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IMPROVED POSITIONS FOR SONNEBERG VARIABLES: PART 1

The Sonneberg Observatory is well known in the world for its large plate archive and also for its contribution to the variable stars research field with almost 11000 variables discovered there. However most of these stars have had only approximate positions reported, so the follow-up observations and cross-referencing to other catalogues is sometimes difficult. Because many Sonneberg variables are located on the fields of the PICA project, one independent part of the project is to determine more precise coordinates for these stars. This paper is the first one devoted to the position improvements for Sonneberg variables.

My work on the PICA project significantly speed up after the USNO A1.0 catalogue (Monet *et al.*, 1996) was kindly supplied by D.G. Monet. The identification procedure now used is as follows: the A1.0 catalogue is visualized on computer screen by means of a special program (written by the author) and then compared with the published chart. When any problem appears then Digitized Sky Survey (DSS) provided by STScI (1997) is used in conjunction with Cotton's Fitsview utility (1996), which is also used for position determination of objects present on DSS but not included in A1.0 catalogue. When no object is found neither in A1.0 nor in DSS, then the coordinates are either estimated according to the position marked on chart or preferably measured from direct CCD images (or plate scans).

Table 1 gives precise positions for objects having published finding charts in MVS 246 – 249 (1957). North on these charts is on the top with exceptions marked directly on individual charts. However there are deviations from this rule and these are noted in remarks. Comments from original paper of Hoffmeister (1931) were used when possible. The source of the position is coded as follows : A = A1.0, C = CCD, D = DSS+Fitsview, E = estimate, P = plate scan. Positions should be precise to $\pm 1''$ for A, C, P code and to $\pm 2''$ for D code. The possible error for E code is noted in remarks. Identification with GSC is given where possible. No other identifications were searched for. As on the charts is not every time given final designation (it was not known at the time when charts were published), provisional designation is given in the table too. The differences resulting from a comparison with the positions given in GCVS in the sense *new – GCVS* are also shown, where $\Delta\alpha$ is given in seconds of time and $\Delta\delta$ is given in minutes of arc.

Table 1

Prov. desig.	Name	RA (2000)	Dec	GSC	s	$\Delta\alpha$	$\Delta\delta$	Remark
121.1931	AT Tau	5 39 55.66	+27 51 05.2	1869.1345	A	+7.8	-0.5	
122.1931	AW Tau	5 47 30.21	+27 08 10.8		A	+2.3	+1.2	
123.1931	AY Tau	5 49 48.80	+25 25 24.1	1866.1969	A	-3.7	+0.6	
124.1931	CG Tau	5 51 58.94	+27 29 21.1		D	-0.6	+0.2	2
125.1931	BB Tau	5 52 18.70	+25 49 41.9	1867.2497	A	-0.4	0.0	
126.1931	BC Tau	5 52 58.85	+24 14 30.5	1863.0151	A	-5.9	+1.9	
127.1931	BD Tau	5 53 41.41	+23 51 43.0	1863.0969	A	-3.9	+0.2	
128.1931	CN Tau	5 58 09.40	+28 02 33.4	1871.2093	A	+3.0	-0.7	
129.1931	CO Tau	5 58 54.64	+26 13 53.6	1867.1913	A	-1.0	+0.7	

Table 1 (continued)

