

**ON THE ANNUAL OCCURRENCE OF LARGE AND SMALL SPORADIC METEORIODS AND METEORITES.** N. A. Konovalova<sup>1</sup>, Yu. M. Gorbanev<sup>2</sup> and N. Kh. Davrugov<sup>1</sup>. <sup>1</sup>Institute of Astrophysics of the Academy of Sciences of the Republic of Tajikistan, nakonovalova@mail.ru, <sup>2</sup>Astronomical Observatory of Odessa National University, Ukraine, skydust@ukr.net.

**Introduction:** The observations of the meteors and bright fireballs by meteor stations and fireball networks allows to get the more precise data on atmospheric trajectories and heliocentric orbits of this bodies. In recent years, several works were published on the subjects of the annual occurrence of fireballs. On the base of the Millman Fireball Archive the time of occurrence data for 2373 fireball events observed from across Canada was studied Beech [1]. An analysis of the frequency of the superfireballs based on the reports which appeared in newspapers in the last 150 years was made in [2]. Shrbeny et al. [3] studied the fireball activity from the Desert Fireball Network records from 2006 to 2014 and identified several time periods with increased number of fireballs. We present here the results of the analysis of annual occurrence of large and small sporadic meteoroids and meteorites with known fall data.

**Databases of sporadic fireballs, small meteors and meteorites:** Our research is based on several sources. On the base of about several hundred very bright sporadic fireballs (brighter than magnitude of -5) which were selected from the international meteor database IAU MDC [4] and sources published in the past years, including scholarly journals and international conference publications we was compiled the dataset. Dataset of 1416 small meteors (magnitude of -2.5 – -4.5) was compiled from SonataCo database [5]. Time of event information is available for 338 of the meteorites contained in the Meteoritical Bulletin Database [6] and were include in dataset for analysis of the activity of sporadic fireballs, small meteors and meteorites with known fall data throughout the year.

**Annual sporadic fireball and meteor activity:** In this work we analyze the frequency occurrence of sporadic fireballs, meteors and meteorites with the aim on investigating the annual activity profile of this events. For the examined fireballs, meteors and meteorites with complete time records the UT time, day, month and year information have been used to determine a corresponding solar longitude (epoch 2000), and the resultant data set has been binned in ten-degree increments. To identify the periods of annual occurrence of sporadic fireballs, meteors and meteorites with the known fall dates, the distribution of the cumulative number of examined bodies versus solar longitude corresponding has been constructed and analyzed. The resulting data distribution is shown in Figures 1, 2. Indeed, several distinct peaks in activity are delineated and is evident

at around a solar longitudes of  $\lambda=30^\circ$ ,  $60^\circ$ ,  $140^\circ$ ,  $210^\circ$ ,  $270^\circ$ ,  $300^\circ$  and  $330^\circ$ .

**Conclusions:** The resulting profile of the annual activity of examined fireballs, small meteors and meteorites with known fall data shows five major and two minor periods of increased activity of sporadic bright fireballs, small meteors and meteorites through the year. The result obtained on the presence of peaks of activity during the year of bright fireballs, meteors and meteorites examined in this work suggests the search for groups of examined bodies with close heliocentric orbits using cluster analysis methods.

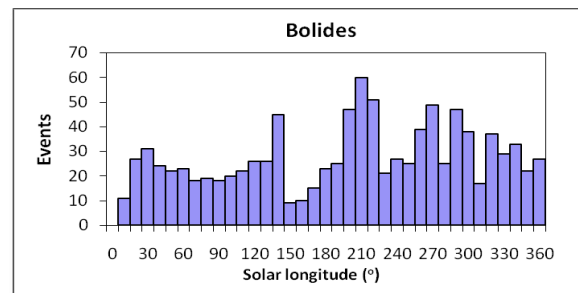


Figure 1. Histogram of annual occurrence of sporadic fireballs and meteorites with known fall dates with 10-day bins.

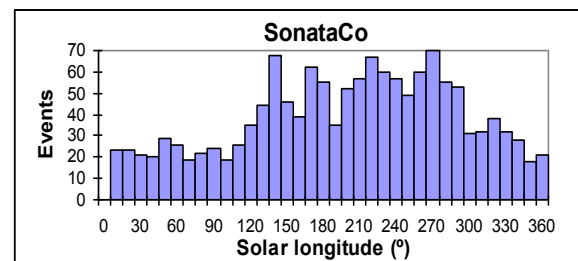


Figure 2. Histogram of annual occurrence of small meteors with 10-day bins from SonataCo.

#### References:

- [1] Beech M. (2006) WGN, the Journal of IMO, 34, 104-110. [2] Zamora S. et al. (2015) Proceedings of the IMC, Mistelbach, Austria, 2015, 187. [3] Shrbeny L. et al. (2016) Proceedings of the IMC, Egmond, 2016, 275.
- [4] <https://www.ta3.sk/IAUC22DB/MDC2007/index.php>
- [5] <http://sonataco.jp/doc/SNM>
- [6] <http://www.lpi.usra.edu/meteor/metbull.php>