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Astrometry of minor planets made at the Skalnaté Pleso Observatory in 2008

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Abstract. The paper presents results of position determinations of minor planets carried out at the Skalnaté Pleso Observatory in 2008. A total of 148 accurate positions of 38 minor planets are given.
Key words: asteroids – astrometry

1. Introduction

The present paper is a continuation of our previous papers which gave the results of positional CCD observations of minor planets obtained at the Skalnaté Pleso Observatory (the last papers of this series being Husárik, 2012 a, b, 2013) and contains observations made in 2008. Missing observations from 2005 to 2008 will be published one after the other simultaneously with the new obtained positions.

The observations were performed with a 0.61-m f/4.3 reflector and a CCD camera SBIG ST-10XME. We obtained CCD frames using a Johnson-Cousins R filter with 3×3 binning and a resolution of 1.6 arcsec/px. We applied the standard calibration with dark and flatfield frames with IRAF tools. The positions of minor planets were made using the method of plate constants within the software *Astrometrica* (Raab, 2011). The reference stars were selected from the UCAC-3 star catalogue.

A total of 148 accurate positions of 38 minor planets are given, as well as a list of collaborators.

2. Positions of minor planets

Table 1 presents the results of positional CCD observations. The data have been arranged according to serial numbers of minor planets.

Table 1. The individual columns of the table contain the following information: N – ordinal number of the observation, Date U.T. – date and time of the middle of the exposure, $R.A._{2000}$ – right ascension for equinox 2000.0 (in h, m, s), $Decl._{2000}$ – declination for equinox 2000.0 (in °, ′, ″), dα – the mean residual in $R.A.$ (in s), dδ – the mean residual in $Decl.$ (in ″), Magn. – magnitude of the minor planet in the R filter, dmag – the mean residual in magnitude (in mag), Ref. st. – number of reference stars with a known position and/or magnitude that are used to find the plate constants and photometric calibration of an image.

N	Date U.T.		$R.A._{2000}$ dα	$Decl._{2000}$ dδ	Magn. dmag	Ref. st.
			(1293) Sonja			
1	2008 Feb.	07.89553	09 05 08.06	+08 08 12.1	17.0	38
			0.02	0.3	0.1	
2	2008 Feb.	07.97279	09 05 03.15	+08 08 32.5	17.1	40
			0.03	0.5	0.1	
3	2008 Feb.	12.78434	09 00 03.83	+08 31 34.3	17.0	53
			0.01	0.1	0.2	
4	2008 Feb.	13.09947	08 59 44.25	+08 33 06.3	17.0	65
			0.01	0.2	0.1	
			(1401) Lavonne			
5	2008 Aug.	04.00146	00 36 37.37	+15 48 40.6	14.3	29
			0.01	0.1	0.1	
6	2008 Aug.	04.07559	00 36 39.99	+15 49 31.0	14.3	27
			0.01	0.1	0.1	
7	2008 Aug.	04.93814	00 37 11.70	+15 59 10.6	14.2	29
			0.01	0.1	0.1	
8	2008 Aug.	05.04461	00 37 15.31	+16 00 22.4	14.2	31
			0.01	0.1	0.1	
9	2008 Aug.	07.91744	00 38 50.11	+16 31 36.3	13.9	40
			0.01	0.1	0.2	
10	2008 Aug.	08.01086	00 38 52.78	+16 32 36.4	14.0	43
			0.01	0.1	0.2	
			(1716) Peter			
11	2008 Aug.	10.01970	23 57 36.09	+08 04 18.5	16.2	29
			0.01	0.2	0.2	
12	2008 Aug.	10.06229	23 57 35.20	+08 04 17.4	16.5	24
			0.01	0.1	0.2	
13	2008 Aug.	10.89609	23 57 18.31	+08 03 54.0	16.9	28
			0.01	0.1	0.2	
14	2008 Aug.	11.08532	23 57 14.12	+08 03 47.9	16.6	27
			0.01	0.1	0.2	

