BUREAU OF MINERAL RESOURCES

AEROMAGNETIC SURVEY

EASTERN PAPUA

JUNE - JULY 1970
MARCH - MAY 1971

COMPAGNIE GENERALE DE GEOPHYSIQUE

Record 1973/60

EASTERN PAPUA AEROMAGNETIC SURVEY. PART 2: SOUTHWESTERN PANEL (ONSHORE) FLOWN IN 1970 - 71

by

Compagnie Générale de Géophysique

COMPAGNIE GÉNÉRALE DE GÉOPHYSIQUE

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26-28 Manning Street, SOUTH BRISBANE.

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SUMMARY

The aeromagnetic survey of Eastern Papua conducted in 1969-71 by Compagnie Générale de Géophysique under contract to the Bureau of Mineral Resources was divided into two areas.

This report describes the operation, compilation, and interpretation of the survey area designated panel 1A, flown at a barometric altitude of 15 000 feet which covered the onshore areas of PORT MORESBY and KALO 1:250 000 sheets and parts of the onshore areas of TUFI and ABAU sheets.

The survey outlines the location of the three basement rock units - (i) mafic and ultramafic belt (ii) Mesozoic metamorphics and (iii) Tertiary intrusives.

Certain basement structures and patterns of the overlying volcanics and sediments were delineated.

INTRODUCTION

By terms of a contract dated August 8th 1969, No. Q 560447, the COMPAGNIE GENERALE DE GEOPHYSIQUE, Head Office at 50 rue Fabert, PARIS 7^{O}, FRANCE, undertook to carry out, compile and interpret an airborne magnetometer survey in the Territory of Papua and New Guinea for the Australian BUREAU OF MINERAL RESOURCES.

The surveyed region covers the whole of the Cape Nelson, Trobriand Islands, Tufi and Fergusson Island 1/250,000 scale map areas, and part of the Buna, Port Moresby, Kalo, Abau and Samarai 1/250,000 scale map areas (see Fig. 1).

The survey, which represents approximately 17,000 line miles, was divided into two panels, each to be flown at a barometric altitude defined by the terrain elevations of the areas :

- panel 1-B, flown at 8,000 ft. barometric altitude, covering the whole of the Cape Nelson, Trobriand Islands, and Fergusson Island maps and part of the Buna, Tufi, Abau and Samarai maps.

- panel 1-A, flown at 15,000 ft. barometric altitude, which covers the land areas of the Port Moresby and Kalo maps, and parts of the land areas of the Tufi and Abau maps.

Due to very bad meteorological conditions, only panel 1-B at 8,000 feet elevation could be flown by the anticipated completion date, and it has already been covered by a first

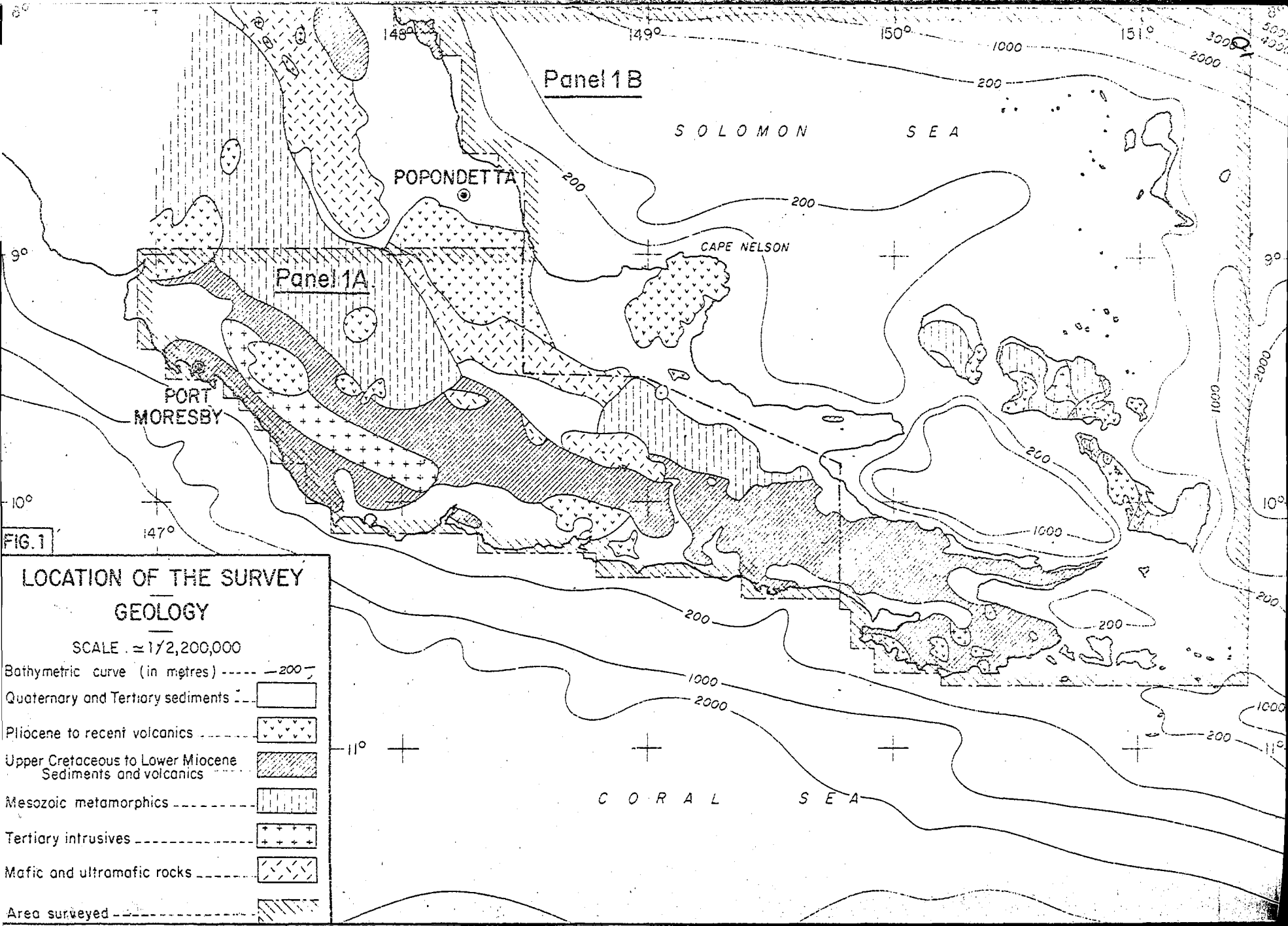

Panel 1B
Panel 1A
SOLOMON SEA
CORAL SEA
POPONDETTA
CAPE NELSON
PORT MORESBY
148°
149°
150°
151°
9°
10°
11°
147°
200
1000
2000
3000
LOCATION OF THE SURVEY
GEOLOGY
SCALE . ≃ 1/2,200,000
Bathymetric curve (in metres) ----- 200
Quaternary and Tertiary sediments
Pliocene to recent volcanics
Upper Cretaceous to Lower Miocene Sediments and volcanics
Mesozoic metamorphics
Tertiary intrusives
Mafic and ultramafic rocks
Area surveyed

FIG. 1

report printed in December 1970 (BMR Record 1971/67). Therefore, the present report concerns solely that part of the survey flown at 15,000 feet (panel 1-A) which represents about 5,800 line miles of profiles.

