COMPARISON OF TOKYO PZT CATALOGUES WITH AGK3 AND WITH THREE OTHER INDEPENDENT CATALOGUES

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SUMMARY

Results are presented of the comparison of five Tokyo PZT catalogues with the AGK3 and three other independent catalogues obtained with meridian circles.

COMPARISON

Five Tokyo PZT catalogues: Torao, Fujii, (1967)-labelled T_I; Iijima, Niimi (1969)(=T_{II}); Iijima et al. (1971)(=T_{III}); Iijima et al. (1977)(=T_{IV}) and Fujii (1981)(=T_V); Sadžakov, S. et al. (1984) are compared with the following independent catalogues obtained with meridian circles: Yasuda et al., (1982)(=1);Mazurier, J.M. et al. (1977)(=2); Sadžakov,S. et al. (1981)(=3) as well as with the AGK3 (1975)(=4). The comparison has been accomodished in the sense Cat - T, where Cat denoting the independent meridian catalogues or the AGK3 and T the Tokyo PZT catalogues. Only stars common to any catalogue pair compared have been used. The proper motions, necessary at reducing the star positions to the 1950. 0 eppoch are borrowed from Yasuda and Kamijo (1970) list for all catalogues used.

The reduction to the eppoch 1950·0 us performed by use of the formula

$$\Delta\alpha_{ep} = \alpha_{1950\cdot0} + \mu_\alpha (t - 1950\cdot0)$$

$$\Delta\delta_{ep} = \delta_{1950\cdot0} + \mu_\delta (t - 1950\cdot0)$$

Then the differences

$$\Delta\alpha = \alpha_{cat} - \alpha_{PZT}$$
$$\Delta\delta \quad \delta_{cat} - \delta_{PZT}$$

are formed and averaged within two-hour-groups. Their mean values are presented in Figs. 1-4.

T A B L E 1.

in $0^{s}.001$ units

$\Delta\alpha$	A_o	A_1	B_1	A_2	B_2	A_3	B_3	ε	n	cat.
T_I	4 ±2	-2 ±3	7 ±3	-3 ±3	1 ±3	-1 ±3	3 ±3	±20	115	1
	0 ±2	-2 ±3	6 ±3	-3 ±3	1 ±3	-1 ±3	4 ±3	±23	107	2
	2 ±3	-16 ±4	8 ±5	-7 ±4	-6 ±5	-1 ±4	4 ±5	±33	108	3
	1 ±2	2 ±2	0 ±2	1 ±2	-2 ±2	1 ±2	2 ±2	±17	112	4
	2 ±2	-5 ±3	5 ±3	-3 ±3	-2 ±3	-1 ±3	3 ±3	±23	442	
T_{II}	2 ±2	-4 ±2	-7 ±3	4 ±2	-1 ±3	-3 ±3	2 ±3	±21	138	1
	-4 ±2	-7 ±3	2 ±3	-7 ±3	1 ±3	-4 ±3	4 ±3	±26	132	2
	0 ±2	-15 ±3	-3 ±3	-2 ±3	-7 ±3	-1 ±3	3 ±3	±23	138	3
	-1 ±2	-2 ±2	1 ±3	-4 ±2	-1 ±3	-2 ±3	5 ±3	±21	138	4
	-1 ±2	-7 ±3	-2 ±3	-2 ±3	-2 ±3	-3 ±3	4 ±3	±23	546	
T_{III}	4 ±1	-3 ±2	5 ±2	-3 ±2	2 ±2	-1 ±2	0 ±2	±13	142	1
	-0 ±1	2 ±2	5 ±2	-3 ±2	2 ±2	-1 ±2	2 ±2	±15	133	2
	-3 ±3	-17 ±4	1 ±4	-9 ±4	-8 ±4	-5 ±4	3 ±4	±32	138	3
	3 ±2	3 ±2	0 ±2	2 ±2	-2 ±2	1 ±2	1 ±2	±18	139	4
	1 ±2	-4 ±3	3 ±3	-3 ±3	-2 ±3	-2 ±3	2 ±3	±20	552	
T_{IV}	4 ±1	-3 ±1	3 ±1	1 ±1	2 ±1	-1 ±1	0 ±1	± 6	142	1
	0 ±1	-3 ±1	2 ±1	1 ±1	3 ±1	-1 ±1	2 ±1	± 8	133	2
	0 ±2	-15 ±3	3 ±3	-7 ±3	-6 ±3	-2 ±3	2 ±3	±26	140	3
	3 ±2	6 ±2	-0 ±2	-1 ±2	-1 ±2	1 ±2	-0 ±2	±17	139	4
	2 ±2	-4 ±2	2 ±2	-2 ±2	-1 ±2	-1 ±2	1 ±2	±14	554	
T_V	4 ±2	-1 ±2	-6 ±2	3 ±2	0 ±2	-2 ±2	-1 ±2	±20	139	1
	0 ±0	-2 ±1	-0 ±1	1 ±1	2 ±1	-0 ±1	3 ±1	± 6	133	2
	3 ±2	4 ±2	2 ±2	-2 ±2	0 ±2	1 ±2	1 ±2	±17	139	3
	2 ±2	2 ±2	1 ±2	-2 ±2	-1 ±2	-0 ±2	2 ±2	±17	139	4
	2 ±2	1 ±2	-1 ±2	0 ±2	0 ±2	0 ±2	1 ±2	±15	550	
	1 ±2	-4 ±3	1 ±3	-2 ±3	-2 ±3	-2 ±3	2 ±3	±19	2.644	

