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DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD No. 1961-117



ISOMAGNETIC MAPS OF EASTERN NEW GUINEA FOR THE EPOCH 1957.5

by

W.D. Parkinson and P.E. Mann

The information contained in this report has been obtained by the Department of National Development, as part of the policy of the Commonwealth Government, to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus or statement without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

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ABSTRACT

Isomagnetic maps of eastern New Guinea and the surrounding region are presented showing five magnetic elements reduced to the epoch 1957.5. All magnetic observations made in the region since 1917 have been used; the older observations have been corrected for secular variation by repeat observations at Port Moresby.

NOTE

It is proposed to issue this work also as one of the Bureau's printed Report series.

1. INTRODUCTION

This report continues the series of reports published by the Bureau of Mineral Resources, Geology and Geophysics (Pinn, 1960; Parkinson and Curedale, 1960; Parkinson, Curedale, and van der Linden, 1961) which summarises the field magnetic work carried out by the Bureau and other authorities in Australia and Australian Territories and Dependencies.

Magnetic surveys of eastern New Guinea and the adjacent region were carried out by the Department of Terrestrial Magnetism of the Carnegie Institution of Washington in 1917, 1922, and 1936, and by the Bureau of Mineral Resources, Geology and Geophysics in 1957. Those surveys furnish the observational data for this report.

2. TREATMENT OF DATA

The observed results were treated as described in Bureau of Mineral Resources Report No. 55 (Parkinson and Curedale, 1960). The observations were first corrected to Toolangi Provisional Standard, which is a good approximation to the magnetic standard generally accepted throughout the world. Then the horizontal intensity and inclination were corrected by the mean diurnal inequality at the time of observation, using the standard tables given by Vestine *et al.* (1948). The diurnal inequalities of declination are so small at these latitudes that no correction was made for them. No attempt was made to correct for magnetic disturbance, because there was no observatory operating in the region until after 1957.

None of the 1957 stations was an exact reoccupation of a former station, and only one, Port Moresby, was a close reoccupation. The locality is sufficiently quiet, magnetically, for the 1957 observation to be considered a satisfactory reoccupation of the 1936 station. This reoccupation, and information extrapolated from the mainland, constitute the only source of secular variation information before 1957. Using this information all results were corrected to the epoch 1957.5.

3. SECULAR VARIATION

At Port Moresby Geophysical Observatory, preliminary magnetic observations were started in 1957, and continuous recording in 1958. The rate of secular variation for the epoch 1957.5 was derived from observations made at the observatory between 1957 and 1961. It is shown in the legends of Plates 1 to 5. No isoporic maps could be drawn, because the rate of secular variation at other locations is not known.

4. PRESENTATION OF DATA

Table 1 contains observed and reduced values of declination, horizontal intensity, and inclination for all stations in eastern New Guinea and nearby islands. The "observed values" have been corrected to Toolangi Provisional Standard. The "1957.5 values" have been corrected also for diurnal and secular variation as described above, and round off to 10 gammas or 1 minute of arc.

Where a later station is within one mile of a former station, latitude and longitude for the later station are omitted.

The initials DTM or BMR in the "remarks" column indicate whether the observations were made by the Department of Terrestrial Magnetism of the Carnegie Institution of Washington or by the Bureau of Mineral Resources, Geology and Geophysics. In the former case the data were taken from Bauer et al. (1921) or Fisk (1927).

Plates 1, 2, and 3 show contours of declination, horizontal intensity, and inclination. The names of all magnetic stations are shown. If the reduced value for the station agrees with the smoothed value (as shown by the contour lines) the station is marked with a solid black circle. If the difference exceeds 100 gammas for horizontal intensity, or 10 minutes of arc in declination or inclination, the station is marked by a black triangle. An open circle indicates that the element was not observed at that station.

Plates 4 and 5 show contours of the vertical intensity (Z) and total intensity (F). These have been derived from the contours of Plates 2 and 3 at the corners of each one-degree square, using the formulae

$$Z = H. \tan I$$

$$F = H. \sec I$$

Contour lines have been made continuous with those in the maps accompanying Bureau of Mineral Resources Report No. 55 and have been smoothed to the same extent.