The flying in that panel commenced on June 22nd 1970 but was interrupted on July 31st. It began again on March 30th 1971 and was finally completed by May 6th 1971.

This report presents and analyses the magnetic data and describes the compilation and interpretation procedures including :

- the plotting of all anomalies, even very weak ones, on Calcomp profiles and their transfer onto the interpretation map
- the quantitative interpretation, using the method of the intersection of the tangents of inflection on all the anomalies whose widths and intensities allowed the tangents to be drawn accurately
- the drawing of an interpretation map showing the trends of the main anomalies, the figures of the corresponding bodies, the magnetic lineations and the delineation of the different basement zones.

CHAPTER I

SPECIFICATIONS AND OPERATIONS

1. EQUIPMENT

1-1. Aircraft :

The aircraft used to fly the part of panel 1-A covered during the period June - July 1970 was the same as that already used to fly panel 1-B (8,000'), i.e. a twin engine DC-3, Australian Registry VHP-WM, owned and operated by East-West Airlines.

For the second period of flying (March - May 1971), it was replaced, with the agreement of B.M.R, by a twin engine Aerocommander, registry VH-PWO, also owned and operated by East-West Airlines.

1-2. Geophysical Equipment :

1-2-1. For the First Period of Flying (June - July 1970), the Equipment mounted in the Aircraft was the same as that installed on board to fly panel 1-B, i.e. :

- one CSF optical pumping Cesium Vapor magnetometer, giving an accuracy of 0.1 gamma, and towed some 150 feet below and behind the aircraft
- one ROCHAR frequency-meter
- one SFIM digital magnetic tape recorder

- one TEXAS INSTRUMENTS analog recorder (chart width = 348 mm) with a longitudinal scale of approximately 1/60,000, chart speed of 7.5 cm per minute, and a vertical scale of 0.5 gamma per millimetre
- one ROSEMOUNT barometric altimeter, which enables the atmospheric pressure to be determined with great accuracy and thereby gives the altitude of the plane with a sensitivity of ± 5 feet
- one APN 1 radar altimeter for ground clearance information
- one MOSELEY / HEWLETT PACKARD analog recorder, for recording the instananeous departures from the preselected flight level. The recording was at a vertical scale of 1 mm = 1 metre
- one AEROPATH 35 mm continuous-strip camera for recording the actual passage of the aircraft over the ground
- one CAMEMATIC 35 mm frame-by-frame camera for recording the position of the aircraft at the instant of the fiducial trigger
- one CAMEMATIC 35 mm frame-by-frame camera for recording the Doppler information

All the recorders, digital and analog, and all the cameras were synchronized by the precisely timed fiducial triggers generated by the frequency-meter.

A ground station magnetometer was in continuous operation during the survey in order to record the diurnal

magnetic variations and the magnetic storms. This magnetometer was a VARIAN M-50 proton precession instrument. It was installed at the B.M.R. magnetic observatory near BOROKO.

1-2-2. For the Second Period of Flying (March - May 1971) the Equipment mounted in the Aircraft was noticeably different from that installed in the DC-3 (panel 1-B); it consisted of :

- one GEOMETRICS G803 magnetometer installed in the tail of the Aerocommander, giving an accuracy of ± 1 gamma
- one TEXAS INSTRUMENTS analog recorder (chart width = 348 mm) with a longitudinal scale of approximately 1/60,000, chart speed of 7.5 cm per minute, and a vertical scale of 0.5 gamma per millimetre
- one ROSEMOUNT barometric altimeter, which enables the atmospheric pressure to be determined with great accuracy and thereby gives the altitude of the plane with a sensitivity of ± 5 feet
- one AEROPATH 35 mm continuous-strip camera for recording the actual passage of the aircraft over the ground
- one CAMEMATIC 35 mm frame-by-frame camera for recording the position of the aircraft at the instant of the fiducial trigger

- one HEWLETT PACKARD line printer for recording the GEOMETRICS magnetometer information
- one MARCONI AD-560 "Doppler" navigation system
- one MOSELEY / HEWLETT PACKARD analog recorder, for recording the Doppler information.

All the recorders, digital and analog, and all the cameras were synchronized by the precisely timed fiducial triggers generated by the magnetometer.

A ground station magnetometer was in continuous operation during that part of the survey in order to record the diurnal magnetic variations and to prevent flying during magnetic storms. This magnetometer was a BARRINGER proton precession instrument; it was installed at the B.M.R. magnetic observatory near BOROKO.

2. PERSONNEL

2-1. The E.W.A. Crew was composed of :

During the first period (June - July 1970) :

- 2 pilots
- 1 ground engineer

During the second period (March - May 1971) :

- 1 pilot

2-2. The C.G.G. Team consisted of :

During the first period :

- 1 Party Chief
- 1 Dataman
- 1 Magnetometer Operator
- 1 Ground Magnetometer Operator
- 1 Navigator

During the second period :

- 1 Party Chief/Navigator
- 1 Magnetometer Operator

3. FLIGHT GRID

Panel 1-A eventually consisted of 64 flight lines, oriented north-south, 3 statute miles apart, and 17 tie-lines, oriented east-west, 6 statute miles apart. The lines were numbered from L 201 to L 264 and the tie-lines from T 301 to T 317.

This panel was flown at a constant barometric altitude of fifteen thousand feet a.s.l., i.e. approximately 4,500 meters a.s.l.

4. NAVIGATION

For the flights carried out in this panel, which is practically all over land, only contact navigation techniques were used, taking into consideration the photo-assemblies and maps supplied by the Bureau of Mineral Resources, supplemented by Marconi AD-560 Doppler Information, which was particularly useful for those profiles partly over water.

Navigation was quite difficult during the first period (June - July 1970), because of the meteorological conditions which were abnormally bad for the "dry" season. In fact, the conditions were so bad that we were obliged to stop the work at the end of July 1970, with the agreement of B.M.R., after only approximately 2,400 miles had been flown in six weeks out of the total of 5,736 line miles planned.

During the second period (March - May 1971), the meteorological conditions were a little better but not really excellent, so that we spent six weeks finishing the 3,400 or so line miles which remained to be flown.

5. FLIGHT PROGRESS (Panel 1-A)

First period (June - July 1970) :

- First magnetic measurement	:	June 22nd, 1970
- Last magnetic measurement	:	July 31st, 1970
- Flying time	:	37.58 hours
- Mileage of profiles flown and recorded	:	2,360
- Average production per hour	:	62 miles

Second period (March - May 1971) :

- First magnetic measurement	:	March 30th, 1971
- Last magnetic measurement	:	May 6th, 1971
- Flying time	:	66.45 hours
- Mileage of profiles flown and recorded	:	3,810 miles
- Average production per hour	:	57 miles

It must be mentioned that eventually 6,170 miles were effectively flown, recorded, compiled and interpreted on panel 1-A instead of the 5,736 miles as planned on the Contract.