T A B L E 2.

in 0".01 units

$\Delta\delta$	A'_0	A'_1	B'_1	A'_2	B'_2	A'_3	B'_3	ε'	n	cat.
T_I	15 ±2	-4 ±3	6 ±4	5 ±3	8 ±3	-0 ±3	5 ±3	±24	115	1
	14 ±3	-1 ±4	3 ±4	5 ±4	7 ±4	-0 ±4	6 ±4	±27	107	2
	16 ±4	-6 ±5	17 ±5	8 ±5	6 ±5	-4 ±5	12 ±5	±35	109	3
	4 ±3	2 ±4	2 ±4	6 ±4	3 ±4	-3 ±4	8 ±4	±28	110	4
	12 ±3	-2 ±4	7 ±4	6 ±4	6 ±4	-2 ±4	8 ±4	±29	441	
T_{II}	14 ±2	-3 ±3	1 ±3	1 ±3	2 ±3	0 ±3	6 ±3	±26	141	1
	13 ±2	0 ±3	-0 ±4	0 ±4	-1 ±4	1 ±4	7 ±4	±29	132	2
	15 ±3	-7 ±4	14 ±5	7 ±5	3 ±5	-8 ±5	9 ±5	±38	140	3
	9 ±2	2 ±3	1 ±3	4 ±3	1 ±3	-1 ±3	4 ±3	±23	140	4
	13 ±2	-2 ±3	4 ±4	3 ±4	1 ±4	-2 ±4	7 ±4	±29	553	
T_{III}	15 ±2	-4 ±3	6 ±4	5 ±3	8 ±3	-0 ±3	5 ±3	±24	115	1
	2 ±2	1 ±3	-4 ±3	6 ±3	0 ±3	-0 ±3	1 ±3	±22	130	2
	11 ±4	-4 ±5	11 ±5	6 ±5	4 ±5	-5 ±5	14 ±5	±40	130	3
	5 ±2	2 ±3	0 ±4	1 ±3	-1 ±3	-3 ±3	9 ±3	±28	120	4
	8 ±3	-1 ±4	3 ±4	5 ±4	3 ±4	-2 ±4	7 ±4	±29	495	1
T_{IV}	4 ±1	-3 ±1	3 ±1	1 ±1	2 ±1	-1 ±1	0 ±1	± 6	142	1
	4 ±1	-0 ±2	-3 ±2	2 ±2	-2 ±2	-1 ±2	3 ±2	±12	133	2
	12 ±3	-7 ±4	15 ±5	9 ±5	6 ±5	-4 ±5	10 ±5	±38	140	3
	6 ±2	0 ±2	4 ±3	4 ±3	1 ±3	-2 ±3	6 ±3	±22	141	4
	7 ±2	-3 ±2	5 ±3	4 ±3	2 ±3	-2 ±3	5 ±3	±20	556	·
T_V	19 ±1	-5 ±1	3 ±1	3 ±1	2 ±1	-2 ±1	1 ±1	±10	142	1
	18 ±1	-4 ±1	3 ±2	3 ±1	-0 ±2	-1 ±1	3 ±2	±12	133	2
	1 ±3	-4 ±4	7 ±5	6 ±5	1 ±5	-8 ±5	9 ±5	±38	138	3
	-4 ±2	2 ±2	4 ±3	5 ±2	1 ±3	-3 ±2	4 ±2	±21	136	4
	9 ±2	-3 ±2	4 ±3	4 ±2	1 ±3	-4 ±2	4 ±3	±20	549	
	10 ±2	-2 ±3	5 ±4	4 ±3	3 ±4	-2 ±3	6 ±4	±25	2.594	

