hemisphere of large negative magnetic anomalies (Ref.4: B. M. Yanovskiy. Zamnoy magnetizm. M., GTTI, 1953), i.e. regions in which the magnetic field strength is lower than the normal field strength. A. J. Dessler (Ref.5: J. Geoph. Res., 64, 713, 1959) has suggested that negative anomalies may act as sinks for the charged particles in radiation belts. V. L. Ginzburg has pointed out to the present authors that T. D. Carr, A. G. Smith and H. Bollhagen (Ref.6: Phys. Rev. Lett., 5, 418, 1960) have discussed the variation in the intensity of radio-waves of Jupiter and have pointed out that the longitude dependence of this intensity becomes understandable if it is assumed that there are magnetic field anomalies on Jupiter. In such regions the charged particle concentration will be enhanced and there will be an increase in the radio emission. This effect may be analogous to the increase in the intensity of radiation in the region of magnetic anomalies reported in the present paper. Acknowledgments are expressed to Professor V. L. Ginzburg and Professor N. A. Dobrotin for their advice. There are 2 figures and 6 references: 4 Soviet and 2 non-Soviet.

SUBMITTED: December 27, 1960

KURNOSOVA, L.V.; LOGACHEV, V.I.; RAZORENOV, L.A.; FRADKIN, M.I.

Radiation effects at a great altitude. Priroda 50 no.4:85-87 Ap '61. (MIRA 14:4)

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR, Moskva.
(Cosmic radiation)

KURNOSOVA, L.V.; LOGACHEV, V.I.; RAZORENOV, L.A.; FRADKIN, M.I.

Radiation effects at a great altitude. Priroda 50 no. 4:86 Ap '61.
(MIRA 14:4)

(Altai Territory—Coal)

FRADKIN, M.I.

32285

S/169/61/000/011/060/065
D228/D304

17.2400

AUTHORS: Kurnosova, L.V., Logachev, V.I., Kolobyanina, T.N., Nazorenov, L.A., Sirotkin, I.A., and Fradkin, M.I.

TITLE: Discovery of radiation anomalies over the Atlantic Ocean's southern part at heights of 310 - 340 km

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 11, 1961, 11, abstract 11G97 (V sb. Iskusstv. sputniki Zemli, no. 8, M., AN SSSR, 1961, 40 - 44)

TEXT: By means of apparatus placed aboard the Soviet satellite the flow of particles exceeding the flow of cosmic rays was recorded. Near the equator the mean flow equalled 1.7 particles $cm^{-2} sec^{-1}$, being 3.3 particles $cm^{-2}sec^{-1}$ in high latitudes. Regions with an anomalously high radiation intensity include the area of the Atlantic Ocean's southern part (25° and 50°S, 0° and 55°W). A Southern anomaly, situated between 50 - 65°S and 30°W - 40°E, was detected at a height of 340 km. An increase in the intensity was recorded in the northern hemisphere in the area 60 - 65°N and 130 - 170°E. This

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32285

Discovery of radiation anomalies ... S/169/61/000/011/060/065
D228/D304

anomaly was only observed on one orbit of the satellite's trajectory, is unstable in time and is possibly related to the outer radiation belt. In the authors' opinion the South Atlantic and Southern anomalies are connected with the existence of large negative magnetic-anomalies in the southern hemisphere, i.e. regions in which the magnetic field-strength is less than the normal intensity for the given geomagnetic latitude. [Abstractor's note: Complete Translation].

Card 2/2

FRADKIN, M. I.

2

32719
S/560/61/000/009/009/009
D045/D114

9,6150
21.6000

AUTHORS: Dragun, G. S., Kurnosova, L. V., Logachev, V. I., Razorenov, L. A., Sirotkin, I. A., and Fradkin, M. I.

TITLE: Equipment for investigating the nuclear components of cosmic rays installed on space rockets and artificial earth satellites

SOURCE: Akademiya nauk SSSR. Iskusstvennyye sputniki Zemli. No. 9, Moscow, 1961, 86-110

TEXT: Equipment installed on the third Soviet artificial Earth satellite and on space rockets, for investigating the nuclear components of cosmic rays, is described. The results of the measurements carried out with the aid of the described devices have already been published in previous issues of the journal. All the devices consist of the following basic elements: a charged particle detector (integral Cherenkov counter); an electronic system for amplifying signals, for selecting the required ionizing events and for storing them; and elements for matching the photomultiplier output with the input of the electronic circuit and the output of this circuit with the radiotelemetric system. A block diagram of a unit for recording the nuclei

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Equipment for investigating the ...

of cosmic rays is given in fig. 1. The Cherenkov counter can be used for investigating temporary changes in the intensity of the nuclear component and the dependence of this intensity on distance from the Earth. The advantages of the counter are that the radiotechnical device used is relatively simple and that a sufficiently large number of particles can be registered per unit of time. The disadvantage of its use is that the quantity of light, divided in the detector, and the number of photoelectrons taken from the cathode of the photomultiplier is small, and consequently the value of the output pulse is small and large statistical fluctuations occur. A device for measuring the characteristics of Cherenkov counters and several aspects of calibration are described and illustrated. It is stated that the instruments for measuring the nuclear components of cosmic radiation installed on the first and second space rockets had an additional channel designed for registering radiation in an area of increased radiation intensity. A sharp increase in intensity was observed at distances of $27 \cdot 10^3$ km (first rocket) and $17 \cdot 10^3$ km (second rocket) in an area later called the inner radiation belt. A block diagram of one version of the electronic system is shown in fig. 17. As can be seen from the figure, information on the condition of

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Equipment for investigating the ...

the triggers of the accumulating system can be transmitted through the radiotelemetric system. The following parts of the radio system are described and illustrated: emitter follower; flip-flop-cells; and summation cells. The described parts were used in designing devices for measuring nuclei beyond the edge of the atmosphere; depending on the problems set and the actual conditions, a final selection of the parameters was made and essential changes in individual elements carried out. Two diagrams are included showing the arrangement of devices for registering nuclei with (1) $Z \geqslant 5$ and $Z \geqslant 15$, and (2) $Z > 2$. The authors thank radio technician V. Marovskiy, laboratory worker V. Nazhin and designer G. Yegorov for their cooperation. There are 29 figures and 7 Soviet references.

SUBMITTED: April, 17, 1961

X

Card 3/3

FRADKIN, M. I.

2

3,2420 (1482, 2806, 1049)
17.2400

33305
S/560/61/000/010/003/016
D299/D302

AUTHORS: Ginzburg, V. L., Kurnosova, L. V., Logachev, V. I., Nazorenov, L. A., Sirotkin, I. A., and Fradkin, M. I.

TITLE: Study of charged-particle intensity during the flight of the 2nd and 3rd Sputniks

SOURCE: Akademiya nauk SSSR. Iskusstvennyye sputniki Zemli. no. 10. Moscow, 1961, 22-33

TEXT: During the flight of the 2nd and 3rd Sputniks, the flow of charged particles at altitudes between 187 and 339 km and latitudes of -65 to +65° was recorded by means of a telescope consisting of 2 rows of gas-discharge counters; the telescope was part of measuring equipment for cosmic rays. As a result of the measurements, the intensity of the charged particles and its latitude dependence were determined. The counting rate N_c and

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S/560/61/000/010/003/016
D299/D302

Study of charged-particles...

the global intensity J_{gl} at various latitudes are listed in a table. It was found that at all latitudes the recorded intensity was several times higher than the intensity of cosmic rays recorded in the stratosphere and in free space beyond the earth's magnetic field. This difference is particularly noticeable in the region of the geomagnetic equator, where the measured intensity was six times that of cosmic rays. Several regional anomalies of intensity were observed, apparently related to the anomalies of the earth's magnetic field. For the entire track of the space-ships, detailed graphs were made of the time dependence of the intensity and hence of its dependence on geographical coordinates and altitude of the space-ship. From these graphs, maps were made of the intensity distribution on the earth's surface. It is noted that, with repeated passage of the space-ship above the same terrestrial point and almost same altitude, the recorded intensity differed sometimes from that on the first passage; in some cases, the intensity was almost double. This difference

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S/560/61/000/010/003/016
D299/D302

was particularly noticeable at high latitudes. As the orientation of the apparatus changes during the second passage, this difference in intensity may not be real. The obtained equi-intensity lines for the south-Atlantic and southern anomalies constitute a slight refinement to the earlier obtained data (in the references); the maximum number of counts in the southern anomaly was 60 per second, and in the south-Atlantic anomaly it was 70 per second. The anomalies are particularly great in the Southern Hemisphere. The intensity distributions in the anomaly regions, recorded at altitudes of 306 - 339 km and at altitudes of 187 - 265 km during the two flights, differ from each other. This difference is apparently due to the different flight-altitudes. The connection between the anomalous structure of the radiation belts and the anomalies of the earth's magnetic field is evident; it would be premature, however, to assume that the regional anomalies of the magnetic field on the earth's surface have a substantial influence on charged-particle flow up to altitudes of 200 - 300 km. The many anomalies in the South- and

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D299/D302

Study of charged-particles...

North-Pole regions, their disposition and variation, suggest that these anomalies are the edges of the outer radiation belt of the earth. The latitude dependence of the intensity is shown in a graph (for the Northern Hemisphere); it is noted that, at high latitudes, the increase in intensity ceases. The obtained data on the intensity distribution give evidence of the edge effects of the radiation belts at 200 - 300 km altitude and of certain peculiar features not observed previously. In particular, the great temporal anomalies are noted; thus, the "northern anomaly" recorded on August 20, 1960, at 7 hr. 40 min. (world time) and the south-polar anomaly recorded on December 1, 1960, at 14 hr. 22 min. These anomalies are apparently due to solar activity. The line of least intensity (the "radiation equator") is shown in a figure. With regard to the composition of the radiation, it is likely that the increase in the counting rate (as compared to that from primary cosmic rays) is due to protons with $E_p >$ 60 Mev; although no definite conclusion is possible as yet, it

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D299/D302

is assumed (as a working model) that the inner radiation belt if formed by protons and that the number of electrons of energies higher than $\sim$ 2 Mev is small. The above results confirm the existence of a high-intensity region down to 200 km altitude (from 1000 km). On the other hand, the radiation at 50 - 150 km is practically independent of altitude. The altitude dependence of the intensity (for 200 - 2000 km) is shown in a figure. Tentatively, the altitude h and the atmospheric density ρ can be expressed by the values:

h, km	100	150	200	300	400	500
ρ, gm $\cdot$ cm^{-3}	10^{-9}	10^{-11}	10^{-12}	10^{-13}	2×10^{-14}	2×10^{-15}

h, km	600	700	800	900	1000
ρ, gm $\cdot$ cm^{-3}	6×10^{-16}	2×10^{-16}	6×10^{-17}	3×10^{-17}	10^{-17}

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2

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D299/D302

Study of charged-particles...

On the basis of the incomplete data available, the internal radiation-belt in the equatorial region for altitudes above 400 - 600 km can be approximated by a very simple model, where only ionization losses are taken into account. At higher latitudes, the pattern is more complicated; it becomes necessary to render more precise the composition, spectrum and altitude-variation of the charged particles. At altitudes below 400 - 600 km, considerable deviations from the formula $J \sim \rho^{-1}$ occur. This is due to diffusion of the particles in a direction transverse to the magnetic field; this diffusion mechanism is related to collisions between particles. A second diffusion mechanism exists, related to the presence of electric fields E which cause particle-drift. The diffusion processes require further investigation. Finally, the radiation dose is estimated beneath a layer of matter of the order of 4 gm/cm^{-2} at an altitude of 200 - 300 km. Assuming recorded proton energies (in the equa-

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Study of charged-particles...

torial region) of $E_p \gtrsim 60$ Mev, the daily radiation dose constitutes approximately 30% of the permissible dose. In the region of the south-Atlantic anomaly at 300 km altitude, the radiation dose is by an order of magnitude higher than at the equator. There are 10 figures, 1 table and 10 references: 7 Soviet-bloc and 3 non-Soviet-bloc (including 2 translations). The reference to the English-language publication reads as follows: S. Yoshida, G. H. Ludwig, J. A. Van Allen, J. Geophys. Res., 65, 807, 1960.

