

THE ARCHIVE OF THE ASTROMETRIC PLATES OBTAINED AT THE ASTRONOMICAL OBSERVATORY FROM CLUJ

GHEORGHE DORIN CHIS, CRISTINA BLAGA, LIVIU MIRCEA

*Astronomical Institute of the Romanian Academy
Astronomical Observatory from Cluj-Napoca, Ciresilor 19, 3400 Cluj-Napoca, Romania
E-mail: dorin@roastro.astro.ro, cpblaga@math.ubbcluj.ro, liviu@email.ro*

Abstract. Within the frame of the Wide-Field Plate Database Project we have begun to make an inventory of the photographic plates kept in the library of our institute. The aim of this note is to present the wide field plates obtained at Cluj between 1952 and 1957. These plates contain 142 positions of 15 small planets and 4 comets visible from Cluj in that period.

Key words: astrometry – wide field plates archive.

1. INTRODUCTION

In the library of the Astronomical Observatory from Cluj-Napoca there are stored the photographic plates obtained between 1943 and 1974 by the astronomers from this observatory. We are going to make an inventory of these plates in the frames of the Wide-Field Plates Database Project. The aim of this project initiated by the Working Group on Wide-Field Imaging at the 21st Assembly of the UAI, in Buenos Aires, is to inventory all the wide field photographic plates obtained, during the time, over the world, in professional observatories, and to organize an online access to the data from the plates. A description of the project can be found in Tsvetkov *et.al.* 1994.

In this note we are interested in the plates made for astrometric purposes, *i.e.* with the aim to determine positions of small planets and comets visible from Cluj between 1952 and 1957. In that period the main observational activity in our observatory was concentrated in the area of variable stars. This is the reason why only about 1.6% from the plates contain positions of asteroids and comets.

The astrometrical plates were obtained by several astronomers. Almost entirely photographic plates, in question now, were made by dr. Gheorghe Chiş (1913-1981), who was involved also in other topics related to comets: observations of faint comets with filar micrometer (Chiş, 1949) and comets ephemerides

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computations (Chiş, 1950). Occasionally he had the support of Ştefan Radu (b. 1915) and dr. Ioan Todoran (b. 1927), who worked at that time at the observatory. The measurements of the coordinates and the positions determinations were made by dr. Ioan Todoran, in the case of the small planets, and by dr Elvira Botez (b. 1932) for comets. The results of the measurements and the methods used to reach them are described in Chiş, *et.al.* 1960.

2. THE LOCATION OF THE OBSERVATORY AND ITS INSTRUMENTS

The old Astronomical Observatory of the University from Cluj, which building was started in 1927, was located near the southern border of the city, at the latitude $\varphi = 46^{\circ}45'33,8''$ N and longitude $L = 1^{\text{h}}34^{\text{m}}23^{\text{s}},46$ E, not very far from the center of the city, because, belonging to the university, its main goal was to give to the students the opportunity to watch the sky through a telescope. In 1931, the equatorial building was ended and two years later there was installed here the Prin equatorial. This instrument was used to obtain the photographic plates. It has two parts: a Newton telescope and a refracting telescope (figure.1). The Newton telescope had a parabolic mirror with diameter $D = 50$ cm and focal length $F = 250$ cm. The telescope's mirror was cut in Couder's optical manufacture from the Astronomical Observatory from Paris. The objective lens from the refracting telescope came from Germany (Zeiss workshop), had a diameter $D = 20$ cm and a focal length $F = 300$ cm.

The limit photographic magnitude for an exposure of 10 minutes was approximately 14.5 for the Newton telescope and 12.5 for the refracting telescope. The plate scale was 68.8 *arcsec/mm*, respectively 82.5 *arcsec/mm*.

3. THE PLATES ARCHIVE

Table I contain the list of the astrometrical plates existent in our observatory. The size of the plates was usually 6x9 cm for the Newton telescope and 9x12 cm for the refracting telescope. The field angular size is then $2^{\circ}.30$, respectively $2^{\circ}.06$.

