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MEASUREMENT OF THE INTENSITY OF COSMIC RADIATION
DURING THE FLIGHTS OF AUTOMATIC INTERPLANETARY STATIONS
ZOND-1, ZOND-2, ZOND-3, LUNA-5, LUNA 6

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by G. P. Lyubimov

SUMMARY

This paper gives a brief illustration of the results of measurements obtained with the aid of Geiger counters installed inside the above interplanetary probes, namely describing the variation of cosmic ray intensity and its dependence on solar activity. Comparison is made with the results obtained on spherical probes in the Murmansk region and also with those of the AES Elektron-2, Elektron-4, Kosmos-17, and Kosmos-53 *satellites*.

* * *

Author

The flights of automatic interplanetary stations provide the possibility of conducting measurements of the intensity of primary cosmic radiation at great distances from the Earth. This is important for the study of the low-energy part of cosmic rays, playing an important role in a series of effects.

APPARATUS. On the interplanetary stations of the type "ZOND" an apparatus was installed for the study of cosmic rays in interplanetary space and of the Earth's radiation belts. This apparatus consisted of scintillation and gas-discharge counters. The Geiger counters of the STS-5 type were installed inside the probes. Counters of the type SBM-10 were installed aboard stations LUNA-5 and LUNA-6, also inside the probes.

The results of measurements described in this paper, correspond to those of Geiger counters installed inside the probes. The shielding by the stations' matter constituted $\sim 1 \text{ g}\cdot\text{cm}^{-2}$, in coal $\sim 3 \text{ sterad}$ and from 10 to $100 \text{ g}\cdot\text{cm}^{-2}$ from other sides.

(*) IZMERENIYE INTENSIVNOSTI KOSMICHESKOGO IZLUCHENIYA PRI POLETAKH AVTOMATICHESKIKH MEZHPLANETNYKH STANTSIIY ZOND-1, ZOND-2, ZOND-3, LUNA-5, LUNA-6