SUBMITTED: May 15, 1961

Card 7/7

FRADKIN, M.I.

3.2100 (also 4303)

37199
S/560/61/000/011/005/012
E032/E514

AUTHORS: Veprik, Ya.M., Kurnosova, L.V., Razorenov, L.A., Tolstov, K.D., Fradkin, M.I. and Chukin, V.S.

TITLE: Experiment on the development of photographic emulsions on board the second cosmic spaceship

SOURCE: Akademiya nauk SSSR. Iskusstvennyye sputniki Zemli. no.11. Moscow, 1961. Rezul'taty nauchnykh issledovaniy, provedennykh vo vremya poletov vtorogo i tret'yego kosmicheskikh korabley-sputnikov, 35-41

TEXT: The second Soviet cosmic spaceship carried stacks of thick nuclear emulsions. Owing to the fact that the spaceship remained in orbit for a considerable time, the number of particles recorded in the emulsions was very large, which could complicate subsequent scanning and identification of particle tracks. It was, therefore, necessary to develop the emulsions before too many particles had been recorded. An account is given in the present paper of how the emulsions were in fact developed on board the spaceship. The operation was carried out in four stages, namely: 1) exposure of the emulsions to the radiations for a given time,

Card 1/2

Experiment on the development ... S/560/61/000/011/005/012
E032/E514

2) development, 3) storage of the emulsions (latent-image centres produced during this period could not be developed), 4) subsequent laboratory analysis on the Earth's surface. The whole operation was carried out in a hermetically sealed container. The emulsion stack (20 unbacked emulsions 300 μ thick each) had to be so arranged that after the exposure the emulsions could be separated from each other and the developer let in. This was done by a piston device (a schematic drawing of the latter is reproduced). After this operation the developer was removed and a stopping solution was introduced. The emulsions remained in this solution until they were returned to the laboratory for final treatment. It was found that relativistic tracks were easily visible in these emulsions, although the sensitivity to the latter turned out to be somewhat lower than usual. Two particle-track microphotographs are reproduced to illustrate the possibilities of the method. There are 3 figures.

SUBMITTED: July 7, 1961

Card 2/2

KURNOSOVA, L. V., LOGACHEV, V. I., RAZORENOV, L. A. and FRADKIN, M. I.

"Observation of the Radiation Anomalies at the Altitudes of 200-300 km"

Report presented at the International Conference on Cosmic Rays and Earth Storm, 4-15 Sep 61, Kyoto, Japan.

42126

S/203/62/002/002/001/017
1046/1246

3.2410
3.2420

AUTHORS: Ginzburg, V. L., Kurnosova, L. V., Razorenov, L. A., and Fradkin, M. I.

TITLE: Some investigations of the cosmic ray nuclear component and of the radiation belts of the earth on Soviet satellites and rockets. Review.

PERIODICAL: Geomagnetizm i aeronomiya, v. 2, no. 2, 1962, 193-232

TEXT: 1) Measurements on groups of nuclei with $Z \geqq 2$, $Z \geqq 5$, $Z \geqq 12$ to 14, $Z \geqq 15$, $Z \gtrsim 28$ to 30, and estimates of the relative intensity of the stream of very heavy nuclei ($Z > 30$) indicate that the nuclear component of cosmic rays drops very sharply in intensity from $Z \gtrsim 28$ to $Z > 30$. 2) The nuclear-component intensity increases in correlation with the solar activity; at energies E 10^9 eV, some selective acceleration mechanism on the sun accelerates preferably the heavier nuclei. 3) Measurements of the latitudinal effect show that, at energies between $\sim$ 1.8 and 7.5 BeV/nucleon, the energy spectra are identical for groups of nuclei with $Z \geq 2$, $Z \geqq 5$, $Z \gtrsim 12$ to 14 (differences in spectral indices do not exceed 10 to 20%). 4) The charge spectra of nuclei indicate that the ratio of the Li, Be, B nuclear group to the $Z \geqq 6$ group is $53 \pm 15\%$. 5) The intensity maximum of the outer radiation belt shifted 10^4km towards the surface of the earth during the time interval between the launchings of orbital spaceships I and II (from January to September, 1959).

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Some investigations of the cosmic ray...

S/203/62/002/002/001/017
I046/I246

6) At altitudes of 200 to 300 km in the 65N to 65S belt the radiation count is in excess of what could have been expected from primary cosmic rays; on the equator, the global radiation intensity is 6 to 7 times as high as the cosmic ray intensity. This phenomenon remains still unexplained. 7) Two radiation-intensity anomalies were discovered, viz., the South-Atlantic anomaly at an altitude of 340 km and the Southern anomaly at 194 to 340 km above the Antarctic coast, both being closely associated with the geomagnetic anomalies. In August and December 1960, the lower boundary of the South-Atlantic anomaly was mapped at an altitude of 265 to 306 km. There are 15 figures, 7 tables and 70 references.

Card 2/2

FRADKIN, M. I., TOLSTOV, K. D., VEPRIK (fnu), KURNOSOVA, L. V., RAZORENOV, L.A., CHUKIN

"Controlled exposition of nuclear emulsions on sputniks"

Fourth International Colloquium on Photography (Corpuscular) - Munich, West Germany, 3-8 Sep 62

38968

S/048/62/026/006/014/020
B125/B102

3.2420

AUTHORS: Ginzburg, V. L., Kurnosova, L. V., Logachev, V. I., Razorenov, L. A., and Fradkin, M. I.

TITLE: Temporary increases in the intensity of the nuclear cosmic-ray component induced by solar activity and investigation of the radiation intensity at altitudes from 200 to 300 km

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 6, 1962, 782-798

TEXT: During the flight of the second Soviet space rocket more than 100 nuclei of $Z \geq 15$, more than 3000 of $Z \geqslant 5$ and more than 30,000 of $Z \geqslant 2$ were measured by means of two Cherenkov counters working independently. On the second and third Soviet space ships a current of charged particles was measured by a telescope consisting of gas-discharge counters at altitudes between 187 and 339 km, in latitudes ranging from -65° to +65°. Variation in number of heavy nuclei with $Z \geqslant 15$ was considerable but that of α-particles was smaller. At altitudes from 187 to 339 km the counting rate of the telescope was several times greater than otherwise by reason

Card 1/02

of the solar activity. On the equator, at an altitude from 306 to 339 km, the global intensity is 1.36 and in higher latitudes 3.3 particles. cm^{-2} sec^{-1}. The charged-particle flux intensity of the anomalies in the southern part of the Atlantic Ocean exceeds that in the corresponding geomagnetic latitudes by two orders of magnitude. In 330 km an area of smaller intensity separates the South Atlantic Anomaly (a "sleeve" of the inner radiation belt) from the Southern Anomaly connected with the outer radiation belt. The particles recorded in the equatorial area are protons of at least 60 Mev or electrons of at least 8 Mev. There are obviously very many particles of smaller energy in the anomalies. The line of the smallest radiation intensity lies in an altitude from 187 to 339 km and on the western hemisphere farther south than the geometrical equator. In higher latitudes, owing to solar activity, the intensity of particle currents is subject to considerable temporal variations. The actual mechanism of acceleration and ejection of heavy particles on the sun is not known hitherto. There are 12 figures and 2 tables.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute imeni P. N. Lebedev of the Academy of Sciences USSR)

Card 2/2

13982

S/560/62/000/012/002/014
I063/I263

9,6150

AUTHORS: Kurnosova, L.V., Logachev, V.I., Razorenov, L.A. and Fradkin, M.I.

TITLE: Energetic spectra of different nuclear groups of the cosmic radiation as measured by Cherenkov detectors in ship-satellites

PERIODICAL: Akademiya nauk SSSR. Iskusstvennyye sputniki Zemli no.12, 1962, Moscow, 16-30

TEXT: The energetic spectra of different nuclear groups within the range of 109 - 1010 eV/nucleon were investigated in the second and third Soviet space ship-satellites. In the former three independently functioning Cherenkov detectors were used: one of the integral type recorded nuclei with charges $Z \geq 5$, $Z \geq 15$, and $Z > 34$ and two detectors of the differential type recorded the charge of nuclei

Card 1/3

S/560/62/000/012/002/014
I063/I263

Energetic spectra of different nuclear....

from helium up to oxygen. The directions of the nuclei were determined by a cosmic-ray telescope. Similar instruments in the third ship-satellite recorded nuclei with the following charges: $Z \geq 5$, $Z \geq 12 - 14$, $Z \geq 31 - 34$ and $Z > 34$. The intensity of each nuclear group was measured within the geographical latitude range of -65° to +65°. Considering the low-energy limit of charged particles arriving vertically at each geomagnetic latitude the integral spectra of the nuclear groups were deduced from flux measurements at the different geomagnetic latitudes. Each spectrum represented an average of both identical plus and minus latitudes. The dependence of the flux of nuclei with $Z \geq 2$, $Z \geq 4 - 5$ and $Z \geq 12 - 14$ on the latitude as measured in the third ship-satellite was similar within the experimental error. An increase of the flux with latitude was observed for latitudes from 0° up to 45°, thereafter the flux remained practically constant. The integral energetic spectra of the different

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Energetic spectra of different nuclear... nuclear groups showed the same behavior. The low-energy cutoff of the particles was observed to occur at 45° latitude instead of 50-55° (high-latitude cutoff). This is explained by the energy threshold of the detectors. (2.2 beV/nucleon). The integral spectra for energies higher than the threshold value were assumed to be represented by a power function. The power-index of each group was measured from the slope of the straight line obtained when the flux was plotted against the energy per nucleon in a double logarithmic scale. No significant difference was observed between the power-indices for nuclear groups having $Z \geq 2$, $Z \geq 4 - 5$, $Z \geq 12 - 14$ as measured in the third ship-satellite. The value of the power-index of nuclei with $Z \geq 15$ as measured in the second ship-satellite was somewhat higher than the values of the other nuclear groups, but as there is not sufficient data for statistical analysis in this group, no conclusions can be made about its spectrum. There are 8 figures and 7 tables.

Card 3/3

3,2410
3,2410

S/560/62/000/012/003/014
I063/I263

AUTHORS: Kurnosova, L.V., Razorenov, L.A., and Fradkin, M.I.

TITLE: A case of a short-term increase of heavy nuclear intensity during the flight of the third satellite space-ship

SOURCE: Akademiya nauk SSSR. Iskusstvennyye sputniki Zemli, no.12, Moscow, 1962, 31-34

TEXT: This increase was observed during the 24 hours flight of the third Soviet space-ship on December 1, 1960. Nuclear components of the cosmic radiation having $Z \geq 5$, $Z \geq 12 \div 14$, $Z \geq 31 \div 34$, $Z > 34$ were detected by a Cherenkov detector of the integral type, whereas for nuclei with $Z \geq 2$ the differential type was used. Only

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S/560/62/000/012/003/014
I063/I263

A case of a short-term increase...

nuclei with total energy higher than 1.4 - 1.5 beV/nucleon were detected. All the measurements were carried out at latitudes higher than 50°, thus the recorded mean intensity of the nuclear component of the cosmic radiation was practically independent of this factor. On December 1st, 1960, an increase in intensity, lasting about 12 min was observed between latitudes 50-70°. The intensity of nuclei with $Z \geqslant 12 \div 14$ increased up to 2.8 ± 1.4 times its mean value; no significant increase was observed for nuclei with $Z \geqslant 5$ and $Z \geqslant 2$. For the first half of the same period the increase was significant also for nuclei with $Z \geqslant 2$ (2.7 ± 1.3 times the mean value). Nuclei with $Z \geqslant 34$ showed an increased intensity simultaneously with that of the lighter nuclei. Similar results were obtained from the second Soviet cosmic rocket (Kurnosova, L.V., Razorenov, L.A., Fradkin, M.I., Akademiya nauk SSSR, Iskusstvennyye sputniki Zemli, no.6, 1961, 132).

