The Sigma-Capricornids fireball shower

G. Kokhirova[1], P. Babadzhanov[1], and U. Khamroev[1]

[1]Institute of astrophysics of the Academy of Sciences of the Republic of Tajikistan

During 2010–2011 three fireballs belonging to the σ-Capricornids (00179 SCA) meteor shower were photographed by the Tajikistan fireball network. As a result of astrometric and photometric reductions of the obtained images, the atmospheric trajectories, radiants, velocities, orbits, and lightcurves of the fireballs, as well as the photometric masses of meteoroids produced these fireballs were determined. Taking into account the observations of six fireballs of this shower by the Prairie network (USA) (McCrosky et al. 1978) and the MORP (Canada) (Halliday et al. 1996), the period of the σ-Capricornids activity 5-24 July was determined as well as, the mean daily radiant drift was found to be $\Delta\alpha$=0.6° for the right ascension and $\Delta\delta$=0.3° for the declination. The coordinates of mean radiant are equal to α=300.4° and δ=-12.4° at the Solar longitude L=115.6°, which corresponds to 18 July.

Further to the empirical PE criterion (Ceplecha, McCrosky 1976), the mean value of bulk density of the majority of fireball producing meteoroids is 0.4 g cm^{-3} that corresponds to bodies of cometary nature. This is supported also by the lightcurves of the fireballs detected in Tajikistan as well as by the fireballs' height scales that are typical for the cometary meteoroids. Two PN fireballs were classified as I and II types, and were produced, probably, by a stone meteoroid and carbonaceous chondrite, respectively. As a rule, the meteoroids of these types have an asteroidal origin. Since the cometary source of the σ-Capricornids fireballs does not cause doubts, the presence of all types among them suggests a non-homogeneous compound of the comet-progenitor of the σ-Capricornids shower.

References: McCrosky, R. E., Shao, S.-Y., Posen, A., 1978, Meteoritika, v. 37, p. 44–59; Halliday, I., Griffin, A.A., Blackwell, A.T., 1996, Meteoritics and Planetary Sci., v. 31, p. 185–217; Ceplecha, Z., McCrosky, R.E.J., 1976, J. Geophys. Res., 81, 6257–6275.