T A B L E   3.

in $0\overset{s}{.}001$ units   in $0\overset{''}{.}01$ units

	K_o	ε_{K_o}	π	ε_π	K_o'	ε'_{K_o}	π'	ε'_π	cat.
T_I	7	±3	250°	±21	7	±3	234°	±27	1
	6	±3	252°	±30	3	±4	245°	±60	2
	18	±4	207°	±15	18	±5	251°	±15	3
	7	±2	74°	±20	2	±4	352°	±120	4
	10	±3	196°	±22	8	±4	271°	±56	
T_{II}	7	±3	200°	±23	3	±3	194°	±62	1
	7	±3	192°	±28	0	±4	81°	±13	2
	17	±4	184°	±14	16	±5	243°	±16	3
	2	±2	110°	±50	2	±3	359°	±111	4
	8	±3	172°	±29	5	±4	219°	±51	
T_{III}	6	±2	243°	±15	7	±2	217°	±14	1
	5	±2	241°	±19	5	±2	227°	±24	2
	15	±3	192°	±12	16	±5	244°	±16	3
	3	±2	359°	±38	4	±3	255°	±35	4
	7	±2	259°	±21	8	±3	236	±14	
T_{IV}	4	±1	216°	±11	3	±1	136°	±24	1
	3	±1	210°	±17	3	±2	96°	±30	2
	16	±3	176°	±10	8	±5	243°	±33	3
	6	±2	1°	±20	7	±3	282°	±19	4
	7	±2	151°	±15	5	±3	189°	±27	
T_V	3	±1	194°	±12	6	±1	212°	±11	1
	2	±1	173°	±18	4	±1	215°	±19	2
	15	±3	168°	±11	12	±5	249°	±24	3
	3	±2	28°	±40	3	±3	348°	±56	4
	6	±2	141°	±20	6	±3	256°	±28	
	8	±2	184°	±21	6	±3	234°	±35	

Figure 1.

Systematic differences between
NPZT (Yasuda) and PZT (Tokyo)

Figure 2.

Systematic differences between
NPZT (Bordeaux) and PZT (Tokyo)

T_I
T_{II}
T_{III}
T_{IV}
T_V

Figure 3.