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S/560/62/000/012/003/014
I063/I263

A case of a short-term increase...

Simultaneously with this nuclear intensity increase, an outburst in the solar chromosphere of the 1^+ class was observed, as well as an increase of the solar radio emission at the frequency of 208 Mc. The concurrence of these events suggests that relativistic nuclei are generated on the sun. The increased intensity of nuclei with $Z \geq 12$ could be the result of a preferential acceleration of the heavier nuclei, whereas the higher number of the α particles may be explained by the relatively high abundance of helium in the sun, so that a large number of these particles are involved in the acceleration process. There is 1 figure. The English-language reference is: C.E.Fichtel, D.E.Guss, Phys. Rev. Lett., 6, 1961, 495.

SUBMITTED: September 12, 1961

Card 3/3

. GINZBURG, L. V. KURNOSOVA, V. I. LOGACHEV, L. A. RAZORENOV, M. [illegible]

rimary cosmic radiation investigation.

eport submitted for the 8th Intl. Conf. on Cosmic Rays (IUPAP), Jaipur India, 2-14 Dec 1963

KURNOSOVA, L.V.; RAZORENOV, L.A.; FRADKIN, M.I.

Increase of short duration in radiation intensity recorded August 20, 1960, during the flight of the second spaceship-satellite. Isk.sput.Zem. no.15:66-70 '63. (MIRA 16:4)
(Artificial satellites) (Solar radiation--Observations)

SHAFER, Yu.G., kand. fiz.-matem. nauk, otv. red.; FRADKIN, M.I., red.

[Geo- and heliophysical effects in cosmic rays and auroras] Geo- i geliofizicheskie effekty v kosmicheskikh luchakh i poliarnykh siianiiakh. Moskva, Nauka, 1964. 157 p. (MIRA 17:12)

1. Akademiya nauk SSSR. Yakutskiy filial, Yakutsk. Institut kosmofizicheskikh issledovaniy i aeronomii.

L 21693-65 FSF(h)/FSS-2/EWT(1)/EEC(m)/FS(v)-3/EWG(v)/FCC Pe-5/Pg-4/P1-4/P1-4/Pe-4/Pq-4 TT/GW-2

ACCESSION NR: AT4048050 S/2504/64/026/000/0003/0016

AUTHOR: Kurnosova, L.V.; Logachov, V.I.; Razorenov, L.A.; Fradkin, M.I.

TITLE: Some results of cosmic ray studies made with Soviet satellites and rockets

SOURCE: AN SSSR. Fizicheskiy institut. Trudy*, v. 26, 1964. Kosmicheskiye luchi (Cosmic rays), 3-16

TOPIC TAGS: cosmic ray, solar burst, Cerenkov radiation, Cerenkov counter, radiation belt, southern anomaly, gas discharge counter

ABSTRACT: The study of the nuclear component of cosmic rays using integral and differential Cerenkov counters is discussed. Nuclei with charges $Z \geq 2$, $Z \geq 5$, $Z \geq 15$ and $Z \geq 28$ were measured in free space. The differential counter had a geometric factor $\Gamma \simeq 2.5 \cdot 10^{-4}$ $m^2 \cdot ster$ and aperture a $\simeq 27°$. The data show the flux of heavy nuclei to be very slight. The energy spectra and chemical composition of cosmic rays were analyzed, data being broken down into 10° intervals of geomagnetic latitude for processing. The latitude dependence of nuclei with $Z \geq 2$ and $Z \geq 4$ is plotted, as is the energy spectrum of nuclei with $Z \geq 2$. It is estimated that Li comprises about 1/6 of the flux of group L nuclei. Evaluation in the range Z = 7-8 gave a flux ratio L/S = 0.31±0.10 (Group S = M + H). A 17-minute variation in nuclear intensity was recorded on 12 Sep59.

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ACCESSION NR: AT4049950

Time dependencies of flux intensities for various nucleus groups during this variation are plotted. All of the more noticeable increases in nuclear flux were accompanied by weak chromosphere bursts and by bursts of radiation at 208-610 mc. The time dependence of the telescope count rate and rate of an integral Cerenkov counter recording nuclei with $Z \geq 5$ are plotted in Fig. 1 of the Enclosure. Results dealing with the earth's radiation belts are also considered (see Table 1 of the Enclosure). Previous work by L. V. Kurnosova et al. and V. L. Ginzburg et al. is discussed. It is stated that the South-Atlantic anomaly is an "arm" of the inner radiation belt, reaching a height of 300 km. It is concluded that the shower produced within the material of instruments mounted near the telescope cannot be the cause of the high counts noted. It is suggested that the cosmic-ray albedo is also not the cause. It is therefore concluded that the question of the increased count at 200-300 km is still open and it is suggested that measurements in the 50-300 km interval with the same instrument might help to solve the problem. Orig. art. has: 3 tables and 7 figures.

ASSOCIATION: Fizicheskiy institut AN SSSR (Physics Institute, AN SSSR)

SUBMITTED: 00 ENCL: 02 SUB CODE: AA

NO REF SOV: 015 OTHER: 007

Card 2/4

L 24693-65

ACCESSION NR: AT4048960 ENCLOSURE: 01

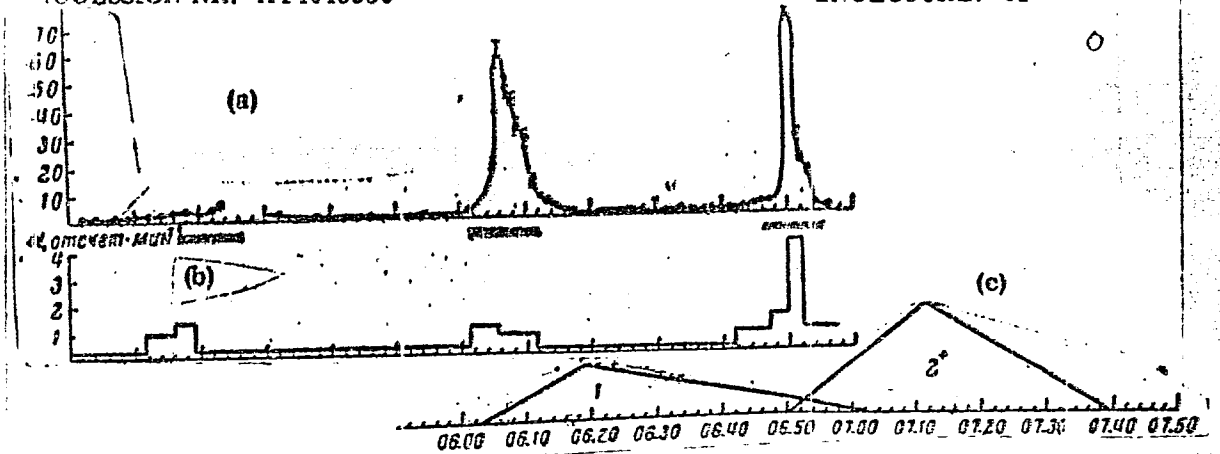

Fig. 1. Time dependence of (a) the telescope count rate, (b) counting rate of nuclei with $Z \geq 5$; the lower part of the figure (c) shows the chromospheric bursts (abscissa = world time). [the hatched areas indicate times of passage of the satellite through the polar regions.]

Card 3/4

L 24693-65

ACCESSION NR: AT4049950 ENCLOSURE: 02

Geomagnetic Latitude	Cosmic-ray flux J, particles$\times cm^{-2} \cdot sec^{-1} \times ster$	$I_{gl}=2\pi J$, particles$\cdot cm^{-2} \times sec^{-1}$	Radiation intensity 2nd Space vehicle: Count rate, imp $imp \cdot sec^{-1}$	2nd Space vehicle: global intensity, particles $\times cm^{-2} \cdot sec^{-1}$	3rd Space vehicle: Count rate, $imp \cdot sec^{-1}$	3rd Space vehicle: Global intensity, particles $\times cm^{-2} \cdot sec^{-1}$
0°	310±10	0,19±0,01	0,83±0,03	1,46±0,03	0,72±0,05	1,30±0,06
10	280±8	0,18±0,01	0,93±0,06	1,57±0,06	0,75±0,07	1,34±0,03
20	310±10	0,19±0,01	1,0±0,1	1,7±0,1	0,76±0,06	1,36±0,07
30			1,3±0,1	2,0±0,1	1,1±0,1	1,8±0,1
40	730±60	0,46±0,04	1,9±0,2	2,6±0,2	1,6±0,4	2,4±0,4
50	1800±200	1,13±0,13	2,5±0,2	3,2±0,2	2,0±0,2	2,7±0,1
60	2900±300	1,82±0,19	2,6±0,1	3,3±0,1	2,2±0,4	2,9±0,3
70	2500±90	1,57±0,04	2,0	2,7	1,9±0,1	2,6±0,1

Table 1. Data from satellite studies.

Card 4/4

L 21108-65 EEC-4/EWG(j)/EWG(v)/EWA(h)/EWT(l)/EWT(m)/EEC(t)/FS(v)-3/EEC(m)/FCC/
T/ESD(t)/ESD-2 Pe-5/Pg-4/Pi-4/Pl-4/Po-4/Pq-4/Pae-2/Peb ASD(a)-5/AFWL(a)/
ACCESSION NR: AP5002104 AFWL/BSD/AFMDC/AFETR/ASD(gs)/ S/0048/64/028/012/2039/2044
TT/GW-2/WS

AUTHOR: Ginzburg,V.L.; Kurnosova,L.V.; Logachev,V.I.; Razorenov,L.A.; Fradkin,M.I.

TITLE: Investigation of primary cosmic rays /Report, All-Union Conference on the Physics of Cosmic Rays held in Moscow 4-10 Oct 1963/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.28, no.12, 1964, 2039-2044

TOPIC TAGS: cosmic ray composition, cosmic radiation, solar radiation

ABSTRACT: The paper gives selected data on primary cosmic rays in the region of light nuclei, obtained during flights of Soviet space vehicles, and comparative data obtained by means of radiosondes. /Abstracter's note: The particular sputniks and dates are not given, but these may be specified in the references./ The comparative data were obtained by means of photographic emulsions and Cerenkov counters. A table lists the values of the L/S ratio; another table gives the values of the percentages of Li, Be, B, C and N and heavier nuclei referred to the total flux with $Z \geq 3$. The satellite and balloon data on the L/S ratio are reasonably consistent; the agreement is somewhat poorer for the percentages. Figures give data on the fluxes of alpha particles, nuclei with $Z \geq 5$ and nuclei with $Z \geq 12$

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for different energies; the flight trajectory corresponding to a brief flare-up in solar activity; and variations with time of the counting rates of the space vehicle gas-counter telescope and Cerenkov counter detecting nuclei with $Z > 5$. From a brief analysis of the data it is inferred that there may be different cosmic ray production mechanisms operating on the Sun. One should produce cosmic radiation with approximately the chemical composition of the solar atmosphere; another may result in preferential acceleration of heavy nuclei. Further data are needed before one can draw definitive conclusions regarding the nature of the solar cosmic ray production mechanisms. Orig.art.has: 2 tables and 4 figures.