5. REFERENCES

- | | | |
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TABLE 1

Observed and Reduced Values of Magnetic Elements for all Stations in Eastern New Guinea

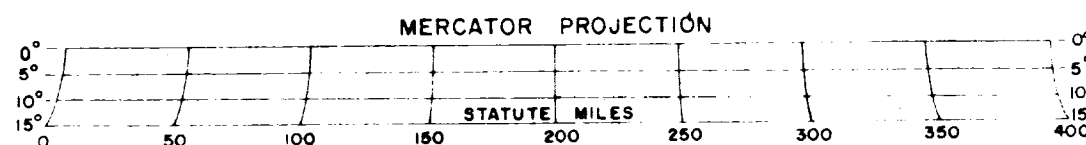
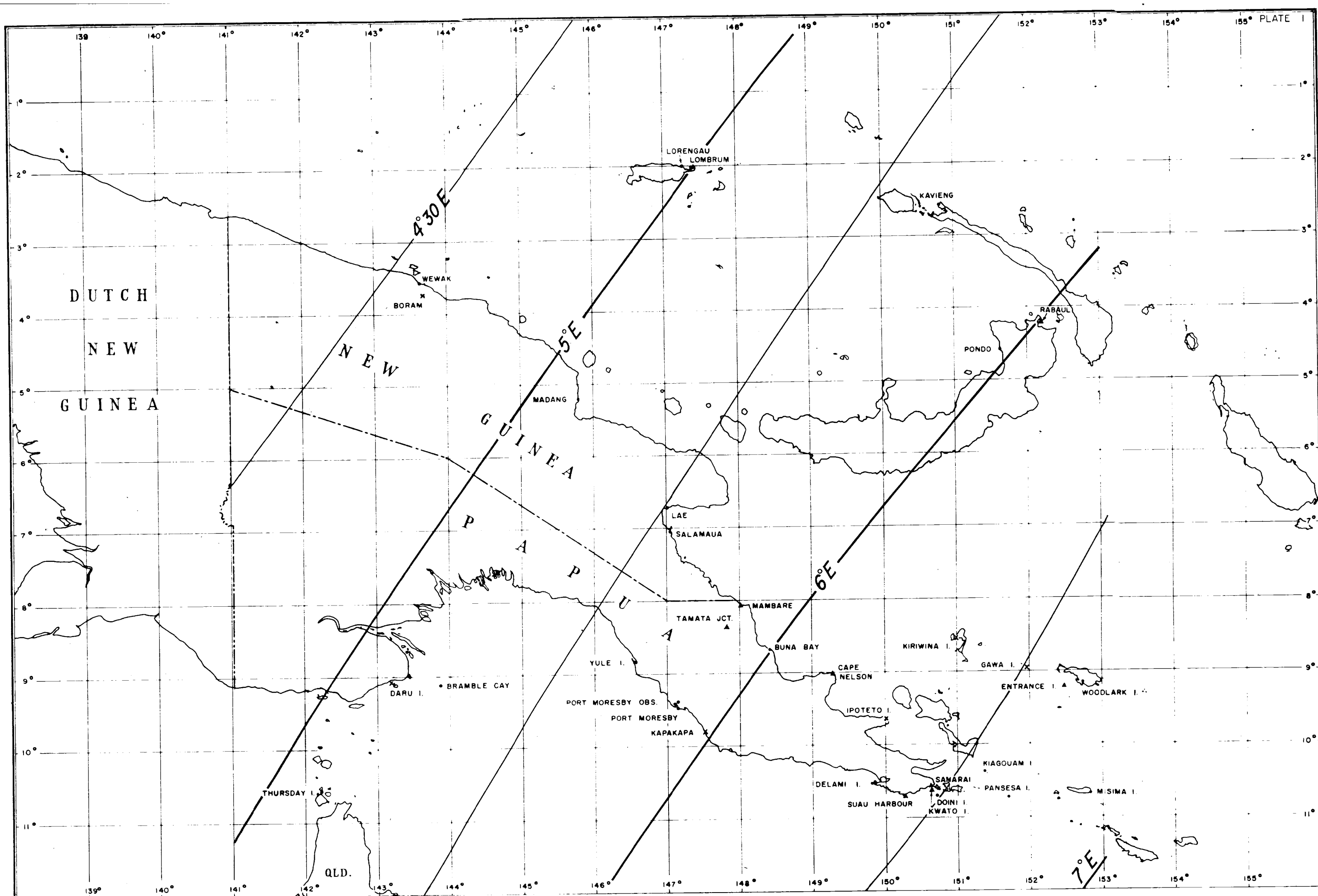
South Lat.	Station		Year	Declination		Horizontal Intensity		Inclination		Remarks
	East Long.	Name		Obs'd	1957.5	Obs'd	1957.5	Obs'd	1957.5	
2°00'	147°16'	Lorengau	1957	5°02 E	5°02 E	36994Y	36960Y	18°48.8'S	18°49'S	BMR
2 02	147 23	Lombrum	1936	4 45	4 59					DTM
2 34	150 48	Kavieng	1957	5 42	5 42	36820	36770	19 20.7	19 21	BMR
3 34	143 38	Wewak	1957	4 33	4 33	37836	37790	21 39.6	21 41	BMR
3 43	143 41	Boram	1936			37421	37220	20 56.0	22 33	DTM
4 13	152 12	Rabaul	1936	4 24	4 38	37007	36830	21 18.9	22 56	DTM 1)
			1957	4 29	4 29	36789	36760	22 33.4	22 34	BMR 1)
4 34	151 38	Pondo	1936	5 43	5 57	36962	36760	20 48.0	22 26	DTM
5 13	145 49	Madang	1936	4 53	5 07	36824	36640	23 56.2	25 34	DTM 2)
			1957	5 00	5 00	36867	36820	24 56.6	24 56	BMR
6 44	147 01	Lae	1957	5 35	5 35	37015	36960	27 21.5	27 21	BMR
7 04	147 03	Salamaua	1936	5 14	5 25	36926	36750	26 55.6	28 32	DTM
8 04	148 01	Mambare	1915	5 20	5 35	36548	36240	28 43.9	30 30	DTM 3)
8 22	147 50	Tamata Junction	1922	5 17	5 32	36720	36550	29 04.7	30 51	DTM
8 32	151 00	Kiriwina Island	1915			36500	36130	28 33.0	30 27	DTM
8 40	148 25	Buna Bay	1915	5 39	5 54	36760	36420	29 16.1	31 10	DTM
