ON THE SYSTEMATIC ERRORS OF THE DETERMINATIONS OF THE ABSOLUTE ORIENTATION OF THE MERIDIAN MARKS

G. M. Petrov
Nikolaev Branch of the Central
Astronomical Observatory at Pulkovo
327030 Nikolaev
U S S R

ABSTRACT. The classical method of determination of the absolute azimuth (or Bessel's parameter "n") can secure sufficiently precision for RA from observations of stars at high geographical latitudes during polar night only.

The results of the study of systematic differences between Right Ascensions obtained from observation of stars in upper and lower culmination at Greenwich, Herstmonceux and Pulkovo show that the determination of RA at these observatories are worse because of the systematic errors of determination of the absolute azimuth of meridian marks.

These errors are given in Tables 1 and 2 which show that errors of azimuth reached $\pm 0^{s}.01$ and more what is inadmissible.

Table I. The Corrections for Azimuth (unit $0^{s}.001$)
(Greenwich-Herstmonceux I,II,III catalogues for 1950.0)

α	GrI	GrIII	HI	HII	HIII	α	GrI	GrIII	HI	HII	HIII
0^h	-10	0	- 4	+2	+3	12^h	-7	- 5	+5	+6	0
1	- 6	0	- 4	+4	+3	13	-5	- 2	+5	+2	+3
2	0	+3	-7	-2	+1	14	-2	- 5	+9	+4	+2
3	+ 7	+5	- 8	-5	-3	15	-1	- 1	+8	+4	+3
4	+11	+6	-11	-8	-5	16	-3	- 7	+9	+4	+1
5	+14	+7	- 9	-3	-6	17	-3	- 7	+3	+5	+2
6	+14	+7	- 5	-5	-6	18	-4	-13	+3	+5	+1
7	+14	+7	0	-2	-6	19	-4	-13	+2	+3	+2
8	+12	+3	+ 1	0	-6	20	-2	-11	+1	-2	+3
9	+10	-1	- 1	+1	-4	21	-4	- 3	-1	-4	0
10	+ 5	-1	0	+2	-3	22	-6	- 1	0	-3	-1
11	- 2	-2	0	+4	-2	23	-10	0	-2	-2	0

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Table 2. The Corrections for Azimuth at Pulkovo

α	1905	1915	1925	1930	α	1905	1915	1925	1930
0^h	-2	-2	-7	-3	12^h	0	+5	-2	-5
1	0	-6	-4	-1	13	-2	+5	-2	-2
2	-1	-7	+2	-1	14	0	+6	+6	+4
3	+3	-6	+11	+1	15	+1	+4	+1	+5
4	+4	-6	+13	+2	16	0	0	-1	+7
5	+3	+1	+9	+4	17	0	-1	-4	+2
6	-2	+6	-2	+2	18	-3	-2	-2	+1
7	-3	+8	+2	+2	19	0	-5	+1	-1
8	-1	+6	-4	+1	20	+1	-8	0	-4
9	+2	+4	0	+1	21	+4	-10	-1	-3
10	+3	+6	+2	-3	22	-1	-7	-4	-5
11	0	+6	-3	-5	23	-2	-3	-6	-2

We think that these errors appear because of carrying out the observations of azimuth stars in both culminations in quite unequal conditions varying during the year.

The Astronomical Observatory at Nikolaev has gathered the experience of working in much better conditions - conditions of polar night at West Spitsbergen ($\varphi = 78°$) with meteorological characteristics being unchanged during 24-h period.

The dispersion of the absolute values of Bessel's parameter "n" against their mean (at Spitsbergen) with his error σ are given in Table 3 for every RA hour of 24-h interval of continuous observations.

Table 3. The Variation Parameter "n" at Spitsbergen

Solar time	Δn	σ	Solar time	Δn	σ
0^h	-0.8	±1.0	12^h	-0.8	±1.0
1	-0.4	1.2	13	-0.4	1.2
2	+1.3	1.3	14	+1.3	1.3
3	+2.4	1.3	15	+2.4	1.3
4	0.0	1.3	16	0.0	1.3
5	-0.6	1.1	17	-0.6	1.1
6	-0.1	1.1	18	-0.1	1.1
7	-2.1	1.0	19	-2.1	1.0
8	-1.4	1.2	20	-1.4	1.2
9	+0.2	1.2	21	+0.2	1.2
10	+1.2	1.3	22	+1.2	1.3
11	0.0	1.1	23	0.0	1.1

These results show that the parameter "n" is practically independent of the Sun's hour angle, what is especially important for absolute determinations of RA.