Seasonal Diurnal Variation of H, 1922.

(Coefficients of the first four terms.)

——	P_1.	A_1.	P_2.	A_2.	P_3.	A_3.	P_4.	A_4.
	γ	° ′	γ	° ′	γ	° ′	γ	° ′
Four summer months ..	13·43	291 37	8·86	299 32	4·52	303 43	0·35	276 55
Four equinoctial months ..	9·78	257 00	4·94	275 19	3·14	285 34	0·59	248 43
Four winter months ..	7·30	208 55	3·01	224 19	1·97	202 42	1·17	186 19

The summer months taken are January, February, November, December; equinoctial months taken are March, April, September, October; winter months taken are May, June, July, August. As regards the amplitudes of these harmonics, a general seasonal graduation shows itself in the first three terms, the amplitude being greatest in summer-time; but in P_4 the reverse is the case, the amplitude being greatest in winter and very small in summer; but there seems no reason to doubt that it is well determined, so that some significance attaches to its phase angle differing by very approximately 90° between summer and winter. Significant also is the fact that in the third and fourth components the winter phase angle is $\frac{2}{3}$ of the summer angle phase, very nearly. In A_2 the summer angle is practically $\frac{4}{3}$ of the winter value, so that in these harmonics the summer angle is $\frac{4}{3}$ of the winter angle for A_2 and $\frac{3}{2}$ of the winter angle for A_4 and A_3.

There seems to be more evidence than usual of the non-independence of the harmonic constituents. This may be looked upon as worthy of consideration, and perhaps attributable to our latitude. The origin of the averages must be remembered, for the summer data are the means for two intervals of two months each, separated by ten months; for the equinoctial data the separation is six months; for the winter data, really two months; and the mean values from the three means is this year appreciably different, being—

H, summer months..	0·222209 C.G.S.
H, equinoctial	0·222125
H, winter	0·222162
Year	0·222165

The winter value is very near the arithmetical mean for the year.

COEFFICIENTS OF THE FIRST FOUR TERMS IN FOURIER SERIES, OF THE MAIN SEASONAL DIURNAL VARIATION, FOR YEAR 1922 AND FOR GREENWICH CIVIL MEAN DAY, AT CHRISTCHURCH, N.Z.

——	P_1.	A_1.	P_2.	A_2.	P_3.	A_3.	P_4.	A_4.
				Magnetic Horizontal Force (unit 1γ).				
		° ′		° ′		° ′		° ′
Four summer months ..	13·43	291 37	8·86	299 32	4·52	303 43	0·35	262 57
Four equinoctial months ..	9·78	257 00	4·94	275 19	3·14	285 34	0·55	272 14
Four winter months ..	7·30	208 55	3·01	224 19	1·97	202 42	1·17	186 19
Year	8·61	261 51	5·02	282 23	5·84	334 06	0·57	226 16
				Magnetic Declination: (unit 1′).				
Four summer months ..	2·59	14 09	2·19	357 48	0·20	22 39	0·16	43 45
Four equinoctial months ..	1·28	35 23	1·83	339 46	0·79	347 58	0·25	332 12
Four winter months ..	5·06	170 54	0·97	328 54	0·43	338 16	0·27	289 15
Year	1·36	32 01	1·63	345 33	0·84	00 33	0·17	329 06

The phase angles are as at 0h. G.C.M.T.

The four summer months comprise January, February, November, December; the equinoctial months, March, April, September, October; and the four winter months, May, June, July, August.

In the horizontal force it is noticeable that the amplitude of the diurnal wave P_1 in summer seems to determine all the amplitudes during the equinoctial months; and in the same way the amplitude of the diurnal wave in equinox seems to determine all the amplitudes in the winter months. This is possibly dependent upon the consideration that the amplitude of P_1 depends upon a generally effective cause. Such cause may be expected to have an effect upon the amplitude of the constituent waves P_1, P_2, P_3, P_4 in the ratio 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$. And taking the resolved equinoctial amplitudes in H, we find $9{\cdot}78 + \frac{1}{2}(4{\cdot}94) + \frac{1}{3}(3{\cdot}14) + \frac{1}{4}(0{\cdot}55) = 9{\cdot}78 + 2{\cdot}47 + 1{\cdot}05 + 0{\cdot}14 = 13{\cdot}44r$, which is the value of P_1 in summer. Similarly, for the winter months, in H, we find $7{\cdot}30 + \frac{1}{2}(3{\cdot}01) + \frac{1}{3}(1{\cdot}97)$