CHAPTER II

COMPILATION OF THE DATA

1. DOCUMENTS OBTAINED DURING EACH FLIGHT

1-1. For the First Period (June - July 1970) :

They were the same as for panel 1-B, i.e. :

- a 35 mm AEROPATH film strip for flight path recovery when above land or islands
- a 35 mm CAMEMATIC frame-by-frame film, also for flight path recovery when above land or islands; this camera served as a backup to the first
- a 35 mm CAMEMATIC frame-by-frame film for recording the Doppler information
- a digital magnetic tape recording of the same magnetic field intensity (one value every second)
- an analog recording of the altimeter data.

During the flights, the ground station provided an analog recording of the ground variations of the magnetic field (one value every second).

1-2. For the Second Period (March - May 1971) :

They were the following :

- a 35 mm AEROPATH film strip for flight path recovery when above land or islands
- a 35 mm CAMEMATIC frame-by-frame film, also for flight path recovery when above land or islands; this camera served as a backup to the first
- a MOSELEY "HEWLETT PACKARD" analog recording of the doppler data
- a digital printing of the magnetic field intensity (one value every half second)
- an analog chart recording of the same magnetic field intensity (one value every half second)
- an analog recording of the altimeter data.

During the flights, the ground station provided an analog recording of the ground variations of the magnetic field (one value every three seconds).

2. PLOTTING AND DRAWING OF THE LOCATION MAP

The positioning of lines and tie-lines was carried out with the help of the strip-films by comparing the visible details on the strip films and the photomosaics and topographical maps supplied by the Bureau of Mineral Resources. Common points were pricked on the films and the photo documents.

The pricked points (fiducial points or percentage between two fiducial points) were then located on the existing topographic maps at 1/250,000 scale.

An assembly of transparent graticules at 1/250,000 scale was then superimposed over an assembly of the topographic maps at the same scale. But, before superimposing and in order to be homogeneous with the part of the survey flown at 8,000 feet, panel 1-B (see page 11, first report), all the parallels on the topographic maps were shifted 2 millimetres towards the north and all the meridians were shifted 3 millimetres towards the east.

Afterwards, we transferred the points pricked on the topographic maps onto the graticules. Then we completed the location map by interpolation or extrapolation of "Doppler" data between or outside these points.

We then enlarged all the 1/250,000 scale graticules to a scale of 1/100,000 (six sheets for one 1/250,000 sheet); then we transferred the fiducial points onto these new 1/100,000 scale graticules, taking into consideration the contractual standard.

The intersections between lines and tie-lines were either directly picked up on the aeropath films and transferred onto the maps at 1/250,000 scale then to the 1/100,000 graticules, or they were graphically determined on these 1/100,000 graticules by drawing the profiles taking into consideration the pin-pricked fiducial points. All the intersections are defined for the ensuing operations by the following three parameters : X and Y and the time of occurrence.

3. DATA PROCESSING OF THE DIGITAL "AIR" RECORDINGS

For the first period of flying (June - July 1970), the frequencies given by the CSF magnetometer (directly proportional to the magnetic field) were converted by the frequency meter into hundreds of gammas which were directly recorded on the "Air" magnetic tape. All this information was transferred onto a new magnetic tape in a special code to make possible further processing with a CDC computer.

For the second period of flying (March - May 1971), the values of the magnetic field (in gammas) were directly recorded by a printer which delivered a listing of these values. They were then punched on cards and transferred in code onto magnetic tape in order to be processed by the CDC computer.

The parameters of the intersections which define the location map were also punched in code on cards to be processed by the CDC computer. These intersections are checked by a special velocity programme.

A second processing by CDC computer, entering on the one hand the data related to the intersections and, on the other hand, the "Air" magnetic data, allows the first stage in the programme of final value calculation to be carried out. This stage consists in defining the differences existing at the intersections between the magnetic values on lines and tie-lines, differences called L - T.

The connection between panel 1-A and the survey flown at the same elevation (15,000 feet) in 1967 on the northern border of this survey was verified, taking into consideration the

tie-line T 317 which was crossed by all the lines of the previous survey.

4. ANALYSIS AND DEFINITE LOCATION OF THE INTERSECTIONS

The final adjustment is done manually by the compilation staff and combines translations of lines and tie-lines. It consists of :

- detecting the abnormal closures due to inaccurate plotting of the intersections or to poor identification of the parameters, and correcting for this by returning to the basic data and re-identifying and replotting
- reducing the too large or non-linear closures by moving the intersection position in a time range of ± 1 second, a displacement which is considered as normally admissible because of the possible swinging of the plane
- calculating the final corrections to be applied to each of the intersections in order to obtain a similar field intensity on both the line and tie-line profiles.

5. CALCULATION OF THE RESIDUAL VALUES

When final corrections have been applied, we will obtain equal values of the magnetic field for the line and tie-line profiles at each intersection. The next and final stage is the calculation of the residual values of the total field. This consists of :

- feeding the computer with the digitised "Air" data
- providing the computer with final intersection parameters (X, Y and time) along each profile and with the final corrected values of the total magnetic field
- producing the residual field after linearly distributing the corrections among the intersections and after the subtraction of a regional field. In this part of the survey, (panel 1-A) the same regional field was chosen as for the adjoining survey flown in 1967; it corresponds to a gradient of :
  - 5.486 gammas per km in the south-north direction
  - 0.955 gamma per km in the west-east direction
- listing the final residual values every 5 seconds and transferring them onto a new magnetic tape

6. CONTOURING OF THE ISOGAM CONTOUR MAP

The final residual values are transferred every 5 seconds onto the 1/100,000 scale graticules with indications of the maximum and minimum values encountered on the profiles.

Transparencies with rectangular coordinates at the corners are then superimposed over the graticules, and the isogam contours are drawn with a pencil every 5 gammas (or more for the intense anomaly contours). The maps obtained are at

1/100,000 scale, and represent, for the part of the survey flown at 15,000 feet, a total of 15 sheets, but they were not ink printed for the final report. They were supplied to B.M.R. for acceptance and only reductions at 1/250,000 scale of these 15 sheets were ink printed and figure in this report. They represent 4 plates (Port Moresby, Tufi, Kalo and Abau).

CHAPTER III

GEOLOGICAL BACKGROUND

General information regarding the geology of Eastern Papua has already been given in Chapter III of the first report printed in December 1970 (pages 16 to 21) concerning the part of the survey flown at 8,000 feet (panel 1-B). Therefore, we will not repeat this information; we will only reiterate the conclusions reached about the geology of Eastern Papua and its influence on the possible magnetic markers which may be encountered in this survey.

1. GEOLOGY

Although the geological information regarding Eastern Papua New Guinea is somewhat scarce, the existing bibliography has led us to make some deductions in an attempt to define the region's main features :

- the mountain system is represented by the Owen Stanley Range
- the mountains are mainly formed by metamorphic and basic rocks (Ultramafic Belt)
- the known sediments range from early Mesozoic through to the Quaternary
- the tectonic trends are mostly northwest
- vulcanism continued throughout the Cainozoic in different parts of the surveyed area.

2. POSSIBLE MAGNETIC MARKERS

It could be supposed, a priori, that we will encounter in this survey several magnetic markers :

i. certainly, the mafic and ultramafic rocks, the Mesozoic metamorphics, and the Tertiary intrusives, all three of which may be considered as representing the magnetic basement

ii. very probably, the Pliocene to Recent volcanics and the Cretaceous and Eocene volcanics and sediments.

