

# ASTRONEGATIVE ARCHIVE OF ODESSA OBSERVATORY

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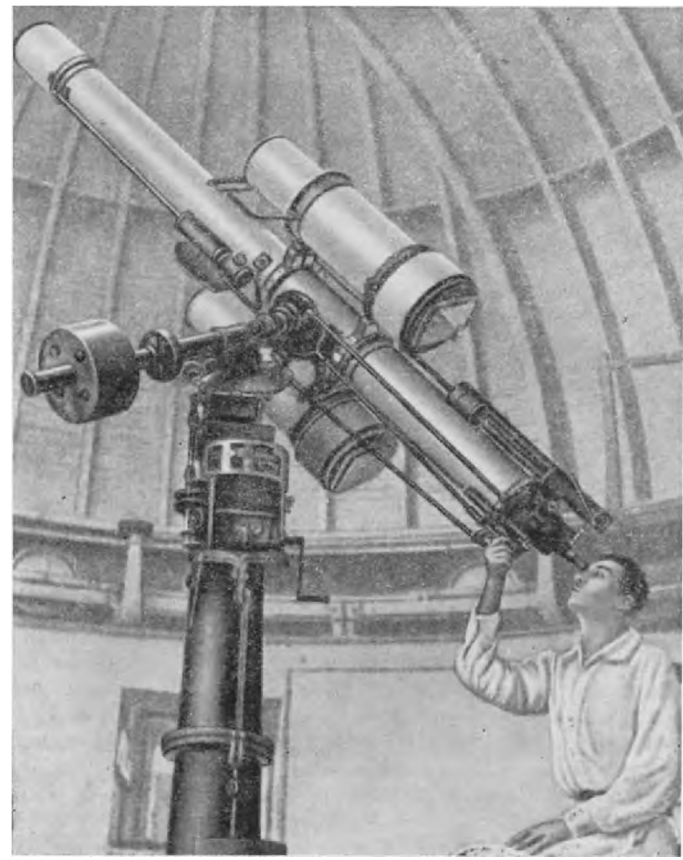


Currently Observatory of I. I. Mechnikov Odessa National University owns collections of astronegatives obtained with its own instruments (about 100000 glass plates), as well as those obtained with instruments from other observatories (about 10000 plates). According to Bulgarian web-page

WFPDB (wfpdb.org) Odessa collection of astroplates is second in Europe (after Sonneberg collection) and third in the world (after Harvard and Sonneberg). In this poster we describe the current condition of our collection and consider our plans for how to maintain this important astronomical

heritage. We are also discussing our first steps in digitizing part of a collection in accordance with the decision of the world virtual observatory and WFPDB standards.

## The Odessa plate archive of records consists of three collections: the Simeiz, the "old" and the collection of plates obtained on the 7-camera astrograph