8 50	146 33	Yule Island	1915	5 32	5 47	36950	36640	29 46.2	31 39	DTM 2)
9 00	152 10	Gawa Island	1915			36420	36120	28 57.7	30 48	DTM
9 03	149 17	Cape Nelson	1915	6 37	6 52	36991	36680	29 18.2	31 10	DTM
9 05	143 11	Daru Island	1915			37018	36660	30 34.2	32 27	DTM
9 08	143 52	Bramble Cay	1915	4 57	5 12					DTM
9 09	152 44	Woodlark Island	1915	6 26	6 41	36452	36130	29 29.1	31 23	DTM
9 12	152 25	Entrance Island	1915	6 37	6 52	36439	36070	29 25.8	31 20	DTM
9 24	147 09	Port Moresby Obs.	1957	5 56	5 56	36530	36520	31 51.0	31 51	BMR 4)
9 29	147 09	Port Moresby	1957	5 57	5 57	36640	36580	32 30.2	32 30	BMR
9 38	150 01	Ipoteto Island	1915					31°13.5'S	33°05'S	DTM
9 50	147 31	Kapakapa	1915			36694Y	36320Y	31 21.7	33 15	DTM 2)
10 22	151 25	Kiagouam Island	1915	6°15 E	6°30 E	36741	36370	31 44.7	33 39	DTM
10 31	149 48	Delami Island	1915	5 58	6 13	36435	36080			DTM 2)
10 35	142 12	Thursday Island	1952	5 00	5 05	36543	36370	34 31.0	34 51	BMR
10 35	150 38	Samarai	1936	8 30	8 44	38006	37780	33 24.8	35 03	DTM
			1957	8 53	8 53	37346	37350	34 20.3	34 23	BMR
10 37	150 38	Kwato Island	1915	4 54	5 09	36805	37470	32 29.9	34 21	DTM
10 41	152 50	Misima Island	1915	6 39	6 54	36596	36260	31 54.4	33 45	DTM
10 41	150 15	Suau Harbour	1915	5 16	5 31	36680	36360	31 46.0	33 37	DTM 2)
10 24	150 43	Doini Island	1915	6 13	6 28					DTM
10 44	151 42	Panasesa Island	1915	6 17	6 32	36449	36150			DTM