ASSOCIATION: none

SUBMITTED: 00

ENCL: 00

SUB CODE: AA

NR REF SOV: 011

OTHER: 006

ACCESSION NR: AP4031621 S/0053/64/082/004/0585/0647

AUTHOR: Ginzburg, V. L.; Kurnosova, L. V.; Razorenov, L. A.; Fradkin, M. I.

TITLE: Investigations of the nuclear component of cosmic radiation performed on Soviet satellites and rockets

SOURCE: Uspekhi fizicheskikh nauk, v. 82, no. 4, 1964, 585-647

TOPIC TAGS: cosmic ray, satellite measurement, space probe, cosmic ray charge distribution, cosmic ray flux, cosmic ray energy spectrum, solar cosmic ray, primary cosmic radiation, nuclear active component, electron positron component, galactic cosmic ray

ABSTRACT: This review summarizes results of measurements of cosmic-ray particle fluxes, cosmic-ray energy spectra, and intensity variations of the cosmic-ray components. performed by the authors with satellite-borne equipment and reported in various publications (Geomagnetizm i aeronomiya, v. 2, 193, 1962. Iskustvenny*ye sputniki zemli, no. 2, 70, 1958; no. 5, 20, 1960; no. 8, 87, 1961; no. 12, 16, 1961; no. 6., 131, 1961; no. 12, 31, 1961; no. 15, 66, 1962. J. Phys. Soc. Japan v. 17, Suppl. A-II, 315, 1962. Izv. AN SSSR ser. fiz. v. 26, 782, 1962)..

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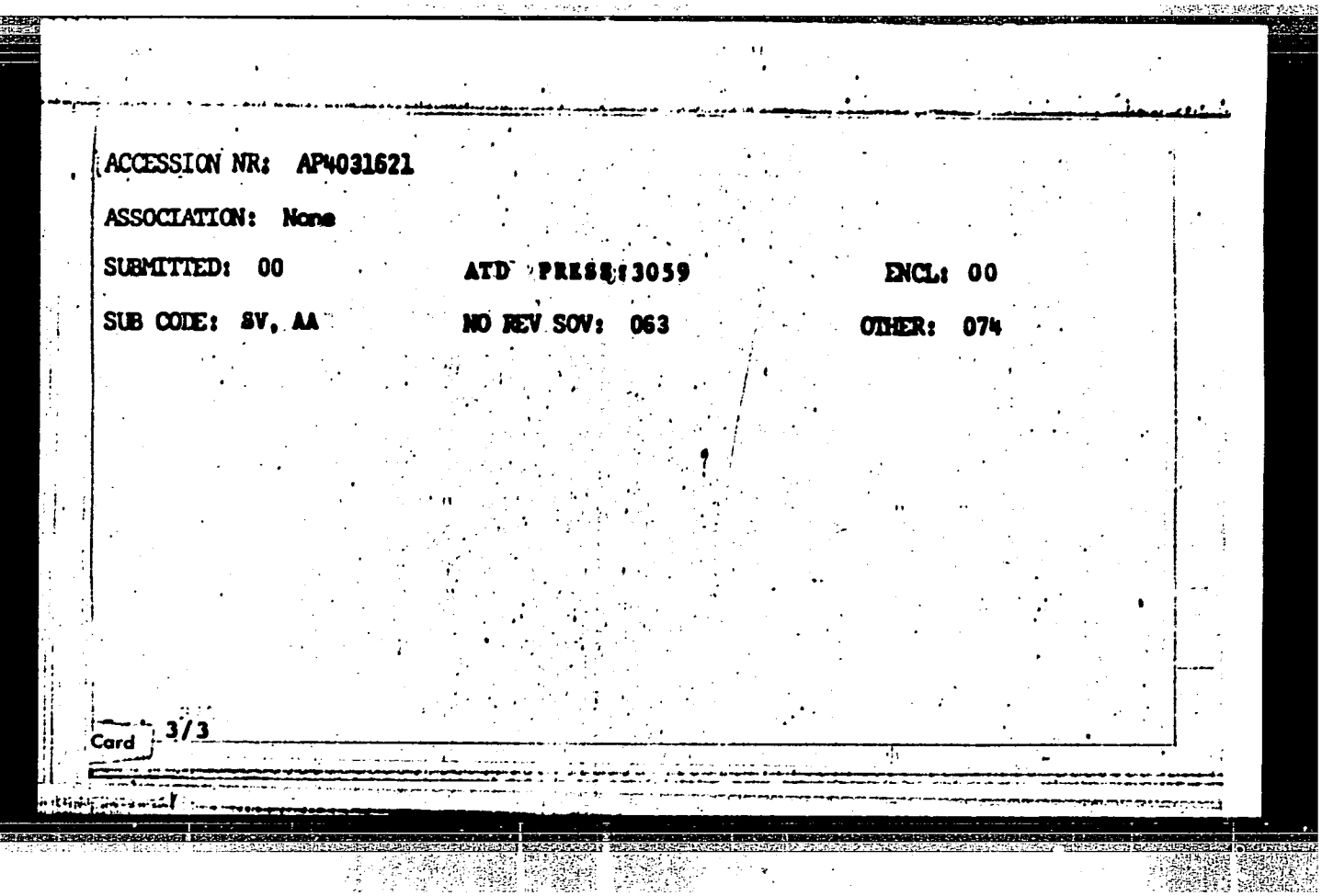
ACCESSION NR: AP4031621

The experimental results are compared with the data by others. In addition, some problems and possibilities of cosmic-ray research outside the earth's atmosphere and magnetic field are also discussed. The advantages and limitations of satellite and rocket studies are briefly enumerated. Certain features of Cerenkov counters, which provided the bulk of the information, are discussed. Difficulties in the comparison of the results of different researches and the effect of the solar-activity cycle and of the individual solar flares are extensively dealt with. The correlation with solar radio emission is also discussed in connection with the electron-positron component of cosmic radiation. The section headings are: Introduction. I. Investigation of the nuclear component of cosmic rays with Soviet satellites and space probes. 1. Procedure. 2. Chemical composition of cosmic rays, fluxes of different nuclear groups and their energy spectra. 3. Variations of the flux of the nuclear cosmic-ray component and nuclei of solar origin. II. Use of satellites and rockets to study primary cosmic radiation. 4. Nuclear component of galactic cosmic rays. 5. Solar cosmic rays and high-latitude cutoff. 6. Electron-positron component of cosmic rays. Bibliography. Orig. art. has: 31 figures, 15 tables, and 6 formulas.

Card 2/3



ACCESSION NR: AP4031621

ASSOCIATION: None

SUBMITTED: 00 ATD PRESS: 3059 ENCL: 00

SUB CODE: SV, AA NO REV SOV: 063 OTHER: 074

Card 3/3

L 1888-66 EWT(l)/EWT(m)/FCC/T/EWA(h) IJP(c) GS/GW

ACCESSION NR: AT5022822 UR/0000/65/000/000/0008/0022

AUTHOR: Ginzburg, V. L.; Kurnosova, L. V.; Logachev, V. I.; Razorenov, L. A.; Fradkin, M. I.

TITLE: Primary component of cosmic rays

SOURCE: Vsesoyuznoye soveshchaniye po kosmofizicheskomu napravleniyu issledovaniy kosmicheskikh luchey. 1st, Yakutsk, 1962, Kosmicheskiye luchi i problemy kosmofiziki (Cosmic rays and problems in cosmophysics); trudy soveshchaniya. Novosibirsk, Redizdat Sib. otd. AN SSSR, 1965, 8-22

TOPIC TAGS: primary cosmic ray, cosmic ray particle, cosmic ray measurement, cosmic radiation composition

ABSTRACT: The article is a survey of reported experimental data on the composition of cosmic rays. The following groups of nuclei (other than protons and alpha particles) with charge $Z \geqslant 3$ are considered: (1) light nuclei with charge $3 \leqslant Z \leqslant 5$ (group L); (2) nuclei of the middle group with $6 \leqslant Z \leqslant 9$; (3) heavy nuclei with $Z > 10$ (group H). The symbol S is also used and designates nuclei with $Z \geqslant 6$ ($S = M + H$). It is shown that fluxes of different nuclei (including protons) should be compared for a given value of their hardness. As a rough general rule, nuclei of elements with atomic number Z are Z times more

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frequent in cosmic rays than in nature. Difficulties involved in measurements of fluxes of the different groups of nuclei are described. High-altitude experiments definitely indicate the presence of lithium, beryllium, and boron nuclei (20-30% of the quantity of heavier nuclei) in the primary component of cosmic rays in the vicinity of the earth. Findings concerning the electron-positron component of cosmic rays are discussed, and the chemical composition of solar cosmic rays is considered. Differential energy spectra of protons and nuclei and their hardness spectra are analyzed. On the basis of the body of data accumulated thus far it is now possible to state that not only protons, but also multiply-charged nuclei are accelerated on the sun; however, this mechanism of particle acceleration is still unknown, and several such mechanisms may exist. Orig. art. has: 14 figures and 3 tables.

ASSOCIATION: Fizicheskiy institut im. N. P. Lebedeva AN SSSR (Physics Institute, AN SSSR)

SUBMITTED: 29Oct64 ENCL: 00 SUB CODE: AA, NP

NO REF SOV: 014 OTHER: 020

L 2326-66 EWT(1)/FCC/EWA(h) GS/GW
ACCESSION NR: AT5023626 UR/0000/65/000/000/0486/0501

AUTHORS: Ginzburg, V. L.; Kurnosova, L. V.; Razorenov, L. A.; Syrovatskiy, S. I.; Fradkin, M. I. 36 BTI

TITLE: Some problems and perspectives in the investigation of primary cosmic rays 12

SOURCE: Vsesoyuznaya konferentsiya po fizike kosmicheskogo prostranstva. Moscow, 1965. Issledovaniya kosmicheskogo prostranstva (Space research); trudy konferentsii. Moscow, Izd-vo Nauka, 1965, 486-501

TOPIC TAGS: cosmic ray, gamma ray, x ray, solar activity, antiparticle

ABSTRACT: Problems associated with the investigation of primary cosmic rays and gamma rays are presented in a three-part report. Part I deals with the proton-nucleus component of the cosmic rays, Part II covers the electron-positron component, and Part III discusses cosmic gamma- and x-rays. Although the proton-nucleus component of primary cosmic rays has been studied quite completely, a group of problems still remains unanswered. Eight such problems discussed in Part I are: 1) energetic spectra of protons and nuclei in the energy interval below 100 Mev/nucleon. These spectra are represented by the form $N(E) \sim E^{1.8}$. 2) The relationship between fluxes of different nuclei groups (L, M, H) in the energy range 55 to 550 Mev/nucleon, which is still not well known. 3) Isotopic components of primary

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cosmic rays. This would require the measurement of three independent parameters such as dE/dx, E, and pc. 4) The presence of high speed antiprotons generated by the interaction of cosmic rays with interstellar media. Some measurements place the percent composition of antiparticles at 0.23%. 5) The verification of the presence of superheavy nuclei, Z > 30. 6) Estimates of the time rate of change of the fluxes in primary nuclei components which have their origin either in solar bursts or in modulated galactic cosmic rays. These intensity variations should be recorded continuously, outside the terrestrial atmosphere. 7) Intensity gradients of cosmic rays in the solar system as evidenced by data from Pioneer-5 and Mariner-1. 8) Anisotropy among particle fluxes of low, near-threshold energies. Two similar problems are discussed in Part II. Here the flux and energy spectra of primary cosmic ray electron-positron components are analyzed first, where data are shown to be rather scant. Next, the relationship between positron and electron fluxes is considered by measuring the charge composition of the primary cosmic rays. In Part III, calculation results of expected γ- and x-ray intensities from important galactic sources are considered. The γ-ray generation is attributed to processes such as π^0-meson decay, bremsstrahlung radiation of relativistic electrons and positrons, and Compton γ-rays by the scattering of photons on x-ray electrons. Experiments indicate I_γ (> 50 Mev) $\leq 3.5 \times 10^{-4}$ photons/cm^2/sec/stere which is larger than expected galactic estimates. This then implies γ-rays of

