

PRECISE CCD ASTROMETRIC OBSERVATIONS OF MINOR PLANETS
AND COMETS AT THE BELGRADE OBSERVATORY DURING 1997V. Protitch-Benishek¹ and Vl. Benishek²¹*Astronomical Observatory, Volgina 7, 11160 Belgrade 74, Yugoslavia*²*Faculty of Physics (student), University of Belgrade, 11000 Belgrade, Yugoslavia*

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SUMMARY: 73 precise astrometric positions of seven comets and two minor planets from MPC critical list – 1093 Freda and 4954 Eric – were obtained with the CCD equipped Askania astrograph (13.5/160) of Belgrade Astronomical Observatory.

The SBIG ST-7 and ST-7 CCD cameras were used in the observations.

1. INTRODUCTION

In the second half of 1996 the classical photographic observations of the solar system bodies at the Belgrade Observatory were supplanted by those made using the CCD cameras ST-6 (Texas Inst. chip) and ST-7 (Kodak KAF-0400 chip) of Santa Barbara Instrument Group – SBIG production, CA, USA. In addition to the camera software the images processing was performed with CCDops, Version 3.5.

First, the camera was put to test beginning with imaging the bright objects like those listed in the Messier Catalogue, such as galaxies, globular clusters, nebulae and some bright comets. This offered us quite a good way to evaluate the possibilities and potentialities of our small ASKANIA Astrograph when equipped with CCD detector.

The first experiments with the digital imaging showed us that high quality results are possible even with small telescopes working under less-than ideal conditions as is the case in Belgrade, with its light-polluted air, if properly equipped.

2. OBSERVATIONAL PROGRAMME,
MEASUREMENTS, REDUCTIONS

After months of experimental work we reverted to our actual programme of minor planets and comets observations, whereby our special aim has been the imaging of the asteroids with unusual orbits, NeO objects and objects from the MPC critical list. The observations of the selected minor planets from ITA list were also included.

All the measurements of the objects images were carried out by Vl. Benishek, making use of the above indicated CCDO software and the Guide Star Catalogue (GSC). The programme of the n-stars astrometric reduction was compiled on the basis of the rigorous tangential coordinate method. The independently conceived programme was written by Vl. Benishek for the DOS.

As for our instrument, ASKANIA Astrograph, the scale is 1".2 per pixel, hence its astrometry is limited by the accuracy of the reference star positions. The timing relied on the internal Observatory's quartz clock, made at "IRIN", Niš.

3. RESULTS

The results of observations are presented in Table 1 and Table 2.
 Table 1 contains the comet designations, time

in UT and the topocentric coordinates α and δ for the equinox 2000.0.

The parameters $\rho \cos \varphi'$ and $\rho \sin \varphi'$ are 0.71074 and +0.70116 respectively, for $\lambda = 20.5133$.
 Table 2 summarizes precise astrometric CCD positions of the minor planets from MPC critical list.

Table 1. Positions of comets

46P/Wirtanen			
Date (UT)	R.A. (2000.0)	Decl. (2000.0)	Mag.
1997 02 24.77667	01 40 05.39	+07 53 12.2	11.8
81P/Wild 2			
1997 02 22.88438	07 46 40.65	+21 09 35.8	
02 23.86108	07 46 34.64	+21 13 20.2	11.6
02 25.88591	07 46 30.12	+21 20 36.8	
02 28.84972	07 46 44.40	+21 30 22.8	
03 02.86489	07 47 08.09	+21 36 19.0	
03 04.83933	07 47 42.93	+21 41 26.0	11.1
03 04.85425	07 47 42.90	+21 41 32.0	
03 05.88740	07 48 05.84	+21 43 58.8	
03 10.82382	07 50 37.08	+21 53 32.5	11.0
03 10.83072	07 50 37.25	+21 53 33.1	
03 11.87579	07 51 18.28	+21 55 02.1	
03 11.88042	07 51 18.43	+21 55 02.1	
03 11.88234	07 51 18.46	+21 55 04.2	
03 12.83443	07 51 58.82	+21 56 15.4	
03 12.83973	07 51 59.21	+21 56 16.5	
03 18.87948	07 57 13.70	+22 00 13.4	
03 23.83495	08 02 45.45	+21 58 41.8	
03 23.83837	08 02 45.67	+21 58 38.5	
03 24.85341	08 04 01.28	+21 57 39.4	
03 24.86422	08 04 01.84	+21 57 40.7	
03 26.83726	08 06 36.25	+21 55 22.6	
03 26.84315	08 06 36.58	+21 55 21.7	
04 05.85293	08 21 55.46	+21 31 44.2	
04 05.85584	08 21 55.68	+21 31 41.8	
04 08.84993	08 27 10.90	+21 20 36.4	
04 08.85425	08 27 11.54	+21 20 34.5	

