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SOVIET BLOC INTERNATIONAL GEOPHYSICAL YEAR INFORMATION

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I. ROCKETS AND ARTIFICIAL EARTH SATELLITES

CPYRGHT

Sputnik II Completes 2,000th Revolution Around the Earth

At 1800 hours Moscow time on 21 March Sputnik II completed its 2,000th revolution around the Earth. Since its launching 138 days ago Sputnik II has traveled a distance equal to 89 million kilometers.

Regular optical observations of the movement of Sputnik II are being conducted by about 80 optical observation stations in the Soviet Union and more than 120 observations stations in Europe, Asia, Africa, and North and South America. The best-quality measurements are regularly received from observatories and optical observation stations in Pulkovo, Arkhangel'sk, Moscow, Ryazan', Riga, Vologda, Gor'kiy, Petrozavodsk, Yakutsk, Stalinabad, Leningrad, Sverdlovsk, and other places.

Much valuable material is received from astronomical stations in Czechoslovakia, China, Bulgaria, Poland, Yugoslavia, East Germany, and Finland. Because of the effect of atmospheric resistance at the minimum point of its orbit the Sputnik II orbit has suffered great changes. The revolution period has decreased 9.5 minutes and the maximum height of its orbit has decreased 900 km.

CPYRGHT

Calculations indicate that Sputnik II will enter the denser layers of the atmosphere and cease its existence between 5 and 15 April. (Moscow, Izvestiya, 21 Mar 58)

CPYRGHT

Rocket Trajectories for Flights Around Moon

The problem of plotting the trajectory of a rocket, launched from the Earth, making a close flight around the Moon, and returning to Earth without expending its fuel en route, is presented by P. A. Tsitovich in an article, "Trajectories for the Flight of a Rocket Around the Moon," originally published in Byul. In-ta teor. astron. AN SSSR, Vol 6, No 8, 1957, pp 550-565. The possibility is shown of plotting similar trajectories with arbitrarily small minimum distances from the Moon provided that the rocket's velocity relative to the Earth at the moment of approach to the Moon is sufficiently great and is counter to the direction of the Moon's velocity. Five orbits having symmetrical axes are constructed by a method of graphic integration developed by the author. These orbits are divided in two types. The first type forms two loops, one of which envelops the Earth, and the other the Moon. The second type forms one loop embracing both the Earth and the Moon. (Referativnyy Zhurnal -- Mekhanika, No 11, Nov 57, Abstract No 12382)

CPYRGHT

Possible Launching Vehicle for Soviet Sputniks

According to an article by A. Gregory in an Italian newspaper, the launching vehicle for the Soviet sputniks could have been a modified "T-7A." (Rome, Il Giornale D'Italia, 15 Mar 58)

Conference of Visual Satellite Observers Concludes in Moscow

A conference of visual satellite observers ended in Moscow on 12 March 1958, according to a report in Izvestiya. The conference was organized by the Astronomical Council of the Academy of Sciences USSR to summarize the results of the 5-month period of observations of Sputniks I and II and to exchange experience.

A. G. Masevich, deputy chairman of the Astronomical Council, told the Izvestiya reporter that during the 5-month period about 2,000 observations were made. Observation data were sent by telegram to the address "Moskva, Kosmos" (Moscow. Cosmos) and are processed in the Computation Center of the Academy of Sciences USSR. The data serve to determine the orbits of the satellites and to predict the satellites' movements.

The Astronomical Council decided to award many of the better observers honorary certificates and special badges.

Associates of the Institute of Theoretical Astronomy presented several papers on the analysis of the observations which were conducted. The problem on variation of the brightness of the satellites was also discussed. These changes have several causes. Their precise determination is of great importance to science. In particular, it will permit establishing the manner in which the satellites are oriented in space and the extent of the transparency of the atmosphere.

The Astronomical Council, A. G. Masevich told the reporter, will soon supplement the equipment of the stations. These stations, she said, have to work for a long time yet. (Moscow, Izvestiya, 13 Mar 58)

Soviet Obelisk to Commemorate First Earth Satellite

Soviet newspapers announce the opening of an all-union contest for the best obelisk design to commemorate the launching of the world's first artificial satellite by the Soviet Union.

"The distinguished victory of Soviet science and technology marking the realization of man's daring dream and the beginning of a new era in the development of world science and culture must be reflected by the

architectural, sculptural, and other monumental art compositions of the obelisk. It must also reflect the prominent role of K. E. Tsiolkovskiy, the first scientist in the world to work on the problems of cosmic flights and assist so much in the priority of the Soviet Union in this field of science," says Pravda.

Izvestiya goes a little further on this theme with this quotation from Tsiolkovskiy. "One thing I strongly believe -- first place will go to the Soviet Union."

The obelisk will be erected in the central parterre of the Moscow State University imeni Lomonosov. Plans for this monument must be in accordance with a predetermined scale and should take into consideration the design of the university and its statue of Lenin.

Entries are to be submitted to the Museum of Russian Architecture imeni Shchusev. Deadline for entries is 10 May 1958. A public display of entries will be held for a month after the close of the contest, and the winners will be announced a month after closing of the display. The first prize will be 30,000 rubles, the second 20,000, and the third 10,000. An additional 40,000 rubles will be made available to the judges for encouragement and acquisition of projects. (Moscow, Pravda, 9 Mar 58; Izvestiya, 9 Mar 58)

New Soviet Color Film, 'The Road to the Stars"

A review of the new Soviet color film, "Doroga k Zvezdam" (The Road to the Stars), appears in a popular Soviet periodical. This review is illustrated by film frames which are keyed to descriptions in the text. Numbers in parentheses refer to these frames. For the most part the review is given the viewer-narrator treatment, which goes as follows:

"A hatch opens. From it appears a man in dress resembling that of a diver. He climbs out and floats in space. A thin line connects him to the ship flying in the spaciousness of the universe. This is the first entrance into the cosmos! An now the astronaut stands on the nose of the ship and sees what no other man has to this time seen -- the immense sphere of the Earth wrapped in the bluish haze of the atmosphere, the reddish solar disk, and along with it myriads of bright nonflickering stars in a black velvet sky.

