ON THE EARTH'S DUST ENVELOPE

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ABSTRACT. The data of studying meteoric particles on Elektron-1 and Elektron-3 space vechicles were processed in a new way which made it possible to get the first idea of the Earth's dust envelope structure. Meteoric matter is distributed in it not unformly, but as aggregations of particles moving around the Earth in more or less stable orbits at certain distances from the Earth's surface.

The planets are the gravitation centers. They posess dust envelopes with different densities, structures and length.

To reveal the Earth dust envelope structure one must know the position of the particle in circumterrestrial space at the moment of its recording by the space vehicle.

To get the idea of the structure of the Earth's dust envelope we made an attempt to process once more in a different than early way the data obtained in 1964 from the space vehicles Elektron-1 and Elektron-3 /1/.

Elektron-1 was launched on January 30, 1964. Its orbital parameters were: perigee 406 km, apogee 7,100 km, inclination 61°, revolution period 169 minutes. Elektron-3 was launched on July 11, 1964 (perigee 405 km, apogee 7,040 km, inclination 60.87° and period 168 minutes).

Information from Elektron-1 over the period from January 31, 1964 to March 5, 1964 (6th to 302nd orbit) and from Elektron-3 from July 11, 1964 to August 3, 1964 (1st to 206th orbit) was processed once again in a different way.

Within these periods meteoric particles were recorded by Elektron-1 in 33 orbits during 41 two-minute information accumulation cycles and by Elektron-3 in eight orbits during eight cycles.

All cycles, during which the recording of the im-

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pacts of meteoric particles took place, were put to their positions in the orbit and plotted on the graph (Fig.1)

As evident, the greater part of them was grouped at definite distances from the Earth which were close to some of the distances predicted for search by Dr.Yu.K. Gulak on the basis of his theory of the distribution of solid interplanetary matter in space and near gravitational centres /2/.

It should be noted that of eight cycles during which meteoric particles were recorded from Elektron-3 which operated about four months after Elektron-1 seven cycles fell on the same distances from the Earth as during the experiment from Elektron-1.

Meteoric particles at the same distances from the Earth were recorded on the ascending or descending parts of the orbits which followed each other in a row or with intervals.

This picture can take place if meteoric particles move around the Earth in more or less stable orbits lying at certain distances from its centre. In this case meteoric particles are the Earth's satellites and form its dust envelope.

The character of the recordings gives grounds to believe that meteoric matter along its orbits is distributed not uniformly, but as individual moving aggregations. The orbits of the particles cross each other when the particles are recorded at the same distances from the Earth on the ascending and descending parts of the satellite's orbit.

To verify the conclusions we made on the basis of the experiments from Elektron-1 and Elektron-3 we used the published data of the meteoric experiment by Dr. H. Fechting, Dr. E.Grün, and Dr. G.Morfill from the HEOS-2 satellite /3/. This experiment yielded a great amount of information. The data on the mass, the impact velocity and the direction of the movement of meteoric particles in near-Earth space were obtained. Many particles had the low impact velocity.

We made an attempt to process the HEOS-2 data in a way similar to the processing of the data obtained from Elektron-1 and Elektron-3.

In the orbit of HEOS-2 the position of all recorded particles were marked. The authors of the experiment classified the registered particles according to time profile under three categories - groups, swarms and random particles.

Fig.2 shows one distances from the Earth of all particles recorded in the perigee area from about 10,000 km to 60,000 km.

The graph clearly shows the regularity in the position of particle registration sites. A considerable amo-

unt of them lies at the same distances from the Earth within about 250 km, including the particles recorded on the ascending and descending parts of HEOS-2 orbits and and for the particles moving from different directions.

The characteristics of the meteoric particles, obtained from the experiment, and the specific features of their distribution in near-Earth space show that most of them are Earth satellites and move around it in more or less stable orbits lying at definite distances from its surface.

The character of the distribution of meteoric particles - Earth satellites - is similar to the distribution observed from Elektron-1 and Elektron-3: the particles at the same distances from the Earth were observed from HEOS-2 irregularly. The time intervals between them had different durations, which indicate their not uniform distribution along their orbits.

Thus, the results of the meteoric experiments from Elektron-1, Elektron-3 and HEOS-2 are in agreement. They indicate the presence of the Earth's dust envelope of the above-mentioned structure.

CONCLUSIONS

The processing of the data on meteoric particles from Elektron-1 and Elektron-3 by a different method made it possible to get the first qualitative idea of the structure of the Earth's dust envelope.

Meteoric matter is distributed in the Earth's dust envelope not uniformly, but as individual aggregations, which move around the Earth in more or less stable orbits lying at certain distances from the Earth's surface and which have different angles of the inclination to the plane of its equator.

The data of the meteoric experiment by Dr. H.Fechtig, Dr. E.Grün, and Dr. G.Morfill from the HEOS-2 satellite which were processed by us in a way similar to the meteoric experiments from Elektron-1 and Elektron-3 have proved to be in agreement with each other.