Systematic differences between
NPZT (Belgrade) and PZT (Tokyo)

T_I
T_{II}
T_{III}
T_{IV}
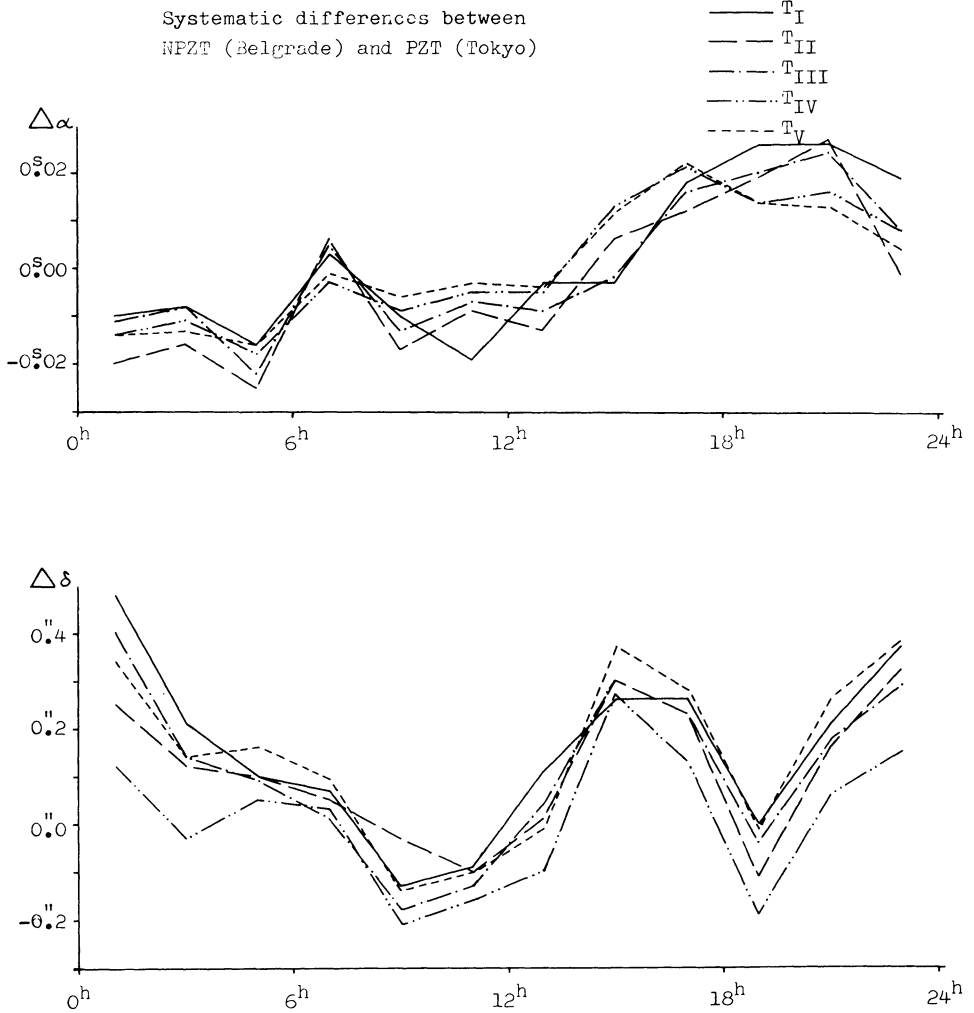T_V

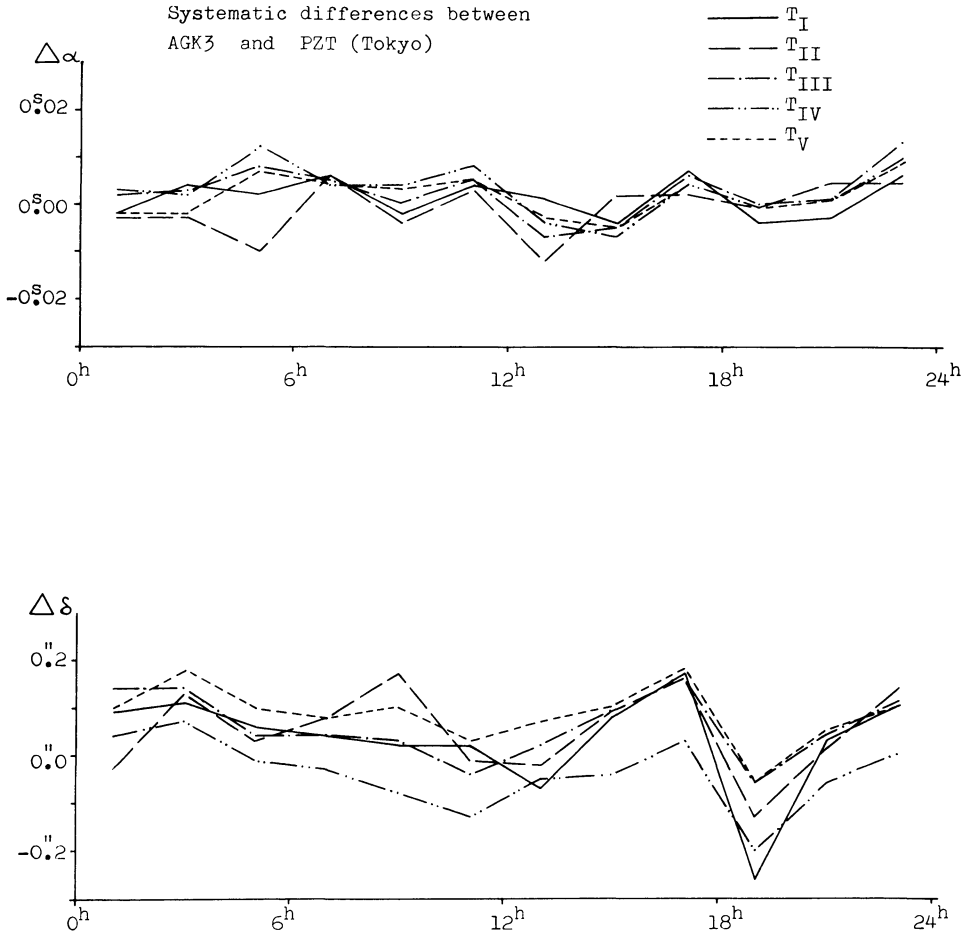Figure 4.

