

EQUATOR AND EQUINOX SOLUTIONS FROM MERIDIAN CIRCLE OBSERVATIONS OF  
THE SUN, MERCURY AND VENUS AT THE CAPE OF GOOD HOPE AND  
THE U. S. NAVAL OBSERVATORY FROM 1907 TO 1971

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A total of 53,259 observations (26,793 in declination and 26,466 in right ascension) of the Sun, Mercury and Venus made with the Washington, six-inch and nine-inch transit circles from 1911 to 1971 and the Cape of Good Hope reversible transit circle from 1907 to 1959 are used to obtain equator and equinox solutions.

Solutions are based on three different ephemerides, which are NEWCOMB(Herget), DE102, and DE200, and three catalog systems, which are the instrumental systems of the individual catalogs, the FK4, and improved FK4 catalog systems (in the improved FK4 catalog system a correction to the equinox of the FK4 given by Fricke, 1982, has been applied). We solve for orbital, and the equator and equinox corrections, using the Sun, Mercury and Venus, separately and in various combinations, and we also include a discussion of time rates of change of the equator and equinox corrections. We limited our discussion here to the comparison of observations referred to the improved FK4 system with the DE200 ephemeris and the equator and equinox corrections. See Table 1.

Table 1. Equator and Equinox Solutions. S = Sun, M = Mercury, V = Venus  
 $\Delta\delta_0$  = Equator Correction  $\Delta\dot{\delta}_0$  = Time Rate of Change of  $\Delta\delta_0$   
 $E_0$  = Equinox Correction  $\dot{E}_0$  = Time Rate of Change of  $E_0$   
Unit = arcsec Unit = arcsec/century

	$\Delta\delta_0$		$\Delta\dot{\delta}_0$		$E_0$		$\dot{E}_0$		Mean Epoch
M + V + S	-0.09 ± 0.01	0.22 ± 0.04	0.00 ± 0.02	0.04 ± 0.06	0.03 ± 0.04	0.03 ± 0.04	-0.73 ± 0.11	0.16	1937.7
M + V	0.00	0.01	0.04	0.06	0.04	0.03	-0.94	0.16	1938.0
V	0.02	0.01	0.13	0.08	0.03	0.04	-0.88	0.19	1939.1
M	-0.04	0.02	-0.10	0.09	0.07	0.05	-1.18	0.32	1936.3
S	-0.18	0.01	0.34	0.05	-0.04	0.02	-0.51	0.16	1937.5

Mercury and Venus give reliable and consistent results for the equator correction,  $0.00 \pm 0.01$  arcsec and its linear time rate of change is  $0.04 \pm 0.06$  arcsec/century, but the solution from the Sun is not consistent with Mercury and Venus. The consistency of the solutions for the equinox and its rate suggest that observations of the Sun, Mercury and Venus may all be used with about equal confidence to establish the zero-point in right ascension. The equinox correction from the combined Sun, Mercury and Venus solution is  $0.00 \pm 0.02$  arcsec and its linear time rate of change is  $-0.73 \pm 0.11$  arcsec/century. The solution implies that the FK5 proper motion system needs a correction of approximately  $-0.73$  arcsec/century. Results of this work will be used to establish zero-point corrections to the individual absolute catalogs that will form the system of the Washington Fundamental Catalog (Cole & Yao, 1989).

REFERENCES

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