N	Date U.T.		$R.A._{2000}$ dα	$Decl._{2000}$ dδ	Magn. dmag	Ref. st.
15	2008 Aug.	11.87414	23 56 57.21	+08 03 17.6	16.5	29
			0.01	0.1	0.2	
16	2008 Aug.	12.06611	23 56 52.75	+08 03 09.5	16.7	27
			0.01	0.1	0.2	
			(1763) Williams			
17	2008 Sep.	27.83491	00 47 49.59	+14 25 18.7	13.6	22
			0.01	0.1	0.2	
18	2008 Sep.	27.98304	00 47 40.75	+14 24 48.9	13.6	24
			0.01	0.1	0.2	
19	2008 Sep.	28.84229	00 46 52.08	+14 21 47.4	14.0	28
			0.01	0.1	0.2	
20	2008 Sep.	29.00199	00 46 42.46	+14 21 12.8	14.0	22
			0.01	0.1	0.2	
21	2008 Oct.	18.70698	00 29 01.30	+12 39 53.9	14.2	22
			0.02	0.2	0.2	
22	2008 Oct.	19.02883	00 28 46.56	+12 38 01.5	14.1	18
			0.01	0.2	0.1	
23	2008 Oct.	20.71881	00 27 36.67	+12 28 11.0	14.2	29
			0.01	0.1	0.1	
24	2008 Oct.	21.07078	00 27 21.78	+12 26 08.3	14.0	15
			0.01	0.1	0.1	
			(1830) Pogson			
25	2008 Sep.	02.84588	00 35 29.92	+00 16 09.6	14.9	27
			0.01	0.1	0.2	
26	2008 Sep.	03.09095	00 35 20.79	+00 14 31.8	14.8	25
			0.01	0.1	0.2	
27	2008 Sep.	04.93332	00 34 12.41	+00 01 59.3	15.2	21
			0.01	0.1	0.2	
28	2008 Sep.	05.07970	00 34 06.48	+00 00 58.2	15.2	21
			0.01	0.1	0.2	
29	2008 Sep.	05.83200	00 33 37.23	−00 04 18.1	14.9	23
			0.01	0.1	0.3	
30	2008 Sep.	05.99708	00 33 30.38	−00 05 28.3	14.8	23
			0.01	0.2	0.3	
31	2008 Sep.	06.85465	00 32 55.63	−00 11 35.7	14.9	29
			0.01	0.1	0.1	
32	2008 Sep.	06.90523	00 32 53.48	−00 11 57.5	14.8	27
			0.01	0.1	0.1	
			(1854) Skvortsov			
33	2008 July	28.95343	23 47 22.64	+02 10 31.9	16.7	26
			0.01	0.1	0.2	

N	Date U.T.		$R.A._{2000}$ dα	$Decl._{2000}$ dδ	Magn. dmag	Ref. st.
34	2008 July	29.05726	23 47 22.16	+02 10 27.7	16.7	28
			0.01	0.1	0.1	
35	2008 July	29.90457	23 47 18.83	+02 09 48.9	17.1	22
			0.01	0.1	0.1	
36	2008 July	30.06049	23 47 17.91	+02 09 41.4	17.0	22
			0.01	0.1	0.1	
			(2408) Astapovich			
37	2008 July	27.91637	23 46 53.93	+02 24 09.9	15.4	31
			0.01	0.1	0.2	
38	2008 July	28.05038	23 46 54.48	+02 23 14.2	15.4	27
			0.01	0.1	0.1	
39	2008 July	28.95343	23 46 58.64	+02 16 50.7	15.4	26
			0.01	0.1	0.2	
40	2008 July	29.05726	23 46 58.87	+02 16 05.7	15.3	28
			0.01	0.1	0.1	
41	2008 July	29.90457	23 47 01.46	+02 09 52.2	15.4	22
			0.01	0.1	0.1	
42	2008 July	30.06049	23 47 01.58	+02 08 42.3	15.5	22
			0.01	0.1	0.1	
			(3018) Godiva			
43	2008 Aug.	10.01970	23 57 53.39	+07 58 42.7	14.9	29
			0.01	0.1	0.2	
44	2008 Aug.	10.08624	23 57 52.73	+07 58 45.2	15.3	24
			0.01	0.1	0.2	
45	2008 Aug.	10.89609	23 57 46.00	+07 59 10.2	15.1	27
			0.01	0.1	0.2	
46	2008 Aug.	11.08532	23 57 43.82	+07 59 14.9	15.2	24
			0.01	0.1	0.2	
47	2008 Aug.	11.87414	23 57 35.84	+07 59 26.5	15.0	29
			0.01	0.1	0.2	
48	2008 Aug.	12.06611	23 57 33.29	+07 59 28.4	15.0	27
			0.01	0.1	0.2	
			(3401) Vanphilos			
49	2008 Feb.	10.07632	10 12 16.77	+07 48 38.0	13.7	33
			0.01	0.1	0.2	
50	2008 Feb.	10.16897	10 12 07.06	+07 47 42.3	13.9	33
			0.01	0.1	0.2	
51	2008 Feb.	11.07558	10 10 33.68	+07 38 46.2	13.9	27
			0.01	0.1	0.2	
52	2008 Feb.	11.08532	10 10 24.19	+07 37 52.6	13.9	30
			0.01	0.1	0.2	

