

ON THE BELGRADE ASTROPHOTOGRAPHIC  
PLATE ARCHIVE: PRELIMINARY RESULTS

VOJISLAVA PROTIĆ-BENIŠEK<sup>1</sup>, VLADIMIR BENIŠEK<sup>1</sup>, ANATOLIJ MIHAJLOV<sup>2</sup>,  
TATJANA JAKŠIĆ<sup>3</sup>, GORAN PAVIČIĆ<sup>4</sup>, S. NIKOLIĆ<sup>3</sup> and N. KNEŽEVIĆ<sup>3</sup>

<sup>1</sup>*Astronomical Observatory, Volgina 7, 11160 Belgrade 74, Serbia and Montenegro*  
*E-mail: vprotic@aob.bg.ac.yu*

<sup>2</sup>*Faculty of Physics, Studentski Trg 16, 11000 Belgrade, Serbia and Montenegro*

<sup>3</sup>*Department of Astronomy, Faculty of Mathematics,*  
*Studentski Trg 16, 11000 Belgrade, Serbia and Montenegro*

<sup>4</sup>*Astronomical Society Rudjer Bošković, Gornji*  
*Grad 16, 11000 Belgrade, Serbia and Montenegro*

**Abstract.** The current status of Belgrade Astrophotographic Plate Archive (BAPA) Database is reported and a brief description of all phases of such a large Project is given. The preliminary computer-readable Catalogue of relevant data from the period 1936-1956 (there are over 15000 glass photographic plates between 1936 and 1996 in Belgrade Plate Archive) is finished as a representative sample only. The images obtained from digitalization of photographic plates will be processed in a standard graphic format, both compressed and not. In the second step that system will be divided into two subsystems: one basic that contains data for each image and the other, resulted from the inquiries of the basic subsystem that will contain the mixing result of all images and catalogue data. The Catalogue BAPA is included into WFPDB (<http://www.skyarchive.org>) as one of the basic sources (Tsvetkova et al., 2005). The first phase in this process is creation of a Database providing complete information about the photo plates of BAO (the object observed, date and timings, details of the method of observation, etc). As an example of the kind of information which will be possible to extract from the Database, we are giving a couple of statistical distributions.

## 1. SHORT HISTORY OF OBSERVATIONS AT BAO

The Belgrade Astronomical Observatory, built in 1887, was located firstly on the Meteorological Observatory's grounds in the center of the town where there were no conditions for serious astronomical work. They were achieved when the new Observatory had been built in 1932 on Veliki Vračar Hill (Zvezdara Hill today). In addition to the other equipment, the Observatory disposed of four instruments devoted especially to astrophotographic observations:

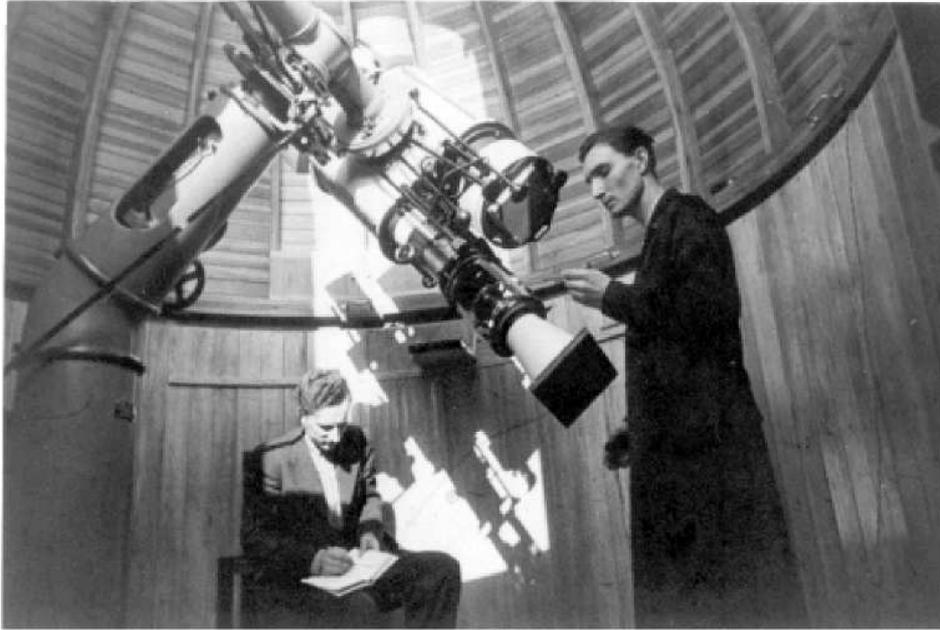


Figure 1: M. B. Protić and M. Simić at Zeiss Astrograph in the year 1936.

Zeiss Refractor 65/1055cm, with special photographic camera,

Zeiss Refractor 20/302cm visual, with two photographic cameras 16/80cm and Zeiss Astrograph (visual objective 11/128cm and astro - camera 16/80cm),

Askania Equatorial refractor 13.5/100cm (with visual scope 12.5/100cm) (Protich-Benishek, 2003).

The various types of astro-plates were used during the whole period: Agfa Astro-Platten, Agfa Isopan-Platten ESO36, Agfa Printon, Bauchet Ortho-Plaque 30 (anti-halo), Ferrania, Gevaert-Scientia 54A50, Gevaert Super Chromosa (high speed press plate), Ilford Plate, Kodak 103a-O, ORWO ZU2, ZU21, ZP1, NP1, Superguill-Guilluminot (anti-halo), etc.

The first photographs of the Belgrade Observatory collection were taken with Zeiss Astrograph in 1935: Open Cluster Pleiades and the photo of four minor planets, 11 Parthenope, 27 Eutherpe, 569 Misa and 889 Erinia with exposure time of whole three hours (Protić, 1935). However, the systematic photographic observations started in 1936 when the rectification of the Zeiss Astrograph has been done, optical characteristics of its objectives were examined and values of limiting magnitudes in function of exposure time were determined, as well as the application of various methods of observations. The Astrograph remained the main telescope of Belgrade Observatory in the field of photographic astrometry up to the present time. Despite the small aperture, with multi-hour exposure limiting magnitudes up to 14-15 could have been reached.

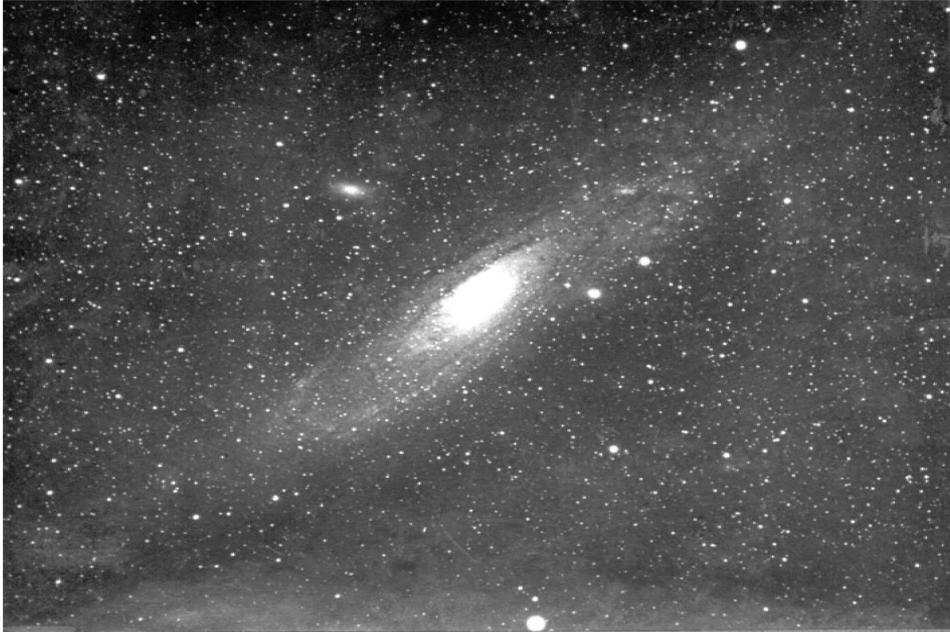


Figure 2: Andromeda Galaxy observed by M. Protić with Zeiss Astrograph in August 10, 1953. (exposure : 3 hours).