1) Locally disturbed

2) Magnetic storm during observations

3) 1922 observations used for inclination

4) Mean of weekly observations throughout the year

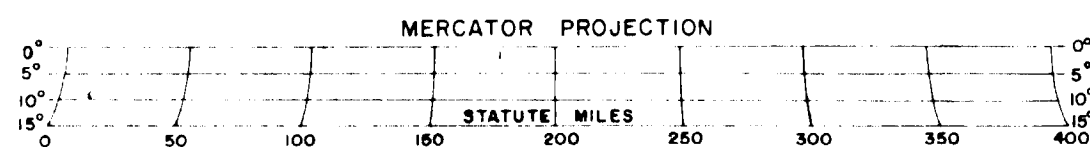
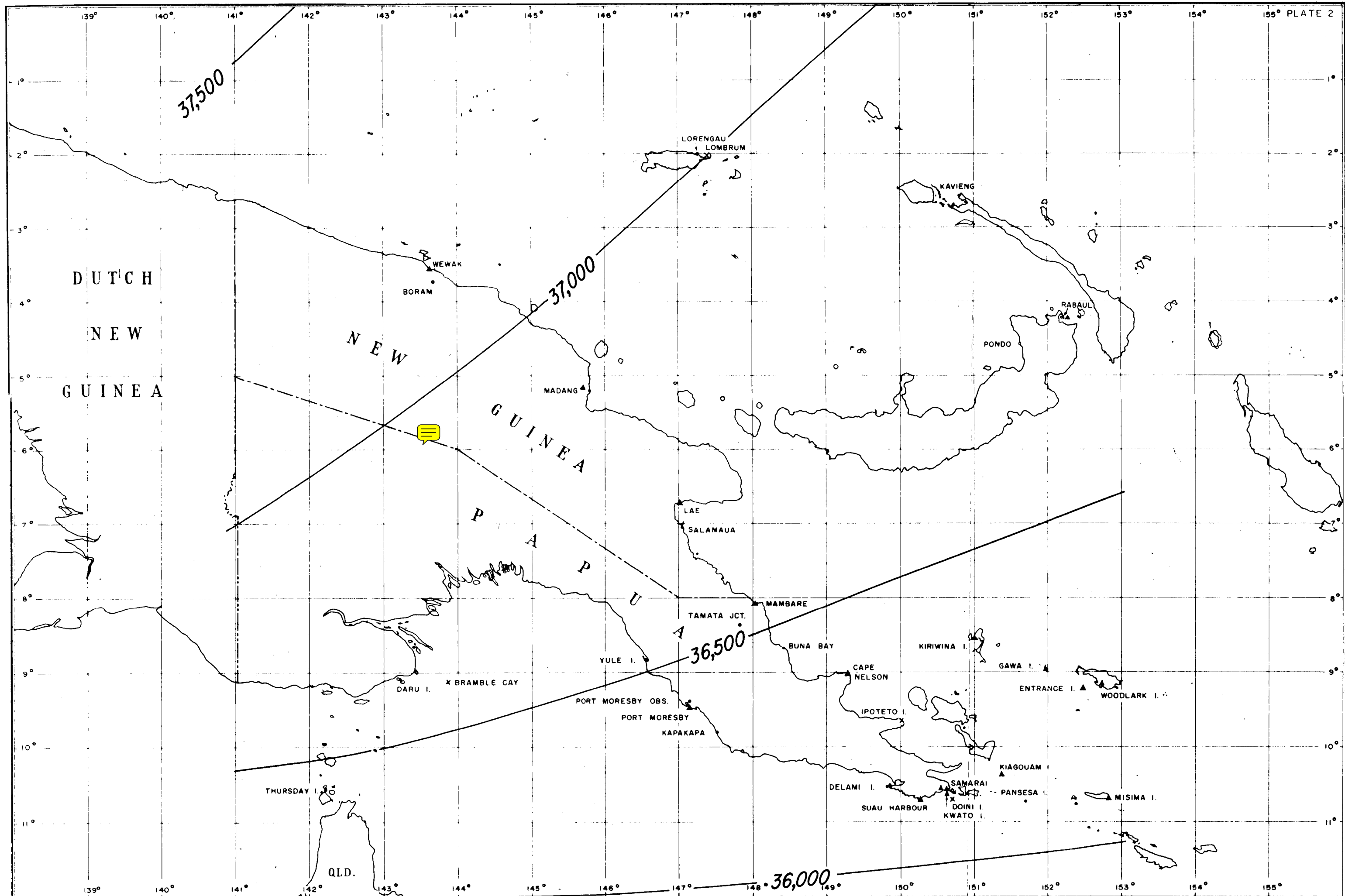