N	Date U.T.		$R.A._{2000}$ dα	$Decl._{2000}$ dδ	Magn. dmag	Ref. st.
53	2008 Feb.	11.82951	10 09 16.49	+07 31 24.8	13.6	41
			0.01	0.1	0.1	
54	2008 Feb.	12.07427	10 08 50.67	+07 29 02.8	13.5	36
			0.01	0.1	0.1	
			(3956) Caspar			
55	2008 Oct.	25.81933	01 26 14.51	+16 56 52.0	14.2	35
			0.01	0.1	0.1	
56	2008 Oct.	25.94726	01 26 07.98	+16 55 43.3	14.1	36
			0.01	0.1	0.2	
57	2008 Oct.	26.77991	01 25 28.70	+16 48 13.2	14.0	38
			0.01	0.1	0.2	
58	2008 Oct.	26.99285	01 25 18.10	+16 46 18.4	14.0	27
			0.01	0.1	0.1	
59	2008 Nov.	02.04891	01 20 55.72	+15 51 47.8	14.3	22
			0.01	0.1	0.1	
60	2008 Nov.	02.07021	01 20 54.87	+15 51 36.2	14.2	23
			0.01	0.1	0.2	
61	2008 Nov.	03.70039	01 19 54.25	+15 37 12.1	14.3	29
			0.01	0.1	0.1	
62	2008 Nov.	04.08058	01 19 39.76	+15 33 52.2	14.2	28
			0.01	0.1	0.1	
			(4323) Hortulus			
63	2008 Aug.	31.85314	23 50 13.07	+09 23 39.6	14.4	26
			0.01	0.2	0.4	
64	2008 Sep.	01.08153	23 50 04.50	+09 23 26.3	14.5	22
			0.01	0.3	0.4	
65	2008 Sep.	01.83216	23 49 38.43	+09 22 34.5	14.5	10
			0.01	0.2	0.4	
66	2008 Sep.	02.09845	23 49 28.09	+09 22 14.3	14.6	12
			0.01	0.2	0.3	
			(5481) Kiuchi			
67	2008 Mar.	31.78655	11 07 50.32	−00 27 42.1	15.9	9
			0.01	0.1	0.2	
68	2008 Mar.	31.92656	11 07 43.51	−00 27 15.9	16.0	8
			0.01	0.1	0.1	
			(7030) Colombini			
69	2008 Aug.	25.85091	22 17 22.85	+09 41 04.8	16.0	55
			0.01	0.2	0.2	
70	2008 Aug.	25.91747	22 17 19.35	+09 40 46.4	15.6	57
			0.01	0.1	0.2	