In the first column we mention the number of the plate written on the envelope in which it is kept: E-means that the plate was obtained with the equatorial and O-that it was made with the aid of the Newton telescope (O is the first letter from the Romanian word *oglinđa* which means mirror). V comes from visual and tell us that to obtain the plate there has been used a filter (GG11 for photovisual). The roman figures from the brackets emphasize the fact that the plate was exposed more than one time. That numbers give the number of exposures considered to determine the position of the object. The small letter *b* means that the plate is broken, but not in the part where the small body or the comet is placed. The letter *m* means that during the

exposure the instrument was moved following the comet. On these plates there are visible the trails of the stars.

In the second column there is mentioned the date at which the observation was made using the day, the month, and the year (DD.MM.YYYY). The third and fourth columns contain right ascension (in hours minutes second.fractions of seconds) and the declinations (degrees minutes seconds of arc) of the observed body at 1950.0 epoch. In the next two columns there are written the moment of the beginning of the observation is in universal time (hh mm ss) and the duration of the exposure in seconds.

In the seventh column we have written the abbreviated name of the observed body. The full name of the objects are the following: for the small planets 1 Ceres, 349 Dembowska, 8 Flora, 11 Parthenope, 51 Nemausa, 6 Hebe, 241 Germania, 109 Felicitas, 490 Veritas, 509 Yolanda, 196 Filomela, 19 Fortuna, 22 Kalliope, 7 Iris, 364 Isara, and for the comets 1954 X Abell (1953 g), 1955 III Mrkos (1955 e), 1957 III Arend-Roland (1956 h), 1957 V Mrkos (1957 d).

There were used different types of emulsions, listed in the last column of the table. We have used the following abbreviations for them: Guill. for Guilleminot Superfulgur plates, Afga Iso for Afga Isochrom Orthochromatic, Afga Ips for Afga Isopan rendered (sensibilised) with a solution of distilled water, alcohol, ammonia and silver tungstate, Afga Pan for Afga Isopan and Afga Ast for Afga Astro-Plates Panchromatic, IsoSPan for Afga Isopan ISS Super Panchromatic and Isopan F for Afga Isopan F plates fine-grain structure, also Super Ortho-Panchromatic.

Table I: The main characteristics of the astrometric plates obtained at Astronomical Observatory from Cluj between 1952 and 1957

No. plate	Date	α 1950.0	δ 1950.0	Time	Duration	Object	Emulsion
1	2	3	4	5	6	7	8
E52(I)	11.12.1952	04 27 59.2	+19 22 40	18 52 30	600s	Ceres	Guill.
E52(II)	11.12.1952	04 27 57.5	+19 22 46	19 37 30	600s	Ceres	Guill.
E53(I)	11.12.1952	04 34 37.2	+30 36 46	20 15 30	600s	Dembr.	Guill.
E53(II)	11.12.1952	04 34 34.5	+30 36 46	21 14 30	600s	Dembr.	Guill.
E67(I)	02.03.1953	10 27 14.6	+17 28 05	18 41 09	600s	Flora	Guill.
E67(II)	02.03.1953	10 27 11.8	+17 22 22	19 35 24	600s	Flora	Guill.
E68(I)	05.03.1953	10 16 57.2	+14 38 58	18 42 50	600s	Parthen.	Guill.
E68(II)	05.03.1953	10 16 54.3	+14 39 20	20 06 50	600s	Parthen.	Guill.
O6(I)	17.05.1953	15 50 09.4	- 04 13 02	22 11 15	630s	Nemausa	Guill.
O6(II)	17.05.1953	15 50 07.0	- 04 12 42	23 08 00	600s	Nemausa	Guill.
E86(I)	17.07.1953	19 28 45.6	- 10 11 53	21 22 30	240s	Hebe	Guill.
E86(II)	17.07.1953	19 28 34.4	- 10 12 04	21 51 30	240s	Hebe	Guill.
O28(I)	01.09.1953	22 14 03.3	- 02 32 57	22 49 32	1140s	Germania	Agfa Iso
O28(II)	01.09.1953	22 14 01.3	- 02 33 13	23 47 32	600s	Germania	Agfa Iso
O33(I)	10.09.1953	23 17 07.3	- 09 05 13	19 54 51	1320s	Felicitas	Agfa Iso
O33(II)	10.09.1953	23 17 04.7	- 09 05 19	20 56 21	600s	Felicitas	Agfa Iso
O34(II)	15.09.1953	23 23 59.0	- 01 56 01	21 45 11	1200s	Veritas	Agfa Ips