We already saw on the first total field map (panel 1-B), and it is confirmed by the new one (panel 1-A), that all these series, including the "Cretaceous and Eocene volcanics and sediments", seem to act as relatively good magnetic markers where they outcrop and are practically impossible to separate from one another. As the corresponding depth-estimates locate the markers very near the surface, even where the "Pliocene to Recent volcanics" or "Cretaceous and Eocene volcanics and sediments" series are outcropping, we must conclude that :

- either (i) the latter series are very thin in places, and the real basement (mafic and ultramafic rocks, Mesozoic metamorphics or Tertiary intrusives) must be very near the surface level. Contrary to the opinion given in the first report, when only a few lines had been flown over land, we think now that this is probably more frequently the case

- or (ii) the composition of the material constituting these series is such that their magnetic response is nearly the same as that of the basement where this outcrops; therefore they may be considered as corresponding locally to the magnetic basement.

CHAPTER IV

QUALITATIVE AND QUANTITATIVE INTERPRETATION

1. QUALITATIVE INTERPRETATION

1-1. The Calcomp Records :

For panel 1-A, the Calcomps are presented at a horizontal scale of approximately 1/100,000. On each Calcomp there are three curves. Two represent the variations in the total magnetic field at different scales, either 1 cm = 10 gammas and 1 cm = 50 gammas for lines L 201 to L 240, or 1 cm = 5 gammas and 1 cm = 20 gammas for lines L 241 to L 264 and all the tie-lines (T 301 to T 317). The third (the one at the top) represents the variations in the computed vertical gradient along the measured profile.

The study of these Calcomps shows that the recorded anomalies may be classified in two categories only (see Fig. 2) :

- Category "A" : large (more than 45 and very often more than 100 gammas) but relatively wide anomalies, which, despite the very high flight altitude, give depth-estimates very near the surface level and which we have related therefore to the outcropping or suboutcropping basement

- Category "B" : small in intensity (less than 45 gammas and sometimes less than 20 gammas) but relatively wide anomalies that we have treated

FIG. 2

EXAMPLE OF TYPICAL ANOMALIES

PROFILE L 210 — SCALE ≈ 1/100,000

MAGNETIC SOUTH

1 cm = 10^{-4} γ/ft (calculated vertical gradient)

43119 42919 42719 42519 42319 42119

CATEGORY "A"

"infinite downwards magnetic compartment"

≈ 58 γ

CATEGORY "A"

"contact"

≈ 35 γ

CATEGORY "B"

"thin plate"

≈ 8 γ

CATEGORY "A"

"infinite downwards magnetic compartment"

≈ 145 γ

CATEGORY "A"

"contact"

≈ 65 γ

1 cm = 50 γ (total field)

43119 42919 43119 42919

(total field) 1 cm. = 10 γ

42719 42519 42319 42119

p = 0.4
h_v = 3.9 km (?)
h_o = −0.6 km (?)

α = 1.2
h_v = 3.6 km
h_o = −0.8 km

p = 1.9
h_v = 3.8 km (?)
h_o = −0.6 km (?)

α = 1.5
h_v = 2.8 km (?)
h_o = −1.8 km (?)

p = 3.0
h_v = 4.5 km
h_o = 0.1 km

4 cm = 4 km

FLIGHT LEVEL

SEA LEVEL

h_v h_o k_1 k_2

10.00 13.33 (SEC/CM) 177

as thick plates or thin plates. They give depth-estimates very near the surface level, like category "A" anomalies, and we have admitted that they were also related to the outcropping or sub-outcropping magnetic basement.

In conclusion, we have plotted these two types of anomalies depending upon their respective intensities; but, inasmuch as the corresponding depth-estimates are very near the surface elevation all over this part of the survey, we have admitted that they were caused by the same magnetic marker, i.e. the magnetic basement.

1-2. Total Field Contour Map : (see Plate 10b)

The residual total field contour maps were drawn at 1/250,000 scale (Pl. 4, 5b, 7 and 8b). However, because of the relatively large size of the surveyed panel, it is necessary to look at the corresponding reduced map at 1/500,000 scale (Pl. 10b) to have a general view of this panel.

This 1/500,000 scale total field contour map will be discussed and analysed in the "Interpretation Map" chapter.

1-3. Magnetic Lineations and Their Direction :

Two types of magnetic lineations may generally be recognized from aeromagnetic data :

- longitudinal lineations, which are near parallel to the anomaly axes, and which are indicated by sharp and generally extended gradients in the contours of the total field

- transverse lineations, which are at a large angle to the anomaly axes, and which are indicated by shifts in the alignment of anomaly maxima and minima.

These lineations are generally considered to be unfaulted contacts. Sometimes, they are considered as faults when a throw between the two magnetic compartments can be computed from the quantitative interpretation in the neighbouring area.

From the total field intensity contour map of panel 1-A, we were able to draw quite a lot of magnetic lineations :

- those of the first type are less numerous (F 54 to F 73), but some of them are very characteristic, being extended over large distances, especially F 55 - F'55 - F''55 and F 66 - F'66 - F''66 which may be considered as corresponding to an elongated faulted zone. They are generally oriented west-northwest/east-southeast or east-west, and only four of them (F 59, part of F''55, F 71 and F 72) are oriented east-northeast/west-southwest. Although the corresponding depth-estimates are practically all very near the surface level, it was nevertheless possible to indicate a probable downthrow side for three of them : F 54 - F'54, F 59 and F 60 - F'60 - F''60.
- those of the second type are more numerous (F 1 to F 53). They are most often oriented north-northeast/south-southwest to north-south, but a few of them (F 11 - F'11, F 15, F23, F 28 and F 29) are oriented north-northwest/south-southeast. As for the longitudinal

lineations, although all the corresponding depth-estimates are near the surface level, it was possible to indicate a probable downthrow side for three of them, F6, F 15 and F 52.

2. QUANTITATIVE INTERPRETATION

2-1. Magnetic Characteristics of the Survey Area :

In panel 1-A, the magnetic inclination ranges from 30^{o} to 34^{o}S, this being the real inclination for an anomaly trending east-west. If the trend of the anomaly is not east-west, the "apparent inclination" is defined by :

$$\tan i' = \frac{\tan i}{\cos \varphi}$$

with :
- i = magnetic inclination in the surveyed area
- i' = "apparent" magnetic inclination of the anomaly
- φ = angle of the anomaly axis to the east-west direction

In this survey, the trends of the main anomalies are generally approximately west-northwest/east-southeast, so that the apparent magnetic inclination seldom differs greatly from 32^{o} to 35^{o}S. This means that, theoretically, a magnetic body will generate an anomaly with a prominent negative to the south and a weak positive to the north.

Nevertheless, if the majority of the anomalies encountered are effectively mainly negative, we should mention that some of them are indisputably positive, especially in the middle east-west range of the panel. This is probably due to the influence of remanent magnetization. These positive anomalies have been plotted as if the magnetic inclination were between 45^{o} and 90^{o}S.

