

Proc. IV Serbian-Bulgarian Astronomical Conference,  
Belgrade 21–24 April 2004,  
eds. M. S. Dimitrijević, V. Golev, L. Č. Popović, M. Tsvetkov,  
Publ. Astron. Soc. "Rudjer Bošković" No 5, 2005, 295 - 301

*Contributed paper*

## KONKOLY WIDE-FIELD PLATE ARCHIVE

M. TSVETKOV<sup>1</sup>, L. G. BALÁZS<sup>2</sup>, A. FRONTÓ<sup>2</sup>, J. KELEMEN<sup>2</sup>, A. HOLL<sup>2</sup>,  
K. Y. STAVREV<sup>1</sup>, K. TSVETKOVA<sup>1</sup>, A. BORISOVA<sup>1</sup>, D. KALAGLARSKY<sup>3</sup> and  
R. BOGDANOVSKI<sup>3</sup>

<sup>1</sup>*Institute of Astronomy, Bulgarian Academy of Sciences,  
72 Tsarigradsko Shosse Blvd., 1784 Sofia, Bulgaria  
E-mail tsvetkov@skyarchive.org*

<sup>2</sup>*Konkoly Observatory, Hungarian Academy of Sciences,  
Konkoly Thege M. ut 15-17, 1121 Budapest, Hungary  
E-mail balazs@konkoly.hu*

<sup>3</sup>*Space Research Institute, Bulgarian Academy of Sciences,  
6 Moskovska str., 1000 Sofia, Bulgaria  
E-mail damyan@skyarchive.org*

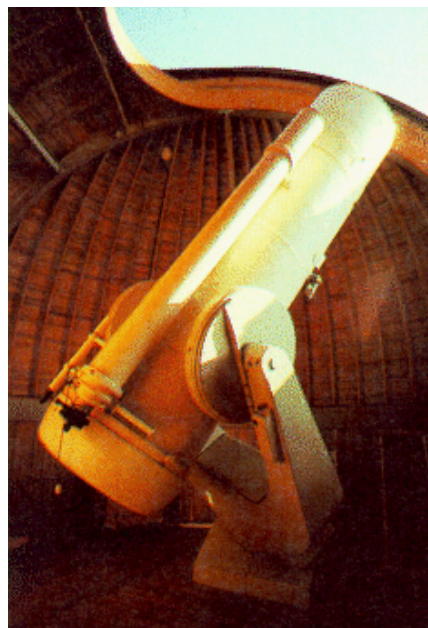
**Abstract.** The wide-field photographic observations in Konkoly Observatory were performed in the period 1962 – 1997 with the 60/90/180 cm Schmidt telescope in Piszkestető Mountain Station. The archive of the telescope contains more than 13 000 observations described in the Konkoly plate catalogue. After the preparation of an enlarged version of the catalogue it has been incorporated in the Wide-Field Plate Database installed in the Sofia Sky Archive Data Center with a possible on-line search at <http://www.skyarchive.org/search/>. Results from the analysis of the catalogue data characterizing the observational activity at Konkoly in the period 1962 – 1997 are presented.

### 1. THE KONKOLY SCHMIDT TELESCOPE

The main instrument for wide-field observations of Konkoly Observatory of the Hungarian Academy of Sciences is the 60/90/180 cm Schmidt telescope, manufactured by Carl Zeiss Jena and put in operation in 1962. The telescope (Fig. 1) is located in the Piszkestető Mountain Station of the Konkoly Observatory at about 120 km North-East of Budapest, in the Matra Mountains (coordinates:  $\lambda = 19^{\circ}53'.7$  E,  $\phi = +47^{\circ}55'.1$ ) at 958 m altitude.

The main characteristics of the telescope are: clear aperture - 0.60 m, mirror diameter - 0.90 m, focal length - 1.80 m, scale - 115"/mm, and field size - 5° (circular field with diameter 15 cm).

Up to the beginning of 1997 the telescope was used with photographic plates for direct observations or with 2° and 5° objective prisms. The following Kodak emulsions were used: 103aO, IIaO, OAO, 103aJ, IIIaJ, 103aG, 103aD, IIaD, OAD, 103aF, IIIaF,



**Figure 1:** The 60/90/180 cm Schmidt telescope of Konkoly Observatory.

103aE, I-N and 09802, as well as some ORWO (ZP, ZU, RP, RO, ASTRO), AGFA, and Perutz emulsions. Standard *RGU* and Johnson (*UBVRI*) photographic filters were at disposal: UG1, UG2, BG12, GG5, GG13, GG14, RG1 and RG5.