Systematic differences between AGK3 and PZT (Tokyo)
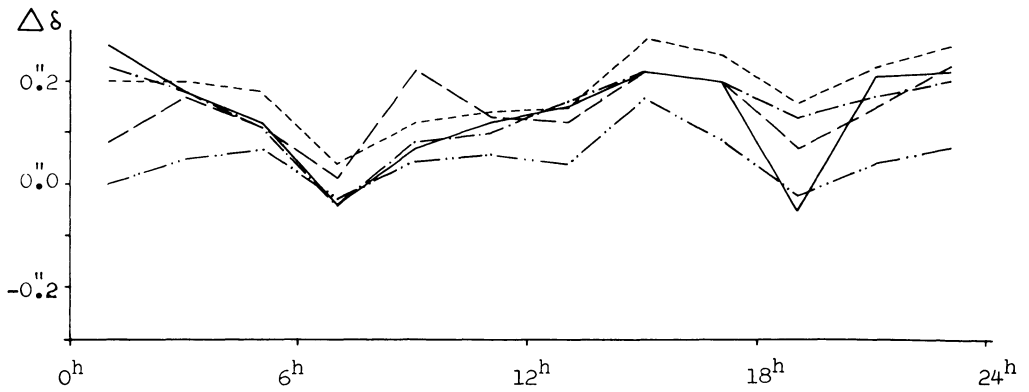