On the Belgrade Astrophotographic Plate Archive: Current Status

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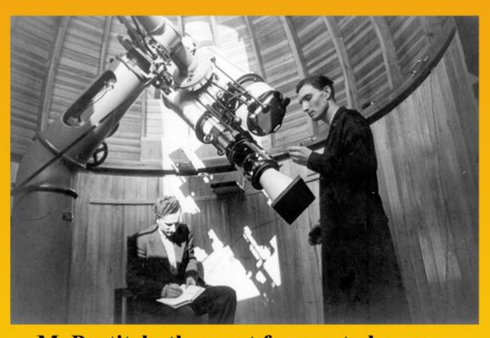
Peltier Comet, 1936



M. Protitch, the most frequent observer at the Zeiss Astrograph

The photo plates

The plate archives of the Belgrade Astronomical Observatory contain more than 15 000 glass photographic plates from the period 1936 - 1996. In addition to the other equipment the Observatory disposed of four instruments devoted especially to astrophotographic observations: Zeiss Refractor 65/1055 cm with special camera, Zeiss Astrograph 16/80 cm, Zeiss Refractor 20/302 cm with two photographic cameras 16/80 cm and Askania Equatorial refractor 13.5/100 cm.

Scientific observations were performed within the framework of programs like: minor planet follow-up, search for new objects (33 new minor planets were discovered from BAO), comet investigation, systematic observations of the Sun, Moon, giant planets, natural and artificial 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.

The current status of Belgrade Astrophotographic Plate Archive (BAPA) Database is reported and a brief description of all phases of this large project is given. The preliminary computer-readable Catalogue of relevant data from the period 1936 - 1981 is finished as a representative sample. The Catalogue BAPA is included into WFPDB (http://www.skyarchive.org) as one of the basic sources. A couple of statistical distributions are given as an example of the kind of information which will be possible to extract from the Database.

The History of Observations at BAO

The Belgrade Astronomical Observatory, built in 1887 was located firstly on the Metheorological Observatory grounds in the center of the town and there were no conditions for serious astronomical work. They were achieved when the new Observatory was built in 1932 on the Veliki Vrachar Hill (Zvezdara Hill today). Besides of other equipment, the observatory was disposed with instruments devoted especially to astrophotographic observations:

Zeiss refractor 65/1055cm with special photographic camera
Zeiss refractor 20/302cm visual, with two photographic cameras 16/80cm
Zeiss astrograph 16/80cm with photographic camera and visual scope 11/128cm
Askania equatorial refractor with visual scope 125/1000cm and photographic camera 13.5/1000cm

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 3 hours! (Protitch M. B., 1935.) However, the photographic observations started systematically in 1936, when the detailed rectification of Zeiss astrograph was performed, optical characteristics of its objectives were examined and values of limiting magnitudes in function of exposure time were determined, as well as the methods of observation (Metcalf etc.) Astrograph stayed the leading telescope of the Belgrade Observatory in the field of photographic astrometry during many years and in recent time. Despite the small aperture, with multi-hour esposures limiting magnitudes down to 14-15 could be reached.

The observations can be devided into two groups: technical experiments and scientific observations.

The technical experiments included investigations of classical photographic processes, optical and other tests of instruments, determining constants of instruments and observation methods.

The scientific observations were taken in the framework of the programs: minor planets follow-up, search for new objects (33 new minor planets were discovered from BAO), comet investigation, systematical observations of the Sun, observations of the Moon (by an original photographic method), of giant planets and natural satellites, variable stars, double stars, stellar clusters etc. Unusual phenomena, such as passages of Mercury and Venus across the solar disc, lunar occultation of stars and planets and special objects have been observed too.

Between 1936 and 1996 (60 years!) more than 15000 high-quality negatives were obtained. We have to mention that only during AGI and ACI (1957-1959), 839 days of photographic observations of Solar photosphere were performed and 2885 plates were obtained.

The Astrograph Pavillon

Askania refractor

Observers' Notebooks

During the period of sixty years (up to the beginning of 1997) the following types of astrophotographic plates were used:

Codak 103aO, 2aO, 103aJ, 103aF etc.
Ferrania Pancro anti-halo
Agfa Astro-Platten
Peruts Emulsion
Gevaert Super Chromosa
ORWO ZU 2 and ZU 21
Ilford, etc

The formats of photo plates used were (in cm):
6x9, 9x12, 13x18, 15x15, 16x16.

OBSERVERS FROM THE BELGRADE OBSERVATORY:

Vojislav V. Mišković
Milorad Protić
Pero Đurković
Zaharije Brkić
Branislav Ševarlić
Časlav Čepinac
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OCCASIONALLY:

Vasilije Oskanjan
Aleksandar Kubičela
Jelisaveta Arsenijević
Ištvan Vince
Dačić Ljubiša
Grujić Radomir

The Digital Archive

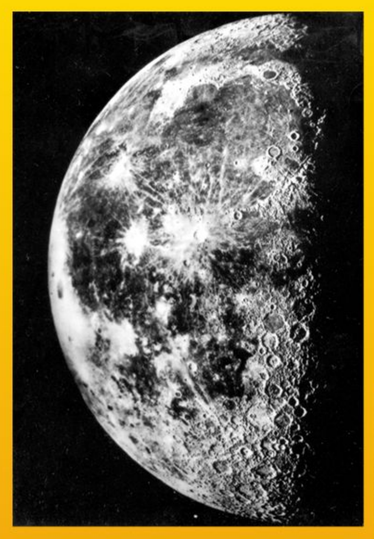
We started digitalization of the photo plate archive by creating a data base which should provide the full description of all the photo plates; the data base itself has already become usable; its network interface will soon be finished, which will will allow for everyone to search it via the Internet.

