip is scheduled to take 2½ days.

The article gives no other details on the project and does not attribute the statements to any person. ("The Moon and Peace -- Man's Flight Into the Universe"; Prague, Pracovnik SVAZARMu, 13 Oct 59, pp 6-7, 13)

Observations at Severnyy Polyus-8

The drift of Severnyy Polyus-8 has been continuing for 6 months. Despite heavy snowstorms, severe frost, and breaks in the ice floe, scientific observations have been continuing without interruption.

During the past 6-month period, the ice floe with the station traveled about 1,000 kilometers on an irregular course in a northwesterly direction. A large amount of material has been collected. After preliminary processing of these data, scientists will be able to draw some conclusions which should be of considerable interest.

As a result of numerous measurements made by hydrological stations operating on a 24-hour basis, some peculiarities in the nature of subglacial currents and in the distribution of warm Atlantic waters have been discovered.

The study of ice dynamics in the drift area of Severnyy Polyus-8 has great practical importance, since the ice masses in this area form the main obstacle for navigation in the eastern part of the Northern Sea Route. The observations made at the station will undoubtedly provide more detailed information on the climatic and synoptic characteristics and the radiation regime of the Arctic Ocean. All of this will simplify the work of scientists compiling ice forecasts and will, to some extent, facilitate navigation.

During the summer, the surface of the ice floe was flooded with water as a result of intensive thawing. A large number of melt water "lakes" appeared in the camp area. Holes were drilled daily in the ice to drain the melt water into the ocean. With the help of a tractor, the living huts and scientific pavilions were repeatedly moved from one place to another.

The short arctic summer is over. A temperature of minus 32 degrees centigrade has already been recorded, and the polar night will soon begin. ("Our Country's Flag in the High Latitudes," by V. Rogachev, chief of Severnyy Polyus-8; Leningradskaya Pravda, 21 Oct 59)

Plans of Fifth Antarctic Expedition

The Arctic and Antarctic Institute in Leningrad is completing preparations for the forthcoming expeditionary research to be conducted in antarctic waters on the Ob' by the marine detachment of the Fifth Soviet Antarctic Expedition.

The main object of these studies will be the southern, ice-covered regions of Bellingshausen Sea. The southern coast of this sea, extending over almost 1,000 kilometers, has never been explored before. A wide zone of almost impassable sea ice has, until now, prevented ships from approaching the coast.

The expedition will devote much work to the study of sea ice and the currents and water masses of this sea. The characteristics and drift of the sea ice in its southern parts will be investigated.

Particular attention will be given to the study of the current of western winds. A very interesting question should be clarified, i.e., whether there exists a coastal western [air] current at the southern shore of Bellingshausen Sea, as has been observed in many other regions of the Antarctic.

In the field of marine geology, the expedition will concentrate its efforts on the study of oceanic depressions in the northern part of the sea and the study of the continental slope of Antarctica in the southern part [of the sea]. The hydrobiological studies should also be of great interest. In addition, the expedition has set itself the task of studying the peculiarities of atmospheric circulation in this little-known region of Antarctica, which is noted for its long-lasting and severe storms. ("To the South Polar Latitudes"; Riga, Sovetskaya Latviya, 18 Oct 59)

Previous Expedition Members Return to Antarctic

The Fifth Soviet Antarctic Expedition will include a number of polar specialists with practical experience. G. I. Matveychuk, deputy chief of the expedition, wintered in Antarctica and at a drift station in the Arctic. V. S. Sidorov, chief of station Vostok, also participated in a previous antarctic expedition. L. I. Dubrovin, Candidate of Geographic Sciences, will be chief of station Lazarev. I. V. Maksimov, Doctor of Geographic Sciences, will supervise oceanographic studies along the coast of Antarctica. He was chief of the Second Marine Expedition on the Ob'. ("New Antarctic Expedition"; Moscow, Sovetskaya Rossiya, 13 Oct 59)

Return of Plane From Station Lazarev

On 1 November 1959, at 1055 hours Moscow time, the LI-2 plane piloted by B. Osipov returned from its long-distance flight over East Antarctica. In addition to the crew, A. Dralkin, chief of the Fourth Antarctic Expedition, N. Shakirov, aerial photographer, and V. Lugovoy, interpreter, took part in the flight.

The round-trip flight, from the Pravda Coast to Queen Maud Land and back, made by the Soviet twin-engine transport plane covered about 7,000 kilometers. For the first time, the two Soviet bases, Mirnyy and Lazarev, were connected by airplane. During the preceding 7-month period, contact between Mirnyy and Lazarev had been maintained by radio only.

After arrival at Lazarev, the plane made two reconnaissance flights in that vicinity: one, along Princess Astrid Coast, and the other, south of station Lazarev, in the region of the Wohlthat and Sor Rondane mountains.

On 28 October, the plane left Lazarev on its return flight. Four stops were made along the way at foreign antarctic stations, including the Belgian base Roi Baudouin, the Australian stations Mawson and Davis, and the Japanese station Showa. The Soviet and foreign polar scientists exchanged scientific information on problems concerning the exploration of East Antarctica. ("Airplane Returns to Mirnyy"; Moscow, Vodnyy Transport, 3 Nov 59)

New Mountains Discovered by Soviet Plane

The group of polar scientists who arrived at station Lazarev by LI-2 plane from Mirnyy on 19 October remained on Queen Maud Land for 10 days. The plane made several flights in the vicinity of Princess Astrid Coast and into the interior of the continent. During the latter flight, two groups of mountain peaks were discovered at a point with coordinates 72 degrees South and 16 degrees East and were plotted on the map; the height of these mountains was about 3,000 meters above sea level. A reconnaissance flight over the area was made to determine the best route for overland transport from central regions of Antarctica to Princess Astrid Coast. ("Above the Ice Cap of Antarctica"; Moscow, Vodnyy Transport, 31 Oct 59)

On their recent long-distance flight from Mirnyy to Lazarev, the Soviet explorers discovered a previously unknown mountain area shortly before arriving in Queen Maud Land. It was determined that the altitude of these mountains was about 3,000 meters above sea level. Possibly these mountains will be named "Oktyabr'skiy Range" in honor of the October Revolution or "Moscow Mountains." However, at the moment, the name is not important. The Soviet people have given science -- geography and geology -- a gigantic new object for further study. (Mirnyy--Lazarev--Mirnyy"; Moscow, Izvestiya, 6 Nov 59)

Current Activities in Antarctica

With the arrival of spring in Antarctica, scientific activities have been greatly expanded. The polar explorers are now headed toward the unexplored interior of the continent.

During the current antarctic spring, interior expeditions will be carried out by scientists of Australia, Belgium, Norway, the US, France, and Japan. The Fourth Soviet Antarctic Expedition is conducting research according to an extensive program.

A group of scientists headed by S. Shcheglov, geophysicist, resumed its complex scientific studies in central regions of Antarctica during mid-September. The explorers have two "Pingvin" snow vehicles with trailers at their disposal, with equipment and food supplies for 4 months.

During a one-month period, the group traveled over 200 kilometers from the coast of Davis Sea. Progress has been greatly slowed down by snowstorms. The final destination of the group is the south geomagnetic pole. These explorations will contribute a great deal to the information collected by previous Soviet expeditions and will enable the scientists to construct a meridional geophysical cross section of Antarctica, extending over 1,400 kilometers.

The scientists are making concentrated preparations for the great transcontinental traverse, which will pass through central regions of Antarctica and the South Geographic Pole. ("Conquerors of the Glacial Continent"; Moscow, Pravda, 21 Oct 59)

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