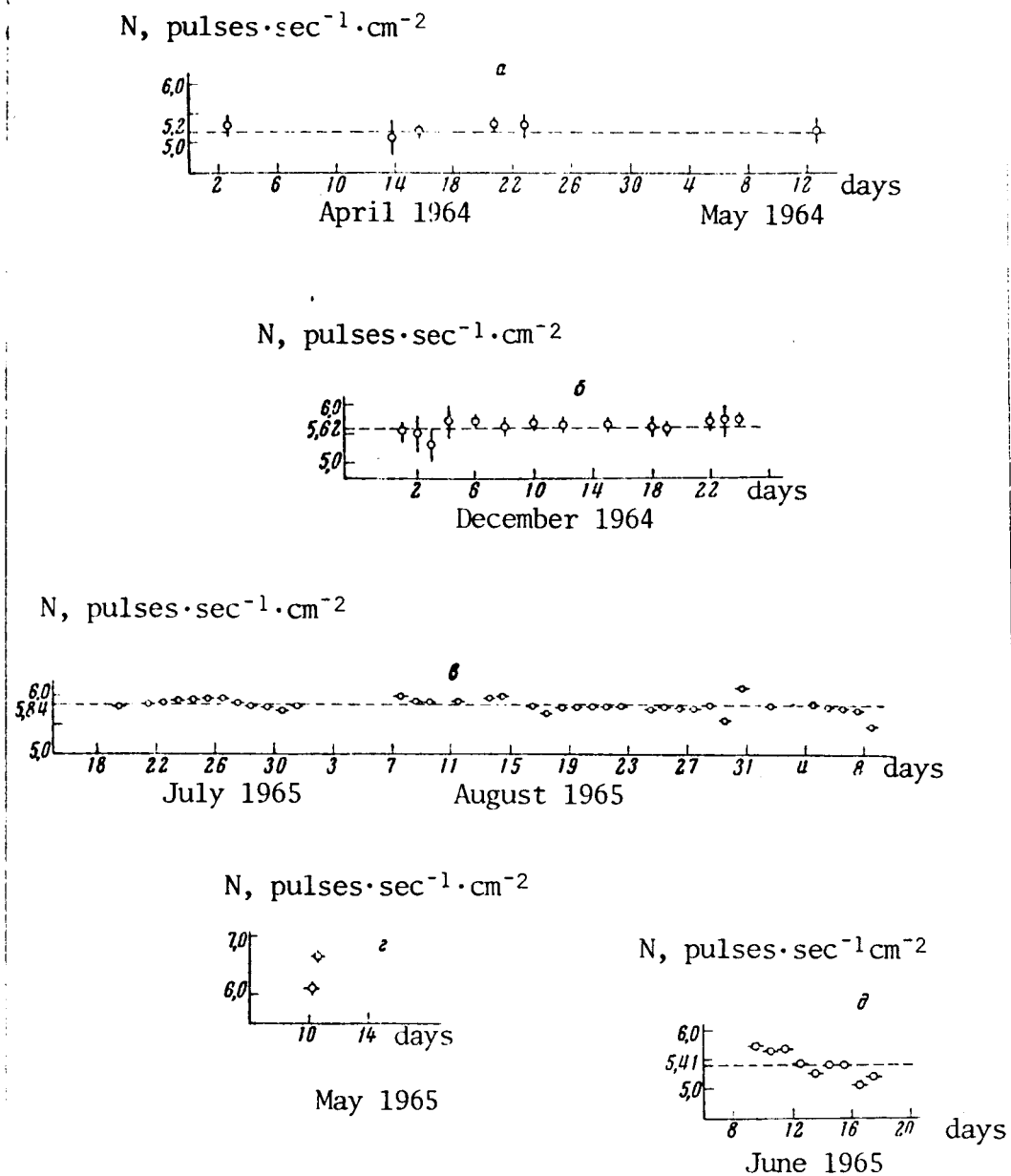


Fig.1 Counting rates of the gas-discharge counter during
the flights of
ZOND-1, ZOND-2, ZOND-3, LUNA-5, LUNA-6

Intensity Variations of Cosmic Rays.

Comparison of the values of intensity measured on interplanetary stations (average daily), plotted in Fig.1 allows us to reveal the variations in cosmic ray intensity analogous to those registered during the flight of LUNA-4 [1]. The maximum deviations from average (dashed line) during measurement time are of $\pm 2\%$ for ZOND-1, $\pm 4\%$ for ZOND-2, $\pm 5\%$ for Zond-3 and $\pm 6\%$ for LUNA-6. These intensity variations are apparently linked with the presence of spatial magnetic inhomogeneities of the near-solar space, and also with the temporal variations of the softest component of solar cosmic rays.

It should be noted that there exist rapid intensity variations within 24 hours, which are not considered in the present work.

Dependence of Cosmic Ray Intensity on the Solar Activity Cycle

Comparison of data on the intensity of cosmic rays measured during the flights of the 1st and 2nd cosmic rockets, of AIS "MARS-" and "LUNA-4" [1] with the data from ZOND-1, ZOND-2, ZOND-3, LUNA-5 and LUNA-6 reveals a further intensity increase. Presented in Fig.2 are the data obtained for the period 1959-1965. For comparison we also plotted the results of measurements of cosmic rays carried out on sounding balloons in the region of Murmansk, according to data of A. N. and T. N. Charakhchyan, and also the results obtained on AES- ELEKTRON-2 and -4 [2], Kosmos-17 [3] and Kosmos-53 [4].

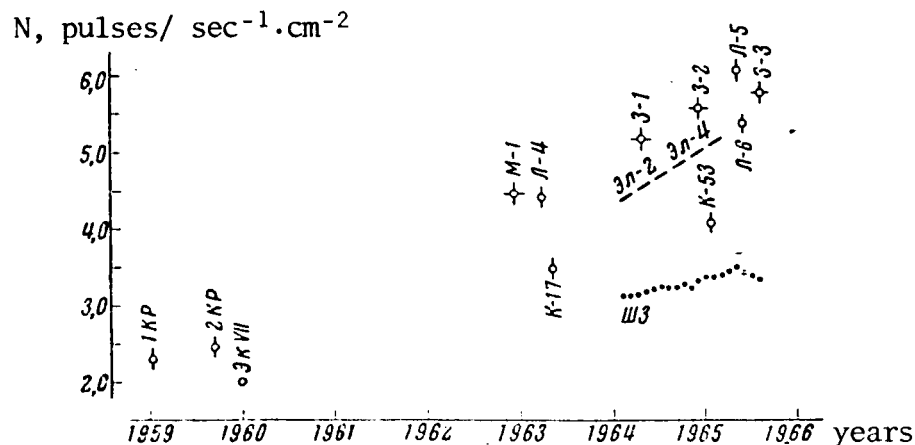


Fig.2. Dependence of average cosmic ray intensity according to the results of flight of various automatic stations for the period from 1959 to 1965

(1KP and 2KP refer to the 1st and 2nd cosmic rockets; M-1 means 'MARS-1'); Л-4, Л-5 and Л-6 refer respectively to LUNA-4, 5, 6; 3-1, 3-2 and 3-3 -- to ZOND-1, ZOND-2, ZOND-3; 3K VII refers to AES Explorer-7; K-17 and K-53 -- respectively to AES KOSMOS-17 and -53; 3n-2 and 3n-4 refer respectively to AES ELEKTRON-2 and ELEKTRON-4; III 3 -- to balloons above Murmansk

A good coincidence can be observed in the course of intensity variations over all the measurements conducted. The differences in the absolute value of intensity between data obtained on automatic interplanetary stations (AIS) on artificial satellites (AES) and on balloons are explained by geophysical factors. An intensity maximum, corresponding to May 1965, can be clearly seen in Fig.2.

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