It will be possible to perform search by any of the parameters describing a photo plate: date, time, the object observed, the referent star, equatorial coordinates, 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, like the atmospheric condition. Together with the full information about the instruments and photo plates involved it is going to give everyone clear notion of whether the BAO plate archive contains items of interest for them.

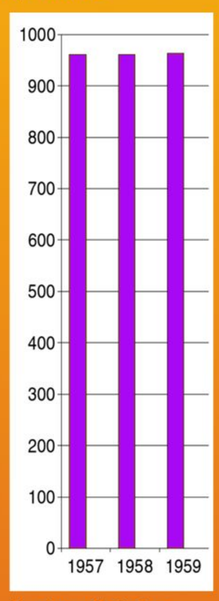
The data base itself has been realized using MySQL (currently 4.1.20), its public interface is being written in PHP (4.4.0) and is running on an Apache (2.0.55) web server; our development platform is Gentoo Linux (http://www.gentoo.org).

We plan to implement some more advanced options, like the possibility of getting certain statistical data about the whole bulk of photo plates. As a simple example, we are presenting here two charts: number of observations per year, and the number of different types of astronomical objects which were observed.

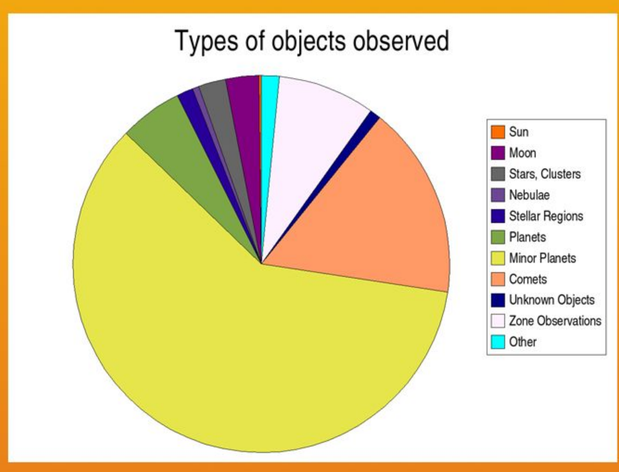
There is also an idea of digitalizing the contents of the photo plates too, but this heavily depends on the financial future of the project and the hardware we will be able to obtain.

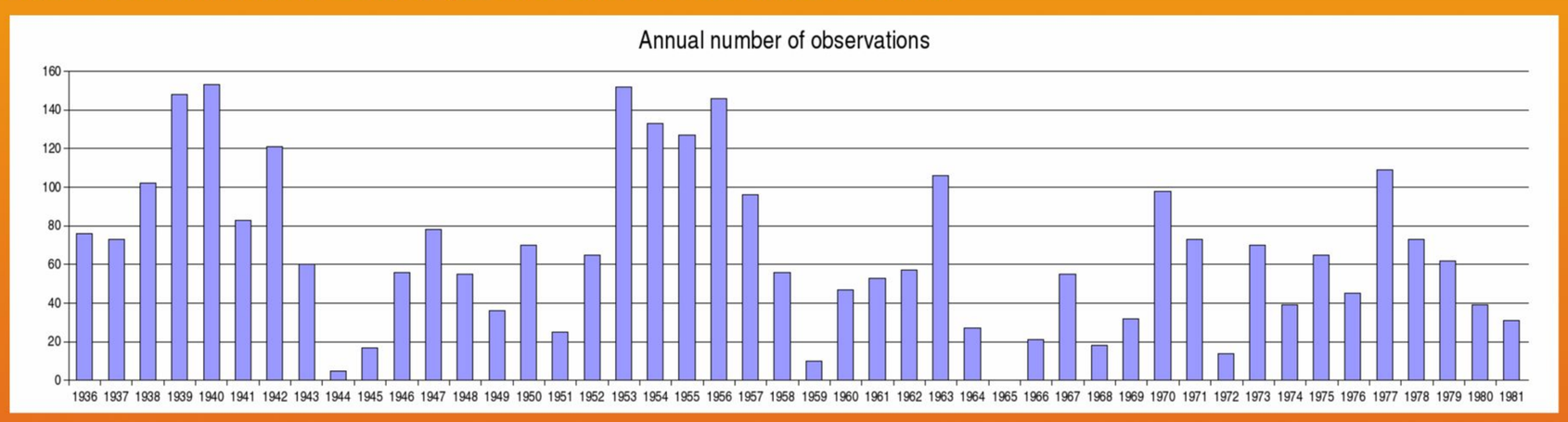


A couple of gems from the Plate Archive: the Moon, the spiral galaxy of Andromeda (1953), a group of solar spots (1959) and the galaxy NGC-891



Number of photos of the solar photosphere by years





Refernces:

Tsvetkova K., Tsvetkov M., Stavrev K. Y., Borisova A., Stavinschi M., Protitch-Benishek V., 2005, Balkan Collaboration in the Archiving of Wide-Field Photographic Observations, Proc. IV Serbian-Bulgarian Astronomical Conference, Publ. Astron. Soc.

Protitch- Benishek, V., Benishek, V., Mihajlov, A., Jakshic, T., Pavicic, G, Nikolic, S., Knezevitch, N: 2006., Publ. Astron. Obs. Belgrade, No. 80, 355-360