L 2326-66
ACCESSION NR: AT5023626 O

meta-galactic origin. For lower energies (0.51 Mev) I_γ = 1.2 to 300 x 10^{-6} photons/cm^2/sec/stere. Orig. art. has: 6 tables, 2 figures, and 4 formulas. [04]

ASSOCIATION: none

SUBMITTED: 02Sep65 ENCL: 00 SUB CODE: AA, NP

NO REF SOV: 020 OTHER: 046 ATD PRESS: 4101

Card 3/3

L 1538-66 EWT(1)/FCC/EWA(h) GS/GW

ACCESSION NR: AT5023627 UR/0000/65/000/000/0501/0502

AUTHOR: Kurnosova, L. V.; Razorenov, L. A.; Logachev, V. I.; Fradkin, M. I. 57 55 B+1

TITLE: Experimental investigations of the composition of primary cosmic rays

SOURCE: Vsesoyuznaya konferentsiya po fizike kosmicheskogo prostranstva. Moscow, 1965. Issledovaniya kosmicheskogo prostranstva (Space research); trudy konferentsii. Moscow, Izd-vo Nauka, 1965, 501-502

TOPIC TAGS: cosmic ray, cosmic ray measurement, cosmic ray intensity, satellite, satellite mission analysis, nucleus, proton, heavy nucleus, nucleon

ABSTRACT: Results of work conducted with the help of satellites and rockets in 1958-63 for the purpose of studying the nuclear component of cosmic rays are presented. The intensities of various nuclei group streams are given, and the upper limit of the ratio of nuclear streams with $Z \geq 30$—40 to that with $Z \geq 15$ is found to be 0.01—0.03%. The ratio of a light nuclear (group L) stream to the stream of nuclei of group S = M + H was found to be $31.0 \pm 9.6\%$. The short-period intensification of nuclear streams is considered in relation to solar chromospheric flares. This intensification proves the existence of solar processes producing the acceleration of nuclei to kinetic energies exceeding $0.5 \cdot 10^9$ ev/nucleon. It is proposed

Card 1/2

L 1538-66

ACCESSION NR: AT5023627

that two mechanisms are active in the sun—one leads to the acceleration of protons and the other to the acceleration of heavy nuclei. [04]

ASSOCIATION: none

SUBMITTED: 02Sep65 ENCL: 00 SUB CODE: AA, SV

NO REF SOV: 000 OTHER: 000 ATD PRESS: 4098

Card 2/2

L 6954-66 EPF(c)/EWA(h)/EWT(1)/EWT(m)/FCC RPL GW/WW

ACC NR: AP5026226 SOURCE CODE: UR/0048/65/029/010/1846/1852

AUTHOR: Kurnosova, L.V.; Razorenov, L.A./Fradkin, M.I. 54 51 B

ORG: none

TITLE: Composition and energy spectrum of the primary cosmic rays in the moderate-energy region /Report, All-Union Conference on Cosmic Ray Physics held at Apatity, 24-31 August 1964/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.29, no.10, 1965, 1846-1852

TOPIC TAGS: Primary cosmic ray, spectral energy distribution, chemical composition, cosmic radiation composition, interplanetary space.

ABSTRACT: Recent literature on the energy distribution and composition of the primary cosmic rays with energies between 10^8 and 10^{10} eV/nucleon is reviewed. For energies above 2 BeV/nucleon the exponent in the energy spectrum is 1.5 and is the same for all components. The Li-Be-B question can be regarded as settled. The ratio L/S of the number of these nuclei to the number of heavier nuclei is between 0.2 and 0.3, and appears to increase with decreasing energy. The increase of L/S with decreasing energy probably indicates that the low-energy primary cosmic ray particles traverse a greater thickness of interstellar matter than do the high-energy particles. The ratio H/M of the number of heavy to the number of medium-mass nuclei in the pri-

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0902 0062

L 6954-66

ACC NR: AP5026226

mary cosmic radiation appears to be approximately 1/3; there are some discordant data, however, and further measurements are necessary. The ratio H/M is greater in the cosmic radiation than in the universe as a whole. Data on the fluxes of separate nuclei of the heavy group are greatly to be desired. The flux of cosmic rays with energies between 10^8 and 10^9 eV/nucleon is modulated by solar activity and diluted by particles of solar origin. Measurements of α particle fluxes have shown that the high latitude cutoff is a rigidity effect and is therefore due to magnetic fields rather than to ionization losses. If the high latitude cutoff were due to irregular magnetic fields frozen into the interplanetary gas ejected from the sun, one would expect the cosmic ray intensity to vary with distance from the sun. Such a variation is not confirmed by measurements with Pioneer 1, Mars 1, and Mariner 2. A small intensity gradient derived from a comparison of Mariner 2 with terrestrial data is questioned because of the dissimilarity of the rocket and terrestrial instruments. The conclusion of R. Vogt (Phys.Rev., 125, 366 (1962) that there exist low-energy protons of solar origin which, however, do not arrive directly from the sun, is questioned because of the sharp cutoff observed beyond the radiation belts at 52° latitude by Explorer 7. It is suggested that Vogt's protons may have originated in unrecorded solar flares or that the effect of atmospheric secondaries may not have been taken properly into account. The low positron content (20%) of the electron component of the primary cosmic radiation shows that the electrons are not to be accounted for by meson decay. There is evidence that the composition of cosmic rays of solar origin is the same as that of the solar atmosphere. There are some indications that

Card 2/3

L 6954-66

ACC NR: AP5026226

heavy nuclei may be preferentially accelerated on the Sun. The data on this question, however, are contradictory, and more observations with instruments of greater luminosity are necessary. Orig. art. has: 4 figures and 2 tables.

SUB CODE: AA SUBM DATE: 00/--Oct 65 ORIG.REF: 007 OTH REF:021

Card 3/3

KURNOSOVA, L.V.; LOGACHEV, V.I.; PLATONOV, G.F.; RAZORENOV, L.A.; SINITSINA, V.G.; SUSLOV, A.A.; FRADKIN, M.I.

Preliminary results of studying the nuclear component of cosmic rays with the aid of the artificial satellite "Elektron-2."
Izv. AN SSSR.Ser.fiz. 29 no.10:1853-1858 O '65.

(MIRA 18:10)

1. Laboratoriya kosmicheskikh luchey Fizicheskogo instituta im. P.N.Lebedeva AN SSSR.

L 2991-66 FSS-2/EWT(l)/FS(v)-3/FCC/EWA(d)/EWA(h) TT/GS/GW
ACCESSION NR: AT5023633 UR/0000/65/000/000/0514/0528

AUTHOR: Blokh, Ya. L.; Dorman, L. I.; Kurnosova, L. V.; Logachev, V. I.; Platonov, G. F.; Razorenkov, L. A.; Sinitsina, V. G.; Suslov, A. A.; Fradkin, M. I. 76 B+1

TITLE: Some results of the study of cosmic ray nucleons by the Elektron-2 satellite

SOURCE: Vsesoyuznaya konferentsiya po fizike kosmicheskogo prostranstva. Moscow, 1965. Issledovaniya kosmicheskogo prostranstva (Space research); trudy konferentsii. Moscow, Izd-vo Nauka, 1965, 514-528

TOPIC TAGS: satellite, radiation, cosmic ray, cosmic radiation, nuclear particle, nucleon/Elektron 2 satellite

ABSTRACT: Included in the instrumentation of the Elektron-2 satellite (launched, Jan 1964; apogee, 68,000 km) was a combination of internal and external counters designed to register nuclear components of primary cosmic radiation. The design and calibration of this apparatus is described, and some results of partially-reduced data are discussed. One counter mounted on the external surface of the satellite was a combination of the Cerenkov and scintillation types which responded to nucleons in the atomic number range of $2 \geq Z \geq 30$. The internal counter was a Cerenkov

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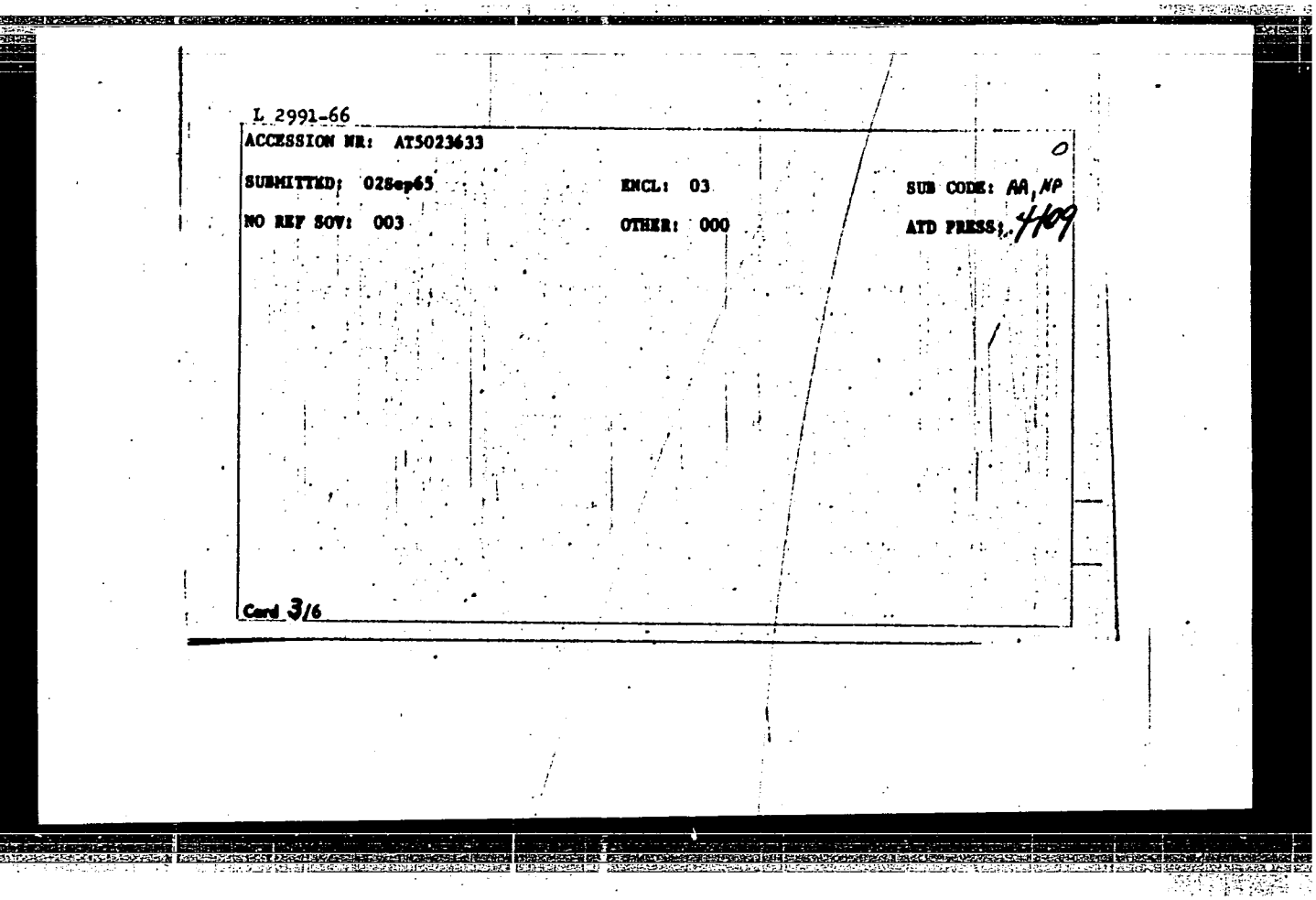
L 2991-66
ACCESSION NR: AT5023633

type, registering at the discrete levels of $Z \geq 2$, $Z \geq 5$, and $Z \geq 15$. All counters were shielded and were designed to register only particles with energies ≥ 600 Mev/nucl. Fig. 1 of the Enclosure gives the basic schematic of the external counter combination. The authors detail the method used to calibrate the photomultiplier outputs in terms of the Z-range of input excitation; for example, for the type FEU-35 external counter, the anode output characteristic corresponded to the range from $Z = 4$ to $Z = 21$, and the output of the 7th dynode, to the range $Z = 6$ to $Z = 28$. The calibration technique was to excite a SiC electroluminescent diode with a high-voltage, short-duration (4—30 nsec) thyratron pulse, providing the phototube with a light input similar to a counter input. Early results from these primary particle counters, obtained during the IQSY, have been a useful supplement to analogous satellite data from the 1959-1962 period, during which solar activity was undergoing the transition from maximum to minimum. Comparative results are seen in Fig. 2, which shows an almost twofold increase in nuclear particles recorded near the solar activity minimum. Table 1 compares data from one orbit of Elektron-2 to that of the 1959 and 1960 satellites and the 1962 Mars-1 probe. To date only data for the $Z \geq 15$ particles have been reduced enough for statistical analysis. A large increase in incidence of this size particle was noted during solar eruptions observed in the course of the Elektron-2 flight. Orig. art. has: 18 figures, 1 table, and 1 formula. [SH]