Prov. desig.	Name	RA (2000)	Dec	GSC	s	$\Delta\alpha$	$\Delta\delta$	Remark
130.1931	BF Tau	5 59 47.19	+26 45 30.6	1871.1494	A	+8.7	+0.4	
131.1931	BO Aur	6 00 10.64	+29 14 06.6	1876.0382	A	+0.5	0.0	
132.1931	BF Gem	6 01 54.99	+26 19 41.3	1872.0911	A	+0.2	+1.7	
133.1931	DP Gem	6 02 24.42	+27 24 53.1	1872.1682	A	+1.0	+0.1	
134.1931	BR Aur	6 02 45.95	+29 38 44.9	1876.1947	A	-7.9	-0.2	
135.1931	BB Aur	6 03 25.06	+31 38 40.5	2419.0804	A	+0.1	0.0	
136.1931	BT Aur	6 04 28.71	+29 51 04.9	1876.0980	A	+4.6	+0.3	
137.1931	BS Aur	6 04 17.06	+28 29 01.4		A	-1.0	-0.2	
138.1931	BH Gem	6 04 39.18	+26 25 17.5	1872.1061	A	-3.8	+0.5	
139.1931	BV Aur	6 10 54.71	+30 13 51.6	2420.0581	A	-7.0	+0.5	
140.1931	CQ Mon	6 27 14.00	+4 46 31.2	0141.1493	A	-1.4	-0.6	
141.1931	CE Mon	6 46 57.40	+3 03 26.5	0152.2294	A	+1.1	-0.3	
142.1931	DI Mon	6 49 36.26	+3 10 19.5	0152.2191	A	+0.8	+0.2	
143.1931	BU Mon	6 50 33.64	+3 44 16.6	0152.1957	A	-6.4	-0.2	
144.1931	CG Mon	6 51 27.15	+5 13 22.0	0156.1137	A	+1.4	-0.6	
145.1931	DL Mon	6 51 55.46	+5 11 08.3	0156.0693	A	-6.3	-1.2	
146.1931	CL Mon	6 55 36.65	+6 22 44.0	0161.1272	A	+2.6	-0.3	
147.1931	BP Mon	6 56 55.44	+5 01 43.9	0157.1941	A	-1.1	+0.2	
148.1931	DS Mon	6 44 47.46	-5 17 48.9	4807.2754	A	+3.7	-1.7	
149.1931	V512 Mon	6 47 31.88	-4 42 59.0	4808.2174	A	+6.5	+1.4	
150.1931	DX Mon	6 47 57.50	-2 07 25.0	4804.1809	A	+1.1	0.0	
151.1931	DZ Mon	6 49 56.33	-4 49 37.9	4808.1020	A	+6.0	+0.9	
152.1931	EH Mon	6 52 08.71	-7 03 52.8	4812.0943	A	-7.0	-0.2	
153.1931	EI Mon	6 52 27.29	-5 45 51.5	4812.0516	A	+3.0	-0.2	
154.1931	EK Mon	6 52 46.13	-2 27 30.0	4805.0467	A	+0.1	-0.1	
155.1931	EM Mon	6 54 54.71	-8 01 18.9	5380.0096	A	-0.9	0.0	
156.1931	EX Mon	7 01 59.12	-8 06 12.8	5381.0523	A	-2.5	+1.2	
157.1931	BQ Mon	7 04 25.76	-9 57 58.3	5385.0039	A	-1.8	-0.4	
158.1931	EZ Mon	7 05 25.36	-5 10 36.8	4822.1190	A	-0.6	+1.0	