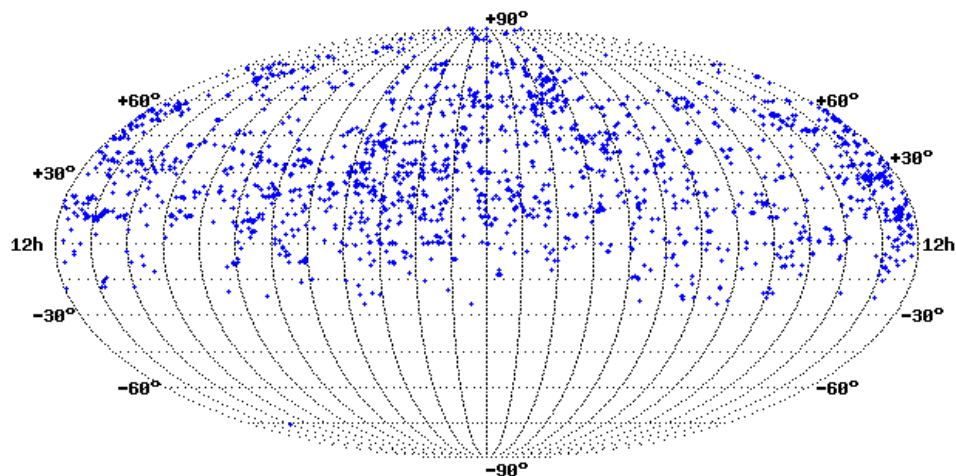
Since 1996 the main light detector is a Photometrics liquid cooled CCD camera with a Kodak KAF1600 1534×1024 chip.

## 2. THE PLATE ARCHIVE

The plate archive was accumulated in the period 1962 – 1997. It comprises about 12 300 direct and about 800 objective prism plates. Usually plates with size of 16×16 cm were used. The limiting magnitude reached is about 19<sup>m</sup> (B). The astronomer in charge for the archive is L. G. Balázs (balazs@konkoly.hu). The plate archive is stored in the main building of the Konkoly Observatory.

The original plate catalogue made by the observatory team contains the following information: running plate number, equatorial coordinates of plate centre, emulsion type and hypersensibilization, objective prism, filter, observation date and time (usually UT), exposure duration, code for the observer, comments for quality and availability, object or field name, and method of observation.

The original plate catalogue was reduced to the format required by the WFPDB by the Sofia Sky Archive Data Center team. The description of the WFPDB format can be found through the Vizier catalogue browser in CDS – Strasbourg at <http://vizier.u-strasbg.fr/cats/VI.htx> – catalogue number VI/90.



**Figure 2:** All-sky distribution of the Konkoly Schmidt telescope observations.

### 3. ANALYSIS OF THE KONKOLY PLATE CATALOGUE

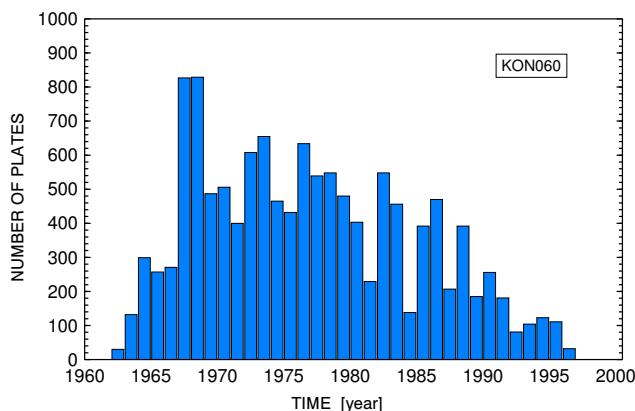
The analysis of the Konkoly plate catalogue is based on data retrieval from the Wide-Field Plate Database (WFPDB, <http://www.skyarchive.org>). In the WFPDB the Konkoly plate catalogue can be found under the WFPDB Instrument Identifier KON060, which according to the accepted rule consists of a 3-letter abbreviation for the observatory name and the clear aperture of the telescope in cm.

The total number of direct and spectral plates in the plate catalogue is 12 707, obtained in the period 1962 – 1996.