N	Date U.T.		$R.A._{2000}$ dα	$Decl._{2000}$ dδ	Magn. dmag	Ref. st.
71	2008 Aug.	27.88978	22 15 40.93	+09 31 00.7	16.2	69
			0.01	0.1	0.1	
72	2008 Aug.	28.10807	22 15 29.65	+09 29 51.3	15.8	46
			0.01	0.1	0.1	
73	2008 Aug.	28.91271	22 14 50.22	+09 25 30.4	15.7	70
			0.01	0.1	0.2	
74	2008 Aug.	29.00328	22 14 45.53	+09 25 00.3	16.1	56
			0.01	0.1	0.1	
75	2008 Aug.	30.84284	22 13 16.05	+09 14 20.9	15.7	50
			0.01	0.1	0.2	
76	2008 Aug.	31.08775	22 13 03.66	+09 12 51.7	15.9	33
			0.02	0.2	0.1	
			(7225) Huntress			
77	2008 Jan.	02.81660	07 15 07.90	+20 08 22.3	14.2	139
			0.01	0.1	0.2	
78	2008 Jan.	03.05521	07 14 51.92	+20 07 16.8	14.3	121
			0.01	0.1	0.1	
79	2008 Jan.	13.81067	07 03 14.35	+19 18 42.9	14.3	220
			0.01	0.1	0.2	
80	2008 Jan.	13.92639	07 03 06.75	+19 18 12.9	14.2	223
			0.01	0.1	0.2	
			(7369) Gavrilin			
81	2008 Jan.	28.79659	07 51 58.10	+03 20 06.2	15.7	152
			0.02	0.2	0.1	
82	2008 Jan.	28.82650	07 51 55.83	+03 19 57.5	15.7	121
			0.01	0.2	0.1	
83	2008 Feb.	09.84955	07 38 52.19	+02 43 03.8	16.1	199
			0.01	0.1	0.2	
84	2008 Feb.	10.01850	07 38 42.85	+02 42 45.1	16.0	191
			0.01	0.1	0.2	
85	2008 Feb.	10.73613	07 38 05.47	+02 41 29.3	16.1	188
			0.01	0.1	0.2	
86	2008 Feb.	11.03941	07 37 49.34	+02 40 58.8	16.0	190
			0.01	0.1	0.2	
			(7676) 1995 WN8			
87	2008 Mar.	26.94587	11 25 45.12	+13 57 54.8	15.8	18
			0.01	0.1	0.1	
88	2008 Mar.	27.00987	11 25 42.21	+13 58 32.2	15.9	18
			0.01	0.1	0.2	

N	Date U.T.		$R.A._{2000}$ dα	$Decl._{2000}$ dδ	Magn. dmag	Ref. st.
			(9000) Hal			
89	2008 July	31.87579	21 36 58.50	+00 44 47.5	15.4	69
			0.01	0.1	0.2	
90	2008 Aug.	01.03090	21 36 51.73	+00 44 38.6	15.5	54
			0.01	0.1	0.2	
			(12303) 1991 RB24			
91	2008 Jan.	13.81067	07 03 32.10	+19 12 27.9	17.5	220
			0.02	0.3	0.2	
92	2008 Jan.	13.92639	07 03 24.71	+19 12 47.3	17.8	223
			0.01	0.2	0.2	
			(13166) 1995 WU1			
93	2008 Mar.	06.87112	11 23 06.55	+23 06 02.6	15.2	19
			0.01	0.1	0.2	
94	2008 Mar.	07.14355	11 22 48.37	+23 06 47.0	15.3	22
			0.01	0.1	0.2	
95	2008 Mar.	07.75414	11 22 09.18	+23 08 23.9	15.1	22
			0.01	0.1	0.2	
96	2008 Mar.	07.98220	11 21 53.98	+23 08 59.9	15.1	25
			0.01	0.2	0.2	
			(30820) 1990 RU2			
97	2008 Oct.	25.81933	01 26 16.56	+16 55 16.6	17.0	35
			0.01	0.1	0.1	
98	2008 Oct.	25.94726	01 26 08.45	+16 54 47.9	17.0	36
			0.01	0.1	0.2	
99	2008 Oct.	26.77991	01 25 18.20	+16 51 38.2	16.9	38
			0.01	0.2	0.2	
100	2008 Oct.	26.99285	01 25 04.96	+16 50 49.6	16.9	27
			0.01	0.1	0.1	
			(53151) 1999 BC24			
101	2008 Aug.	10.01970	23 57 18.71	+08 01 21.4	18.0	29
			0.02	0.3	0.2	
102	2008 Aug.	10.08624	23 57 17.31	+08 01 25.5	18.0	24
			0.01	0.2	0.2	
			(60629) 2000 FX25			
103	2008 Sep.	02.84588	00 35 19.68	+00 10 37.6	18.4	26
			0.01	0.2	0.2	
104	2008 Sep.	02.91775	00 35 17.13	+00 10 03.6	18.5	26
			0.01	0.2	0.2	
105	2008 Sep.	04.94130	00 34 03.63	−00 06 11.7	18.4	22
			0.01	0.2	0.2	