"What is it? A page from a fantasy novel? No, this action is unfolding on a screen before our eyes.

"The new scientific-artistic color film, "The Road to the Stars," developed by the Leningrad Studio of Popular Science Films, unfolds prospects of the new vigorously developing young science of astronautics before the audience. The spectator appears as if he were present at the origins of astronautics and follows themes of the astonishing achievements which tomorrow will bring.

"One after the other pass episodes of man's discoveries in the world in which he lives; distant navigation and attack on the poles, journey into the heart of the atom and the living cell, investigation of the universe, high-altitude flights and deep-sea descent. However, not once has man crossed the threshold of his 'native home.' An now what is happening.... Across the sky flies a bright little star -- the first satellite, a new moon created by the hands of Soviet people. With what did the seige of the cosmos begin? The spectator is carried to the city of Kaluga at the end of the last century. There, the unassuming teacher, Konstantin Eduardovich Tsiolkovskiy, lived and worked. An illness had made him practically deaf for his entire life. Contact with people became difficult. With his sympathetic and attentive friends, children, he shared his secret dreams of flight to the Moon, visits in space, and utilization of the energy of the Sun.

"But how is it possible to fly in a vacuum?' Tsiolkovskiy poses this question and also answers it. 'Look,' he says to a young boy, 'how it is possible to travel in a boat. We are motionless, but I take an oar, throw it behind, and the boat moves ahead. It is possible to propel oneself away from any object one takes along and no brace such as air is necessary' (1). Gradually, the idea of a cosmic ship develops. Tsiolkovskiy dwells persistently on this idea. On the street, at home, in class, and while strolling, he reflects on what the future ship of the universe will be like. The solution of the problem illuminates the darkness of the unknown like a flash of lightning. The rocket is the true ship of the universe! The spectator relives the delight of the discovery with the scientist. In 1903 the classic work of Tsiolkovskiy, 'Investigation of Universal Space with Reaction Devices,' appeared. In his study, Konstantin Tsiolkovskiy reads the manuscript of this work (2). He is already an elderly man, but his eyes are as young as before and his mind still labors on problems as to how to get beyond the limits of the Earth and build a rocket which will contain the great quantity of fuel necessary for interplanetary flight. In his decling years Tsiolkovskiy solves this problem also with a rocket train consisting of sectional rockets capable of attaining cosmic speed.

"The years pass. The ideas of the scientist began to be converted into fact. Before the spectators passes the history of the modern rocket: the first attempts, the failures and the sacrifices, and finally the first successful flights. In 1933 the first Soviet rocket rises into the sky (3).

"Step by step the film traces rocket techniques. The spectator becomes familiar with the construction of a rocket, through the help of which amazing possibilities were opened up. It can overcome the distance between any points of the Earth's sphere or attain circular velocity and become a satellite of the Earth. On the screen appears the first satellite which excited the entire world. 'The Earth is the cradle of intelligence, but it is impossible to live in a cradle forever,' said Tsiolkovskiy. Man's entrance into the cosmos is contained in the latter portion of the film, its scientific fantasy portion.

"There are the three who are the first to fly in the first ship (4). The spectator watches the ship take off and follows the experiences of the cosmonauts who are subjected to the action of overloading and, afterward, weightlessness (5). He follows the everyday operations of the crew and the first exit of a helmeted man into the airless space of the universe (6) and his return to Earth.

"After the first exploration, a large number of ships set out for the cosmos to transport the parts of a future space station onto a circling orbit. This will be an inhabited earth satellite. People in helmets with miniature rocket engines move about in 'space construction' (7). An unusual installation (8) develops -- a scientific research and rocket drome in the cosmos. In it work scientists with various specialties: physics and meteorology, biology, and astronomy. From here they observe life on Earth, and the activity of the sun and study the universe. Equipped with a helmet, an astronomer works at his telescope, not fearing his once eternal enemy, the atmosphere (9).

"A robot rocket has already departed for the Moon, and a ship with people stands moored to the space station. A rocket approaches the lunar surface (10). The first humans step out into an unknown world (11). This work has slept thousands of years. Man has awakened it (12)!

"The film was produced by the creative collective headed by director-producer P. V. Klumantsev according to the script of B. V. Lyapunov and V. I. Solov'yev. Making of the film required great creativeness and inventiveness. It was necessary to construct much complicated scenery, perfect methods for showing such unusual shots as weightlessness, construct a ship and a space station, and reproduce the historical episodes. The film successfully combines elements of historical-biographical, popular

[redacted] (Nauka i Zhizn', No 1, Jan 58, pp 40-41)

Shternfel'd Books on Artificial Earth Satellites and Space Travel

Ot iskusstvennogo sputnika k mezhplanetnym poletam (From Artificial Satellite to Interplanetary Flight) by A. A. Shternfel'd is a popular book describing the structure of cosmic craft -- cosmic rockets and artificial satellites, the movement of artificial satellites, the methods for observing them, and what scientific problems can be solved with the use of artificial satellites. There are chapters on the survival of man in interplanetary space and on flights to the Moon and other planets of the solar system. The book is intended for a wide group of readers. (Novyye Knigi, No 49, 1957, p 51)