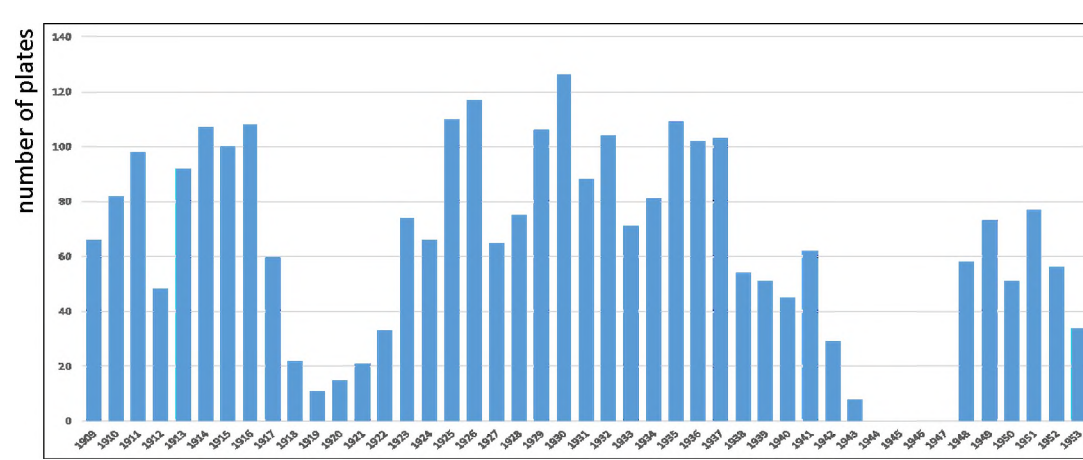


**Fig. 1**  
Double astrograph with 120 mm Unar Lenses (established in 1908). In the evacuation (1942–1944) in Kitab (Uzbekistan) during the Second World War, observations were made with the Bredikhin Double astrograph.

A collection of 8,000 plates was obtained at the Simeiz Observatory on a two-camera 2x120-mm astrograph (Fig. 1) during the period 1909–1953. In 1966, the archive of the Simeiz records was moved from the Crimean to the Odessa Observatory by agreement between A. B. Severnyy and V. P. Tsessevich. Thus, the Simeiz collection became part of the Odessa archives of astrophotonegatives. In the collection of the Simeiz plates there are mainly observations of small bodies of the Solar system (asteroids), planets and their satellites. Several hundred plates contain images of various objects and phenomena: comets and variable stars, lunar eclipses, etc. The field centers are determined by the position of small planets and comets and by their expected region of presence. Coordinates are indicated on the plate envelopes.

### SIMEIZ COLLECTION (1909-1953)

#### Observation statistics in Simeiz from 1909 to 1953

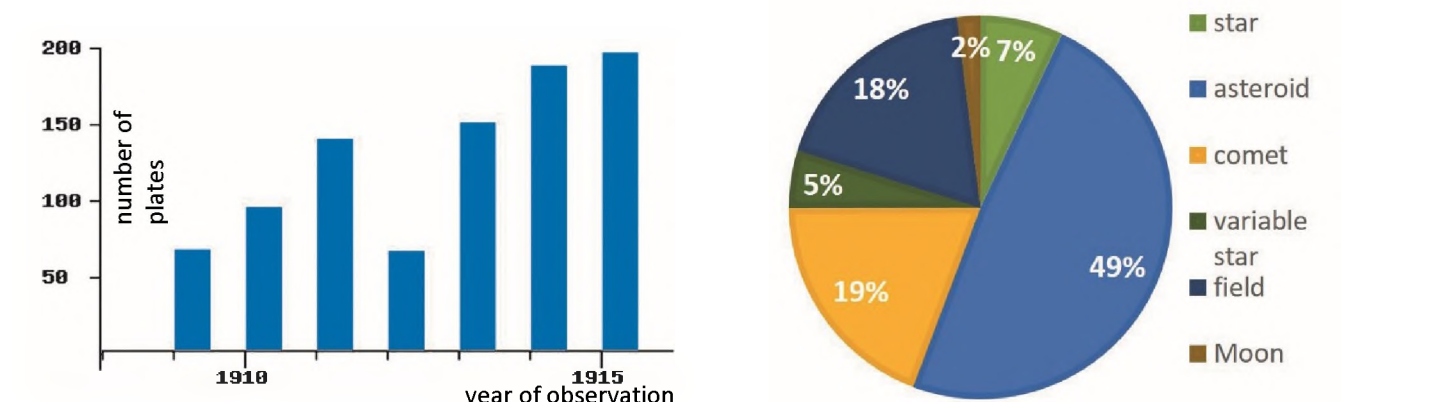


**Plate in cm:** 13 x 18  
**Emulsion:** more than 10 varieties  
**Field-of-view:** 11.9 x 16.2 deg  
**Scale:** 344 arcsec/mm  
**Limiting magnitude:**  $m_{pg} \sim 15$   
**Exposure time:** up to 2 hours  
**Studied objects:** small bodies of the Solar system  
**Number of plates:** about 8,000  
**Digitized:** 5,000