N	Date U.T.		$R.A._{2000}$ dα	$Decl._{2000}$ dδ	Magn. dmag	Ref. st.
106	2008 Sep.	04.96792	00 34 02.63	−00 06 24.2	18.7	22
			0.02	0.4	0.1	
			(61737) 2000 QQ152			
107	2008 Jan.	02.81660	07 15 26.24	+20 02 53.0	18.1	139
			0.02	0.4	0.2	
108	2008 Jan.	03.05521	07 15 19.76	+20 02 49.6	18.1	121
			0.01	0.1	0.1	
			(72396) 2001 CU20			
109	2008 Jan.	15.78896	06 35 02.04	+36 52 17.5	15.1	157
			0.01	0.1	0.2	
110	2008 Jan.	15.97072	06 34 47.98	+36 55 24.3	15.1	168
			0.01	0.1	0.2	
			(85459) 1997 HZ10			
111	2008 Sep.	05.83200	00 32 54.92	−00 06 27.6	16.8	24
			0.02	0.3	0.3	
112	2008 Sep.	05.90122	00 32 51.99	−00 06 37.3	16.8	25
			0.02	0.3	0.3	
113	2008 Sep.	06.85465	00 32 12.32	−00 08 44.2	16.9	29
			0.01	0.1	0.1	
114	2008 Sep.	06.90523	00 32 10.10	−00 08 51.1	16.9	27
			0.01	0.1	0.1	
			(90645) 1004 T-3			
115	2008 Aug.	07.91744	00 38 58.57	+16 25 33.2	18.0	46
			0.02	0.3	0.2	
116	2008 Aug.	08.01086	00 38 59.37	+16 26 09.3	18.3	40
			0.01	0.2	0.2	
			(118325) 1998 XP71			
117	2008 Aug.	10.89609	23 57 28.78	+07 53 38.4	18.3	28
			0.01	0.2	0.2	
118	2008 Aug.	10.99729	23 57 27.41	+07 54 21.9	18.5	27
			0.01	0.2	0.2	
119	2008 Aug.	11.87414	23 57 16.29	+08 00 32.3	18.1	29
			0.02	0.4	0.2	
120	2008 Aug.	12.06611	23 57 13.33	+08 01 53.3	18.6	27
			0.01	0.2	0.2	
			(136108) Haumea = 2003 EL61			
121	2008 June	03.83843	13 33 12.93	+19 51 25.3	17.0	15
			0.02	0.3	0.2	
122	2008 June	03.89372	13 33 12.79	+19 51 24.8	17.2	18
			0.01	0.2	0.1	

