Orionids and Eta Akvarids in the IAU MDC Database

J. Svoren, Z. Kanuchova
Astronomical Institute of the Slovak Academy of Sciences, SK-059 60 Tatranska Lomnica, Slovak Republic
(astrsven@ta3.sk, zkanuch@ta3.sk)

Introduction

The method of indices [1] was used to study the meteoroid stream of the periodic comet 1P/Halley. The procedure based only on mathematical statistics was applied to select the Orionid and Eta Aquarids meteor records from the IAU Meteor Data Center Database. There were selected 63 Orionids and 14 Eta Aquarids from IAU MDC Database [2].

Selection of orbits

Using the method of indices we were searching for associations of meteoroid orbits (i.e. at least 3 meteors at similar orbits) in the datasets. The method is based on a comparison of meteoroid orbits on the basis of their "indices" - set accordingly to the values of 5 orbital elements (perihelion distance q, eccentricity e, argument of perihelion ω, longitude of ascending node Ω, inclination i) and 3 geocentric parameters (right ascension α and declination δ of radiant, and geocentric velocity v_g) of individual meteoroids.
Here we present the analysis of both 63 orbits of Orionids and 14 orbits of Eta Aquarids selected from the IAU MDC database, and provide a global view of the meteoroid stream of the periodic comet 1P/Halley. The mean orbits of selected Orionids and Eta Aquarids together with the orbit of their parent comet 1P/Halley are in Table 1.

Table 1 The mean orbit of selected Orionids and Eta Aquarids and the orbit of 1P/Halley (in the same precision as mean orbits of the meteoroids, although the cometary orbit is known with higher precision [3].

	q	e	ω	Ω	i
Orionids	0.579 ±0.046	0.972 ±0,075	81.4 ±6,2	28.3 ±4,3	163.5 ±1,7
Eta Aquarids	0.569 ±0.013	0.935 ±0.028	95.6 ±2.2	44.6 ±0.7	163.7 ±0.7
1P Halley	0.587	0.967	111.9	58.9	162.2

Orionids associations

We found 7 filaments of the Orionids formed by 54 meteor orbits (what is 86% of 63) and 2 pairs. Mean values of selected filaments are plotted in Fig. 1, 2 and 3.

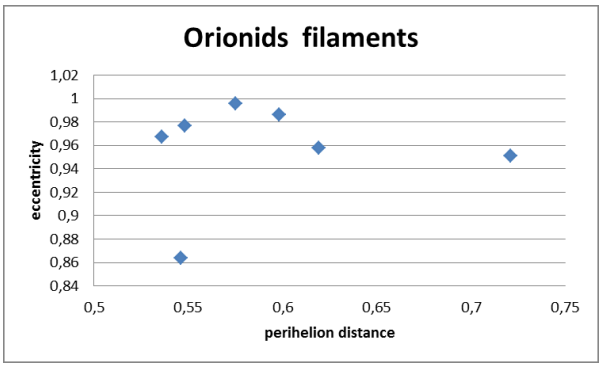

Fig 1 Orionids filaments – eccentricity versus perihelion distance

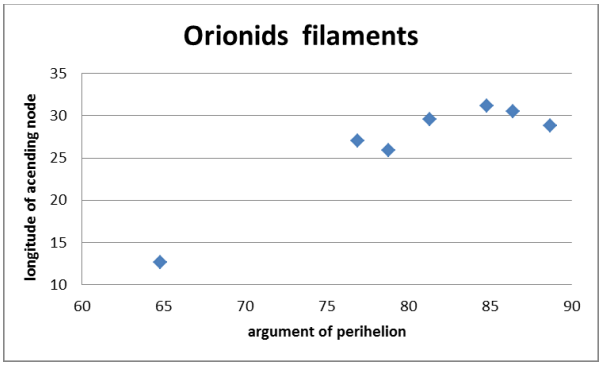

Fig 2 Orionids filaments – longitude of ascending node versus argument of perihelion

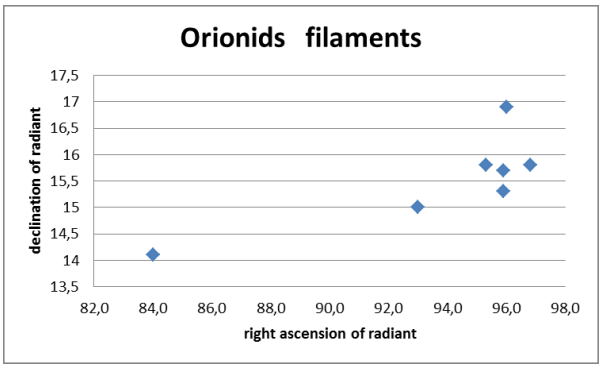

Fig 3 Orionids filaments – declination versus right ascension of radiant

References

[1] Svoreň, J., Neslušan, L., Porubčan, V., Planet. Space Sci., Vol. 48, pp. 933-937, 2000.
[2] Kaňuchová, Z., Svoreň, J., Contrib. Astron. Obs. Skalnaté Pleso, Vol. 43, 135-141, 2013.
[3] Marsden, B.G.., Williams, G..V., Catalogue of Cometary Orbits 1997, IAU CBAT MPC, Cambridge, 1997.