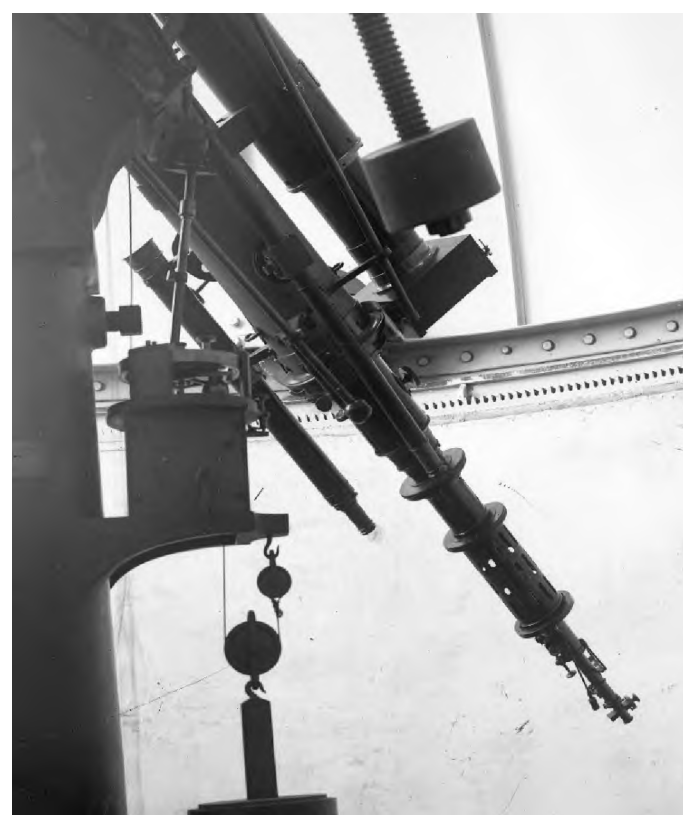
Since the end of 2013 (Vavilova I., et al. 2012) it has been digitized more than 5 thousand plates of the Simeiz collection with the help of the Epson Perfection V700 Photo scanner, donated by the sponsors.

The plates are digitized in TIFF format, 16 bit, 20  $\mu$ m/pixel, the volume of one file is  $\approx$  90 MB (at 1200 dpi resolution) and  $\approx$  350 MB (2400 dpi). In his methodology, V. Andruk (Kashuba S., et al. 2017) tested scanning device.

In May 2018, 887 records of the Simeiz collection SIM012A (80 GB) of the period 1909–1915 were placed in the database of the Bulgarian Data Processing Center (WFPDB) (Tsvetkov M., et al. 2006)



Distribution of digitized plates SIM012A by year and objects in the database



**Fig. 2**  
In the pre-war years, the camera "Large Astrograph" with a long focus was installed on the telescope-refractor Cook (165 mm)

The "Old collection" of the sky imagery was obtained with three instruments: "Large" Astrograph ("Cook") (Fig. 2), "Small 2-camera" Astrograph and 3-camera Astrograph "Hedgehog". During the work of these three astrographs in 1951–1957, more than 10,000 plates were obtained, suitable, first of all, for studying variable stars and other objects. The cycle of patrol observations on this astrograph was organized already in the first years of his directorate in 1945, V. P. Tsessevich (1907–1983). The "Large Astrograph" was replaced by a "Small Astrograph", which already had two cameras (in other words – two-camera Astrograph), and then – "three-camera Astrograph" ("Hedgehog"), with the short-focus cameras.

### THE "OLD COLLECTION" (1951-1957)

**Location:** Odessa  
**Plate in cm:** 13 x 18, 18 x 18 and 18 x 24  
**Emulsion:** Ilford, Agfa Astro, "Isoorto" with yellow, red filters and without filters  
**Field-of-view:** 24 x 33 deg  
**Guide stars:** 64 (+35 single stars)  
**Limiting magnitude:**  $m_{pg} \approx 13.5$   
**Exposure time:** from 0.5 to 3 hours  
**Studied objects:** variable stars, comets, asteroids  
**Number of plates:** about 10,000  
**Digitized:** 0

