

Tentative corrections to the FK₃ and GC systems of declinations, by *J. H. Oort*.*Summary.*

From data given by HEINEMANN and Frl. NOWACKI corrections to the FK₃ and GC systems of declinations and of proper motions in declination have been derived. Near the equator the new system is the average of that derived from catalogues corrected by means of solar observations and that from uncorrected catalogues, and is supposed to have a weight of about twice that of the FK₃. Between the equator and the pole the corrections to the FK₃ were assumed to vary linearly. The final corrections are given under $\Delta_o\delta$ and $\Delta_o\mu_\delta$ in Table 2.

As shown in the preceding article, it is possible to derive a system of declinations and proper motions in declination which has about twice the weight of the FK₃ system. It is the purpose of the present note to determine this system.

We shall use a most simple method for this purpose. The procedure is this. In the zones from -10° to $+17\frac{1}{2}^\circ$ declination corrections to the FK₃ system in declination were determined from all 49 catalogues used by HEINEMANN in the construction of the FK₃. These corrections have already been given in Table 2 of the preceding article. The same weights were used as in that article; no systematic corrections were applied to the individual catalogues. Similar corrections were derived from the 28 catalogues reduced by means of observations of sun, moon or planets (Table 4 of the preceding article). Here again, I have not applied any systematic corrections except the individual corrections yielded by the solar observations pertaining to each catalogue. The systems of Tables 2 and 4 are thus entirely independent as systems; they are very nearly of equal weight, and I have thus adopted the following simple average of these two results as basis for the definitive corrections to the FK₃ system.

TABLE I.

Systematic corrections to the FK₃ near the equator

δ	δ_{1900}	m.e.	μ_δ	m.e.
$+10^\circ$ to $+17\frac{1}{2}^\circ$	$+01$	± 04	$+0014$	± 0019
0 „ $+7\frac{1}{2}^\circ$	-01	± 04	$+0018$	± 0018
-10 „ $-2\frac{1}{2}^\circ$	$+02$	± 04	$+0028$	± 0019

The extreme simplicity of this procedure cannot be extended beyond the equatorial zone, because to the north we dispose practically only of catalogues of northern observatories, and to the south vice versa. Now, the northern catalogues may well differ systematically from the southern ones, in fact we have

seen already from Table 3 of the foregoing article that there is an enormous systematic difference between them. So, if we should also omit all systematic corrections outside the equatorial zone, the resulting system would become extremely inhomogeneous, showing large and inadmissible jumps in systematic error near the declinations $+17\frac{1}{2}^\circ$ and -10° .

In order to avoid this, the reductions have been made as follows. For the northern hemisphere, and down to -10° declination, corrections to the FK₃ system were computed anew from the northern catalogues alone. The computations were made in the same manner as described in the preceding paper, by means of the catalogues from which the FK₃ system was built up¹⁾. Four of the 35 catalogues were excluded, viz. Leiden 1865 and Oxford 1900 because they did not extend north of $+25^\circ$, Vienna (GROSSMANN) and Heidelberg (1926) because of the outstanding discontinuity between $+40^\circ$ and $+45^\circ$ for both these series of observations, coupled with the absence of comparisons with the NFK in this region. For the catalogues Kasan and Nikolajew (1926), which do not occur in the GC, weights 5 have been assumed.

The corrections to the FK₃ derived from these catalogues are shown for zones of 10° width in Table 2 under $\Delta_1\delta_{1900}$ and $\Delta_1\mu_\delta$. At the equator (i.e. for the average of the zones from -10° to $+17\frac{1}{2}^\circ$) the difference between these corrections and the average of the corrections found in Table 1 is $+0005$ for $\Delta\delta_{1900}$ and $+00064$ for $\Delta\mu_\delta$. In accordance with the scheme used in the reduction of the FK₃ it was assumed that the deviation between the system of the northern catalogues and the final system (which for the equatorial belt is given in Table 1) would vary linearly between the equator and the pole, becoming zero at the pole. With the aid of this assumption the deviation for each zone was computed from the equatorial differences just mentioned. Subtracting these values from $\Delta_1\delta_{1900}$ and $\Delta_1\mu_\delta$ we obtain the definitive corrections to the FK₃ system shown under $\Delta_o\delta_{1900}$, $\Delta_o\delta_{1950}$ and $\Delta_o\mu_\delta$ in the upper part of Table 2. Exactly the same procedure was applied to the southern catalogues. Of the 14 catalogues used in the construction of the FK₃, one, namely Melbourne 1880, was excluded because it did not extend south of -35° . The definitive corrections are given in the lower half of Table 2. The mean epoch for both southern and northern catalogues is near 1900. It is to be noted that the values derived from the northern and southern catalogues in the zones between -10° and $+17^\circ 5$ are individually in excellent agreement;

¹⁾ A.N. 252, 353, 1934; Mitt. Astr. Rechen-Inst. 3, No. 19.