

NEW VARIABLE STARS IN THE FIELD OF 66 OPH ON DIGITIZED MOSCOW PLATES

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ABSTRACT. Regular photographic observations at the Moscow Observatory began in 1895. The archive of direct and spectroscopic sky photographs kept at the Sternberg Astronomical Institute (SAI) currently contains more than 60000 photographs. The most important part of the Moscow plate stacks are about 22500 direct sky photographs acquired in 1948–1996 with a 40-cm astrograph, at different sites in Crimea and near Moscow (currently in Nauchny, Crimea). The size of its plates is 30×30 cm, corresponding to a $10^\circ \times 10^\circ$ sky field. The limiting magnitude is 17.5^m for good-quality plates.

Keywords: Variable stars, large surveys, discovery

To keep a large plate collection and to distribute information from it is a rather difficult task. After the transition to modern CCD imaging techniques, sufficiently effective algorithms of extracting data and analyzing information from panoramic sky images were developed, applicable, in a somewhat modified form, to old photographic images provided that they are digitized, also guaranteeing safe archive keeping and simple data transfer. Many observatories of the world have started projects on digitizing their plate stacks.

We began digitizing the Moscow collection of astronomical photographs in 2004 using two Creo EverSmart Supreme II scanners. The mode currently used for scanning provides a resolution of 2540 dpi (dots per inch).

The difference of our scanning program from those of other observatories is that, parallel to the process of scanning, we are developing and applying techniques of search for variable stars on a large scale.

The first area to be completely digitized in our program was the field centered at 66 Oph. This

star ($18^{\text{h}}00.3^{\text{m}}$, $+4^\circ 22'$, J2000.0) was the center of 254 plates taken in 1976–1995.

In this field, we discovered and studied 480 new variable stars, suspected brightness variations for more than 50 stars, and significantly improved information for 43 known variables. The statistics of our new discoveries shows a large number of new high-amplitude δ Scuti (HADS) stars in our sample: there are 11 of them in a field covering only 0.24% of the whole sky, while the General Catalogue of Variable Stars (GCVS) currently contains 121 stars of this type. The period distribution of eclipsing variables in our sample is considerably shifted towards short periods compared to the GCVS.

Hundreds of new variables found in a well-studied sky region demonstrate that archive photographs possess a large information potential, not realized till now, and that our techniques of semi-automated search for variables using digitized plates is rather efficient.

Our preliminary results for the northern half of the field were published in Kolesnikova et al. (2008). The complete version of this paper will be published in Astronomy Reports.

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References

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