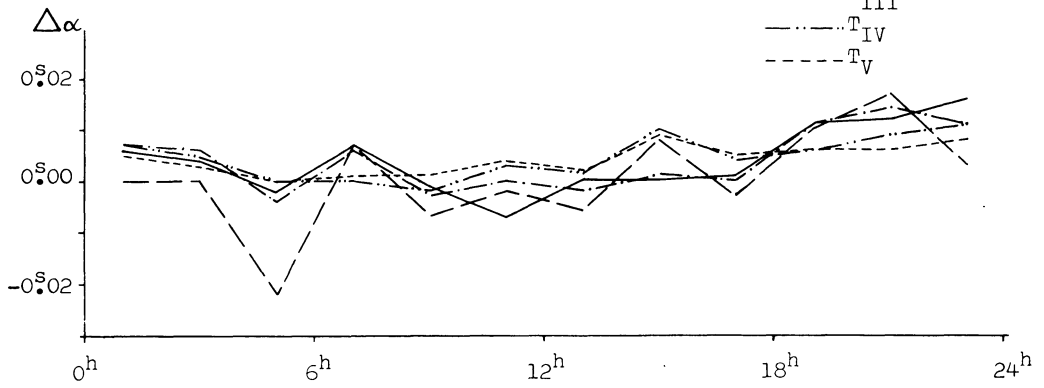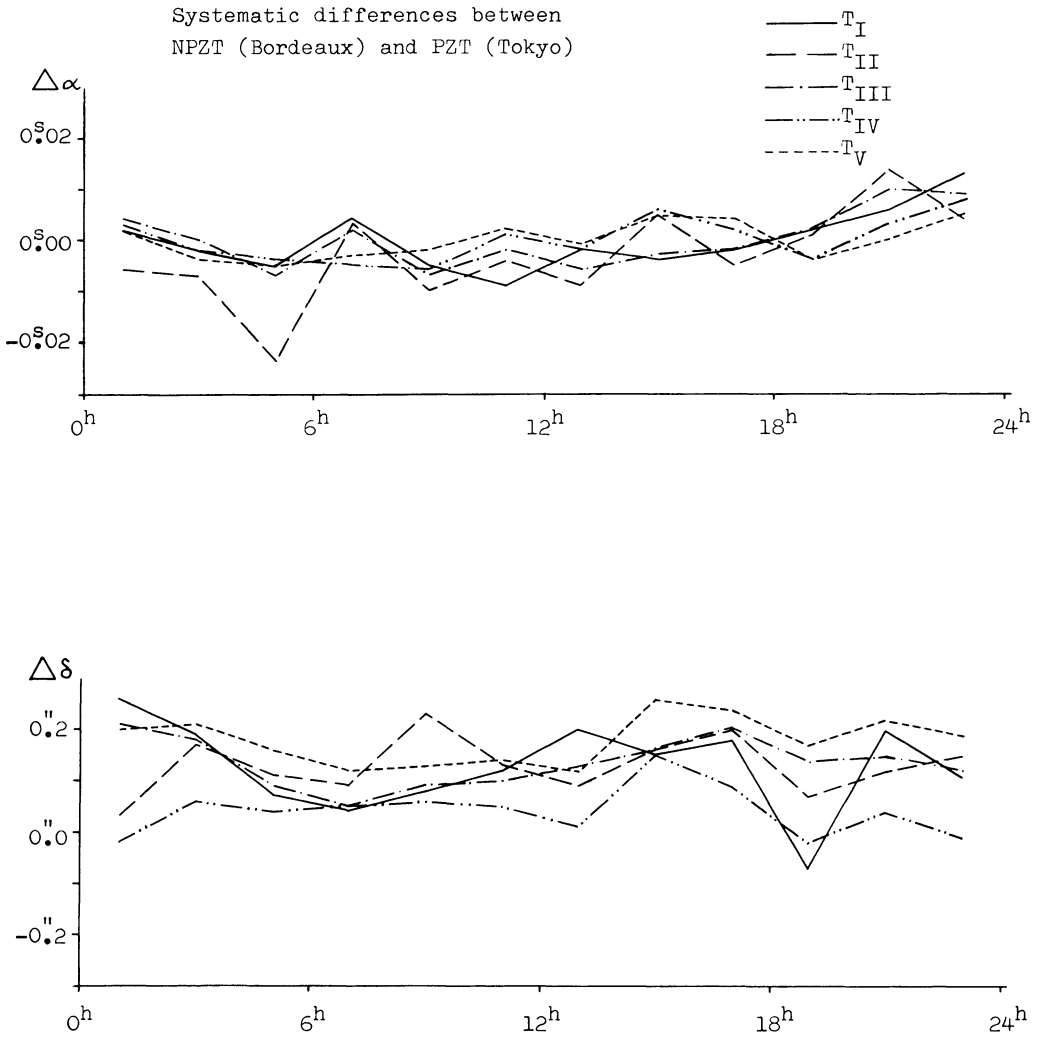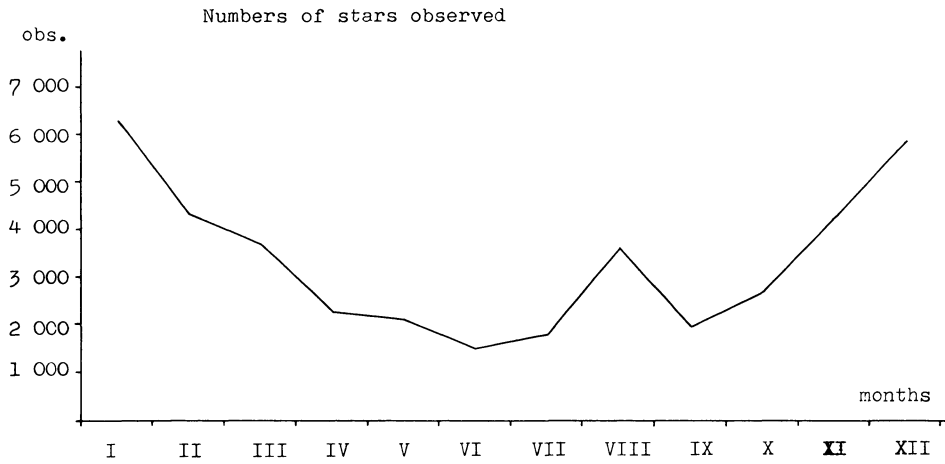
Figure 5.

