7.1. THE POLHODY IN A CRITICAL PERIOD (1941·06–1948·98)

T. NICOLINI
(Osservatorio di Capodimonte, Naples, Italy)

ABSTRACT

The definitive values of the coordinates of the pole from 1941·06 to 1948·98 as determined from ILS observations are given.

RÉSUMÉ

On donne les valeurs définitives des coordonnées du pôle de 1941·06 à 1948·98, déduites des observations du SIL.

The last-printed definitive results on the International polhody are those of the late Prof. L. Carnera, Director of the Central Bureau, for 1935·06–1940·98 (Carnera, 1957). Prof. Carnera also wished to complete the work from 1941·06 to 1948·98, the most critical period of the Service because of the second world war. He took the work to Florence, during his retirement, after the preliminary reductions had been made at the Naples Observatory. Several reasons, however, hindered the work, his age, the lack of help, the amount of numerical calculations, and above all, the decidedly deceiving preliminary results obtained. Also, confining the computations to the three stations responsible for the best observations, Mizusawa, Gaithersburg, and Ukiah, which had been in continuous operation during the whole period, caused difficulties. These problems led Prof. Carnera to drop the later calculations, of which he left no trace, in the declared conviction that nothing could be safely deduced.

However, a positive or negative conclusion must be given, and so, through the interest of the IAU, the IAG, and the Italian Geodetic Commission, I had the opportunity to resume the calculations already abandoned. By lucky chance Carnera, besides the preliminary results (given in several *Contributi* of Capodimonte (Carnera, 1947–9)) had published data useful for improved solutions (Carnera, 1953), including definitive values of the micrometer screws, temperature coefficients, level values, and corrections to the declinations. We must remember that because of the common programme observed by the stations on the same parallel, errors of declinations (and relative p.m.) give a common error in absolute latitudes, which is not our problem, and which is of no relevance to the polhody. The corrections to star declinations found by Carnera, could only give a better agreement between mean latitudes deduced from different groups, an improvement that could be more or less masked by the lack of precision.

Markowitz and Guinot (eds.), Continental Drift, 101–104. © *I.A.U.*

All the details for the final solution will be given in vol. X of Publications of the ILS. Here we shall only recall that more than one station has given impaired observations, and this would appear natural in the circumstances imposed by a world war. Unfortunately, Carloforte was also closed at times, beginning in 1941, and the difficulties of keeping skilled observers gave absurd results. The reopening took place in 1946.

After various trials, I found that the only combinations which gave consistent results are the following:

1941·06–1946·39, from M, K, G, U;

1946·48–1948·98, from M, K, C, G, U.

About 50000 sheets of provisional calculations were retaken and corrected one by one, and mean latitudes for each stellar group were computed again. From these, equations for x, y and z, evening and morning, were established:

Table 1

Coordinates x and y of the North Pole 1941·060–1948·976

(Units: 0″.001)

	1941		1942		1943		1944	
	x	y	x	y	x	y	x	y
·060	+066	+065	+156	+062	+089	+207	−011	+184
·143	+045	+037	+098	+074	+086	+195	+003	+229
·226	+022	+090	+075	+045	+132	+177	+025	+222
·310	−015	+101	−003	+113	+108	+134	+087	+228
·393	+008	+134	+035	+100	+153	+140	+194	+203
·476	+029	+177	+009	+110	+135	+082	+285	+171
·560	+069	+196	+023	+113	+122	+046	+302	+059
·643	+172	+209	+015	+112	+118	+043	+292	−008
·726	+137	+192	−005	+171	+040	+026	+161	−083
·810	+129	+154	−019	+170	−030	+050	+002	−088
·893	+148	+097	+033	+172	−085	+081	−059	−056
·976	+144	+083	+025	+225	−028	+091	−133	+012

	1945		1946		1947		1948	
	x	y	x	y	x	y	x	y
·060	−162	+098	−121	−057	+103	−075	+264	+108
·143	−158	+131	−189	+002	+007	−077	+237	+007
·226	−113	+238	−184	+086	−076	−028	+191	−019
·310	−053	+301	−145	+203	−150	+091	+106	−062
·393	+094	+310	−074	+285	−154	+160	+017	−023
·476	+200	+311	+062	+330	−084	+246	−032	+027
·560	+266	+172	+174	+346	+010	+285	−029	+067
·643	+286	+105	+219	+324	+119	+324	−038	+139
·726	+329	+010	+254	+268	+189	+311	−078	+184
·810	+252	−095	+309	+122	+263	+272	−032	+253
·893	+114	−137	+323	−030	+286	+227	+026	+305
·976	+064	−104	+233	−040	+278	+148	+129	+324