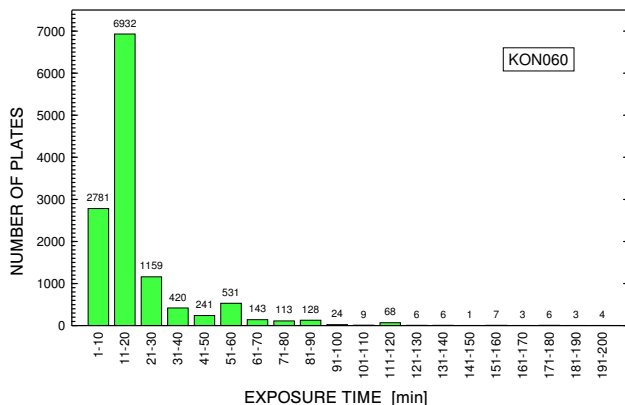
The distribution of the plate centres on the celestial sphere in equatorial coordinates is presented in Fig. 2.

The time distribution of the number of plates is shown in Fig. 3. As it is seen the most productive period is 1967 – 1979 after which a decline in the number of photographic observations started. It deserves to mention the years 1967 – 1968, when there is a maximum of observational activity for the whole period of the telescope operation. Starting with the seventies the plate consumption was gradually decreasing due to the steadily increasing prices of the photographic plates and the economic troubles of Hungary. Those scientific topics received more emphasis where the information content of an observed plate was high. One has to mention the  $H\alpha$  survey of young stellar objects in star forming regions which is still the most powerful research topic of the institute.

The month distribution of the number of plates shows a maximum for October and a comparatively high observational activity during the winter months (January – March), which obviously is partly due to the length of the night and the meteorological conditions.



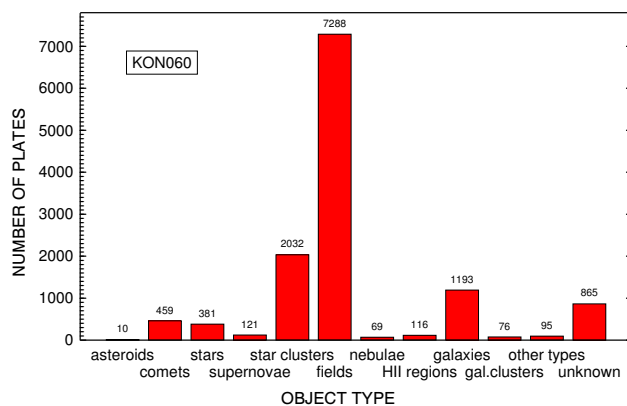
**Figure 3:** Time distribution of the number of Konkoly plates.



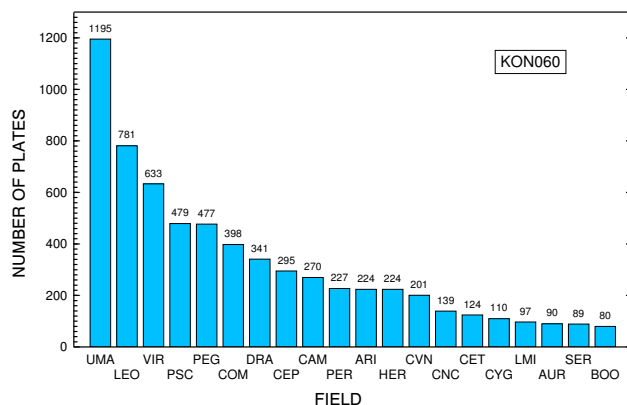
**Figure 4:** Distribution of Konkoly observations by exposure time.

Exposures mainly up to 30 min were used (Fig. 4). Exposures larger than 1 hour were rarely applied.

In Fig. 5 the distribution of the number of plates versus object type is given. The majority of plates in Konkoly Observatory is devoted to observations of selected fields (57%) – mostly of regions which are rich in galaxies for searching supernovae –, star clusters (16%) and individual galaxies (9%). (It is worth mentioning that in 1995 when the last SN with the Schmidt was recorded the number of catalogued events was about 1000 and out of them 42 were discovered in Piskéstető.) The distribution of the selected fields according to the name of the constellation is presented in Fig. 6 with Ursa Majoris, Leo and Virgo as the most observed regions on the sky. The observers have given in the logbook the object name for less than 40% of the observations. The distribution by object name is shown in Fig. 7 with M 45 being the most observed object.



