GROUPS OF METEORITE-PRODUCING SPORADIC FIREBALLS ON COMETARY ORBITS. N. A. Konovalova[1], N.H. Davruqov[1]. [1]Institute of Astrophysics of the Academy of Sciences of the Republic of Tajikistan, Bukhoro, str. 22, Dushanbe 734042, Tajikistan, nakonovalova@mail.ru,

Introduction: The detailed study of bright meteorite-producing fireball events is important in the field of research of small bodies of the Solar system. Meteorite-producing sporadic fireballs are produced by large meteoroids which are capable, under the suitable geometric and physical conditions, of producing meteorites. The meteorites can help us to understand the solar system genesis and the processes that occurred after the formation of small bodies of solar system. Meteorite and fireball instrumentally observations provide useful data for a study a link between meteoroids, meteorites and their parent bodies. We present here the analysis of groups of linked slow moving sporadic fireballs and known meteorites, observed in the past. The main argument for the existence of groups of meteorite-producing fireballs is the existence of "clusters" of fireballs with mutually similar orbits and of meteorite falls with correlated days-of-fall.

Meteorite-producing groups on cometary orbits containing ordinary chondrite meteorites.. The possibility of existence of groups of related meteorite-producing fireballs which include six known ordinary chondrite meteorites and whose pre-atmospheric orbits would indicate that there is a group of meteoroids in very similar Earth-crossing orbits have been analyzed. The search of meteorite-dropping fireballs in the IAU MDC database [1] has been made. The well-known D_{SH} – criterion of Southworth & Hawkins [2], D_{Dr} – criterion of Drummond [3] and D_N – criterion [4] have been used to compare the similarity of each specified meteorite and fireball orbits. The threshold value Dc = 0.2 for D_{SH}, D_N – similarity functions and the threshold value Dc = 0.105 for D_{Dr} –similarity function was selected, which should reduce the number of chance coincidences from the compiled set of fireballs.

The main parameters of the atmospheric trajectory and orbital data of the studied meteorites and mean data of groups of meteorite-dropping fireballs are listed in Table 1: name; year, month, day; geocentric radiant, V_∞, velocity; a, semi-major axis; e, eccentricity, I; inclination; ω, argument of perihelion; Ω, the longitude of the ascending node. The final three columns list the value of D_{SH}, D_{Dr} and D_N similarity criterions. The orbital elements of the meteoroid confirmed the sporadic nature and cometary origin ($T_j \le 3.1$) of these events.

Table 1. Groups of six known meteorites and meteorite-dropping bolides with similar orbits of type JFCs (2000.0)

Name	Y	M	D	α_R (°)	δ_R (°)	V_∞ km/s	q a.u.	a a.u.	e	i (°)	ω (°)	Ω (°)	D_{dr}	D_{sh}	D_N
MEAN	-	04	03	184.4	-4.5	19.8	0.795	2.495	0.664	3.8	58.3	205.9	0.00	0.00	0.00
Pribram	1959	04	07	192.3	17.5	20.9	0.790	2.401	0.671	10.5	241.8	17.8	0.05	0.15	0.15
MEAN	-	05	01	224.0	40.6	19.3	0.948	2.360	0.588	20.4	211.6	53.4	0.00	0.00	0.00
Benesov (b)	1991	05	07	227.0	39.8	21.1	0.925	2.428	0.619	23.7	218.5	46.3	0.04	0.08	0.08
MEAN	-	04	03	183.6	-6.9	19.9	0.798	2.430	0.665	4.5	21.0	240.2	0.00	0.00	0.00
Neuschwanstein	2000	04	06	190.6	22.0	21.0	0.793	2.401	0.671	11.4	16.8	241.8	0.04	0.13	0.10
MEAN	-	03	29	173.6	10.8	19.3	0.830	2.486	0.663	5.1	233.6	16.5	0.00	0.00	0.00
Park Forest	2000	03	27	171.8	11.2	19.5	0.810	2.530	0.680	3.2	237.5	6.1	0.03	0.09	0.09
MEAN	-	03	27	151.9	10.9	16.8	0.905	2.455	0.624	5.3	41.1	176.8	0.00	0.00	0.00
Mason Gully	2010	04	13	148.4	9.0	14.6	0.982	2.556	0.616	0.9	19.0	203.2	0.05	0.12	0.10
MEAN	-	02	22	113.0	23.1	17.0	0.884	2.564	0.652	3.4	219.9	327.3	0.00	0.00	0.00
Kosice	2010	02	28	114.3	29.0	15.0	0.957	2.710	0.647	2.0	204.2	340.1	0.05	0.09	0.06

