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Analysis of 430322 lunar occultations

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Abstract

© SGEM2017 All Rights Reserved. In the present work for the first time in the world practice 430322 occultations of stars by the Moon are analyzed. The relevance of the work is that the accuracy analysis of stars' proper motion in modern star catalogues can only be conducted using either observations of small planets or occultations, since only those observations are long-term and homogenous in time. When making the occultation database a comparative analysis has been used to study types and accuracy of occultation. For photoelectric observations were increased weights in this analysis, but only marginally, because the considerable contribution to the errors there are from the catalogue positions of the stars and the corrections for the outline of the Moon. The Russian occultations database has been independently analyzed. The photoelectric occultations database has been analyzed as well. In particular, there is a database of observations of occultations including 225121 objects taken from 1943 to 1980 in Greenwich observatory. But that database does not contain observations of occultations taken in Russia. The number of those observations is 7698. We adjusted this lack. We also keep constructing the full database of occultations using the Internet, printed editions, and data provided by the scientists of National Astronomical Observatory of Japan (NAOJ). As a result, the number of occultation observations was increased to 430322. Approximately 94.3% of those observations are taken by the visual method using telescope of comparatively small aperture. Around 11 % of them were taken by professional astronomers, the rest – by amateurs. About 5.7 % of all the observations are taken by photoelectric method, which implies recording an occultation with an accuracy of 0.001 sec. In conclusion it should be noted that the occultations database is going to be used for studying modern space catalogues, such as Hipparcos, UCAC 4, “Gaia” space mission etc.

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Keywords

Lunar occultation, Selenodesy, Space astrometry, Star catalogues

References

- [1] Appleby G.M., Morrison L.V., White M.T., Catalogue of observations of total occultations of stars by the Moon for the years 1972 to 1980 and of grazing occultations for the years 1963 to 1980, Roy Greenwich Obs. Bull, vol. 192, pp 1-12, 1984.
- [2] Morrison L.V, Catalogue of observations of occultations of stars by the Moon 1943-1971, Roy Greenwich Obs. Bull, vol. 183, pp 1-14, 1978.

- [3] Morrison L.V., An analysis of lunar occultations in the years 1943-1974 for corrections to the constants in Brown's theory, the right ascension system of the FK4, and Watts' lunar - profile datum, Monthly Notices, vol. 187, pp 41-82, 1979.
- [4] Soma M., Analysis of lunar occultations in the years 1955-1980 using the new lunar ephemeris ELP2000, Celestial Mechanics, vol. 45/issue 88, pp 45-88, 1985.
- [5] Nefedyev Y., Valeev S., Mikeev R., Varaksina N., Andreev A., Analysis of data of "CLEMENTINE" and "KAGUYA" missions and "ULCN" and "KSC-1162" catalogues, Advances in Space Research, vol. 50, pp 1564-1569, 2012.
- [6] Batrakov Yu.V., Chernetenko Yu.A., Gorel G.K., Gudkova L.A., Hipparcos catalogue orientation as obtained from observations of minor planets, Astronomy&Astrophysics, vol. 352, pp 703-711, 1999.
- [7] Nefed'ev Yu. A., Rakhimov L.I., Rizvanov N.G., Shaimukhametov R.R., Graphical method for estimating the accuracy of astrometric catalogs, Kinematics and Physics of Celestial Bodies, vol. 22/issue 3, pp 167-172, 2006.