Mezhplanetnyye polety (Interplanetary Travel) is a 63-page pamphlet published in 1957 by the Publishing House for Foreign Literature in Russian, English, and Spanish. (Novyye Knigi, No 17, 1957, p 12; and No 27, 1957, p 31)

Proposed Soviet Rocket 120 Meters Long

A Slovak newspaper reports that one of the planned Soviet rockets will be 120 meters high. The item is accompanied by a photograph of a rocket. (Bratislava, Sloboda, 19 Jan 58)

II. UPPER ATMOSPHERE

Soviet Astronomical Instrument Building Reviewed

O. A. Mel'nikov, Doctor of Physicomathematical Sciences and a member of the Main Astronomical Observatory at Pulkovo, in a short review of Soviet astronomical instrument building says that there are not many new Soviet makes of reflecting astrophysical telescopes. It should be noted, he says, that the original anaberration 40-cm telescope at Byurakan Observatory was built in 1946 and reconstructed in 1950. It has two systems: one similar to the Cassegrain with an equivalent focus of 3.2 m and the other similar to Schwarzschild, basically, with a 1.2 m focus. In the latter case both mirrors are concave and elliptic and the second mirror is located on the side of the tube; the beams from the main mirror are reflected to it by a diagonal mirror. The focal plane is located on the other side of the tube. The system is convenient from the optical and mechanical viewpoint.

In recent years more powerful reflecting telescopes were set up in a number of observatories. A 70-cm reflecting telescope on a parallactic mounting was made under the supervision of P. V. Dobychin for the Astronomical Institute imeni P. K. Shternberg in Moscow and the observatory of the Academy of Sciences Ukrainian SSR. For these institutes and for the Pulkovo and Byurakan observatories, 25-cm afocal parabolic reflectors (1/3) with quartz spectrograph of the O. A. Mel'nikov system and B. K. Ioannisiani design, which are used particularly under high mountain conditions for observing ultraviolet spectra of stars, were made.

Successful work with reflectors is determined to a large degree by the quality of their main, usually parabolic, mirror. In this connection, in 1939-1941 N. G. Ponomarev worked on the problem of making large astrodisks for astronomical mirrors. The mirror consisted of separate honeycomb-glass with hexagonal sections "cooked" one to another and to a support plate of which the front side was ground, polished, and retouched to give it the required mirror surface. High-quality samples with a diameter to one m were made.

Later, it was established by D. D. Maksutov that under operating conditions of reflectors "honeycomb" or "ribbed" (from the rear) metallic mirrors especially from alloy steel are more suitable. In the selection of material for the mirror not only the physicochemical and mechanical properties of the mirror but also the technology of its manufacture, i.e., the possibility of polishing and coating with a fine aluminum or other good reflecting film, have to be considered.

In a short time, Mel'nikov continues, a large (2.6 m) reflecting telescope which will be almost completely automatic will be completed for the Crimean Observatory.

Much has been done in the construction of refracting telescopes. In this field the masterpiece is the 82-cm photographic double lens achromat (1/13) ground in the State Optical Institute under the direction of D. D. Maksutov by the optician M. A. Stepanov. It is probable that this objective will be coupled with the Pulkovo 76-cm visual (1/19). This double astrograph will be the largest instrument of its type in the world.

In 1955 a Soviet-made 23-cm wide-angle astrograph (1/10) with a 6° by 6° field was installed at the observatory of the State Astronomical Institute imeni P. K. Shternberg on Lenin Hills on the Moscow State University campus for astrometrical purposes.

The most original of the short-focus astrographs is the double astrograph made for Pulkovo and Kiev (Goloseyevo) observatories and also the seven camera panoramic astrograph for the Mayaki station of the Odessa observatory. Many observatories have light-gathering wide-angle astrographs.

The fixed Pulkovo 20-cm polar tube (1/30) set up at the North Pole may be considered a type of astrophotographic instrument. According to the measurement of the diurnal arc of the stars on photographs taken with this instrument, precession, nutation, and aberration are studied.

With the astrometrical astrograph also may be included the horizontal telescope of Bel'kovich with the Markowitz Moon camera at the Engel'gardt observatory and the 25-cm photographic zenith tube at Pulkovo and the Institute imeni P. K. Shternberg for latitude service.

In recent years Soviet industry placed in Soviet observatories high-quality standard 20-cm visual refractors (1/15) for observing variable stars and solving a number of other problems.

Two new systems of mirror-lens telescopes have been created in the Soviet Union: D. D. Maksutov's meniscus system and G. G. Slyusarev's system.

The largest mirror-lens meniscus astrophysical telescope was made for the Abastumani observatory. The diameter of input aperture, i.e., the meniscus, is 70 cm and the mirror is 97.5 cm. The optics of the telescope is of the D. D. Maksutov system and B. K. Ioannisiani design. In the direct focus the working field is 5°5', but equivalent to the Cassegrain 40'. Among the accessories are a diffraction-grating spectrograph and one of the largest and highest-quality objective prisms in the world. Its diameter is 72.5 cm and refracting angle, 8°. The telescope is semiautomatic and is controlled from a general control desk.