ASSOCIATION: none

Card 2/6



L 2991-66

ACCESSION NR: AT5023633

SUBMITTED: 02Sep65 ENCL: 03 SUB CODE: AA, NP

NO REF SOV: 003 OTHER: 000 ATD PRESS: 4109

Card 3/6

L 4089-66 EWT(1)/FCC/EWA(h) GW

ACCESSION NR: AP5036227 UR/0048/65/029/010/1853/1858

AUTHOR: Kurnosova, L.V.; Logachev, V.I.; Platonov, G.P.; Rasorenov, L.A.; Sinit-sina, V.G.; Suplov, A.A.; Trukhin, M.I.

TITLE: Investigation of low-energy charged particles with the Cosmos 12, Cosmos 15, and Electron 2 satellites /Report, All-Union Conference on Cosmic Ray Physics held at Apatity 24-31 August 1964/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 29, no. 10, 1965, 1853-1858

TOPIC TAGS: primary cosmic ray, heavy particle, artificial earth satellite, Cerenkov counter, scintillation counter, solar activity

ABSTRACT: Equipment carried by Electron 2 to measure the nuclear component of cosmic rays during the International Year of the Quiet Sun is described briefly and a few preliminary results are reported. The equipment consisted of a Cerenkov counter mounted within the satellite behind 1.5 g/cm^2 of matter and a telescope composed of a Cerenkov counter and a scintillation counter, mounted outside the satellite behind 0.6 g/cm^2 of aluminum. All the counters could record cosmic ray particles with energies exceeding 600 Mev/nucleon. The external telescope recorded nu-

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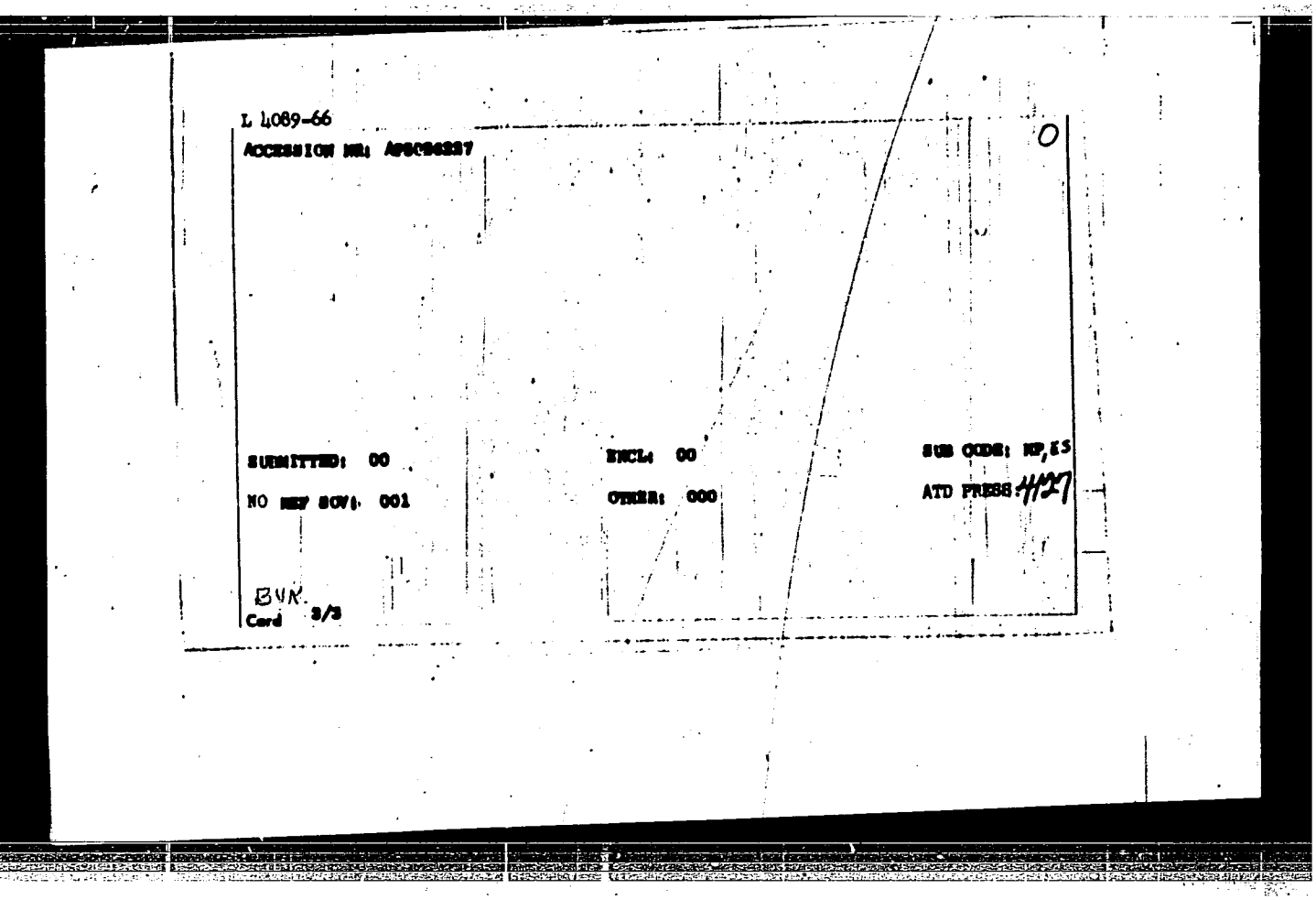
L 4089-66

ACCESSION NR: AP5026227

clei with charge numbers of 2 or greater, and the external Cerenkov counter, which was part of the telescope, also recorded very heavy nuclei with charge numbers near 30. Nuclei with charge numbers not less than 2, 6, or 15 were recorded in separate channels by the internal Cerenkov counter. The counters were tested and calibrated in the laboratory with the aid of cosmic ray particles; the associated photomultipliers were calibrated with flashes from a GiC diode. Preliminary results are compared with analogous data recorded with the Second Soviet Cosmic Rocket, the Third Soviet Satellite Vehicle, and the Mars 1. A strong negative correlation is indicated between solar activity and the intensity of the nuclear component of the cosmic radiation. The intensity of the nuclear component nearly doubled between the flights of the Second Cosmic Rocket in 1959 and the Electron 2 in 1964. It is anticipated that when the data recorded with the Electron 2 are processed they will provide information concerning the dependence of the nuclear component on solar activity. A number of solar flares occurred in February and March during the flight of the Electron 2. Analysis of the data recorded during these flares is awaited with great interest. Orig. art. has: 1 formula, 6 figures, and 1 table. [15]

ASSOCIATION: Laboratoriya kosmicheskikh luchey Fizicheskogo instituta im. P.N. Lebedeva Akademii nauk SSSR (Cosmic Ray Laboratory, Physics Institute, Academy of Sciences, SSR)

Card 2/3



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ACCESSION NR: AP6036227

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SUBMITTED: 00

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SUB CODE: MP,ES

NO REF SOV: 001

OTHER: 000

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BVK

Card 3/3

L 38564-66 FSS-2/EWT(1)/FCC TT/GW

ACC NR: AP6007751 SOURCE CODE: UR/0293/66/004/001/0170/0172

AUTHORS: Kurnosova, L. V.; Mandel'shtam, S. L.; Razorenov, L. A.; Tindo, I. P.; Fradkin, M. I.

ORG: none

TITLE: Occurrences of transient increase in the flux of heavy nuclei following an x-ray radiation burst

SOURCE: Kosmicheskiye issledovaniya, v. 4, no. 1, 1966, 170-172

TOPIC TAGS: x radiation, heavy nucleus, artificial satellite, signal to noise ratio, artificial satellite observation, solar atmosphere, solar x radiation

ABSTRACT: The transient increase in the flux of heavy nuclei with $Z \geq 15$ is discussed for the two periods 22 hr, 31 January, and 02 hr 15 min, 14 February 14, 1964. The duration of the flux was about 16 minutes and seemed to correspond to an x-ray burst recorded by the instruments on the artificial satellite "Elektron-2." The instruments were Cherenkov detectors with an area of 5 cm^2. During this sudden increase, the satellite was at an altitude of 6.6×10^4 km and the wavelength of the recorded x-rays was $\lambda < 10$Å. It is shown after some detailed discussion that this event could not be caused by statistical fluctuations because the chances for recording 100 such events on the basis of statistical fluctuations in x-rays would be less than 8.2×10^{-2}. Orig. art. has: 2 figures and 2 formulas.

SUB CODE: 04, 20/ SUBM DATE: 26Jul65/ ORIG REF: 004

FRADKIN, P. P.