2-2. Depth-estimates of the Magnetic Contrasts :

All the interpreted anomalies have been plotted with the help of C.G.G. "I.T.I" and "I.T.I. gamma" master charts, but it was necessary to select an appropriate criterion for differentiating the "intrabasement bodies" and the "thick" or "thin plates". After several test-cases, it was decided that any anomaly whose apparent amplitude was greater than 45 gammas would be interpreted using the hypothesis of a magnetic block of infinite depth, whereas those with apparent amplitudes lower than 20 gammas would be interpreted as "thin plates".

Anomalies with amplitudes between these two values have generally been interpreted as "thick plates" (ratio $\frac{H}{h} = 2$), except where the two flanks were too asymmetrical to fit in with this hypothesis; in such a case, the hypothesis of a magnetic block of infinite depth was employed.

2-3. Transfer of the Depth-estimates :

The maxima and minima of the anomalies were transferred onto the location map. The calculated depths were multiplied, where necessary, by the cosine of the angle between the

flight line and the perpendicular to the plotted anomaly axis.

The exact location of the depth-estimates depends on the "apparent inclination". For a magnetic inclination of about 32^{o}S, corresponding to a negative anomaly, the depth-estimate is plotted between the minimum and the maximum, to the north of and close to the minimum (about one fourth of the distance between the minimum and the maximum).

Where the anomaly is a positive one, the depth-estimate is plotted to the south of the maximum and generally near this (about one fourth of the distance between the maximum and the minimum).

CHAPTER V

INTERPRETATION MAP

1. ACCURACY

From several statistics made on different detailed surveys where comparison has been possible between depth-estimates and data provided by drilling, it appears that, generally, the mean quadratic error to be expected from a group of depth-estimates corresponding to the interpretation of a well determined anomaly axis, is around 10 per cent.

For this panel where the plotted depth-estimates are nearly always very near the surface, i.e. (except for a few values above the GOROPU Mountains), between approximately 2,000 and 4,000 metres below the flight elevation, this means that the mean quadratic error would be between 200 and 400 metres. Therefore our depth-estimates cannot be guaranteed to have an accuracy better than ± 300 metres on average. This value is approximately the maximum difference between our depth-estimates and the corresponding surface elevation. We conclude that the sources of the anomalies lie in the surface magnetic marker which corresponds, at least in the centre of the panel, to the magnetic basement (Ultramafic rocks of the Owen Stanley Range - see Plate 11 - Geology).

2. DESCRIPTION OF THE INTERPRETATION MAP (see Plate 12b)

The interpretation map was drawn at 1/500,000 scale, i.e. the same scale as the existing geological map, so that a direct comparison between the geology and our interpretation is possible.

As indicated above, it appears that all depth-estimates are practically at the same altitude as the ground elevation. Therefore we did not draw an isobath contour map, which would only have been a repetition of the topographic map. Consequently, we have only noted on this interpretation map the trends of the anomalies, and the figures of the corresponding bodies, the magnetic lineations, if any, the intensity of the main anomalies, and the delineation of the different basement zones.

2-1. Port Moresby Sheet : (Plate 4)

This sheet covers the western part of the on-shore area flown at 15,000 feet elevation.

(a) Field Contours :

On this sheet, the magnetic pattern may be divided into four zones:

i. One to the south, the southwest and the west, which is parallel to the coast and which corresponds to a wide, quite intense, and very elongated negative anomaly which extends from 147°00 to 148°30'. On the geological map, this zone corresponds at surface partly to the Upper Cretaceous to Lower Tertiary sediments and volcanics, partly to Tertiary intrusives between 148°10 and 147°35'.

ii. A second, just to the north of the first zone,

which is parallel to the latter and which also corresponds to an intense and relatively wide anomaly, but this time it is positive and extends right across the sheet from southeast to northwest. On the geological plate, this second zone corresponds partly to a large outcrop of Tertiary intrusives from 148°10' to 147°15' and partly to a band of Upper Cretaceous to Lower Tertiary sediments and volcanics between 148°20' and 148°30'.

iii. A third zone, centrally located, which covers the largest part of the sheet shows a few narrow intense anomalies. Some overlie volcanoes.

On the geological map, this zone corresponds mainly to a wide band of Mesozoic metamorphics except in the southeastern part, where it corresponds to an ensemble of Miocene to Pleistocene sediments, Cretaceous ? and Eocene and some younger volcanics and sediments, and Upper Cretaceous to Lower Tertiary sediments and volcanics.

iv. Finally, a fourth zone in the northeastern part of the sheet which corresponds to a wide area of several broad intense anomalies generally oriented west-northwest/east-southeast. On the geological map, this zone corresponds partly to an outcrop of Mafic and Ultramafic rocks along its southwestern border and partly to a wide band of Pliocene to Recent volcanics..

(b) Interpretation :

Some of the units defined in the geological background may be identified on the field contour map (Plate 4).

i. Mafic and Ultramafic Rocks :

In the northeastern part of this sheet an intense (110 to 130 gammas) negative anomaly, called Mu 1 on our interpretation map, is located above an outcrop of mafic and ultramafic rocks and may be considered as related to this outcrop.

Two anomalies (Mu 2 and Mu 3) located over Pliocene to Recent volcanics to the north are similar to anomaly Mu 1 and are assumed to correspond also to the mafic and ultramafic rock unit. It is suggested that the outcrop of Pliocene to Recent volcanics marked on the geological map coinciding with these anomalies belongs to a thin overburden and that the magnetic basement is nearly outcropping. The same remark applies to the Mount Lamington area.

A succession of magnetic lineations (F"'55 - F 66 - F'66 - F"66 - F 69) coincides with the southwestern limit of the mafic and ultramafic rock unit and corresponds to a known faulted zone at the surface, the "Owen Stanley" fault.

ii. Mesozoic Metamorphics :

An outcrop of Mesozoic metamorphics covers a large part of the sheet. The anomalies located above this outcrop are of low intensity (up to 20 gammas) and are practically all plotted as thin plates or thick

plates. At the northwestern border of the sheet the anomalies are more intense and, although located over metamorphics at the surface, are considered to be an extension to the west of the mafic and ultramafic rocks below the metamorphics.

iii. Tertiary Intrusives :

An elongated outcrop of these rocks crosses the sheet from south-east to north-west. It corresponds on the field contour map to an intense positive anomaly. It is paralleled on the southern boundary by an associated negative anomaly. These anomalies are undoubtedly related to the Tertiary intrusives. It appears that the intrusives extend further than indicated on the geological map. On the basis of their distinctive anomaly character these Tertiary intrusives are interpreted to extend eastward below the Upper Cretaceous - Lower Tertiary volcanics and sediments.

The intrusives probably continue eastward at least to long. 148°30'E. The outcrop of Upper Cretaceous to Lower Tertiary sediments and volcanics apparently represents only a thin cover and the Tertiary intrusives are very near the surface.

iv. Cretaceous ? and Eocene and some younger Volcanics and Sediments :

According to the geological map, this unit is represented on this sheet by a narrow band of outcrops with a northwest/southeast direction on the middle

eastern edge of the sheet, south-east of the Mesozoic metamorphic outcrops. Above this unit the total field shows two small intense anomalies (Lmv1 and Lmv2), both plotted as thin plates, which are very probably related to this unit and which indicate that this outcrop represents only a thin cover.