MKCGU,

$$x = -0{\cdot}4359\varphi_M + 0{\cdot}1227\varphi_K + 0{\cdot}4484\varphi_C + 0{\cdot}1233\varphi_G - 0{\cdot}2583\varphi_U - 1{\cdot}1694$$
$$y = -0{\cdot}2637\varphi_M - 0{\cdot}3133\varphi_K - 0{\cdot}0172\varphi_C + 0{\cdot}3382\varphi_G + 0{\cdot}2559\varphi_U - 5{\cdot}8770$$
$$z = +0{\cdot}2305\varphi_M + 0{\cdot}2007\varphi_K + 0{\cdot}1756\varphi_C + 0{\cdot}1851\varphi_G + 0{\cdot}2082\varphi_U - 7{\cdot}7337$$

MKGU,

$$x = -0{\cdot}6288\varphi_M + 0{\cdot}5580\varphi_K + 0{\cdot}4291\varphi_G - 0{\cdot}3584\varphi_U - 0{\cdot}0971$$
$$y = -0{\cdot}2563\varphi_M - 0{\cdot}3300\varphi_K + 0{\cdot}3265\varphi_G + 0{\cdot}2597\varphi_U - 5{\cdot}9181$$
$$z = +0{\cdot}1550\varphi_M + 0{\cdot}3712\varphi_K + 0{\cdot}3048\varphi_G + 0{\cdot}1690\varphi_U - 7{\cdot}3132$$

Let A_i and A_i' denote, respectively, the coefficients of φ_i (mean monthly group latitude of station i) in the expression for x, and let a_i and a_i' be the analogous coefficients for

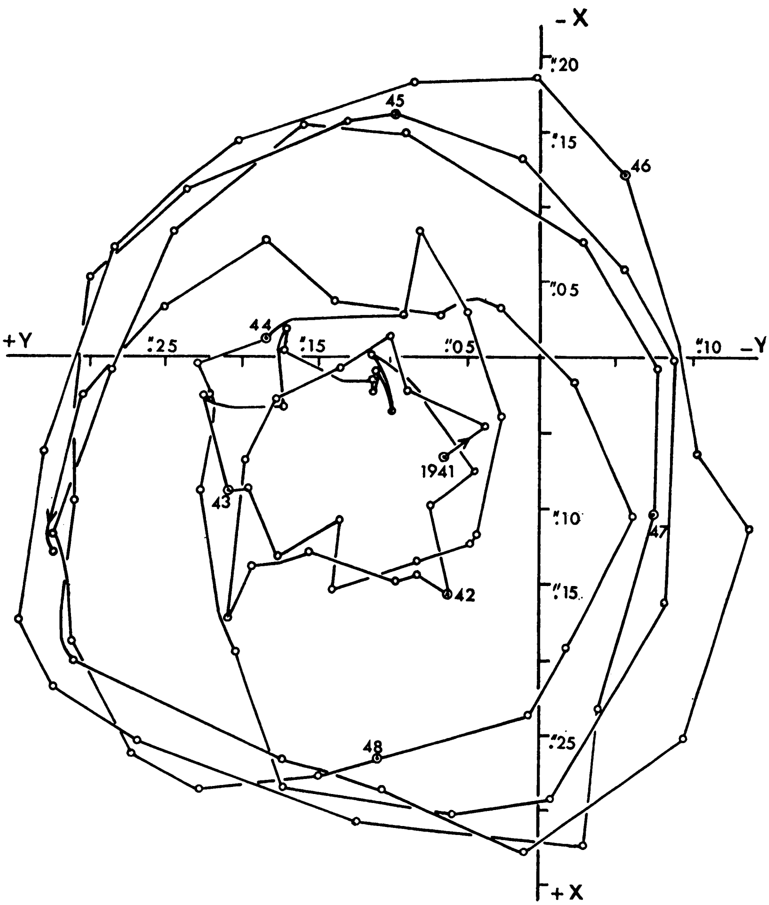

FIG. 1. *Polhody, 1941·06 to 1948·98.*

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y. The conditions

$$\Sigma A_i = \Sigma a_i = \Sigma A_i' = \Sigma a_i' = 0.$$

are easily verified. If there is an error in the declination, the identity of the programme gives a common error in latitude, and the contributions of this error on x, or on y, are

$$\delta\varphi \Sigma A_i = \delta\varphi \Sigma a_i = \delta\varphi \Sigma A_i' = \delta\varphi \Sigma a_i' = 0.$$

This shows the independence of the polhody from errors in declinations.

I must add that different groupings of equations (that is different numbers of considered stations) give largely different solutions. It would be difficult to give the reasons for the peculiarities in the derived trend of the polhody. The solution from three stations, Mi, Ga, Uk, which I communicated for the Draft Reports of the 13th General Assembly of the IAU (Prague), is much less satisfactory than the one here reached.

The polar path resulting from my final computations are given in Table 1 and Figure 1.

References

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