- Observed values agree with smoothed values
- ▲ " " disagree " " "
- × No observations

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EASTERN NEW GUINEA LINES OF EQUAL MAGNETIC DECLINATION AS AT 1957.5

VALUES INCREASING EASTERLY BY 2.5 MINUTES PER YEAR

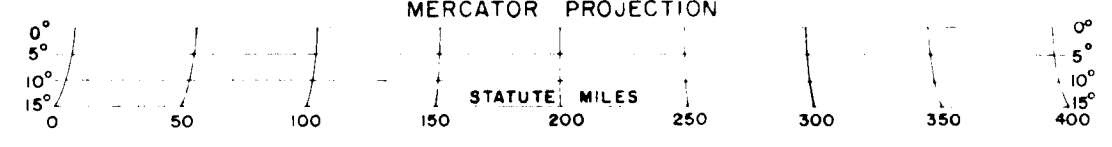
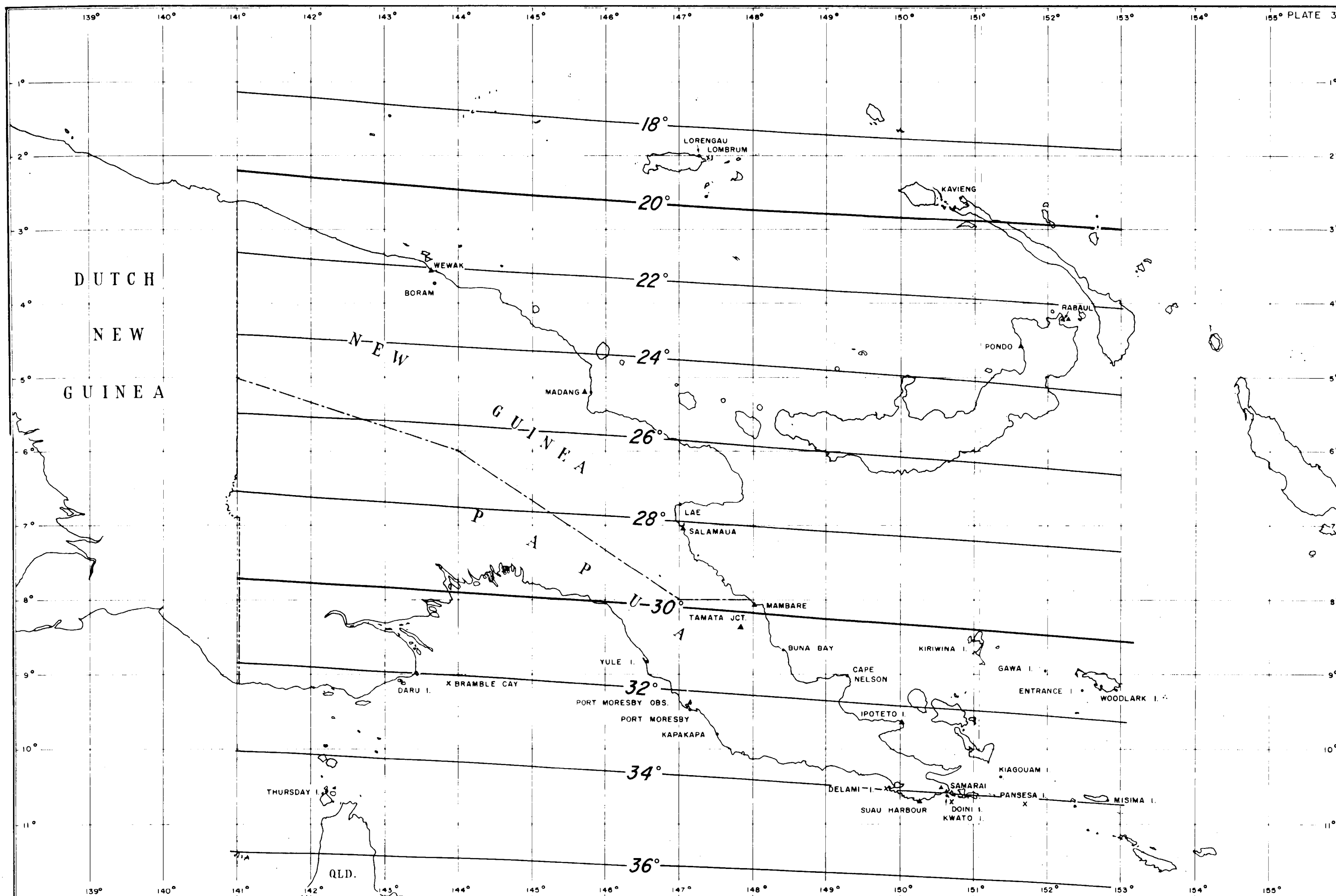


