PAPERS COMMUNICATED

66. *Preliminary Result of the Observations made at Adelaide International Latitude Station during the Period 1931.64—1932.97.*

By Hisashi KIMURA, M.I.A.

International Latitude Observatory, Mizusawa.

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The observation at Adelaide was begun already on November 24, 1930. But during the initial period they were unsatisfactory in the way of observing, so I have not used them till August 6, 1931, since then reliable observations have been carried out.

Two observers Messrs. Dawson and Markey have been engaged from the beginning.

Weather conditions seem to be very unfavorable throughout the whole period and unfavorable for frequent observation.

The site of the observing house is in the terrain of the Adelaide Astronomical Observatory.

The instrument used is the large zenith telescope of Wanschaff used at Mizusawa till the end of the year 1927, but its objective lens and the micrometer case were replaced by new ones made by Bambergwerk.

The star list consists of 12 groups, each of 6 pairs, and the observing programme is just the same as that of the north parallel. Here it should be remarked that in the group V five effective pairs were observed in this station, pair No. 29 being missed due to some confusion of having been interchanged once by a new better one after the first star list was made.

The adopted value of one revolution of the micrometer and its temperature coefficient are :

$$39''.9377 + ''0.00145 (T - 13^{\circ}.3)$$

They were determined from the abundant results of 40 observations by the greatest elongations. As the number of observation at east and west elongations and that in two different positions of the telescope are just the same, any error caused from those sources were eliminated in the final result mentioned. The inequality of the screw was carefully

determined and it was applied in the reduction.

The method of taking the mean of the group is same as in the case of the international latitude observations in the north parallel.

TABLE I.

Mean of the Group.

Group		Date		No. Obs.		$\varphi = -34^{\circ} 55' 30'' +$	
		e	m	e	m	e	m
XI	XII	1931.64	.64	29	29	-4.71	-4.22
XII	I	.72	.72	30	33	-4.36	-5.16
I	II	.81	.81	41	37	-5.09	-8.98
II	III	.90	.89	22	25	-8.85	-7.25
III	IV	.96	.97	29	22	-7.04	-7.76
IV	V	1932.06	.06	40	36	-7.69	-7.89
V	VI	.15	.15	23	31	-7.90	-7.63
VI	VII	.21	.21	34	34	-7.65	-5.93
VII	VIII	.31	.31	36	32	-6.10	-4.76
VIII	IX	.37	.38	19	21	-4.77	-2.81
IX	X	.47	.47	30	26	-3.14	-4.75
X	XI	.55	.55	23	18	-4.71	-4.60
XI	XII	.65	.65	20	17	-4.64	-4.41
XII	I	.71	.71	34	26	-4.33	-5.31
I	II	.82	.82	32	28	-5.14	-9.03
II	III	.88	.88	25	24	-8.93	-7.30
III	IV	.96	.96	27	25	-7.11	-7.88

The method for finding the latitude variation and local z from the materials tabulated above is as follows. First reduce the values of the group mean to the standard common epochs by applying slight corrections for the changes of latitude during short intervals between the observed and the standard epochs. Then find the relative declination errors for all groups by the chain method used hitherto in the case of a single station. Finally by applying those declination errors to the corresponding group means, we get the variation of latitude. This result is, however, not wholly the variation of latitude caused from the polar motion, but it contains local z . Now if we assume z to be of the form $\sum a_n \sin(n\odot - a + A_n)$, the first term $a_1 \sin(\odot - a + A_1)$ appears as constant in the difference of the evening and morning observations throughout the whole series, and it gives no effect on the variation of latitude. On the other hand, the second term $a_2 \sin(2\odot - a + A_2)$ enters into the variation of latitude as an annual form with its

amplitude twice as large as its original. This amplification of the amplitude is caused by the fact that the declination errors due to the second term has the same form as the latter.

For these reasons, the residual of the result of the variation of latitude subtracted from the part due to the pure polar motion will give answer for evaluating the amplitude and the phase of the second term. It is here to be noted that the constant quantity for the first term may be simply found by dividing «the closing sum» by the total number of groups 12.

By the above method we got for Adelaide during the present period,

constant for the first term = $-''\text{.003}$

for the second term = $+''\text{.06} \sin (2\odot - \alpha - 83^\circ)$.

The following table 2 gives the variation of latitude, the values being the means of the evening and morning observations.

TABLE II.

$$\Phi_0 = -34^\circ 55' 34''.41$$

Fraction of Year	Φ	Obs. $\Phi - \Phi_0$	Intern. Cal. $\Phi - \Phi_0$	Residual	Cal. $+''\text{.06} \sin (2\odot - \alpha - 83^\circ)$	O - C
1931.64	-34.65	$-.24$	$-.20$	$-.04$	$-.11$	$+.07$
.72	.66	$-.25$	$-.12$	$-.13$	$-.12$	$-.01$
.80	.54	$-.13$	$-.01$	$-.12$	$-.09$	$-.03$
.89	.43	$-.02$	$+.08$	$-.10$	$-.05$	$-.05$
.97	.19	$+.22$	$+.15$	$+.07$	$+.02$	$+.05$
1932.06	.11	$+.30$	$+.20$	$+.10$	$+.07$	$+.03$
.14	.11	$+.30$	$+.19$	$+.11$	$+.11$	00
.22	.14	$+.27$	$+.11$	$+.16$	$+.12$	$+.04$
.30	.28	$+.13$	$+.02$	$+.11$	$+.09$	$+.02$
.39	.34	$+.07$	$-.04$	$+.11$	$+.05$	$+.06$
.47	.66	$-.25$	$-.08$	$-.17$	$-.02$	$-.15$
.56	.61	$-.20$	$-.13$	$-.07$	$-.07$	00
.64	.70	$-.29$	$-.18$	$-.11$	$-.11$	00
.72	.72	$-.31$	$-.19$	$-.12$	$-.12$	00
.80	.60	$-.19$	$-.11$	$-.08$	$-.09$	$+.01$
.89	.46	$-.05$	$+.02$	$-.07$	$-.05$	$-.02$
.97	.26	$+.15$	—	—	—	—

In conclusion it is to be noted that all values given above need further modifications when the simultaneous observations at La Plata will be calculated. Above all the value of z would be changed after all the values of the instrumental constants was ascertained. At any rate, we have obtained a rough idea of z phenomenon in one of the

south international stations. I am very glad to state that the result is more than I expected from the scantiness of the observation. I am sure that more satisfactory results would follow when La Plata co-operate with Adelaide and then the importance of the southern stations will be well realized.