159.1931	FF Mon	7 06 35.51	-3 21 20.5	4818.2450	A	-3.5	+1.4	
160.1931	BR Mon	7 07 22.39	-1 19 25.3	4814.0434	A	0.0	-0.7	
161.1931	FI Mon	7 10 37.99	-7 07 22.0	4827.1039	A	-7.9	+0.6	
162.1931	BW Mon	7 11 22.22	-1 29 40.2	4815.1732	A	-5.9	+0.4	
163.1931	FK Mon	7 11 21.15	-5 27 08.4		A	-4.6	+0.9	3
164.1931	FP Mon	7 15 08.83	-9 57 47.8	5398.1061	A	-0.9	-0.5	
165.1931	FR Mon	7 17 48.28	-9 38 10.3	5399.0783	A	-1.8	+1.3	
166.1931	DZ CMa	7 16 59.31	-15 18 26.3	5965.0667	A	+6.8	+1.0	
167.1931	DR CMa	7 22 24.09	-15 19 32.7	5966.0512	A	-1.6	+0.3	
168.1931	DS CMa	7 24 09.71	-15 14 55.0		A	+1.9	+1.0	
169.1931	HN Pup	7 29 46.02	-15 22 11.5	5979.2826	A	-2.8	-0.9	
170.1931	KP Mon	7 30 06.80	-10 53 21.5	5400.0633	A	-0.1	0.0	
171.1931	EE Pup	7 30 28.20	-14 44 34.7		A	+5.6	+1.0	
172.1931	FV Pup	7 32 36.37	-12 14 15.5	5405.2616	A	-4.1	-0.8	
173.1931	FX Pup	7 33 02.06	-11 47 55.5	5405.2443	A	+2.0	-1.4	
174.1931	HO Pup	7 33 54.13	-15 45 38.3		A	+0.6	+0.9	
175.1931	NSV 03651	7 35 06.98	-15 08 03.7	5979.2750	A	+5.7	+0.6	
176.1931	BF Pup	7 35 25.17	-15 06 33.0	5979.2390	A	-1.1	+0.3	4
177.1931	FZ Pup	7 38 06.87	-17 37 22.2	5984.2694	A	+2.4	+0.5	
178.1931	GH Pup	7 39 37.56	-15 56 20.2	5980.2323	A	+56.1	+0.6	5
179.1931	GK Pup	7 41 44.01	-15 13 50.1	5980.1982	A	-9.4	-0.7	
180.1931	GN Pup	7 46 35.78	-15 00 33.3	5981.1169	A	0.0	0.0	6
181.1931	GO Pup	7 47 37.49	-11 57 11.1	5419.2392	A	+0.3	0.0	
182.1931	GQ Pup	7 48 29.06	-16 23 12.5	5981.0576	A	-0.2	+1.3	
183.1931	EG Her	17 39 26.52	+29 17 34.1	2088.1619	A	+1.0	+0.1	7
184.1931	NR Her	17 40 30.64	+27 50 57.6	2084.1066	A	-2.0	+0.4	
185.1931	LW Her	17 41 48.91	+25 09 25.6	2080.1960	A	+0.4	+0.1	
186.1931	FS Her	17 44 13.90	+25 14 55.0	2081.0972	A	+3.5	+0.1	
187.1931	LY Her	17 45 09.65	+25 20 12.8	2081.2430	A	-0.6	-0.3	
188.1931	EH Her	17 45 56.51	+32 51 31.1	2611.1450	A	-0.2	-1.4	
189.1931	EI Her	17 48 20.41	+24 42 27.2	2081.1595	A	-6.7	+0.4	