South and west of these two small anomalies, a narrow, intense negative anomaly (long. 148°15'E) seems to correspond to a dyke which is apparently connected to a volcano indicated on the geological map at the junction of the northern and central districts. This dyke would be Upper Cretaceous to Lower Miocene in age.

v. Upper Cretaceous to Lower Tertiary Volcanics and Sediments :

South of the Tertiary intrusives unit, the geological map indicates a large outcrop of Upper Cretaceous to Lower Tertiary volcanics and sediments along the coast between 147°E and 148°E. This outcrop corresponds on the field contour map to a succession of negative anomalies, some intense, some less intense, which are oriented north-west/south-east and constitute the southwestern border of the panel 1-A.

The major elongate negative anomaly has been attributed to the Tertiary intrusives as previously described. The small ones plotted as thin plates (those marked Ucv1 and Ucv2 on our interpretation map, Ucv1 is west of F9 near the coast, Ucv2 is west of F2 on the Laloki River) effectively correspond to the cover of

volcanics and sediments. According to the magnetic characteristics of the other anomalies encountered in this zone, it may be that the marker responsible for these anomalies is the same as that responsible for the same type of anomalies encountered at the north-east of the sheet, i.e. the mafic and ultramafic rocks of the basement. This is only an hypothesis, but this seems to us more plausible than to admit that the Upper Cretaceous to Lower Tertiary sediments and volcanics series may correspond over so large an area to deep seated magnetic bodies.

2-2. Tufi Sheet : (Plate 5b)

This sheet covers the northeastern part of the on-shore area flown at 15,000 feet elevation.

(a) Field Contours :

On this sheet the magnetic pattern may also be divided into four zones.

i. A small zone, at the extreme south-west of the sheet which is the extension to the east of the first zone described on the Port Moresby sheet and which corresponds to an intense negative anomaly. On the geological map this zone corresponds partly to Upper Cretaceous to Lower Tertiary sediments and volcanics and partly to Pliocene to Recent volcanics.

ii. A second zone, to the east and northeast of the first, which extends eastward to Goodenough Bay and bordered on the north by the Goropu Mountains. It corresponds to a succession of intense positive anomalies. This zone is the eastern extension of the second zone described in the Port Moresby sheet, but at the surface it does not coincide with the same geological outcrop. It coincides partly with mafic and ultramafic rocks, partly with Mesozoic metamorphics, and partly with Cretaceous ? and Eocene and some younger volcanics and sediments.

iii. A third zone, north of and smaller than the second, has an east-west extension from the western boundary of the sheet to the Ruaba River across the Didana Range. This zone has few magnetic anomalies and represents the eastern extension of the third zone already described on the Port Moresby sheet. On the geological map it corresponds at the surface to two different outcrops, Miocene to Pleistocene sediments and mafic and ultramafic rocks, and Mesozoic metamorphics to the east.

iv. Finally, a fourth zone, on the northwestern border of the sheet extends with a west-northwest/east-southeast trend across the Musa River area. This is the extension of the fourth zone described on the Port Moresby sheet. On the geological plate it corresponds at the surface, partly to mafic and ultramafic rocks, partly to Mesozoic metamorphics, and partly to Quaternary limestone and alluvium.

(b) Interpretation :

On this sheet also, some of the units described in the geological background chapter (page 17) may be identified on the field contour map.

i. Mafic and ultramafic rocks (centre of the sheet) :

Three intense anomalies (Mu5, Mu6 and Mu7) south of the centre of the sheet are located over this rock type. Two of these anomalies are positive and one is negative (but in a positive complex). Without geological information, these anomalies may have been interpreted as due to Tertiary intrusives in the same way as the intense positive anomaly on the Port Moresby sheet, but it is evident that these three anomalies effectively correspond to the mafic and ultramafic rocks. By extension the positive anomaly which is located on the Bonua River over the Cretaceous ? and Eocene and some younger volcanics and sediments just south of the mafic and ultramafic outcrop, is probably related to the latter type of rocks.

ii. Mesozoic Metamorphics :

A large outcrop of this unit covers a large part of the sheet. It corresponds on the field contours to a zone where the magnetic values are more uniform than those to the south and to the north. Five anomalies have been attributed to this type of unit : a small intense negative one (called Mm6 on our map) located south of Ubo; two small intense negative

anomalies west of the latter Mm7 and Mm8 which are located over outcrops of Miocene to Pleistocene sediments. These two anomalies, in our opinion, are the western extension of the Mesozoic metamorphics below a thin cover of Miocene to Pleistocene sediments; in the east, two other anomalies, Mm9 and Mm10, have also been attributed to the Mesozoic metamorphics, although they are intense. Mm9 between F48 and F44 is actually located over Mesozoic metamorphics. Mm10, east of F48, is located over Cretaceous and Eocene and some younger volcanics and sediments but this series probably represents only a thin cover.

iii. Mafic and Ultramafic rocks : (northwestern part of the sheet)

North-west and west of the above mentioned Mesozoic outcrops, the geological map shows an outcrop of mafic and ultramafic rocks extending in a southeast direction from the Port Moresby sheet. No rock type boundary corresponding to this type of rocks is drawn. A succession of magnetic lineations (F 55 - F'55 - F"55) with a general west-northwest/east-southeast direction delineates two different magnetic zones, an undisturbed one to the south corresponding to the Mesozoic metamorphics, the second to the north (an intense negative anomaly) evidently related to the mafic and ultramafic rocks below a very thin cover of Quaternary sediments. F 55 and F'55, approximately follow the northern limit of the outcrops of Mesozoic metamorphics, seem also to mark the northern boundary of the outcropping basement. Except for some high

basement peninsula similar to A11, A12 and A13, a vast sedimentary basin begins north of this boundary, it extends northwards in the Solomon Sea as indicated in the first report (1-B).

2-3. Abau Sheet : (Plate 8b)

This sheet covers the southeastern part of the area flown at 15,000 feet elevation.

(a) Field Contours :

In this sheet, the magnetic pattern is homogeneous. It corresponds to a series of wide intense negative anomalies extending across the northern margin of the sheet with an east-west orientation and bordered to the south by another series of intense positive anomalies extending over the same distance. On the geological map this sheet corresponds mainly to a large outcrop of Cretaceous ? and Eocene and some younger volcanics and sediments in its eastern part, to Quaternary deposits along the coast in its central part, and to Pliocene to Recent volcanics in its western part.

(b) Interpretation :

On this sheet, geological units are difficult to identify other than those which outcrop here, i.e. the Cretaceous ? and Eocene and some younger volcanics and sediments and the Pliocene to Recent volcanics series.

A few low intensity anomalies are plotted as thin plates and

attributed to Cretaceous ? and Eocene and some younger volcanics and sediments (called LMv3, LMv4 and LMv5) or to Pliocene to Recent volcanics (called PRv1 and PRv2). The other anomalies must probably be related to the mafic and ultramafic rocks of the magnetic basement. It seems improbable that the succession of intense negative and positive anomalies corresponding evidently to deep seated bodies are related over so large an area solely to Cretaceous ? and Eocene and some younger volcanics and sediments. In particular, the intense negative anomaly which is located partly over Lower Miocene volcanics and partly over Pliocene to Recent volcanics, corresponds undoubtedly to a single deep seated magnetic body. This body cannot be attributed either to Cretaceous ? and Eocene and some younger volcanics or to the Pliocene to Recent volcanic series, but most probably to the mafic and ultramafic rocks of the magnetic basement.