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The next telescope in size is the 50-cm meniscus telescope. At the Alma-Ata observatory such a telescope has a 67-cm mirror and a focal length of 1.2 m (1/2.4). Its plane operating field is 6° in diameter, which is achieved by mounting a special lens in front of the focal surface. With this telescope V. G. Fesenkov and D. A. Rozhkovskiy observed the extremely fine parts of many galactic nebulae. A similar instrument, but of different design and less sensitive, is located at the Astronomical Institute imeni P. K. Shternberg and has a meniscus diameter of 50 cm, a 70-cm mirror (1/4), and a 2-m focal length.

Even less sensitive are the Pulkovo and Crimean 50-cm meniscus telescopes (1/13). However, this is because they have a fixed Kude focus. The beams of light are led out through the declination axis and the polar in the housing of the tower to which is coupled a receiver.

For expeditionary purposes a series of 20-cm meniscus telescopes with equivalent focal lengths of 2 m and 10 m and attachments in the form of eletrophotometers, spectrographs, etc., were made.

For exploratory expeditions and pedagogical higher educational institutions, 250-, 140-, and 80-mm meniscus telescopes are especially issued.

Several years ago a 325-mm anaberration mirror-lens telescope with a G. G. Slyusarev system was made for the Pulkovo observatory.

As an experiment, several telescopes with a B. Schmidt mirror-lens system were made. The largest of these with a 53-cm plate-lens and a mirror (1/3.4) was installed at Buryakan observatory in 1954. With the aid of this instrument B. Ye. Markaryan obtained high-quality material on star clusters.

Meniscus systems have an advantage over the Schmidt systems in that in the parameters mentioned the meniscus system is twice as short and its aberration is less.

The construction and introduction in Byurakan and the Crimea of special telescopes (designed by B. K. Ioannisiani) for observing nebulae spectra are great achievements. In the bottom of a pit are mounted a meniscus prism camera and a plane mirror reflecting the beam to the slit. Light from a star falls on the coelostat mirror and is reflected to a polar mirror (perpendicular to the Earth's axis) located at a distance of 25 m. From this mirror, light, reflected and traversing this distance, falls on a prism meniscus 15-cm camera (1/1). This system seems to "cut out" a very large part of the nebulae in the sky (for example, a fiber), and then, mixing the spectrum of the sky, is extinguished, and the spectra of the nebulae are emphasized. A similar instrument was used by N. N. Pariyskiy for observing the spectrum of the corona during the solar eclipse of 1941 at the Institute imeni P. K. Shternberg and is now being used in Alma-Ata in several varied types for a number of other problems.

The pride of Soviet astronomical instrument building, says Mel'nikov, is the Crimean tower solar telescope (diameter of the entire mirror is 70-cm, with a supplementary 60-cm) with a powerful diffraction spectrograph and a double beam spectroheliograph. With the aid of this telescope, whose manufacture was supervised by P. V. Dobychin on assignment from A. B. Severnyy, many-sided investigations on the physics of the Sun are conducted.

At present, the tower solar telescope of the observatory at the Institute imeni P. K. Shternberg and, also, the horizontal solar telescope at this same observatory and the station of the Institute of Terrestrial Magnetism are being installed.

Many solar installations of horizontal and vertical types have been made and are being used successfully at the L'vov, Kiev, Kuchino, Leningrad, Tashkent, and other observatories. All these have good diffraction spectrographs as accessories.

In the Crimean observatory a Soviet-made coronagraph in combination with a polarized interference filter (IPF) calculated by A. B. Severnyy and made by A. B. Gil'varg was installed and is used efficiently.

High-quality narrow-band IPF filters calculated by S. B. Ioffe of the State Optical Institute were made for Pulkovo.

The network of stations of the Sun Service USSR is equipped with original two-meniscus heliographs for observing spots and with chromosphere telescopes for observing the chromosphere and photosphere. A spectrohelioscope of N. G. Ponomarev and N. P. Barabashev (1935) design are used at the Khar'kov station.

Since the restoration [World War II] of Pulkovo, a horizontal solar telescope of N. G. Ponomarev design with D. D. Maksutov optics (diameter of the coelostat mirror is 45 cm) has been operating. The spherical mirror in the direct, Newtonian focus gives a 15.6-cm image of the Sun and in the Cassegrain focus an image 56.0 cm in diameter.

In such a way, for the most important works on the study of the physics of the Sun Soviet opticomechanical industry and native workshops of the observatories prepared an entirely modern instrument base.

In speaking of astrometrical, stellar instruments, above all, the development and manufacture under the direction of P. V. Dobychin of the contemporary classical 18-cm meridian arc (1/13) for the Institute imeni P. K. Shternberg, which, however, has not been installed, and also the horizontal meridian instrument designed by L. A. Sukharev for Pulkovo, should be mentioned. The basic part of the latter instrument is a revolving massive metallic mirror (on a horizontal axis). On both sides of the

mirror horizontally and in the meridian are located two telescopes to which are directed the light from the stars culminating in a given place. In this case the dangerous bend of the instrument is absent, and the contemporary photoelectric method of recording is used in a more simple form.

In very recent times Soviet industry has made a series of new zenith-telescopes with a 18.0-cm aperture and 2.36-m focal length, that have more light-gathering power than most existing ones.

The USSR Time Service obtained a series of new classical transit instruments for observing the passage of stars across the meridian. These transits have a 10-cm aperture and a one-m focal length (a broken tube).

The stellar interferometer and the interference heliometer of the V. P. Linnik system should be included among the original astrometrical instruments. These new complex instruments at present are being worked with at Pulkovo.

For observing meteors in Odessa at the "Kinap" Plant and in a number of observatories a series of multicamera "meteor patrols" have been made. These are special wide-angle astrographs which imprint the flashing trail of a very fast flying object.