The analytical expressions of the catalogue deviations are given in the form:

$$\Delta\alpha \cos \delta = A_o + A_1\sin\alpha + B_1\cos\alpha + A_2\sin 2\alpha + B_2\cos 2\alpha + A_3\sin 3\alpha + B_3\cos 3\alpha$$

$$\Delta\delta = A_o' + A_1'\sin\alpha + B_1'\cos\alpha + A_2'\sin 2\alpha + B_2'\cos 2\alpha + A_3'\sin 3\alpha + B_3'\cos 3\alpha$$

Table 1 summarized the coefficients A_i, B_i, A_i', B_i' (i=1, 2, 3), their determination errors, mean errors of the weight unit (ϵ) and the number of the common stars (n). In the last rows of Table 1 are the mean values of the coefficients and of their errors (Table 1 and 2).

Proceeding from the values of A_i, B_1, A_i', B_i', the quantities $\Delta\alpha$ and $\Delta\delta$ can be expressed in the form:

$$\Delta\alpha = K \sin(\alpha+\pi) \quad ; \quad \Delta\delta = K' \sin(\alpha+\pi')$$

where K and K' are amplitudes, π and π' periods. The values of K, K', π, π' and the accompanying errors are presented in Table 3.

CONCLUSIONS

As evident from Figs. 1-4 and Table 1 and 2 one can speak about systematic deviations being present in all five Tokyo PZT catalogues in the period 1957-1978. Howewer, it is hard without further analysis to be resolute as to the origins of these deviations. It seems, howewer, reasonable that the uneven distribution of the observations throughout the year has left, among other things, its mark on the results.

As evidenced by Table 3 the Belgrade K coefficients are markedly larger than theit homologues in other catalogues (the same applies, of course, to the Belgrade amplitudes in Fig. 3). A more thorough analysis is necessary to ascertain the origins of this finding.

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