2-4. Kalo Sheet : (Plate 7)

This sheet covers a very small part of the area flown at 15,000 feet elevation, located to the extreme south-west of the survey.

(a) Field Contours :

The magnetic pattern in this part of the survey represents an individual zone with an intense positive anomaly located beside and parallel to the first zone of the Port Moresby sheet. On the geological map this zone corresponds at the surface partly to Quaternary alluvium and partly to Upper Cretaceous to Lower Tertiary sediments and volcanics.

(b) Interpretation :

The intense positive anomaly which covers the major part of the area surveyed in the sheet has been plotted as corresponding to an downward magnetic compartment in the west and to a contact with a great downward extension (n = 3.0) in the centre of the sheet. In the eastern part of the sheet (east of F 24), a small intense positive anomaly has been plotted as a thin plate : since a corresponding body with the same width is located in the eastern extension of an outcrop of Upper Cretaceous to Lower Tertiary sediments and volcanics, we must admit that this body represents this type of geological unit. On the other hand, the source of the broad anomaly at the west of the sheet, evidently deep seated, cannot be related to the Upper Cretaceous to Lower Tertiary sediments and volcanics but more probably to the true magnetic basement, either mafic and ultramafic rocks or perhaps Tertiary intrusives.

3. GENERAL REMARKS

It appears after studying the isogam contour map and making a comparison between qualitative and quantitive interpretation and the existing geological map, that practically everywhere in the area flown at 15,000 feet elevation (panel 1-A) we have followed the real magnetic basement, either the Mafic and Ultramafic rocks, or the Mesozoic metamorphics, or the Tertiary intrusives. Although other series, such as the Upper Cretaceous to Lower Tertiary sediments and volcanics, the Cretaceous ? and Eocene and some younger volcanics and sediments and the Pliocene to Recent volcanics,

may cover large areas, they probably do not correspond to a great thickness of deposits and represent only a thin cover over one of the three above mentioned geological units which constitute the magnetic basement.

Concerning oil exploration, the complete area covered by the part of the eastern Papua survey flown at 15,000 feet elevation (panel 1-A) is not of any interest for further oil investigation since the cover of sediments is practically negligible. Where such cover exists locally (see geological map, Plate 11) the basement is mostly sub-outcropping.

It must be emphasized that nowhere in this part of the survey, even where volcanics are apparently outcropping, have the Calcomp profiles shown anomalies which could possibly be broader after regularization than those plotted and could therefore correspond to deeper bodies than those given by our interpretation. This is another reason to conclude that all the intense anomalies plotted (those more than 45 gammas) correspond to deep seated bodies. It is not possible to find deeper magnetic bodies.

The survey cannot be considered as an ideal tool for direct mineral exploration, for two reasons :

1. the flight elevation (15,000 feet) is generally too far above ground level to give a perfect definition of the anomalies encountered

2. the grid of profiles is too large (5km x 10km) for delineating with any accuracy the exact

limits of the magnetic bodies corresponding to these anomalies. Nevertheless, it may be seen from looking at the isogam contour map and the interpretation map, that we have been able :

(a) to underline the main geological trends, north-northwest/south-southeast for the majority of the anomalies and north-northeast/south-southwest for the majority of the magnetic lineations

(b) to give an approximate estimate of size and depth for the main magnetic bodies delineated by this survey, all of which are practically outcropping. Such information is particularly interesting from a structural point of view and may help further mineral exploration on the ground. If mineral deposits are discovered at the surface, possible extensions of such deposits may be postulated below a thin cover of sedimentary or volcanic material and further investigations directed on the ground with another geophysical method.

CONCLUSIONS

During this part of the aeromagnetic survey over eastern Papua (panel 1-A) which was conducted in two periods (June - July 1970; March - May 1971), 6,170 statute miles of profiles were covered at 15,000 feet a.s.l. covering an area of about 27,000 km^2, mainly over land.

The purpose of the complete survey was mainly to provide information on the following topics :

(a) the extent of the continuation of the ultramafic belt to the south of latitude 9^oS and the structure which may be related to the termination of this belt

(b) the relationship of the structures of the d'Entrecasteaux Islands to the mainland structures

(c) the form and extent of any Tertiary Sedimentary basin in the Trobriand Islands shelf area and its relation to the Tertiary sediments in the Cape Vogel area

Points (b) and (c) have already been analysed and discussed in the first report printed in 1970 (pages 53 and 54). Point (a) has been covered in the present report, so that we think the general goal of the complete survey has been reached.

The qualitative and quantitative study of the recorded anomalies in panel 1-A allowed the determination of depth-estimates of the corresponding bodies. In practically all cases depth-estimates are very near the surface level. In that part of the survey therefore, the isobath contours

of the magnetic basement were not drawn. The interpretation includes only the depth-estimates, the trends of the main anomalies encountered, the figures of the corresponding bodies, the magnetic lineations and the delineation of the different basement zones.

Looking at this interpretation map (see Plate 12b), and at the geological map (Plate 11) it is clear that :

1. the magnetic basement is suboutcropping everywhere on panel 1-A, which means that this part of the survey is of no interest to oil exploration and therefore does not merit any further investigation for it

2. in this part of the survey, several geological units may be recognized which are generally elongated in a west-northwest/east-southeast direction; they are

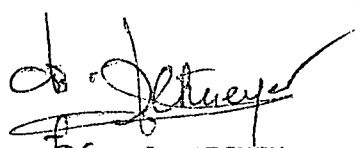
   (a) at the north and northeast of panel 1-A, a zone which corresponds to suboutcropping mafic and ultramafic rocks, even in the vicinity of Mount Lamington where the geological map indicates Pliocene to Recent volcanics at the surface

   (b) to the south of zone a, is a zone which corresponds to Mesozoic metamorphics. This zone covers a large area on the Port Moresby sheet and a smaller one on the Tufi sheet. It is separated from zone a by a succession of magnetic lineations (F 55 to F"'55, F 66 to F"66 and F 69), which indicates the existence of a faulted zone partly corresponding to the Owen Stanley fault.

(c) a third zone, south of the second, which corresponds to an elongated positive and quite intense anomaly on the Port Moresby sheet and to an "ensemble" of intense positive anomalies on the Tufi sheet. On the Port Moresby sheet, the positive anomaly is related to the outcrop of Tertiary intrusives, towards the east very probably up to long. 148°30'. On the Tufi Sheet, the "ensemble" of positive anomalies apparently corresponds to mafic and ultramafic outcrops up to long 149°15' and, more to the east, to the Mesozoic metamorphic series.

(d) a fourth zone, (parallel to and south of the third) which covers a large area north of the southern coast of Eastern Papua. This zone probably also corresponds to the mafic and ultramafic rocks or the Tertiary intrusives beneath a thin cover of either Upper Cretaceous to Lower Tertiary sediments and volcanics or Cretaceous and Eocene volcanics and sediments. Some volcanics and sediments could be younger, even Pliocene to Recent.

Respectfully Submitted,



for J. DEGUEN

Geophysicist

REFERENCES

- "Eastern Papua Geological Reconnaissance", by H.L. DAVIES, I.E. SMITH, G. CIFALI and D.J. BELFORD (Record No. 1968/66, B.M.R.)