O34(III)	15.09.1953	23 23 57.8	- 01 56 14	22 36 11	600s	Veritas	Agfa Ips
O43(I)	30.09.1953	00 21 43.1	+15 00 56	18 58 50	1200s	Yolanda	Agfa Ips
O43(II)	30.09.1953	00 21 40.3	+15 00 26	20 17 50	1260s	Yolanda	Agfa Ips
O45(I)	30.10.1953	02 22 57.4	+07 25 45	01 43 18	1200s	Filomela	Agfa Pan
O45(II)	30.10.1953	02 22 56.3	+07 25 39	02 36 18	1200s	Filomela	Agfa Pan
O55(I)	05.05.1954	14 12 38.1	- 13 02 23	21 22 12	600s	Fortuna	Agfa Pan
O55(II)	05.05.1954	14 12 36.9	- 13 02 16	21 54 12	600s	Fortuna	Agfa Pan
O57(I)	08.05.1954	15 20 42.2	- 12 34 14	23 17 07	600s	Kalliope	Agfa Ast
O57(II)	10.05.1954	15 18 56.7	- 12 25 29	22 45 05	600s	Kalliope	Agfa Ast
O149(I)	06.08.1954	21 23 46.9	- 06 16 36	23 29 50	600s	Iris	Agfa Ips
O149(II)	07.08.1954	21 23 44.9	- 06 16 42	00 13 50	600s	Iris	Agfa Ips
O201(I)	26.09.1954	00 06 55.8	- 11 44 08	00 37 00	660s	Isara	IsoSPan
O201(II)	26.09.1954	00 06 54.5	- 11 44 24	01 16 00	600s	Isara	IsoSPan
O205(I)	01.10.1954	00 17 10.2	- 00 58 42	00 54 00	600s	Nemausa	IsoSPan
O205(II)	01.10.1954	00 17 08.3	- 00 59 00	01 34 00	600s	Nemausa	IsoSPan
O60(b)	12.05.1954	07 04 50.1	+53 21 59	19 45 02	600s	1954 X	Guill.
O61	12.05.1954	07 04 55.5	+53 21 16	20 11 03	600s	1954 X	Guill.
O62	15.05.1954	07 16 36.3	+51 28 58	19 57 00	600s	1954 X	Guill.
O63	15.05.1954	07 16 39.3	+51 28 24	20 17 00	600s	1954 X	Guill.
O64	25.05.1954	07 52 32.6	+44 28 43	20 01 48	600s	1954 X	Guill.
O65	25.05.1954	07 52 34.9	+44 28 15	20 17 48	600s	1954 X	Guill.
O69	27.05.1954	07 59 11.8	+42 56 21	20 17 46	600s	1954 X	Guill.
O70	27.05.1954	07 59 13.6	+42 55 57	20 33 46	240s	1954 X	Guill.
O77	03.06.1954	08 20 58.0	+37 16 27	20 08 40	240s	1954 X	Guill.
O78	03.06.1954	08 20 59.5	+37 15 59	20 20 40	240s	1954 X	Guill.
O79	03.06.1954	08 21 00.6	+37 15 37	20 32 40	300s	1954 X	Agfa Ast
O82	09.06.1954	08 38 07.8	+32 03 16	20 15 30	240s	1954 X	Agfa Ast
O83	09.06.1954	08 38 09.5	+32 02 41	20 32 00	150s	1954 X	Agfa Ast
O86(b)	10.06.1954	08 40 51.6	+31 09 18	20 19 28	240s	1954 X	Agfa Ast
O87	10.06.1954	08 40 52.6	+31 08 58	20 28 28	240s	1954 X	Agfa Ast
O90	14.06.1954	08 51 24.5	+27 30 04	20 11 49	180s	1954 X	Agfa Ast
O91	14.06.1954	08 51 26.8	+27 29 41	20 20 19	240s	1954 X	Agfa Ast
O360	16.07.1955	11 20 42.8	+51 05 25	20 01 41	180s	1955 III	Agfa Ast
O361	16.07.1955	11 20 45.7	+51 04 59	20 10 11	180s	1955 III	Agfa Ast
O362(m)	16.07.1955	11 20 49.6	+51 04 34	20 22 41	540s	1955 III	Agfa Ast
O363	16.07.1955	11 20 54.7	+51 03 58	20 37 10	180s	1955 III	Agfa Ast
O365	18.07.1955	11 35 27.2	+49 02 31	19 51 34	183s	1955 III	Agfa Ast
O366	18.07.1955	11 35 30.0	+49 02 05	20 02 04	180s	1955 III	Agfa Ast
O367	18.07.1955	11 35 33.1	+49 01 36	20 12 38	180s	1955 III	Agfa Ast
O368	18.07.1955	11 35 37.3	+49 01 00	20 26 34	180s	1955 III	Agfa Ast
O371	19.07.1955	11 42 11.6	+48 00 15	19 51 00	180s	1955 III	Agfa Ast
O372	19.07.1955	11 42 14.4	+47 59 54	20 00 00	180s	1955 III	Agfa Ast
O373	19.07.1955	11 42 16.4	+47 59 30	20 08 30	180s	1955 III	Agfa Ast
O374	19.07.1955	11 42 20.9	+47 58 47	20 25 00	180s	1955 III	Agfa Ast
O375	19.07.1955	11 42 22.8	+47 58 26	20 33 30	120s	1955 III	Agfa Ast
O385	22.07.1955	12 00 11.4	+44 54 17	19 49 50	180s	1955 III	Agfa Ast
1	2	3	4	5	6	7	8