The second glaciation of the west Siberian depression. DAN SSSR Vol. 24, No. 4, 1939

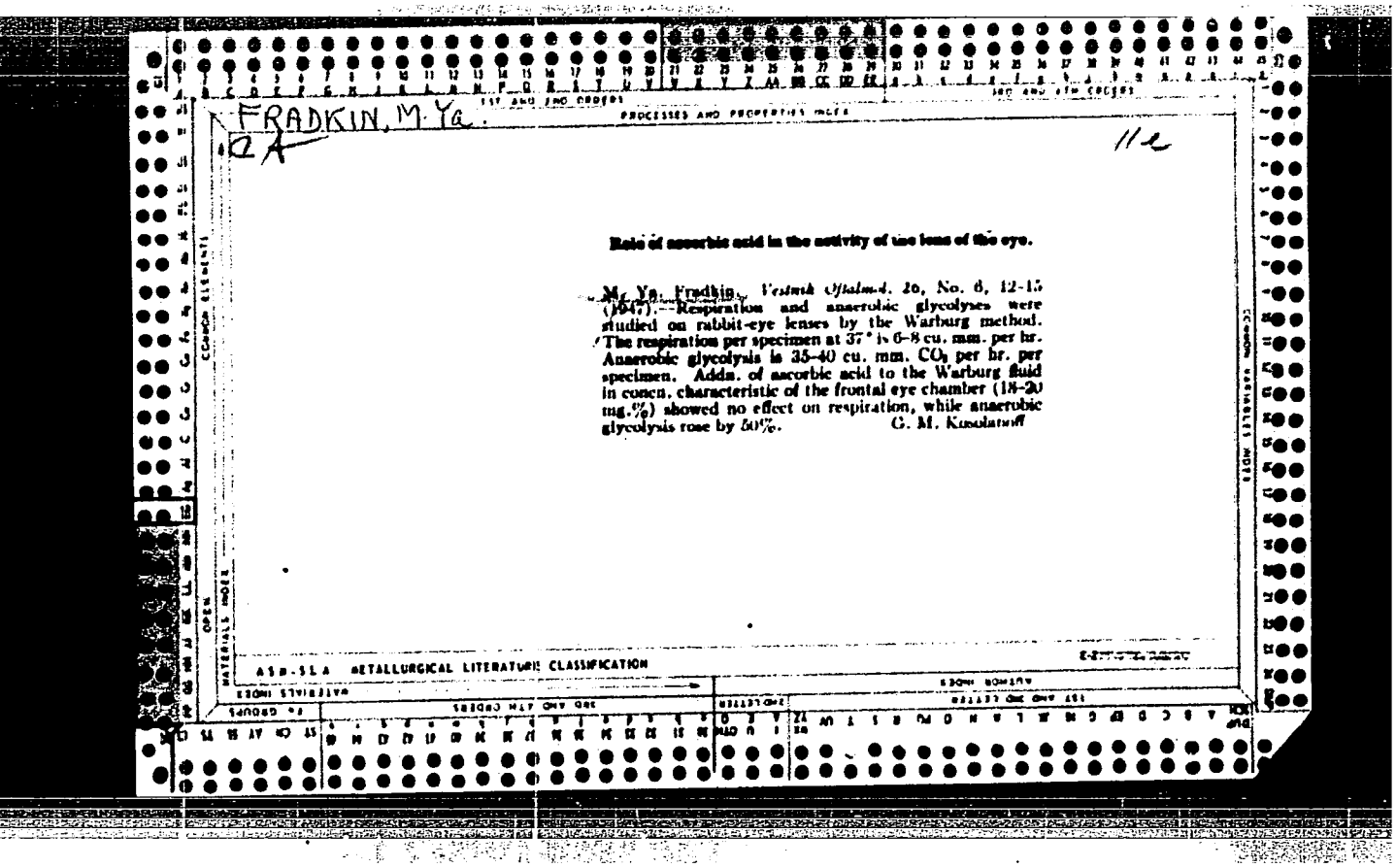
So: Trudy Arkticheskogo Nauchno-Issledovatel'skogo Instituta, GUSMP, Council of Ministers, Vol. 201, 1948

State Pedagogical Inst, Tyumen

FRABTIN, V. V.

Altitude of the eastern slopes of the Urals during the neogene period. DAN, SSSR Vol. 27, No. 6, 1940

So: Trudy Arkticheskogo Nauchno-Issledovatel'skogo Instituta, GUSMP, Council of Ministers, Vol. 201, 1948



FRADKIN, M. Ya.

QA

11-2

Role of ascorbic acid in the activity of the lens of the eye.

M. Ya. Fradkin, *Vestnik Oftalmol.* 26, No. 6, 12-15 (1947).—Respiration and anaerobic glycolyses were studied on rabbit-eye lenses by the Warburg method. The respiration per specimen at 37° is 6-8 cu. mm. per hr. Anaerobic glycolysis is 35-40 cu. mm. CO_2 per hr. per specimen. Addn. of ascorbic acid to the Warburg fluid in concn. characteristic of the frontal eye chamber (18-20 mg.%) showed no effect on respiration, while anaerobic glycolysis rose by 50%. G. M. Kusalatoff

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

[redacted], M. Ya.

Fradkin, M. Ya. and Levina, L. S.--"On the problem of central regulation of intra-ophthalic stress," Sbornik nauch. rabot, posvyashch. pamyati akad. Aberbakha. Moscow-Leningrad, 1948, P. 223-27

SO: U-3264, 10 April 1953, (Letopis 'Zhurnal 'nykh Statey, No. 3, 1949)

FRADKIN, M.Ya.

CHUMAKOV, M.P.; FRADKIN, M.Ya.; SHLYKOVA, B.D.; AVAKYAN A.A.; ZAITSEVA N.S.

New method for trachoma control; therapy with chloromycetin L and synthomycin. Vest. oft., Moskva 30 no.3:3-9 May-June 51. (CIML 21:1)

1. Of the State Scientific-Research Institute for Eye Diseases imeni Gel'mgol'ts and of the Institute of Virusology imeni Ivanovskiy of the Academy of Medical Sciences USSR.

3263. INTRA-OCULAR PRESSURE FOLLOWING STIMULATION OF THE CEREBRAL CORTEX AND THE VEGETATIVE NERVOUS SYSTEM (Russian text) - Fradkin M. Ya. and Pevzner V. I. - SBORN. INFORM.-METOD. MATERIAL. INST. 1956, 4 (10-12)

Fluctuations of the intra-ocular pressure were studied in rabbits after the following procedures: excision of the upper cervical sympathetic ganglia; stimulation of one of the middle cervical sympathetic ganglia with drops of croton oil; a combination of either excision or stimulation of the upper cervical sympathetic ganglia by the i. v. administration of distilled water (30 ml./kg. body weight); general anaesthesia of the animal. During anaesthesia a sustained lowering of ocular tension was observed. Administration of water alone did influence the intra-ocular pressure; however, introduction of water during anaesthesia caused an elevation of the intra-ocular pressure. Stimulation of the upper cervical sympathetic ganglion with croton oil, combined with introduction of water, produced an increase of the intra-ocular tension. The authors hold that the functional condition of the cortex has a substantial influence on the intra-ocular tension. (S)

FRADKIN, M.Ya., prof.; MOGILEVSKAYA, F.Ya., nauchnyy sotrudnik

Study of the effect of oxygen introduced into the anterior chamber in cases of nonrestoration following antiglaucomatous operations. Oft. zhur. 15 no.8:457-460 '60. (MIRA 14:1)

1. Iz Nauchno-issledovatel'skogo instituta glaznykh bolezney im. Gel'mgol'tsa (direktor - A.V.Roslavtsev).
(OXYGEN--THERAPEUTIC USE) (GLAUCOMA)

FRADKIN, M.Y., prof.; VILENKINA, A.Ya., doktor med.nauk; ITSIKSON, L.Ya., kand.med.nauk; VAYNSHTEYN, Ye.S., nauchnyy sotrudnik

Radiation cataract and its treatment. Vest. rent. i rad. 36 no.4: 83-85 Jl-Ag '61. (MIRA 15:2)

1. Iz Gosudarstvennogo nauchno-issledovatel'skogo instituta glaznykh bolezney imeni Gel'mgol'tsa (dir. A.V.Roslavtsev).
(RADIATION SICKNESS) (CATARACT)

SIKHARULIDZE, I.A., zasl. deyatel' nauki, prof., otv. red.; BERADZE, N.I., dots., otv. red.; ARKHANGEL'SKIY, V.N., prof., red.; ABULADZE, V.A., red.; ANTELAVA, D.N., kand. med. nauk, red.; BOGOSLOVSKIY, A.I., doktor biol. nauk, red.; BUNIN, A.Ya., kand. med. nauk, red.; VILENKINA, A., doktor med. nauk, red.; VISHNEVSKIY, N.A., prof., red.; ZARUBIN, G.S., nauchn. sotr., red.; ITSIKSON, L.Ya., kand. med. nauk, red.; KRASNOV, M.L., zasl. deyatel' nauki, prof., red.; MACHARASHVILI, P.D., zasl. vrach Gruz. SSR, red.; PUCHKOVSKAYA, N.A., prof., red.; RABKIN, Ye.B., prof., red.; RSHZHECHITSKAYA, O.V., kand. med. nauk, red.; ROSLAVTSEV, A.V., st. nauchn. sotr., red.; TARTAKOVSKAYA, A.I., kand. med. nauk, red.; FRADKIN, M.Ya., prof., red.; KHAYUTIN, S.M., prof., red.; CHERNYAKOVSKIY, G.Ya., kand. med. nauk, red.; CHKONIYA, E.A., kand. med. nauk, red.; SHATILOVA, T.A., doktor med. nauk, red.; YAKOVLEV, A.A., nauchn.sotr., red.

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1. Vsesoyuznaya konferentsiya oftal'mologov, 2d, Tiflis, 1961.
2. Chlen-korrespondent AMN SSSR (for Arkhangel'skiy).

FRADKIN, M.Ya.; VILENKINA, A.Ya.; ITSIKSON, L.Ya.; VAYNSHTEYN, Ye.S.

Biochemical principles and the differential diagnosis of primary cataracts. Uch.zap. GNII glaz.bol.no.8:7-12'63. (MIRA 16:9)

1. Gosudarstvennyy nauchno-issledovatel'skiy institut glaznych bolezney imeni Gel'mgol'tsa.
(CATARACT) (DIAGNOSIS, DIFFERENTIAL)

FRADKIN, M.Ya.; VILENKINA, A.Ya.; ITSIKSON, L. Ya.; VAYNSHTEYN, Ye.S.

Conservative treatment of initial cataracts. Uch.zap. GNII glaz.bol. no.8:84-90'63. (MIRA 16:9)
(CATARACT) (CYSTEINE)

FRADKIN, N. G.

OBRUCHEV, V. V. and N. G. FRADKIN. Po vnutrennei Azii. M.V. Pevtsov, V.A. Obruchev. Moskva, Geografgiz, 1947. 87 p. (Russkie puteshestvenniki) Bibliography: p. 85-87.
WaU DLC: DK851.032

SO: LC, Soviet Geography, Part I, 1951, Uncl.

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SO: LC, Soviet Geography, Part I, 1951, Uncl.

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2. USSR (600)

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7. In the Mountains and Deserts of Central Asia, V. A. Obruchev. (Press of Acad Sci USSR, 1948.) Reviewed by N. G. Fradkin, Sov. Kniga, No. 1, 1949.

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SO: LETOPIS ZHURNAL STATEY No., 27, Moskva, 1949

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FRADKIN, N.

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SO: Monthly List of Russian Accessions, Vol. 7 No. 1 April 1954.

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[N.M.Prsheval'skii] N.M.Prsheval'skii. Moskva, Ges. izd-vo geogr. lit-ry, 1953. 54 p. (MLRA 7:8)
(Prsheval'skii, Nikolai Mikhailovich, 1839-1888)

FRADKIN, N.G.

[Academician I.I.Lepekhin and his travels in Russia in 1768-1773] Akademik I.I.Lepekhin i ego puteshestviia po Rossii v 1768-1773 g.g.] [2.izd.] Moskva, Gos.izd-vo geogr.lit-ry, 1953. 218 p. (MLRA 6:7)
(Lepekhin, Ivan Ivanovich, 1740-1802)

FRADKIN, Naum Grigor'yevich; KRASHENNIKOV, S.P.; SOLOV'YEV, A.I., redaktor; MARGOLIN, Ya.A., redaktor; KOSHELEVA, S.M., tekhnicheskiy redaktor.

S.P.Krashennikov. Pod red.A.I.Solov'eva. 2-e izd. Moskva, Gos. izd-vo geograficheskoi lit-ry, 1954. 43 p. (MLRA 8:5)
(Krashennikov, Stepan Petrovich, 1713-1755)

FRADKIN, N.G.

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S.P. Krasheninnikov. 2-e izd. Moskva, Geografgiz, 1954. 45 p.
(MLRA 8:2D)

FRADKIN, N., kandidat geograficheskikh nauk.

Readers of an ancient book. Vokrug sveta no.2:57-60 F '55.
(Kamchatka--Description and travel) (MLRA 8:4)

FRADKIN, N., kandidat geograficheskikh nauk.

A book's fate ("Book of Marco Polo." Book reviewed by N.Fradkin). (MLRA 9:1)
Vokrug sveta no.10:61-62 O '55.
(Polo, Marco, 1254-1323)

FRADKIN, N.G.