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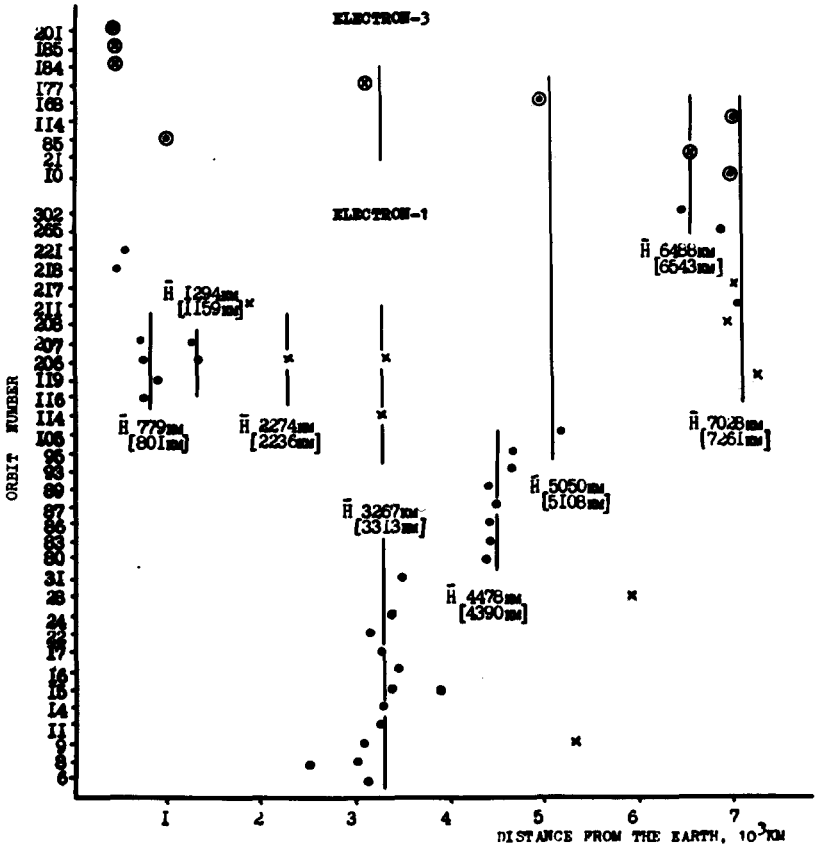

Fig.1 The distances of information accumulation cycles from the Earth's surface during which impacts of meteoric particles were recorded.
• -ascending part of the cicuit of Elektron-1;
X -descending part of the circuit of Elektron-1;
⊙ -ascending part of the circuit of Elektron-3;
⊗ -descending part of the circuit of Elektron-3;
[...km]-distance of the meteoric particles aggregation predicted for search by Yu.K.Gulak.

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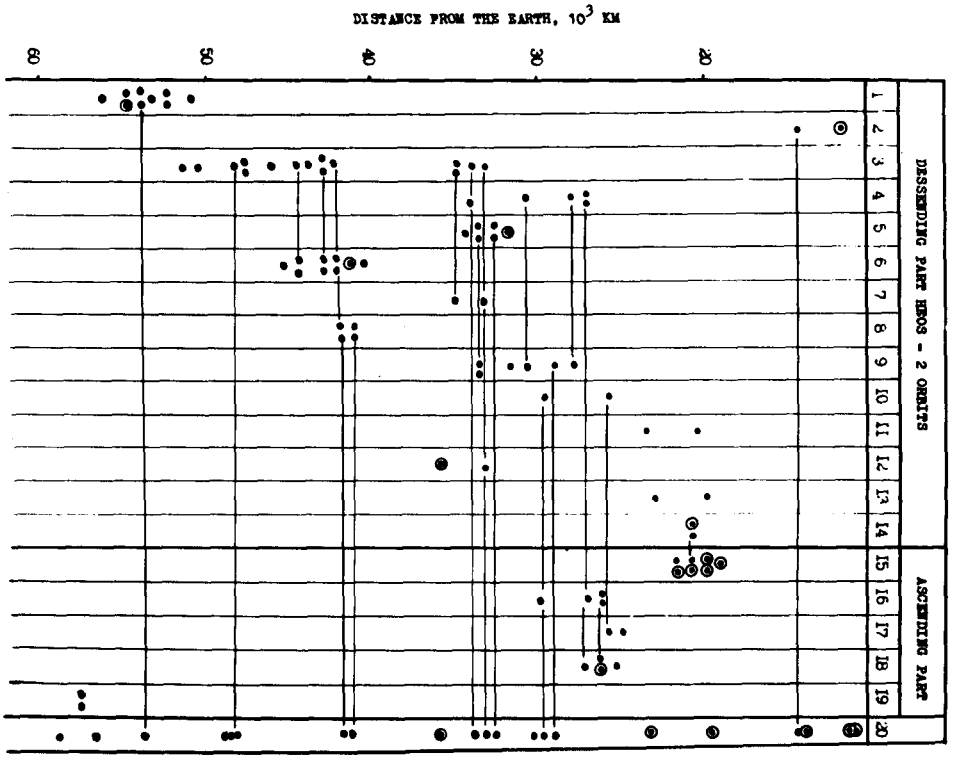

Fig.2 The distances from the Earth of all particles recorded in the perigee area from 10,000 km to 60,000 km. Groups: 2,10-13: swarms:1,3-9, 14-19, random particles-20. The particles whose impact velocities are large for being regarded as Earth satellites are marked by the sign .

Discussion.
Dr. Kessler' question:
Is it possible that Elektron-1 and Elektron-3 detected the needles from "Ford Space Needle" experiments performed several time in the early 1960's?

Dr. Fechtig' remark:
There is a possibility that HEOS-2 detector registrated the particles of solid rocket motors near the Earth ($< 10R_{earth}$)

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Author' answer.
It can not be asserted that a single needle ("Ford Space Needle Experiments) and the particle of solid rocket motors could not be registered by Elektron-1, Elektron-3 and HEOS-2 meteoric detectors, though this possibility is small.
But if meteoric detectors of those satellites would register on essential quantity of man-made debris, their spatial location is not ordered.
Calculation has shown that millions of years and sufficient value of space density of man-made debris are necessary for formation of debris structure in space.
It seems to us that swarms registered by HEOS-2 are the structural elements of the Earth dust envelope.
They were registered not only at distances less than 60,000 km, but also at distances about 200000 km from the Earth.

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