#### Characteristics of astrographs "Old collection" of Odessa Observatory (The plate centers listed in Table are given as offset relative to the corresponding guide star (in degrees of declination))

| Name of instrument             | No. of cam. | Type of objective                | D, cm          | F, cm             | Field in °                    | Photom. system   | Center in °     |
|--------------------------------|-------------|----------------------------------|----------------|-------------------|-------------------------------|------------------|-----------------|
| "Large" Astrograph             | 1           | Tessar SOI                       | 148            | 1000              | 9 x 12                        | pg               | 0               |
| "Small 2-camera" Astrograph    | 2           | Industar-17<br>Triplet Zeiss     | 100<br>100     | 500<br>500        | 22 x 15<br>22 x 15            | pg, pr<br>pg, pv | 0<br>0          |
| 3-camera astrograph "Hedgehog" | 3           | Industar-163<br>Xenon<br>Epostar | 67<br>60<br>60 | 300<br>120<br>120 | 20 x 30<br>20 x 30<br>20 x 30 | pv<br>pv<br>pv   | 0<br>-25<br>+25 |



**Fig. 3**  
The 7-camera astrograph was twice modernized. Some cameras were replaced with more efficient ones, their field of view also changed. Thus, all the photographic plates of the astrograph are divided into three series: the Old (1957–1959), the New (1959–1966) and the III (1966–1998) series.

The largest collection in the Odessa Archives contains about 84,000 photographic plates (12225 exposures) obtained with 7-camera astrograph over 40 years of observations. The seven-camera astrograph was created in 1957 during the preparation for the International Geophysical Year (IGY) at the country astronomical station in the village Mayaki (40 km from the city of Odessa) on of V. P. Tsessevich. The collection was intended, first of all, for the study of variable stars ("Sky service"). In addition, twilight phenomena, comets, asteroids, satellites, quasars (for example, 3C 273) were photographed, the outbursts of gamma-busters and others phenomena where investigated.

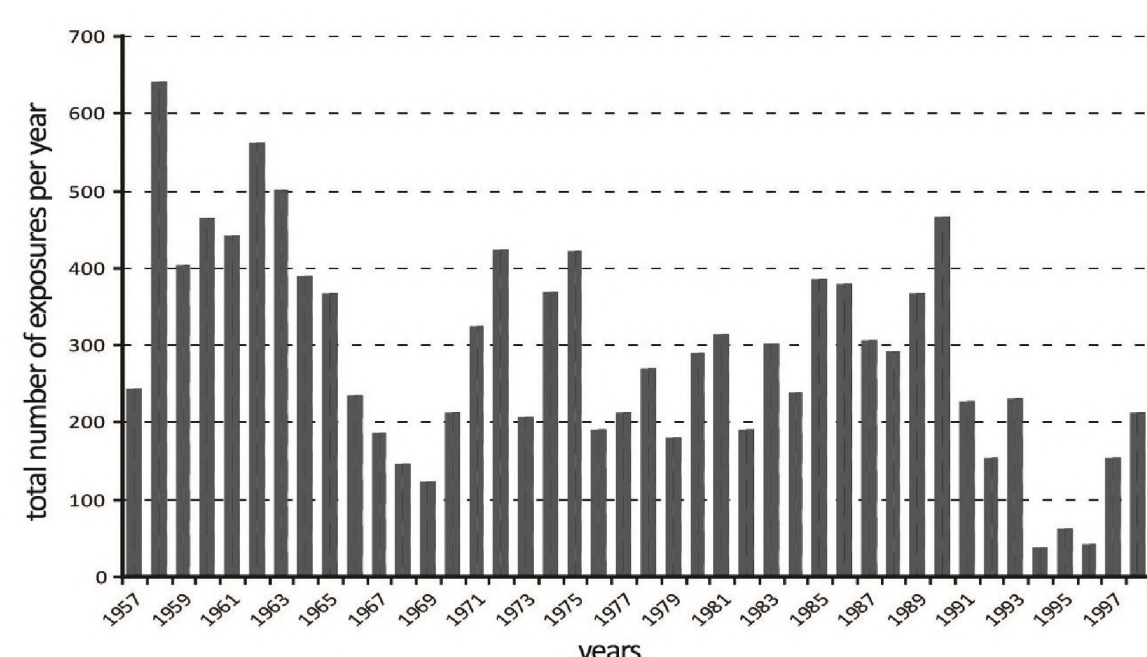
### COLLECTION OF "THE 7-CAMERA ASTROGRAPH" (1957-1998)