Table 1 (continued)

Prov. desig.	Name	RA (2000)	Dec	GSC	s	$\Delta\alpha$	$\Delta\delta$	Remark
190.1931	EK Her	17 49 17.69	+24 59 08.2	2081.3600	A	-12.0	0.0	
191.1931	LZ Her	17 49 29.23	+29 19 15.8	2089.1510	A	-2.1	+1.1	
192.1931	EL Her	17 51 48.58	+26 38 48.6	2098.2583	A	-5.8	+0.5	8
193.1931	EN Her	17 53 38.57	+26 39 25.7	2098.2793	A	-3.8	+2.0	
194.1931	EO Her	17 53 55.88	+28 13 25.6	2102.0068	A	-0.1	+0.9	
195.1931	FT Her	17 54 04.61	+28 57 49.1	2102.2426	A	-10.3	+2.3	
196.1931	EP Her	17 55 09.40	+26 36 19.1	2098.2384	A	+3.0	+2.7	
197.1931	ER Her	17 56 48.29	+25 54 21.5	2094.3319	A	+3.9	+1.7	
198.1931	ES Her	17 56 42.45	+32 52 31.8	2612.0362	A	-7.1	-2.2	
199.1931	EU Her	17 58 13.45	+31 55 10.0	2612.1609	A	-6.7	-1.6	
200.1931	FW Her	17 59 25.79	+25 43 12.6	2094.1197	A	+5.2	-1.7	
201.1931	EV Her	17 59 03.51	+31 41 57.6	2608.1902	A	-5.1	+0.1	
202.1931	MN Her	18 02 17.64	+27 53 27.9	2099.1300	A	-2.8	-1.6	
203.1931	EW Her	18 03 50.52	+33 23 01.5		A	-4.2	-2.2	1
204.1931	EY Her	18 04 38.79	+32 41 39.7	2625.0721	A	-3.2	-0.6	
205.1931	EZ Her	18 04 56.61	+28 32 46.8	2103.0130	A	-9.9	+0.5	
206.1931	FF Her	18 05 07.50	+30 05 41.0	2621.0282	A	-6.7	+2.4	9
207.1931	FY Her	18 06 28.56	+29 05 50.9	2103.3029	A	-3.1	-0.6	10
208.1931	FH Her	18 06 09.24	+32 22 13.0	2625.0277	A	-9.3	+0.8	
209.1931	FI Her	18 09 54.82	+31 21 46.1		A	-3.3	+0.1	
Ross 297	CG Her	18 11 41.20	+26 25 56.6		A	+0.5	+0.2	
210.1931	V555 Oph	17 42 14.33	+5 23 57.7	0423.0716	A	+1.8	0.0	11
211.1931	NSV 09582	17 43 20.41	+5 09 16.3	0423.1094	A	+6.6	-0.4	11
212.1931	V 439 Oph	17 43 33.28	+3 35 36.2	0419.1720	A	+4.7	-0.6	
213.1931	V557 Oph	17 45 04.73	+6 41 37.7		A	+0.7	0.0	
214.1931	V457 Oph	17 47 14.08	+3 04 38.3	0420.0040	A	-1.1	-0.1	
215.1931	V559 Oph	17 47 12.73	+3 20 21.5	0420.1303	A	-0.2	-0.1	
216.1931	V458 Oph	17 47 37.13	+1 32 36.7	0416.0618	A	-0.9	-0.2	
217.1931	V560 Oph	17 48 52.66	-1 13 53.2	5082.1714	A	+6.4	+1.0	
218.1931	V459 Oph	17 48 47.15	+1 59 46.7		A	+0.7	+0.1	
219.1931	V562 Oph	17 49 00.42	+2 38 27.3	0420.0119	A	+7.7	-0.6	
220.1931	V460 Oph	17 49 24.74	-0 03 06.6		A	+0.9	+0.5	
221.1931	V563 Oph	17 49 29.29	+3 19 22.7		A	-1.6	-0.2	
222.1931	V461 Oph	17 51 15.59	+0 43 23.5	0416.1852	A	-0.4	0.0	
223.1931	V462 Oph	17 51 08.63	+2 51 07.1		A	+0.1	+0.1	
224.1931	V463 Oph	17 51 37.92	-1 32 21.8		A	+3.3	+0.3	
225.1931	V464 Oph	17 51 42.16	+5 05 26.7	0424.0637	A	-0.7	+0.1	
226.1931	V465 Oph	17 52 07.42	-1 05 07.8	5082.1262	A	+3.4	-0.6	
227.1931	V530 Oph	17 52 02.73	+4 37 25.7	0424.1475	A	+0.3	+0.3	
228.1931	V466 Oph	17 52 07.23	+4 52 43.9	0424.1174	A	-0.9	+1.2	
229.1931	V467 Oph	17 53 16.92	-0 28 08.1		A	+8.5	+1.5	
230.1931	V468 Oph	17 54 02.02	+6 18 45.2	0429.1968	A	+2.6	+0.1	
231.1931	V469 Oph	17 54 43.01	+0 47 15.2	0417.0655	A	+0.1	+0.1	
232.1931	V470 Oph	17 54 40.06	+0 56 08.7	0417.0361	A	+0.3	0.0	
233.1931	V531 Oph	17 54 40.88	+6 10 34.1	0429.1462	A	+1.3	0.0	
234.1931	NSV 09850	17 55 03.32	+1 15 29.2	0417.0590	A	-1.1	+0.9	
235.1931	NSV 09851	17 55 01.66	+3 21 20.2	0421.0847	A	-1.3	+0.8	1
236.1931	V471 Oph	17 55 28.71	+2 18 30.2		A	-0.4	+0.1	
237.1931	V472 Oph	17 55 47.12	+0 56 37.8	0417.1923	A	+0.4	+0.2	
238.1931	V565 Oph	17 55 42.26	+5 52 10.0		A	+0.3	+0.2	
239.1931	NSV 09878	17 56 20.96	+3 23 30.8	0421.0226	A	-0.9	-0.2	
241.1931	V473 Oph	17 56 53.13	+3 22 11.9	0421.0376	A	-0.8	+0.1	
54.1907	SV Oph	17 56 24.80	+3 22 38.1	0421.0854	A	-0.1	0.0	
240.1931	NSV 09881	17 56 25.66	+0 36 19.2	0417.2172	A	-4.5	+2.7	
242.1931	V474 Oph	17 57 55.70	+0 58 22.1	0417.2557	A	+1.0	-0.1	
243.1931	V1013 Oph	17 57 58.59	+5 34 36.2		A	+4.3	+1.8	
244.1931	V475 Oph	17 58 24.74	+4 09 05.5		A	+0.8	+0.2	
245.1931	V476 Oph	17 58 22.58	+3 37 18.2	0421.0335	A	+1.0	-0.1	
246.1931	V477 Oph	17 59 08.15	+5 38 25.7		A	+0.9	+0.1	
247.1931	V478 Oph	17 59 38.97	+0 47 08.4	0417.2031	A	+0.1	-0.1	