- Observed values agree with smoothed values
- ▲ " " disagree " "
- × No observations

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EASTERN NEW GUINEA LINES OF EQUAL MAGNETIC HORIZONTAL INTENSITY AS AT 1957.5

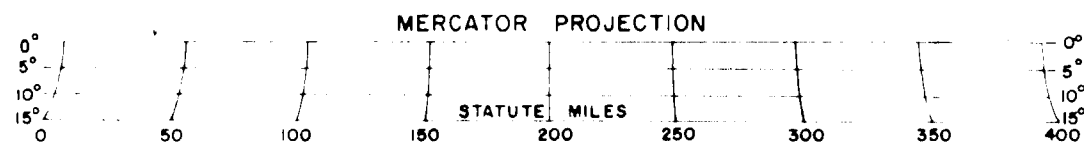
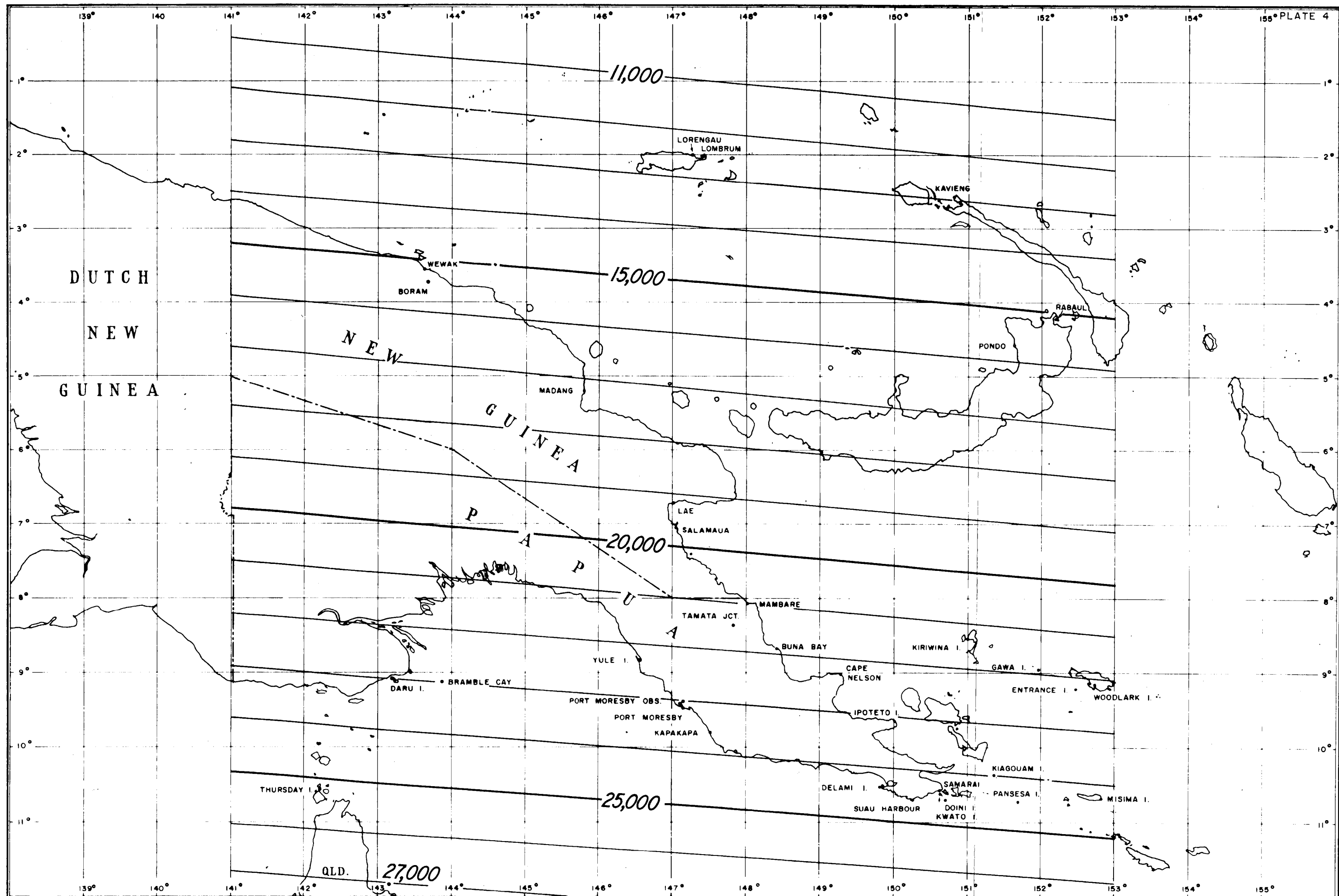
VALUES IN GAMMAS, DECREASING BY APPROXIMATELY 27 GAMMAS PER YEAR