N	Date U.T.		$R.A._{2000}$ $d\alpha$	$Decl._{2000}$ $d\delta$	Magn. dmag	Ref. st.
			(137170) 1999 HF1			
123	2008 Apr.	14.91539	18 14 02.16	+41 55 38.7	14.8	118
			0.01	0.1	0.2	
124	2008 Apr.	15.08394	18 13 56.50	+42 03 30.8	14.9	128
			0.01	0.1	0.2	
			(190637) 2000 WE155			
125	2008 July	31.87579	21 36 43.36	+00 43 06.6	18.2	69
			0.01	0.3	0.2	
126	2008 Aug.	01.03090	21 36 35.18	+00 43 22.5	18.1	54
			0.02	0.3	0.2	
			(153591) 2001 SN263			
127	2008 Feb.	24.75633	08 27 53.08	+04 28 22.0	12.0	72
			0.01	0.2	0.2	
128	2008 Feb.	25.02948	08 30 15.12	+03 48 26.5	12.1	81
			0.01	0.1	0.2	
129	2008 Feb.	25.89818	08 38 08.24	+01 44 13.2	12.1	65
			0.01	0.1	0.1	
130	2008 Feb.	26.04515	08 39 22.26	+01 23 37.2	12.1	43
			0.01	0.2	0.1	
			(197342) 2003 WG192			
131	2008 Oct.	25.81933	01 26 10.60	+16 49 44.9	18.4	35
			0.01	0.2	0.1	
132	2008 Oct.	25.88707	01 26 06.96	+16 49 37.0	18.7	36
			0.02	0.2	0.2	
133	2008 Oct.	26.77991	01 25 20.16	+16 47 56.6	18.6	38
			0.01	0.2	0.2	
134	2008 Oct.	26.99285	01 25 08.83	+16 47 32.2	18.3	27
			0.01	0.2	0.1	
			(199063) 2005 XE16			
135	2008 Oct.	25.81933	01 26 21.89	+16 51 02.5	18.2	35
			0.01	0.2	0.1	
136	2008 Oct.	25.88707	01 26 18.02	+16 50 30.4	18.4	36
			0.02	0.2	0.2	
137	2008 Oct.	26.77991	01 25 29.26	+16 43 28.0	18.3	38
			0.01	0.2	0.2	
138	2008 Oct.	26.99285	01 25 17.23	+16 41 47.0	18.2	27
			0.01	0.2	0.1	
			(217510) 2006 TY111			
139	2008 Feb.	12.78434	09 00 21.16	+08 27 25.1	17.8	53
			0.01	0.2	0.2	

N	Date U.T.		$R.A._{2000}$ dα	$Decl._{2000}$ dδ	Magn. dmag	Ref. st.
140	2008 Feb.	13.09947	09 00 03.86	+08 30 47.7	17.9	65
			0.02	0.3	0.1	
			(250365) 2003 SJ307			
141	2008 Jan.	02.81660	07 15 21.91	+20 13 18.8	17.8	139
			0.02	0.3	0.2	
142	2008 Jan.	03.05521	07 15 03.70	+20 11 58.2	18.4	121
			0.01	0.2	0.1	
			(329681) 2003 UD153			
143	2008 Sep.	02.84588	00 36 05.28	+00 18 38.9	18.4	27
			0.02	0.4	0.2	
144	2008 Sep.	02.91775	00 36 03.11	+00 18 21.5	18.4	26
			0.02	0.3	0.2	
			(331837) 2003 UL92			
145	2008 Aug.	04.00146	00 36 19.12	+15 46 44.5	18.9	29
			0.02	0.4	0.1	
146	2008 Aug.	04.03852	00 36 19.53	+15 46 50.5	18.9	27
			0.02	0.3	0.1	
			2008 TT115			
147	2008 Oct.	26.77991	01 24 57.39	+16 46 00.4	18.3	38
			0.02	0.3	0.2	
148	2008 Oct.	26.99285	01 24 47.02	+16 43 40.5	18.2	27
			0.01	0.2	0.1	

3. List of collaborators

Table 2. A list of people who participated in the observations and the position measurements and reductions.

Name	Exposures	Measurements	Reductions
P. Bendík	10	–	–
G. Červák	22	–	–
M. Husárik	22	148	148
Z. Kaňuchová	12	–	–
Z. Krišandová	22	–	–
M. Pikler	84	–	–

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