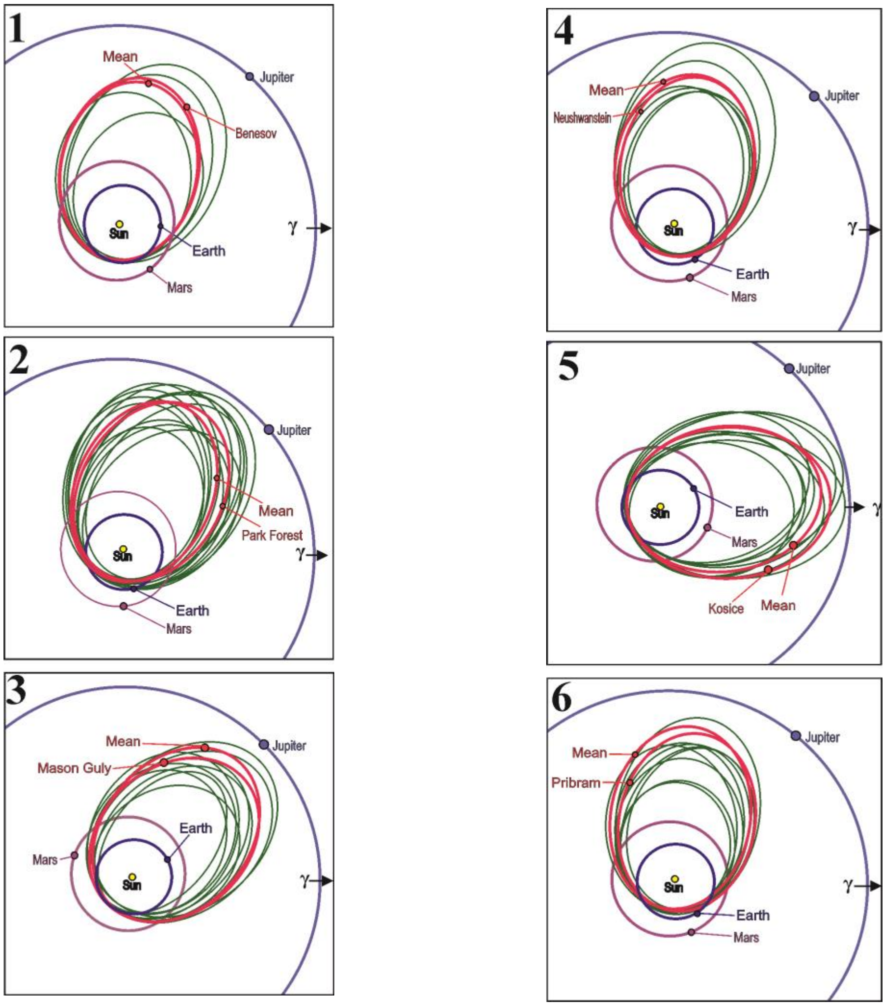

Figure 1. Orbits of known six meteorites and mean orbits of meteorite-producing fireballs.

Summary and Conclusions: The calculated radiant and orbital data confirm the sporadic nature of event and the likely asteroidal origin of meteoroids. The de rived value of the aerodynamic pressure at the heights of maximal brightness and terminal flare used to estimate the bulk density of the meteoroid by using the graphical fit of the meteoroid bulk density versus the compressive strength in [5]. As result a value of the meteoroid bulk density about 1070 - 1250 kg m^{-3} is obtained and suggests the carbonaceous composition of the studied meteorite-dropping fireballs in these groups. Group associations were determined for six ordinary chondrites and several potential meteorite-dropping bolides on the base of links of their orbits. The identified groups may still contain large meteorite-dropping bodies. In practical terms, this can serve as an incentive for purposeful monitoring of the indicated groups of the meteorite-dropping fireballs during the perods of increased fireball activity.

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