Soviet opticomechanical and other branches of industry provided the observatories of the USSR and the astronomers also with improved laboratory equipment and various instruments -- objective and self-recording microphotometers; measuring machines for spectra and direct photography of stars; spectrophotometers; distributors of spectra; examiners of levels and printing chronographs; quartz, atomic, and molecular clocks, and in general, chronometers; computers; all kinds of spectrographs; receivers of radiation; etc.

Soviet specialists have a solid instrument base ensuring the successful conduct of various investigations, especially in connection with the IGY program.

A number of stations are equipped with radar installations, but, says Mel'nikov, these will not be discussed, nor will radio astronomical telescopes constructed recently in the USSR. A review of these instruments, he says, would constitute a separate article.

The successes of astronomical instrument building in the USSR are really great. According to Mel'nikov, the following are tasks which remain before Soviet astronomers in the future:

The first task is the development and construction of new gigantic telescopes, probably all reflecting telescopes using every modern means of electrical engineering, electronics, and telemechanics. It is probable that in the future astronomers will couple together two or more identical telescopes for amplifying signals and penetrating even deeper into outer space.

The second task of instrument building, which, however, will be subordinate to the first, is the development of new and improved, small receivers of radiation, especially television tubes for the very inaccessible range of the spectra.

The third, and also very important, task is to develop methods of recording radiation from celestial objects.

The fourth task, subordinate to the rest, is to create an even more perfect and completely automatic multiform laboratory, (measuring) instruments, etc.

In concluding his review Mel'nikov says that it can be said with confidence that, having available such perfected equipment, Soviet astronomers will accomplish new important research, will uncover new secrets of the universe, and will be completely prepared to answer those questions which will be placed before them in the near future by Soviet reality and Soviet engineering, especially rocket engineering, in the gigantic strides of forging ahead.

The article contains a photograph of the 70-cm telescope of the D. D. Maksutov system and B. K. Ioannisiani design for the Abastumani observatory and a photograph of the 70-cm telescope designed by P. V. Dobychin for the Astronomical Institute imeni P. K. Shternberg in Moscow. (Vestnik Akademii Nauk SSSR, No 1, Jan 58, pp 54-59)

Soviet Meteor Study Work Noted CPYRGHT

"The Role of the Base Line in Determining Meteor Orbits" by S. V. Orlov indicates that in fixing meteor orbits by photographic observations it is essential to know the base, radius of curvature of the great circle arc connecting the ends of the base, the distance to the corresponding points of the photographed trace, and the passage time of the meteoric body along a determined path.

Orlov's work, which appeared originally in the Byul Komis. po Kometam i Meteoram Astron. Soveta AN SSSR (Bulletin of the Commission on Comets and Meteors of the Astronomy Council, Academy of Sciences USSR), No 1, 1957, pp 24-28, examines in detail the problem of calculating these quantities. It is demonstrated that, in setting the base line according to

the geographic coordinates of its ends, with the coordinates accurate to 1" and a base less than 10 km, the error may reach plus or minus 30 m. To increase accuracy in determining base length it is necessary either to know the geographic coordinates of the observation points with a high degree of accuracy or to tie in to geodetic points close to the base.

The author also examines the problem of camera adjustment and presents formulas for computing the angles of inclination of the cameras' optical axes for the purpose of photographing the identical region of the atmosphere. (Referativnyy Zhurnal -- Astronomiya i Geodeziya, No 12, Dec 57, Abstract No 9793 by L. A. Katasev)

"The Light Intensity Curve of Meteors and the Ceplecha Method of Checking the Deceleration Pattern of a Single Meteoric Body" by B. Yu. Levin and S. V. Meyeva, which appeared in Byul. Komis. po Kometam i Meteoram Astron. Soveta AN SSSR, No 1, 1957, pp 29-31, presents the derivation of a formula for computing the momentary light intensity of a meteor according to its momentary velocity. By means of this formula light intensity curves for five meteors photographed in Czechoslovakia are computed and compared with observation curves. Ceplecha's method (Referativnyy Zhurnal -- Astronomiya i Geodeziya, 1954, Abstract No 4948) for comparing a theoretical and actual deceleration pattern is applied to the same meteors. It is demonstrated that there is no connection between deviation of actual light intensity from theoretical and a deviation of the actual deceleration pattern from the theoretical. (Referativnyy Zhurnal -- Astronomiya i Geodeziya, No 12, Dec 57, Abstract No 9794 by Zd. Ceplecha)

Polish Meteor Photography System and Aims

The Ondrzejowie observatory setup for meteor photography, as described by Zdenek Ceplecha in a Polish astronomy journal (Postepy Astron, Vol 5, No 1, 1957, pp 8-9) consists of ten fixed cameras with Tessar 1:4.5 lenses (f = 18 cm) which cover more than half the sky. The apparatus is equipped with two rotary obturators. An identical installation is set up at a station in Precy, 40 km from Ondrzejowie. Test observations (Geminid 1955) yielded fully satisfactory results. During the IGY three more stations, identical to the others, will be organized and at least two more, long-focus (75-100 cm) cameras will be put to use. The chief aim will be the investigation of meteor streams, substantiation of a physical theory of meteors, and the investigation of atmospheric density at about 100-km altitude. (Referativnyy Zhurnal -- Astronomiya i Geodeziya, No 12, Dec 57, Abstract No 9795 by St. Szelingowski)

ZTL-180 Telescope Installed at Irkutsk State University

The installation of the powerful ZTL-180 zenith-telescope at the Astronomical Observatory at Irkutsk State University has been completed. (Moscow, Izvestiya, 1 Mar 58)