Table 1 (continued)

Prov. desig.	Name	RA (2000)	Dec	GSC	s	$\Delta\alpha$	$\Delta\delta$	Remark
248.1931	V479 Oph	18 00 04.11	+6 07 16.5	0442.1093	A	-1.6	+1.3	
249.1931	V 480 Oph	18 00 32.43	+1 08 51.8	0430.3557	A	-8.1	-0.1	
250.1931	V481 Oph	18 00 54.49	+2 19 37.3	0434.3668	A	-1.6	-0.4	
251.1931	NSV 09981	18 01 04.41	+1 29 25.2	0430.2390	A	+0.3	+1.4	
252.1931	V482 Oph	18 01 07.02	+0 41 43.9	0430.2105	A	+2.0	-0.1	
253.1931	V483 Oph	18 01 19.58	+2 58 01.6	0434.2819	A	+10.2	0.0	
254.1931	V570 Oph	18 01 22.77	+4 02 28.6	0438.2164	A	-0.3	+0.2	
255.1931	V485 Oph	18 02 12.49	+5 02 50.4	0438.1803	A	-0.4	+0.3	
256.1931	AX Ser	18 02 30.90	-0 05 59.5	5096.0029	A	-1.0	-0.1	
257.1931	V484 Oph	18 02 06.81	+7 03 33.0	0442.1130	A	-1.7	-0.5	
258.1931	V487 Oph	18 02 33.66	+1 47 47.5	0430.1536	A	-0.1	+0.7	
259.1931	V486 Oph	18 02 27.52	+4 28 01.4	0438.1446	A	+7.0	-2.1	
260.1931	V488 Oph	18 02 46.94	+4 18 10.3	0438.1826	A	+7.2	-0.9	
261.1931	V489 Oph	18 03 01.89	+4 58 46.2		A	+5.9	-0.4	
262.1931	V490 Oph	18 03 33.03	+4 28 32.3	0438.2002	A	+0.5	-1.6	
263.1931	V491 Oph	18 04 31.36	+3 23 52.0	0434.1058	A	-1.5	-1.4	
264.1931	V492 Oph	18 05 23.80	+2 56 35.7	0434.0921	A	+2.4	+0.3	
265.1931	V493 Oph	18 06 58.78	+5 31 46.2	0438.0161	A	-1.6	+0.3	
266.1931	AY Ser	18 08 06.58	-0 15 17.4		A	-2.6	+1.2	
29.1926	V426 Oph	18 07 51.71	+5 51 49.7	0443.1459	A	-0.3	-0.1	

Remarks:

1. Two entries for the same star in A1.0. The position given in the table is an average.
2. **CG Tau** – mean position of a close double, not known which component varies.
3. **FK Mon** – north on the bottom.
4. **BF Pup** – not sure, northernmost in a small triangle.
5. **GH Pup** – GCVS position in error by 1^m.
6. **GN Pup** – southern component of a double star; the northern one is GSC 5981.1307 at a distance of about 7".
7. **EG Her** – north to the right side.
8. **EL Her** – nearby GSC 2098.2252 represents another object about 15" to east. On DSS it seems that these two objects are connected with some nebulosity. There also exist GSC 2098.3223 which is probably EL Her in maximum and blended with its eastern neighbour.
9. **FF Her** – north on the bottom.
10. **FY Her** – north to the right side, not left.
11. **V555 Oph** and **NSV 09582** – two independent charts in one frame. Should be vertically divided into two square frames.

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