**Plate in cm:** 13 x 18, 18 x 24  
**Field-of-view:** 30 x 80 deg  
**Emulsion:** Agfa Astro, ORWO, with yellow filters and without filters  
**Guide stars:** 39 (+75 single stars)  
**Limiting magnitude:**  $m_{pg} \sim 14.5$ ,  $m_{pv} \sim 12$   
**Exposure time:** 30 min  
**Number of plates:** about 84,000  
**Digitized:** about 400

#### Characteristics of the 7-camera astrograph

| Name and Data                                    | No. of cam. | Type of objective | D, mm | F, mm | Field in ° | Photom. system | Center in ° | Field of view scheme* |
|--|-------------|-------------------|-------|-------|------------|----------------|-------------|-----------------------|
| The Old series.<br>From 19.07.1957 to 08.04.1959 | 1           | Uran-9            | 100   | 250   | 30 x 40    | pg, pv         | +13         |                       |
|  | 2           | Uran-9            | 100   | 250   | 30 x 40    | pg, pv         | -13         |                       |
|  | 3           | Uran-9            | 100   | 250   | 35 x 25    | pg             | +25         |                       |
|  | 4           | Vierlinser        | 160   | 720   | 13 x 18    | pg             | +08         |                       |
|  | 5           | Vierlinser        | 160   | 720   | 13 x 18    | pg             | -08         |                       |
|  | 6           | Uran-9            | 100   | 250   | 30 x 40    | pg             | -27         |                       |
|  | 7           | Tessar SOI        | 148   | 100   | 9 x 12     | pg             | 0           |                       |
| The New series.<br>From 09.04.1959 to 08.06.1966 | 1           | Uran-9            | 100   | 250   | 30 x 40    | pv             | +10         |                       |
|  | 2           | Uran-9            | 100   | 250   | 30 x 40    | pv             | -10         |                       |
|  | 3           | Triplet           | 100   | 500   | 22 x 15    | pg             | +30         |                       |
|  | 4           | Vierlinser        | 160   | 720   | 13 x 18    | pg             | +18         |                       |
|  | 5           | Vierlinser        | 160   | 720   | 13 x 18    | pg             | -18         |                       |
|  | 6           | Industar 17       | 100   | 500   | 22 x 15    | pg             | -33         |                       |
|  | 7           | Uran-12           | 200   | 500   | 18 x 24    | pg, pv         | 0           |                       |
| The III series.<br>From 09.06.1966 to 31.10.1998 | 1           | Uran-9            | 100   | 250   | 30 x 40    | pv             | +13         |                       |
|  | 2           | Uran-9            | 100   | 250   | 30 x 40    | pv             | -13         |                       |
|  | 3           | UNAR              | 120   | 600   | 16 x 11    | pg             | +23         |                       |
|  | 4           | Vierlinser        | 160   | 720   | 13 x 18    | pg             | +08         |                       |
|  | 5           | Vierlinser        | 160   | 720   | 13 x 18    | pg             | -08         |                       |
|  | 6           | UNAR              | 120   | 600   | 16 x 11    | pg             | -23         |                       |
|  | 7           | Uran-12           | 200   | 500   | 18 x 24    | pv             | 0           |                       |

\* red – pv snapshots, blue – pg



Statistics patrol observer for 1957–1998

**Conclusion:** the main goals of the digitization of the entire archive is to preserve the historical heritage of the Odessa Observatory, to update the archive as a resource for obtaining full photometry and astrometry results for the greater part of the northern sky, as an extension of the observatory's resource base. In other words, to make the archive popular for scientific community.