The observations can be divided into two groups: technical experiments and scientific observations. Technical experiments included investigations of standard photographic process, optical and other tests of instruments, determining the constants of instruments and observation methods. Scientific observations were taken in the framework of the programs such as: minor planet follow-up, search for new objects (33 new minor planets were discovered from BAO), comets investigation, systematic observations of the Sun, observations of the Moon (using an original photographic method), giant planets and natural satellites, variable stars, double and multiple stars, stellar clusters etc.

Rare phenomena, such as passages of Mercury and Venus across the Solar disc, lunar occultations of stars and planets and special objects have been observed, too. Between 1936 and 1996 more than 15000 high-quality negatives were obtained. We have to mention that only during AGI and ACI (1957-1959), there were 839 days of photographic observations of Solar photosphere when 2885 photographs were obtained.

## 2. THE DIGITAL ARHIVE

The digitalization of the Photo Plate Archive started with a creation of the database which should provide the detailed information about all the photo plates. So far the database itself has been constructed, and its network interface will soon be finished,

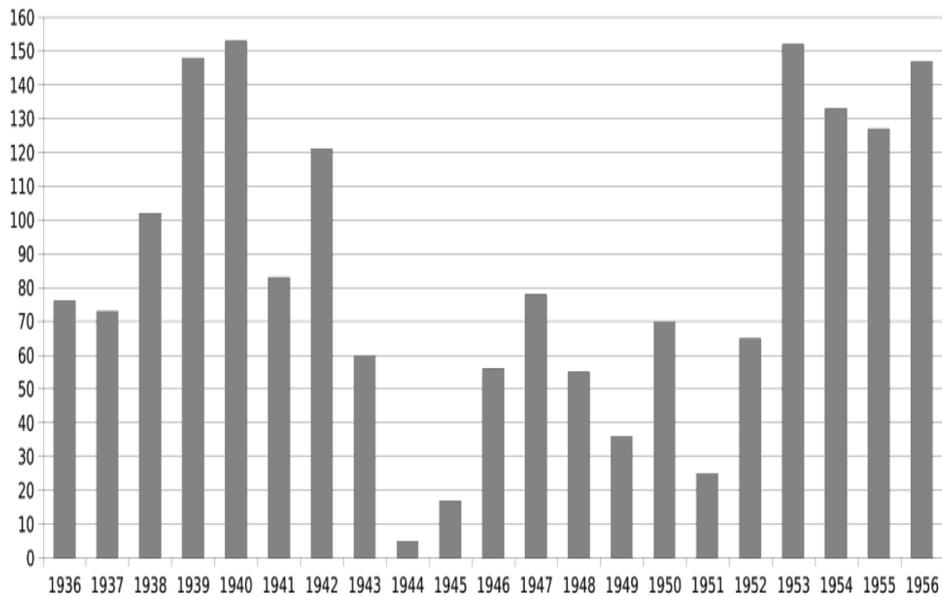


Figure 3: The number of Belgrade plates in the period (1936 - 1956).

which will allow the search of the base via the Internet. It will be possible to perform search by any of the parameters stored: date, time, the object observed, the reference star, equatorial coordinates, the length of exposition, the type of photo plate, the type of instrument, the quality of capture, the observer involved, the method used and probably some more, such as the atmospheric conditions. Together with the full description of the instruments and the types of the photo plates involved, it is going to give everyone a clear notion of whether the BAO Plate Archive contains items of interest for them. The database has been realized using MySQL 4.0.25, and the public interface is being written in PHP, run on the Observatory's Apache web server. Some more advanced options will soon be implemented, like the possibility of getting certain statistical data about the whole bulk of photo plates.