The ZPL-180 telescope was constructed according to technical specifications worked out by V. I. Sakharov and I. F. Korbut, scientific associates at the Main Astronomical Observatory in Pulkovo near Leningrad. The telescope has an objective lens diameter of 180 mm and a focal length of 2,360 mm. According to O. Karyshev, it is the largest telescope of its kind in the world and is used in studying the precession of the Earth's poles. (Leningradskaya Pravda, 8 Jan 58)

New Electrophotometer Records Current Ratio of Two Light Streams

An experimental model of an electrophotometer, which gives a record of the ratio of two streams of light, is described in an article entitled "An Electrophotometer for Recording the Ratio of Two Streams of Light," by G. M. Malyshev, Leningrad State University imeni A. A. Zhdanov. Two photomultipliers, a double-bridge amplifier, and an automatic potentiometer (EPP-1) are used as a ratiometer in the electrophotometer. All the basic components used in the photometer are of Soviet manufacture. Characteristics and samples of photometer recordings are presented. (Pribory i Tekhnika Eksperimenta, No 6, 1957, pp 98-100)

Armenian Observatory Develops Second Microphotometer

The automatic registration of spectrograms on a dark scale is accomplished by a new self-recording microphotometer which was developed in the Byurakan Observatory, Armenian SSR. According to G. A. Gurzadyan ("Second Self-Recording Microphotometer of Byurakan Observatory," Soobshch. Byurakansk. obser. AN ArmSSR, No 18, 1956, pp 29-32), the instrument is based on the objective lens photometer of the State Optical Institute (GOI). It can be used in those cases which do not require the determination of the precise values of wave lengths according to microphotograms. The recording scale is adjustable. The rectangular cross section of the actuating light rays in the GOI system is replaced by a circular one into whose path a dark-red cellophane film having a rectangular opening is placed. The part of the rays being measured on the membrane passes through this opening, the working sizes of which are determined with the aid of a special attachment. It is possible to obtain transverse and linear scales directly during recording. Power for the instrument is supplied by a circuit through a transformer and voltage stabilizer. (Referativnyy Zhurnal -- Geofizika, No 2, Feb 57, Abstract No 941)

Electromagnetic Fields in Heterogeneous Media Studied

D. N. Chetayev, in an article entitled "Calculation of the Nonsteady State of Electromagnetic Fields in Heterogeneous Media," considers the formation of an electromagnetic field perturbed by the element of a direct current in a two layer medium in cases when the conductivity of the layer is sufficiently close to the conductivity of the base and when the conductivity of the base is sufficiently small. (Trudy Geofizicheskogo Instituta, No 32 [159], 1956, pp 3-25)

Czechoslovak Telescope at Skalnate Pleso Observatory

The main telescope at the observatory at Skalnate Pleso (lake) is being used more frequently during the IGY. The item is accompanied by a photograph of the telescope. (Bratislava, Sloboda, 19 Jan 58, p 6)

Books on Astronomy of IGY Interest

I. Rakhlin, writing on books on astronomy in the weekly bibliographic bulletin of the All-Union Book Chamber, indicates that the State Publishing House for Technical and Theoretical Literature was to issue 14 titles in 1957 and considerably more than that in 1958.

Concerning books to be issued in connection with the IGY, he says the following:

The study of meteors has today acquired an immediate practical significance because it is one of the methods of investigating the properties of the upper layers of the Earth's atmosphere and one of the ways of solving problems involved in interplanetary flight. Meteornyye yavleniya v atmosfere (Meteor Phenomena in the Atmosphere) by I. S. Astapovich, Fotograficheskiye metody meteornoy astronomii (Photographic Methods in Meteor Astronomy) by Docent L. A. Katasev, and Meteornaya Astronomiya (Meteor Astronomy), which is a translation from the English of Prof A. C. B. Lovell's book, practically embrace all aspects of meteor astronomy for observers. The first of these monographs is devoted to methods of observing meteors (chiefly visual) and physical phenomena during movement of meteoric bodies in the Earth's atmosphere. The second book deals with photographic methods. The third discusses radar methods of observing meteors and the obtaining of results by this method.

The comparatively small popular scientific book Solntse i atmosfera Zemli (The Sun and the Earth's Atmosphere) by E. R. Mustel', Corresponding Member of the Academy of Sciences USSR, is written on a modern scientific level and is appropriate for students of the upper classes. This publication will also be of interest to specialists such as radiophysicists, magnetologists, and workers in other fields of science conducting observations according to the IGY program.

Nearly all problems connected with the problem of Sun-Earth are examined in the popular monograph Solntse i yego vliyaniye na Zemlyu (The Sun and Its Effect on the Earth), which is a translation of Ellison's book from the English.

It is planned to issue a number of original scientific monographs. Prof S. K. Vsekhsvyatskiy's book Fizicheskiye kharakteristiki komet (Physical Characteristics of Comets) contains brief information on the nature, origin, and evolution of comets, a catalogue of all known comets in history, and the circumstances of the discovery of comets which are appearing and a detailed description of their physical characteristics. In Prof K. F. Ogorodnikov's book Dinamika zvezdnykh sistem (Dynamics of Star Systems) stellar dynamics as an independent branch of stellar astronomy is systematically presented for the first time. Astronomiya v SSSR za 40 let (Forty Years of Astronomy in the USSR) is being prepared for release. Leading Soviet astronomers are participating in the preparation of this symposium. A detailed bibliography of Soviet scientific works and books on astronomy is planned. The aforementioned books will be released at the opening in Moscow of the Tenth Congress of the International Astronomical Union.