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EASTERN NEW GUINEA LINES OF EQUAL MAGNETIC INCLINATION AS AT 1957.5

VALUES ARE INCREASING BY APPROXIMATELY 4.4 MINUTES PER YEAR

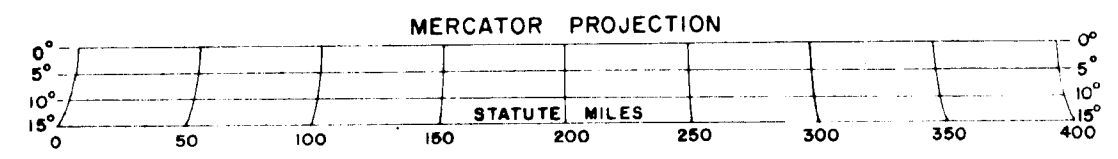
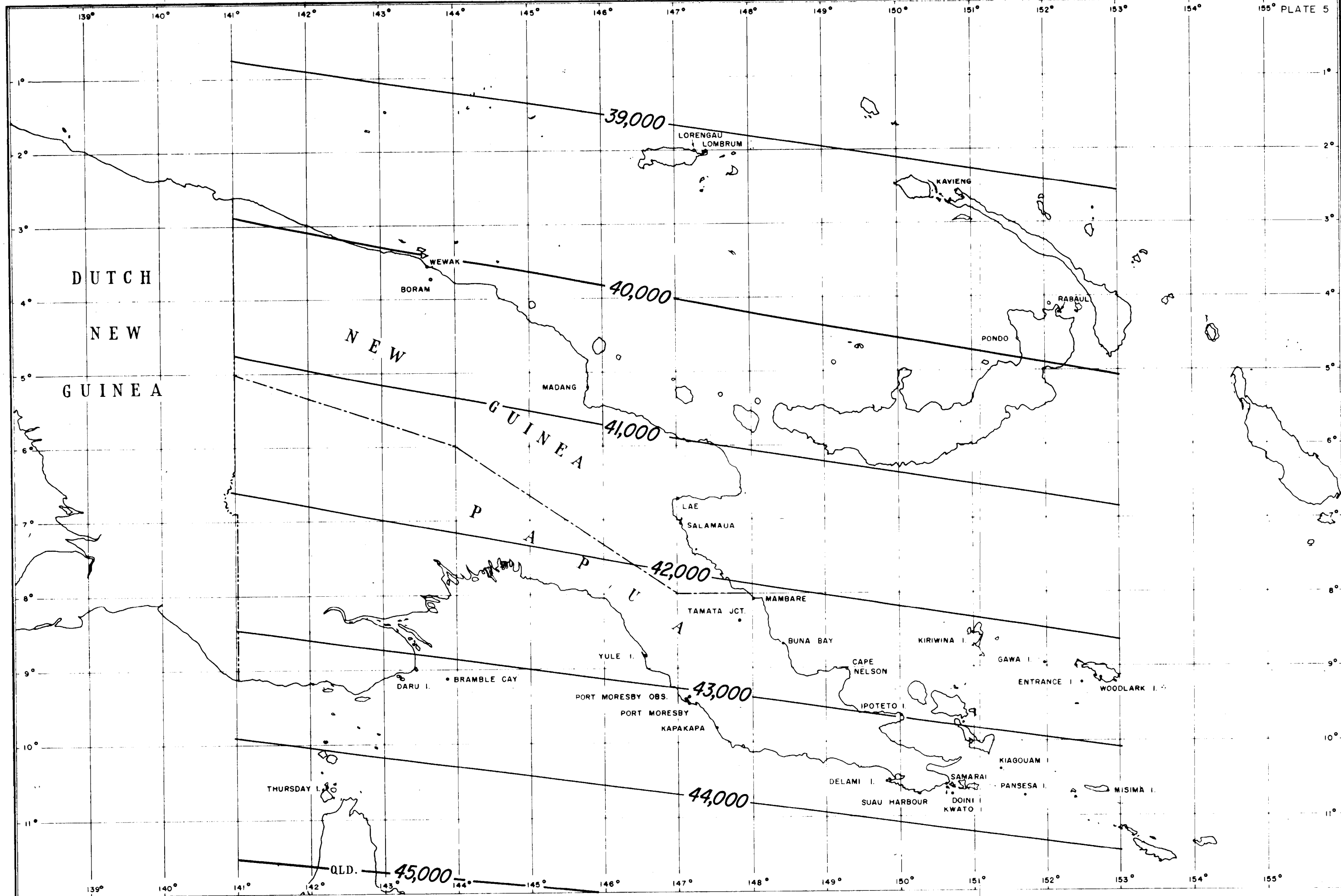


Contours derived from maps of Horizontal Intensity and Inclination
All values are negative

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EASTERN NEW GUINEA LINES OF EQUAL MAGNETIC VERTICAL INTENSITY AS AT 1957.5

VALUES IN GAMMAS, INCREASING NEGATIVELY BY APPROXIMATELY 48 GAMMAS PER YEAR



Contours derived from maps of Horizontal Intensity and Inclination

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EASTERN NEW GUINEA
LINES OF EQUAL MAGNETIC TOTAL INTENSITY
AS AT 1957.5

VALUES IN GAMMAS. ANNUAL CHANGE NEGLIGIBLE