"P.P.Semenov-Tian-Shanskii and his work on geography." V.I.Cherniavskii. Reviewed by N.G.Fradkin. Izv.AN SSSR.Ser.geog.no.4:143-145 Jl-Ag '56. (Semenov-Tsian-Shanskii, Petr Petrovich, 1827-1914) (MLRA 9:10) (Cherniavskii, V.I.)

FRADKIN, N.G.

[The road south from the Celestial Mountains] Put' k iugu ot Nebesnykh gor. Moskva, Gos.izd-vo detskoi lit-ry, 1958. 133 p. (MIRA 13:8)
(Asia, Central--Description and travel)

Fradkin N.G

10-58-3-13/29

AUTHORS: Grekov, V.I., Lebedev, D.M., Ye.R. Lopatina, Fradkin, N.G.

TITLE: Memorable Dates From the History of Geographical Science (Pamyatnyye daty iz istorii geograficheskoy nauki)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geograficheskaya, 1958, Nr. 3, pp 84-87 (USSR)

ABSTRACT: With this article the periodical starts to publish biographical sketches of outstanding Soviet and foreign geographers.

AVAILABLE: Library of Congress

Card 1/1

1. Biographies - Geographers 2. Periodicals - USSR

BOGOYAVLENSKIY, G.P.; DUNAYEV, V.N.; NEDOSEKIN, D.V., Prinimaliuchastiye: GALITSKIY, V.A., GRIN, M.F., kand.ekonom.nauk, nauchnyy red.; ZABELIN, I.M., kand.geograf.nauk, nauchnyy red.; SAMSONENKO, L.V., nauchnyy red.; FRAIKIN, M.G., kand.geograf.nauk, nauchnyy red.; MAL'CHEVSKIY, G.N., red.kart; GLEYKH, D.A., tekhn.red.

[The earth and its people; a geographical calendar for 1959] Zemlia i liudi; geograficheskii kalendar', 1959. Moskva, Geografgiz, 1958. 390 p. (MIRA 12:3)

(Geography)

3(5) PHASE I BOOK EXPLOITATION SOV/1781

Akademiya nauk SSSR. Institut geografii.

Voprosy fizicheskoy geografii (Problems in Physical Geography) Moscow, Izd-vo AN SSSR, 1958. 370 p. Errata slip inserted. 1,500 copies printed.

Resp. Ed.: G.D. Rikhter, Doctor of Geographical Sciences, Professor; Ed. of Publishing House: D.N. Tugarinov; Tech. Ed.: N.D. Novichkova.

PURPOSE: This book is intended for meteorologists, hydrologists, pedologists, geologists, and students of physical geography in general.

COVERAGE: These articles are dedicated to Academician A.A. Grigor'yev in commemoration of his seventy-fifth birthday anniversary. They treat problems in physical geography pertaining to the northern regions of the USSR and particularly those of Yakutia. The majority of the articles are devoted to questions of latitudinal and vertical zonation and contain much factual material on the relationship between the various geographic components. Practical conclusions and meteorological principles are cited. Each article is accompanied by maps, photographs and numerous bibliographic references.

Problems in Physical Geography SOV/1781

AVAILABLE: Library of Congress

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Card 1/8

(7)

SOV-10-58-4-13/28

AUTHORS: Grekov, V.I., Kamanin, L.G., Lebedeva, D.M., Lopatina, Ye.R., Fradkin, N.G.

TITLE: Landmarks in the History of Geographical Science (Pamyatnyye daty iz istorii geograficheskoy nauki)

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya geograficheskaya, 1958, Nr 4, pp 87-90 (USSR)

ABSTRACT: This article contains a list of memorable events in the field of geography from 1508 to 1933.

1. Geography---USSR

Card 1/1

FRADKIN, Naum Grigor'yevich; SAMARSKAYA, N., red.; KORNEYEVA, V., tekhn.red.

[Birth of the map; pages from the history of geographical discoveries] Rozhdenie karty; stranitsy iz istorii geograficheskikh otkrytii. Moskva, Izd-vo TsK VLKSM "Molodaia gvardiia," 1959. 159 p. (MIRA 12:8)
(Cartography)

BOGOYAVLENSKIY, G.P.; DUNAYEV, V.N.; NEDOSEKIN, D.V.; DANILOVA, N.A., avtor kart; KEMMERIKH, A.O., avtor kart. Prinimal uchastiye GALITSKIY, V.A.. GRIN, M.F., kand.ekonom.nauk, nauchnyy red.; ZABELIN, I.M., kand.geograf.nauk, nauchnyy red.; SAMSONENKO, L.V., nauchnyy red.; FRADKIN, M.G., kand.geograf.nauk, nauchnyy red.; MAL'CHEVSKIY, G.N., red.kart; BELICHENKO, R.K., mladshiy red.; GLEYKH, D.A., tekhn.red.

[The earth and the people; geographical calendar for 1960] Zemlia i liudi; geograficheskii kalendar' 1960. Moskva, Geografgiz, 1959. 381 p.[___ Seasonal phenomena in U.S.S.R.nature]___Sezonnye iavleniia v prirode SSSR. Sost.N.A.Danilova, A.O.Kemmerikh. 12 maps. (MIRA 13:3)

(Geography--Dictionaries) (Calendars)

SOV/10-59-1-15/32

AUTHORS: Grekov, V.I., Kamanin, L.G., Lebedev, D.M., Fradkin, N.G.

TITLE: Memorable Dates From the History of Geographical Science, Third Review (Pamyatnyye daty iz istorii geograficheskoy nauki - Obzor tretiy)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya geograficheskaya, 1959, Nr 1, pp 106-108 (USSR)

ABSTRACT: This survey covers 10 memorable dates from the 18th and early 19th centuries.

Card 1/1

BOGOYAVLENSKIY, G.P.; NEDOSEKIN, D.V.; MAL'CHEVSKIY, G.N., red.-sostavitel' kart; BELEN'KIY, A.B., kand.istor.nauk, nauchnyy red.; GRIN, M.F., kand.ekonom.nauk, nauchnyy red.; ZABELIN, I.M., kand.geograf.nauk, nauchnyy red.; SAMSONENKO, L.V., nauchnyy red.; FRADKIN, N.G., kand.geograf.nauk, nauchnyy red.; BELICHENKO, R.K., mladshiy red.; VILENSKAYA, E.N., tekhn.red.

[The land and the people; the 1961 geographical calendar] Zemlia i liudi; geograficheskii kalendar' 1961. Moskva, Izd-vo geogr. lit-ry, 1960. 262 p. [___New construction projects, 1959-1965; color map. Appendix to "Zemlia i liudi," the 1961 geographical calendar] ___Novostroiki semiletki, 1959-1965; tsvetnaia karta. Prilozhenie k geograficheskomu kalendariu "Zemlia i liudi" na 1961 g. (MIRA 14:1)

(Geography) (Russia--Industries--Maps)

FRAIKIN, Naum Grigor'yevich; GRIGOR'YEV, A.A., akademik, otv. red.; SINILOVA, M.N., red. izd-va; NOVICHKOVA, N.D., tekhn. red.

[History of research on the physical geography of the U.S.S.R., 1917-1927] Ocherki po istorii fiziko-geograficheskikh issledovanii territorii SSSR, 1917-1927 gg. Moskva, Izd-vo Akad. nauk SSSR, 1961. 245 p. (MIRA 14:5)
(Physical geography)

FRADKIN, Naum Grigor'yevich; PERVAKOV, I.L., red.; CHERNYKH, M.P., mladshiy red.; KOSHELEVA, S.M., tekhn. red.

[From the four corners of the world] S chetyrekh storon gorizonta. Moskva, Geografgiz, 1962. 141 p. (MIRA 15:6)
(Voyages and travels)

BOGOYAVLENSKIY, G.P.; TIKHOMIROV, V.N.; Prinimala uchastiye NEDOSEKINA, D.V.; BELEN'KIY, A.B., kand. istorich. nauk, nauchnyy red.; GRIN, M.F., kand. ekonom. nauk, nauchnyy red.; ZABELIN, I.M., kand. geogr. nauk, nauchnyy red.; SAMSONENKO, L.V., nauchnyy red.; FRADKIN, N.G., kand. geogr. nauk; MAL'CHEVSKIY, G.N., red. kart; BELICHENKO, R.K., mladshiy red.; VILENSKAYA, E.N., tekhn. red.

[Land and people; geographical calendar for 1962]Zemlia i liudi; geograficheskii kalendar' 1962. Moskva, Gos.izd-vo geogr. lit-ry, 1961. 253 p. ___ [Africa, 1951 and 1961; colored maps. Supplement] Afrika 1951 i 1961 gody; tsvetnye karty. Prilozhenie. (MIRA 15:2)

(Geography) (Africa--Maps)

GREKOV, V.I.; FRADKIN, N.G.

Session of a joint meeting of the Departments of Geology, Geography, and Chemistry of the Academy of Sciences of the U.S.S.R. dedicated to the 250th anniversary ov M.V.Lomonosov's birth. Izv. AN SSSR. Ser. geog no.1:160-161 Ja-F '62.
(MIRA 15:2)

(Lomonosov, Mikhail Vasil'evich, 1711 - 1765)

BOGOYAVLENSKIY, G.P.; TIKHOMIROV, V.N.; Prinimali uchastiye: SHISHKIN, I.B.; MAL'CHEVSKIY, G.N.; GALITSKIY, V.A.; BELEN'KIY, A.B., kand. ist. nauk, nauchnyy red.; GRIN, M.F., kand. ekon. nauk, nauchnyy red.; ZABELIN, I.M., kand. geogr. nauk; SAMSONENKO, L.V., nauchnyy red. FRADKIN, N.G., kand. geogr. nauk, nauchnyy red.; BELICHENKO, R.K., mladshiy red.; VILENSKAYA, E.N., tekhn. red.

[The land and people; geographical calendar for 1963]Zemlia i liudi; geograficheskii kalendar' 1963. Moskva, Geografgiz, 1962. 303 p. (MIRA 16:2)

(Geography--Yearbooks)

BOGOYAVLENSKIY, G.P.; SHISHKIN, I.B.; Prinimal uchastiye GALITSKIY, V.A.; MAL'CHEVSKIY, G.N., red.-sostavitel' kart; BELEN'KIY, A.B., kand. ist. nauk, nauchn. red.; GRIN, M.F., kand. ekon. nauk, nauchn. red.; ZABELIN, I.M., kand.geogr. nauk, nauchn. red.; SAMSONENKO, L.V., nauchn. red.; FRADKIN, N.G., kand. geogr. nauk, nauchn. red.; BELICHENKO, R.K., mlad. red.; KIR'YANOVA, Z.V., mlad. red.; VILENSKAYA, E.N., tekhn. red.

[Land and people; geographical calendar for 1964] Zemlia i liudi; geograficheskii kalendar' 1964. Moskva, Gos.izd-vo geogr. lit-ry, 1963. 302 p. (MIRA 17:2)

BOGOYAVLENSKIY, G.P.; SHSHKIN, I.B.; GALITSKIY, V.A.; BELEN'KIY, A.B., kand.ist. nauk, nauchn. red.; GRIN, M.F., kand. ekon. nauk, nauchn. red.; ZABELIN, I.M., kand. geogr. nauk, nauchn. red.; LAPPO, G.M., kand. geogr. nauk, nauchn. red.; SAMSONENKO, L.V., red.; FRADKIN, N.G., kand. geogr. nauk, nauchn. red.; KIR'YANOVA, Z.V., mlad. red.

[The land and the people; Geographical calendar for 1965] Zemlia i liudi; Geograficheskii kalendar' 1965. Moskva, Mysl', 1964. 303 p. (MIRA 18:1)