It is planned to publish new issues in the "Popular Lectures on Astronomy" series, which is intended for students in the upper classes and persons with a secondary education. Included in this series will be the following: V mire zvezd (In the World of Stars), by P. P. Parenago, Corresponding Member of the Academy of Sciences USSR; Astronomiya na sluzhbe narodnogo khozyaystva (Astronomy in the Service of the National Economy), by Prof K. A. Kulikov; Dvizheniya zvezd (Movement of the Stars), by V. N. Komarov; Meteority (Meteorites), by Ye. L. Krinov; and Solnechnaya korona (Solar Corona), by E. V. Kononovich.

In the "Amateur Astronomer's Library" series V. A. Bronshten's book Planety i ikh nablyudeniya (Planets and Their Observation) will be published. The first part is devoted to a description of planets and the second part is a handbook for conducting independent amateur observations of planets. (Novyye Knigi, No 34, Aug 57, pp 34-35)

New Books on Solar Physics and Atmospheric Electricity

Fizika Solntsa (Physics of the Sun) by A. B. Severnyy is part of a popular science series and presents the latest data and ideas on the physical structure of the solar atmosphere, on the processes occurring on the Sun, and on their effect on the Earth's magnetism and on the upper layers of the Earth's atmosphere. The book also acquaints one with methods and instruments for investigating the physical condition of the solar atmosphere and processes occurring on the Sun. Readers interested in astronomy will enjoy this book. (Novyye Knigi, No 3, 1957, p 45)

Solntse i atmosfera Zemli (The Sun and the Earth's Atmosphere) by E. R. Mustel' describes, in popular form, the effect of the Sun on the Earth's atmosphere. The first sections of the book are devoted to a description of the Sun and the processes occurring on its surface. In the succeeding chapters the effects of ultraviolet and corpuscular radiation of the Sun on the upper layers of the atmosphere are discussed. The problems examined have great significance for practical radio communications. A special chapter contains a short description of the leading facts on the effect of the Sun on the weather. The final chapter gives an idea of the type of work on the study of the influence of the Sun on the Earth which will be conducted during the IGY. The book is intended for pupils in upper classes, instructors, lecturers, specialists in radio communications, and magnetologists. (Novyye Knigi, No 49, 1957, p 50)

Pribory i metody dlya izucheniya elektrichestva atmosfery (Instruments and Methods for Studying Atmospheric Electricity) by I. M. Imyanitov, published in 1957, is devoted to the problem on the formation and properties of atmospheric electricity. Details are given on the apparatus necessary for suitable investigations and the methods for collecting and processing the results of measurements. (Novyye Knigi, No 25, 1957, p 28)

III. METEOROLOGY

New Actinometric Instruments

A new simplified type pyranometer, differing from several standard types in that it has a blackened aluminum foil membrane (0.05-0.02 mm thick) for the perception of radiant rays, is described by I. I. Prokhorov in "Actinometric Instruments With Membrane Transducers," originally published in Tr. Kazakhsk. n.-i. gidromet. in-ta, No 7 1956, pp 82-86. The membrane is stretched over a curved aluminum frame thermally insulated from the body of the instrument. For decreasing the heat transfer to the housing from the membrane, a circular white band is placed in the latter so that it adjoins the frame. Solar radiation buckles the membrane, which action is transferred through a system of rods to a needle guage. The membrane is protected by a cover glass and suitable measures are taken against condensation when the instrument cools. The selection of a thin membrane, fastened all along its circumference, rather than the usual type fastened at the ends, ensures the necessary firmness and stability of the system in the case of small thermal inertia (10 seconds). Tests have shown that the instrument's temperature coefficient is sufficiently small and that its conversion coefficient retains its value with sufficient accuracy for practical purposes even under field conditions.

An albedograph has been developed on these same principles, both for ground observation as well as in combination with airplane meteorographs. (Referativnyy Zhurnal -- Geofizika, No 2, Feb 57, Abstract No 940)

IV. OCEANOGRAPHY

Zarya in Buenos Aires

The arrival of the expeditionary ship Zarya in Buenos Aires on the 17th of March is reported in the Soviet press. The ship will remain in port for 2 weeks before continuing her voyage under the IGY program. (Moscow, Izvestiya, 19 Mar 58)

Electronic and Acoustical Equipment Used in Marine Investigations

Contemporary technical equipment used in hydrological and hydrographic work, is presented in the monograph, Radiotekhnicheskiye i gidroakusticheskiye sredstva morskikh issledovaniy (Radio Engineering and Hydroacoustical Means Used in Marine Investigations) by V. V. Dremlyug. Basic attention is centered on hydroacoustical and radio engineering methods for studying

marine objects. The monograph is intended for oceanographers, hydrographers and navigators interested in investigations connected with navigation, port construction, and sea commerce. The book may also be used as a textual aid by students in the hydrometeorological specialty. (Novyye Knigi (New Books), No 47, 1957, p 53)

V. GEOMAGNETISM

Czechoslovak Geomagnetic Stations in Budkov

According to a short item in a February issue of the newspaper of the Czechoslovak Socialist Party, a center for research on the time microstructure of the earth's electromagnetic field, was established in Budkov near Husinec. The Institute of Geophysics of the Czechoslovak Academy of Sciences established stations here for observing rapid geomagnetic and telluric variations. The article says that both stations work together closely and really form one unit, and that since 1 January 1958 results have been sent to the IGY regional center in Moscow, the center for geomagnetic service in De Bilt in the Netherlands, and to the commission for rapid magnetic and telluric variations of the International Association for Geomagnetism. (Prague, Svobodne Slovo, 18 Feb 58)

VI. ARCTIC AND ANTARCTIC

Rocket Soundings of the Upper Atmosphere in Arctic and Antarctic

It was reported in the Soviet IGY Committee that, in accordance with the IGY program, the Main Administration of Hydrometeorological Service under the Council of Ministers USSR and the Main Administration of the Northern Sea Route, Ministry of Maritime Fleet USSR, are conducting investigations of the upper atmosphere in the Arctic and Antarctic by means of vertical launchings of meteorological rockets.