O386	22.07.1955	12 00 13.7	+44 53 57	19 58 20	180s	1955 III	Agfa Ast
O387	22.07.1955	12 00 14.8	+44 53 35	20 06 20	180s	1955 III	Agfa Ast
O388	22.07.1955	12 00 17.4	+44 53 13	20 14 50	180s	1955 III	Agfa Ast
O389	27.07.1955	12 24 36.1	+39 53 21	20 20 04	620s	1955 III	Agfa Ast
O390	27.07.1955	12 24 28.7	+39 52 44	20 37 04	360s	1955 III	Agfa Ast
O509	30.12.1956	00 26 34.5	+08 31 20	17 30 56	601s	1957 III	Agfa Ast
O510	30.12.1956	00 26 33.7	+08 31 06	17 53 00	600s	1957 III	Agfa Ast
O511(I)	30.12.1956	00 26 32.7	+08 30 54	17 15 57	600s	1957 III	Agfa Ast
O513	01.01.1957	00 25 02.0	+07 50 34	18 24 04	602s	1957 III	Agfa Ast
O514(I)	01.01.1957	00 25 01.5	+07 50 20	18 43 14	600s	1957 III	Agfa Ast
O514(II)	01.01.1957	00 25 00.9	+07 50 02	18 57 49	600s	1957 III	Agfa Ast
O515	01.01.1957	00 25 00.9	+07 49 48	19 15 44	600s	1957 III	Agfa Ast
O516	03.01.1957	00 23 37.7	+07 11 12	18 37 47	600s	1957 III	Agfa Ast
O517(I)	03.01.1957	00 23 36.8	+07 11 02	18 55 47	600s	1957 III	Agfa Ast
O518	03.01.1957	00 23 36.1	+07 10 38	19 25 47	610s	1957 III	Agfa Ast
E376	27.04.1957	03 10 41.7	+50 58 26	19 00 26	1200s	1957 III	Isopan F
E376a	27.04.1957	03 11 16.1	+51 04 19	20 08 26	600s	1957 III	Isopan F
O519 m	27.04.1957	03 11 56.4	+51 1 10	21 22 26	600s	1957 III	IsoSPan
O520I m	28.04.1957	03 24 53.6	+53 11 49	21 02 22	60s	1957 III	IsoSPan
O520II m	28.04.1957	03 24 56.5	+53 12 11	21 05 22	120s	1957 III	IsoSPan
O521(I)	28.04.1957	03 25 01.4	+53 13 00	21 15 24	180s	1957 III	IsoSPan
O522(I)	28.04.1957	03 25 07.4	+53 13 59	21 26 22	120s	1957 III	IsoSPan
O523(I)	28.04.1957	03 25 20.5	+53 15 42	21 48 22	300s	1957 III	IsoSPan