As a simple example we are presenting here three charts: number of observations per year, the contribution of the most active observers in the period we have processed so far and the number of different types of astronomical objects which were observed.

### 3. CONCLUSION

The aims of Virtual Observatory and international collaboration on digitization of data from Observatories world wide are the most urgent for our Observatory, as we have a very good plate and film collection which needs an archive systematization and a serious research.

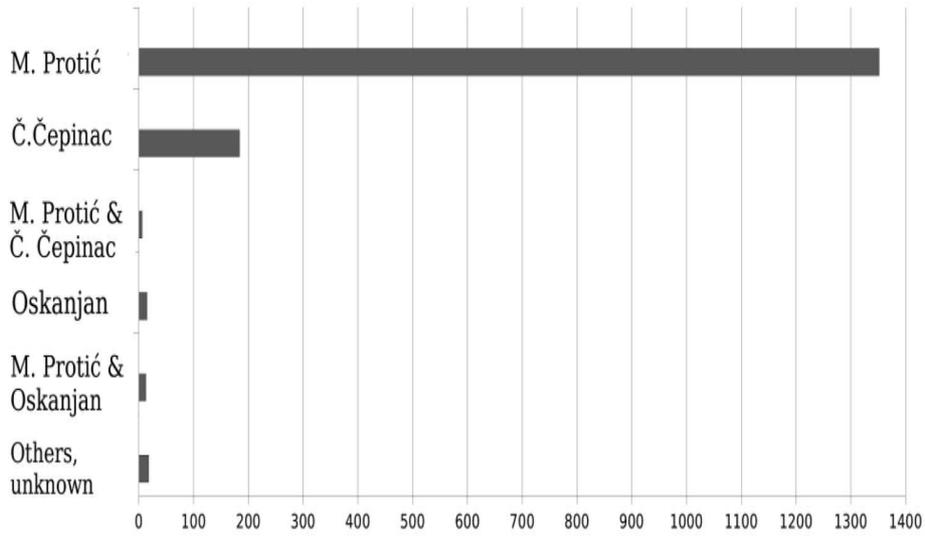


Figure 4: Number of Belgrade plates obtained by different observers (1936 - 1956).

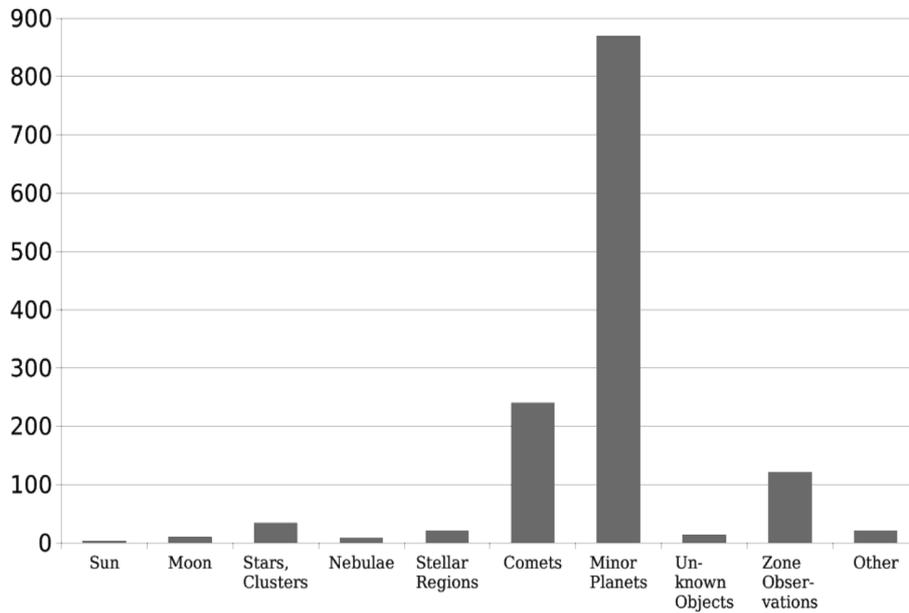


Figure 5: Number of Belgrade plates according to object type (1936 - 1956).

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