Table 1. (continued)

Date (UT)	R.A. (2000.0)	Decl. (2000.0)	Mag.
C/1995 01 Hale-Bopp			
1997 03 06.17123	21 53 22.05	+37 11 14.8	
03 08.14963	22 07 01.81	+38 37 42.6	
03 11.17160	22 29 49.28	+40 42 07.2	
03 13.12975	22 45 50.81	+41 55 36.2	
03 23.76785	00 26 46.99	+45 46 56.3	
03 24.14557	00 30 37.08	+45 48 32.7	
03 24.76575	00 36 52.57	+45 50 04.6	
03 26.79029	00 57 15.49	+45 45 44.9	
03 29.79893	01 26 47.91	+45 14 04.0	
04 05.79590	02 28 40.20	+42 22 48.9	
04 08.76895	02 51 14.72	+40 40 44.1	
04 09.79914	02 58 31.83	+40 02 45.5	
04 10.79041	03 05 17.48	+39 25 09.4	
C/1997 J1 Mueller			
1997 05 24.89799	09 38 51.44	+65 54 24.2	
05 24.90563	09 38 50.55	+65 54 13.0	
05 24.91804	09 38 49.57	+65 53 52.1	
06 12.97382	09 17 00.03	+57 47 51.6	
06 15.92726	09 15 49.73	+56 42 53.2	13.2
C/1997 J2 Meunier-Dupouy			
1997 05 24.02581	10 47 18.02	+73 01 46.8	13.7
05 24.87128	10 47 17.75	+72 58 29.8	
06 15.90098	10 58 12.35	+71 23 53.6	
06 29.89880	11 14 26.94	+70 19 10.7	
07 01.89994	11 17 17.19	+70 09 42.2	
07 04.85468	11 21 39.88	+69 55 51.0	
07 30.88833	12 10 01.24	+67 48 44.3	
C/1997 D1 Mueller			
1997 05 10.82016	08 36 24.60	+45 48 04.9	
05 10.84378	08 36 23.24	+45 47 43.6	
05 10.85834	08 36 23.00	+45 47 30.5	
05 10.86117	08 36 22.43	+45 47 30.9	
05 15.85566	08 31 30.11	+44 34 14.5	13.9
05 15.86999	08 31 28.85	+44 34 00.2	
C/1997 T1 Utsumomiya			
1997 10 08.89043	21 31 14.20	+69 05 31.8	11.0
10 08.89893	21 31 05.33	+69 04 58.0	
10 11.80075	20 47 35.00	+65 27 18.7	12.1
10 11.80805	20 47 29.31	+65 26 43.5	

Table 2. Positions of minor planets

Date (UT)	R.A. (2000.0)	Decl. (2000.0)	Mag.
1093 Freda			
1997 03 10.99288	14 42 49.56	+03 39 58.7	
03 10.99677	14 42 49.57	+03 40 02.1	13.5
03 11.93237	14 42 34.85	+03 41 37.2	
03 11.93997	14 42 34.54	+03 41 37.0	
03 12.03285	14 42 33.34	+03 41 44.6	
03 12.04183	14 42 32.94	+03 41 45.5	
4954 Eric			
1997 04 08.94808	11 39 49.20	-01 52 09.4	15.4
04 08.95043	11 39 49.26	-01 52 11.7	
04 08.95356	11 39 48.80	-01 52 11.8	
04 08.95782	11 39 48.67	-01 52 11.8	
04 08.95997	11 39 48.41	-01 52 11.8	

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**ССД АСТРОМЕТРИЈСКА ПОСМАТРАЊА МАЛИХ ПЛАНЕТА И КОМЕТА
СА АСТРОНОМСКЕ ОПСЕРВАТОРИЈЕ У БЕОГРАДУ У 1997. ГОДИНИ**

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Стручни рад

У току 1997. године на Астрономској опсерваторији у Београду вршена су ССД посматрања седам комета и малих планета које се налазе на критичној листи МРС-а.

Одређени су прецизни астрометријски положаји ових објеката, укупно 73, уз коришћење Guide Star Catalog-а и одговарајућих програма за обраду слике и редуцију положаја.