O524(I)	29.04.1957	03 38 29.2	+55 01 05	21 31 18	120s	1957 III	IsoSPan
O526(III)	29.04.1957	03 38 43.0	+55 03 04	21 57 48	90s	1957 III	IsoSPan
O527(I)	05.05.1957	04 55 20.9	+61 23 11	20 18 59	11s	1957 III	IsoSPan
O527(II)	05.05.1957	04 55 22.2	+61 23 16	20 22 00	31s	1957 III	IsoSPan
O527(III)	05.05.1957	04 55 24.0	+61 23 24	20 24 30	90s	1957 III	IsoSPan
O528(I)	05.05.1957	04 55 30.4	+61 23 36	20 37 50	10s	1957 III	IsoSPan
O528(III)	05.05.1957	04 55 32.1	+61 23 46	20 41 00	120s	1957 III	IsoSPan
O528(IV)	05.05.1957	04 55 33.4	+61 23 52	20 44 00	30s	1957 III	IsoSPan
O529(I)	05.05.1957	04 55 37.3	+61 23 58	20 50 00	10s	1957 III	IsoSPan
O529(II)	05.05.1957	04 55 37.9	+61 24 02	20 52 00	30s	1957 III	IsoSPan
O529(III)	05.05.1957	04 55 38.9	+61 24 10	20 54 00	90s	1957 III	IsoSPan
O530	05.05.1957	04 55 52.1	+61 24 44	21 04 00	1800s	1957 III	IsoSPan
E381(I)	05.05.1957	04 56 07.1	+61 25 32	21 53 00	300s	1957 III	IsoSPan
E381(II)	05.05.1957	04 56 09.4	+61 26 05	22 00 00	120s	1957 III	IsoSPan
O531(I)	05.05.1957	04 56 36.6	+61 26 50	22 48 00	180s	1957 III	Agfa Ast
O532(I)	11.05.1957	05 59 32.3	+63 25 43	21 06 38	180s	1957 III	IsoSPan
O533(I)	11.05.1957	05 59 34.1	+63 25 44	21 14 38	180s	1957 III	IsoSPan
O534(I)	11.05.1957	05 59 38.3	+63 25 44	21 24 38	12s	1957 III	IsoSPan
O534(II)	11.05.1957	05 59 39.2	+63 25 46	21 26 38	30s	1957 III	IsoSPan
O535(II)	11.05.1957	05 59 41.7	+63 25 49	21 35 38	30s	1957 III	IsoSPan
O535(III)	11.05.1957	05 59 42.8	+63 25 50	21 37 08	90s	1957 III	IsoSPan
O536(I)	11.05.1957	05 59 44.0	+63 25 54	21 44 08	10s	1957 III	IsoSPan
O536(II)	11.05.1957	05 59 45.4	+63 25 55	21 45 08	30s	1957 III	IsoSPan
1	2	3	4	5	6	7	8