**Figure 5:** Number of Konkoly plates versus object type.



**Figure 6:** Distribution of Konkoly observations according to field region (constellation).

The examination of the catalogue data shows a total number of 35 observers with the Schmidt telescope. The ordering of the observers by the number of obtained plates (Fig. 8) shows that the most productive observer has more than 5000 plates (Miklós Lovas) and other 3 observers (Lajos G. Balázs, Maria Kun and Gábor Szécsényi-Nagy) have obtained between 1000 and 2000 plates. The first 10 observers according to the number of plates have obtained 96% of all plates (the upper four plus István Jankovics, Imre Tóth, Béla Balázs, Margit Paparó, Zsuzsa Vizi, and János Kelemen).

The check-up of the plate availability made in December 2003 revealed that available in the plate vault of Konkoly Observatory are 8935 plates or 70.3% of all plates, while 3772 plates (29.7%) are not available in the archive. Most of them are still at the observers.

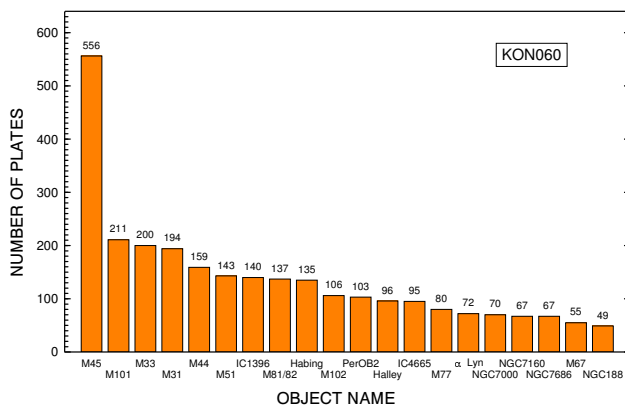


Figure 7: Distribution of Konkoly observations by object name.

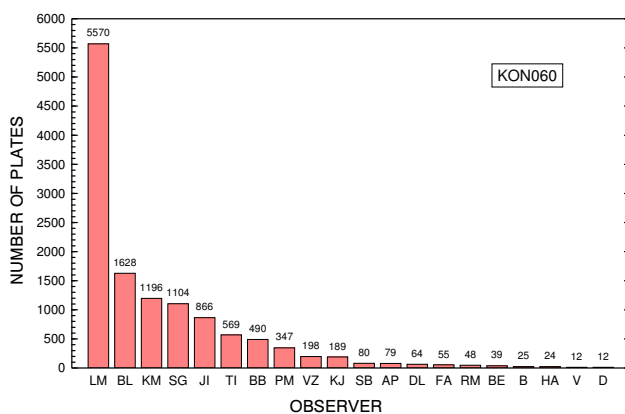


Figure 8: Number of Konkoly plates obtained by different observers.

#### 4. PLATE DIGITIZATION

The Konkoly Observatory has at disposal a flatbed scanner UMAX PowerLook 3000. With it scanning in high resolution mode of 3048 dpi ( $8 \mu\text{m}$ ) is possible. One Konkoly plate can be scanned for about 20 min in two parts because of the 8 cm wide field of the scanner in this mode. The total volume of the digitized information per plate (with some overlapping of the two parts) is nearly 400 Mb. Up to now only several dozens of selected plates, most of them in the Pleiades region, have been scanned.

## 5. CONCLUSIONS

More than 13 000 plates were obtained in the period 1962 – 1997 with the 60/90/180 cm Schmidt telescope of Konkoly Observatory, Hungarian Academy of Sciences, as a main observatory instrument for wide-field photographic observations. The data for these plates from the Konkoly plate catalogue were included in the WFPDB and thus made accessible on-line at <http://www.skyarchive.org>. The analysis of the plate catalogue data shows that the majority of plates are devoted to observations of selected fields (57%), mostly for supernova research, star clusters (16%) and individual galaxies (9%). Presently in the plate vault of Konkoly observatory are available 8935 plates or 70.3% of all plates, while 3772 plates (29.7%) are not in the archive – most of them are still at the observers. Selected plates in the Pleiades region have been scanned with the Konkoly Observatory flatbed scanner UMAX PowerLook 3000 which offers good possibilities for plate digitization. The results from the conducted wide-field observations in Konkoly have been published in the contributions of the institute, in IBVS, as well in other known astronomical journals.