Rocket soundings of the atmosphere are conducted by the high-latitude observatory of the Arctic Scientific Research Institute on Ostrov Kheysa [Heiss Island] (one of the islands of Franz Josef Land) and by the expeditionary ship Ob' of the Complex Antarctic Expedition of the Academy of Sciences USSR.

The observatory on Ostrov Kheysa, located at 80-37 N and 58-03 E, was established in 1957 in connection with the IGY and is engaged in geophysical research.

Since November 1957, six meteorological rockets were launched on Ostrov Kheysa. The first rocket was launched in the zenith on 4 November 1957, at 1055 hours Moscow time. During its flight, the head section containing the instruments was detached from the main body of the rocket; the head section remained in the air about 40 minutes, descending slowly by parachute. The instruments in it included electric resistance thermometers, as well as thermal and membrane manometers for measuring the temperature and pressure of the air. The results were transmitted from the rocket to the earth by means of a radiotelemetering apparatus.

Subsequent meteorological rockets with similar instruments were launched on the following dates: second rocket, 16 December 1957 at 0735 hours; third rocket, 21 December 1957 at 0740 hours; fourth rocket, 19 January 1958 at 1145 hours; fifth rocket, 10 February 1958 at 1145 hours; and sixth rocket, on 18 February 1958 at 1610 hours. At the time of the last launching, heavy radio interference was superposed on some of the telemetric recordings.

The Third Antarctic Marine Expedition on the diesel electric ship Ob' has been launching meteorological rockets in antarctic waters. The first of these rockets was launched from Davis Sea, in the region of the observatory Mirnyy, on 31 December 1957 at 0910 hours Moscow time. The rocket was equipped with instruments, similar to those used in the Arctic. Data was also transmitted by radiotelemetry. After its flight, the head section of the meteorological rocket was found and delivered to the Ob'.

Other meteorological rockets were launched from the ship as it moved along the antarctic coast east of Mirnyy, at the following points and on the following dates: second rocket, from 65-26 S and 120-32 E, on 20 January 1958 at 1615 hours; third rocket, from 67-44 S and 147-12 E on 1 February 1958 at 1717 hours; fourth rocket, from 69-49 S and 161-52 E on February 1958 at 1600 hours.

As a result of rocket soundings of the atmosphere, data was obtained for the first time on the distribution of temperature and pressure of the air in the middle statosphere in the Arctic and Antarctic.

During the period of the IGY, additional rockets will be launched from Ostrov Kheysa and from the Ob'. The data received from rocket soundings of the atmosphere are now being processed. (Moscow, Pravda, 13 Mar 58)

Change of Staffs at Drift Stations

The Arctic Institute is making preparations for the replacement of scientific staffs at the drift stations, which is to take place at the end of March.

The new staff of Severnyy Polyus-7, composed of experienced polar scientists, will be headed by N. A. Belov, Candidate of Geographical Sciences. Complex scientific research in the Central Arctic Basin will continue, and the geological history of the Arctic Ocean will be studied under an expanded program. For the first time, the staff of the drift stations will use heavy tubes for taking samples of the ocean bottom. These continuously operating piston-devices are able to penetrate as much as 8 meters into the ocean bottom. The study of soil samples from the ocean bottom will permit geologists to determine the age of sediments and to revise the soil map of the Arctic Basin. In addition, it is planned to use new devices for determining the amount of ozone found in the atmospheric layers at an altitude of several tens of kilometers.

A new staff for the Severnyy Polyus-6 station has also been selected. The new station chief will be S. T. Serlapov, who has frequently wintered on Ostrov Dikson (Dikson Island), Mys Shmidt, and in other arctic regions. The new staff includes specialists in the fields of ionosphere, geophysics, hydrology, magnetology, and aerology.

Preparations are in progress for equipping an aerial expedition under the leadership of M. M. Mikitin, Candidate of Geographical Sciences. The expedition will deliver the new staffs of Severnyy Polyus-6 and Severnyy Polyus-7 to the Central Arctic Basin and will conduct some research work in the Arctic. (Moscow, Vodnyy Transport, 11 Mar 58)

New Staff at Station Vostok in Antarctic

The Vostok, station established in December 1957, is conducting IGY research, including the study of the ionosphere and photography of auroras. The station is preparing to receive its new staff, which arrived in Mirnyy on 23 December on the diesel ship Kooperatsiya. The new shift will take over around the middle of January. (Leningradskaya Pravda, 7 Jan 58)

Soviet Expeditionary Ship Visits Australian Port

The Soviet expeditionary ship Ob' spent 3 days in the Australian port of Adelaide. The arrival of the Soviet explorers of the Antarctic aroused a great deal of interest among the local population and the scientists of the University of Adelaide, which is the oldest university in Australia. Hundreds of visitors inspected the equipment and scientific laboratories on the Ob', as well as the photographic exhibits showing the work of Soviet scientists in the Antarctic and at sea.