O536(III)	11.05.1957	05 59 46.2	+63 26 01	21 46 38	90s	1957 III	IsoSPan
O537	11.05.1957	06 00 07.2	+63 26 19	22 13 37	3600s	1957 III	Isopan F
E382	11.05.1957	06 00 22.7	+63 26 22	23 22 38	300s	1957 III	IsoSPan
O540(II)	12.05.1957	06 08 20.1	+63 32 34	20 49 34	30s	1957 III	IsoSPan
O540(III)	12.05.1957	06 08 22.6	+63 32 35	20 51 34	90s	1957 III	IsoSPan
O541(III)	12.05.1957	06 08 27.1	+63 32 39	21 06 04	90s	1957 III	IsoSPan
O542(II)	12.05.1957	06 08 31.3	+63 32 41	21 15 34	45s	1957 III	IsoSPan
O542(III)	12.05.1957	06 08 32.1	+63 32 43	21 17 34	90s	1957 III	IsoSPan
OV127	14.05.1957	06 24 36.2	+63 39 44	19 33 57	180s	1957 III	Isopan F
OV128	14.05.1957	06 24 38.6	+63 39 44	19 41 27	180s	1957 III	Isopan F
O543(III)	14.05.1957	06 24 43.6	+63 39 53	19 57 57	90s	1957 III	Agfa Ast
O544(III)	14.05.1957	06 25 29.6	+63 39 57	20 23 27	90s	1957 III	Agfa Ast
OV129(I)	15.05.1957	06 32 34.2	+63 40 43	20 21 24	180s	1957 III	Isopan F
O545(II)	15.05.1957	06 32 43.6	+63 40 40	20 56 24	30s	1957 III	Agfa Ast
O545(III)	15.05.1957	06 32 44.2	+63 40 40	20 57 24	90s	1957 III	Agfa Ast
O546(III)	15.05.1957	06 32 46.5	+63 40 40	21 07 24	90s	1957 III	Agfa Ast
O547(III)	15.05.1957	06 32 50.0	+63 40 38	21 17 24	90s	1957 III	Agfa Ast
OV131	30.05.1957	07 53 48.3	+62 21 09	22 44 43	300s	1957 III	Isopan F
OV132	30.05.1957	07 53 50.0	+62 21 07	22 59 43	300s	1957 III	Isopan F
O548(III)	30.05.1957	07 53 52.9	+62 21 06	23 21 43	90s	1957 III	Agfa Ast
O549(II)	30.05.1957	07 53 54.2	+62 20 58	23 36 43	60s	1957 III	Agfa Ast
O549(III)	30.05.1957	07 53 54.7	+62 20 58	23 39 43	180s	1957 III	Agfa Ast
OV133	02.06.1957	08 04 36.4	+61 59 49	20 46 25	540s	1957 III	Isopan F
O550(III)	02.06.1957	08 04 39.8	+61 59 37	21 15 55	270s	1957 III	Agfa Ast
O553(I)	08.06.1957	08 24 18.7	+61 15 19	21 50 00	300s	1957 III	Agfa Ast
O553(II)	08.06.1957	08 24 20.7	+61 15 17	22 05 00	600s	1957 III	Agfa Ast
O554(I)	08.06.1957	08 24 23.6	+61 15 15	22 25 00	300s	1957 III	Agfa Ast
O554(II)	08.06.1957	08 24 35.4	+61 15 04	22 40 00	600s	1957 III	Agfa Ast
O565(III)	15.08.1957	11 08 45.7	+35 45 47	19 31 18	90s	1957 V	IsoSPan
O566	15.08.1957	11 08 54.9	+35 45 20	19 48 18	205s	1957 V	Isopan F
OV156 Ib	24.09.1957	14 45 44.0	- 00 08 59	17 38 42	270s	1957 V	Isopan F
OV157 Ib	24.09.1957	14 45 45.2	- 00 10 34	17 57 42	270s	1957 V	Agfa Pan
O572	24.09.1957	14 45 46.9	- 00 11 13	18 10 12	600s	1957 V	IsoSPan

These 142 positions of small planets and comets recorded on photographic plates, between 11th December 1952 and 1st October 1957, described in our note, are incorporated into the Wide-Field Plate Database (<http://www.skyarchive.org>) (Tsvetkov, *et.al.*, 2000).

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