- "Papuan Ultramafic Belt" by H.L. DAVIES (Record No. 1967/107, B.M.R.)

- "The Geology of FERGUSSON and GOODENOUGH Islands (Papua)" by H.L. DAVIES and D.J. IVES (Report No. 82, B.M.R., 1965)

- "NORMANBY Island, T.P.N.G. - Reconnaissance Geology" by H.L. DAVIES (Record No. 1967/50, B.M.R.)

- "The Geology of the BOWUTU Mountains, New Guinea" by D.B. DOW and H.L. DAVIES (Report No. 75, B.M.R. 1965)

- "Notes on the Volcanoes Mount BAGANA and Mount VICTORY, Territory of Papua and New Guinea" by I.E. SMITH (Records 1969/12, B.M.R.)

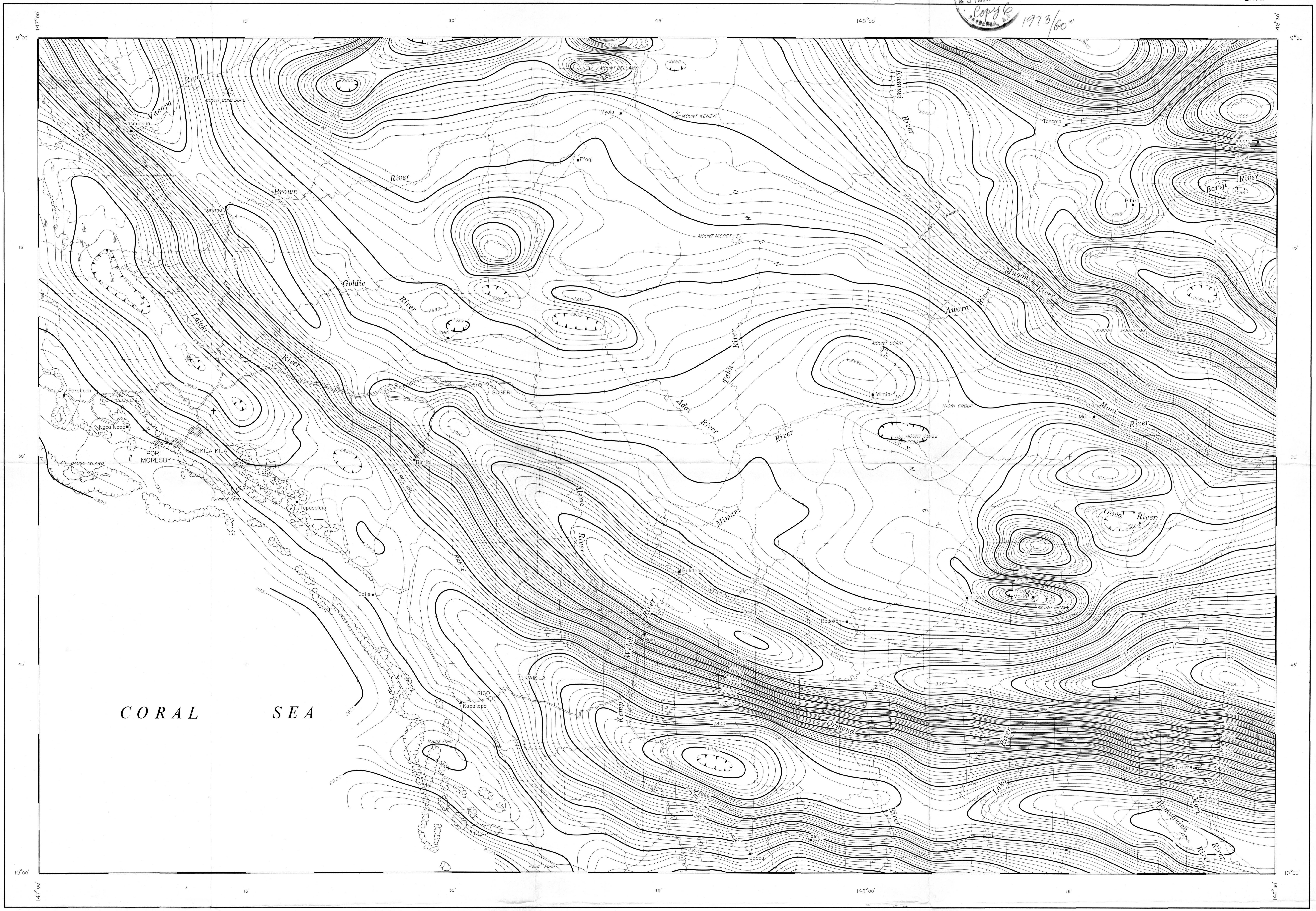
- "The East Indian Archipelago" by E.A. KISSLING (formerly of N.V. de Bataafsche Petroleum Maatschappij)

- "Australian New Guinea" by K. WASHINGTON GRAY (Anglo-Iranian Oil Company Ltd.)

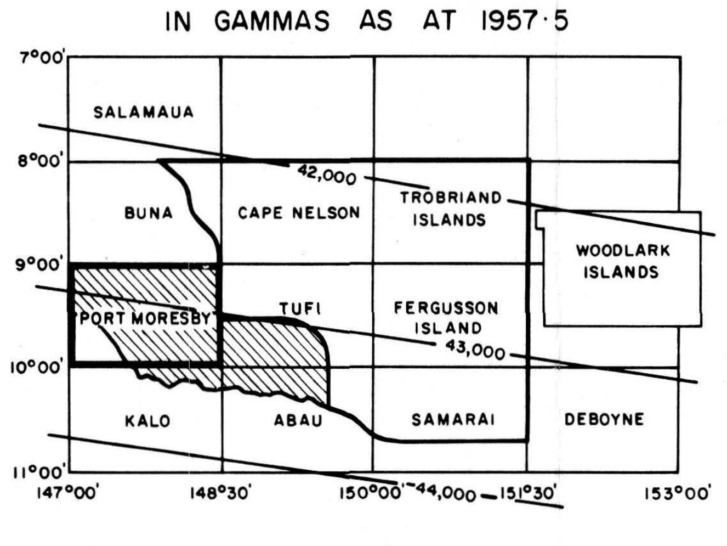
- "De la Pointe Keppel a la Baie Hercule" (Iles d'Entrecasteaux et Archipel de la Louisade) Marine Map No. 4977 (scale 1/783,200) printed by the Hydrographical Service of the French Navy

- "De la Baie Orangerie au Cap Vogel" (Iles d'Entrecasteaux) Marine Map No. 6301 (scale 1/332,200) printed by the Hydrographical Service of the French Navy (from the Marine Maps published in 1957 by the English Admiralty).

PORT MORESBY



REFERENCE TO 1:250,000 MAP SERIES SHOWING REGIONAL TOTAL MAGNETIC INTENSITY IN GAMMAS AS AT 1957·5



Regional Gradient as shown on the map diagram has been removed.

Area flown at 15,000' A.S.L.

TOTAL MAGNETIC INTENSITY

CONTOUR INTERVAL 5 GAMMAS

ALTITUDE 15,000 FEET

SCALE 1:250,000

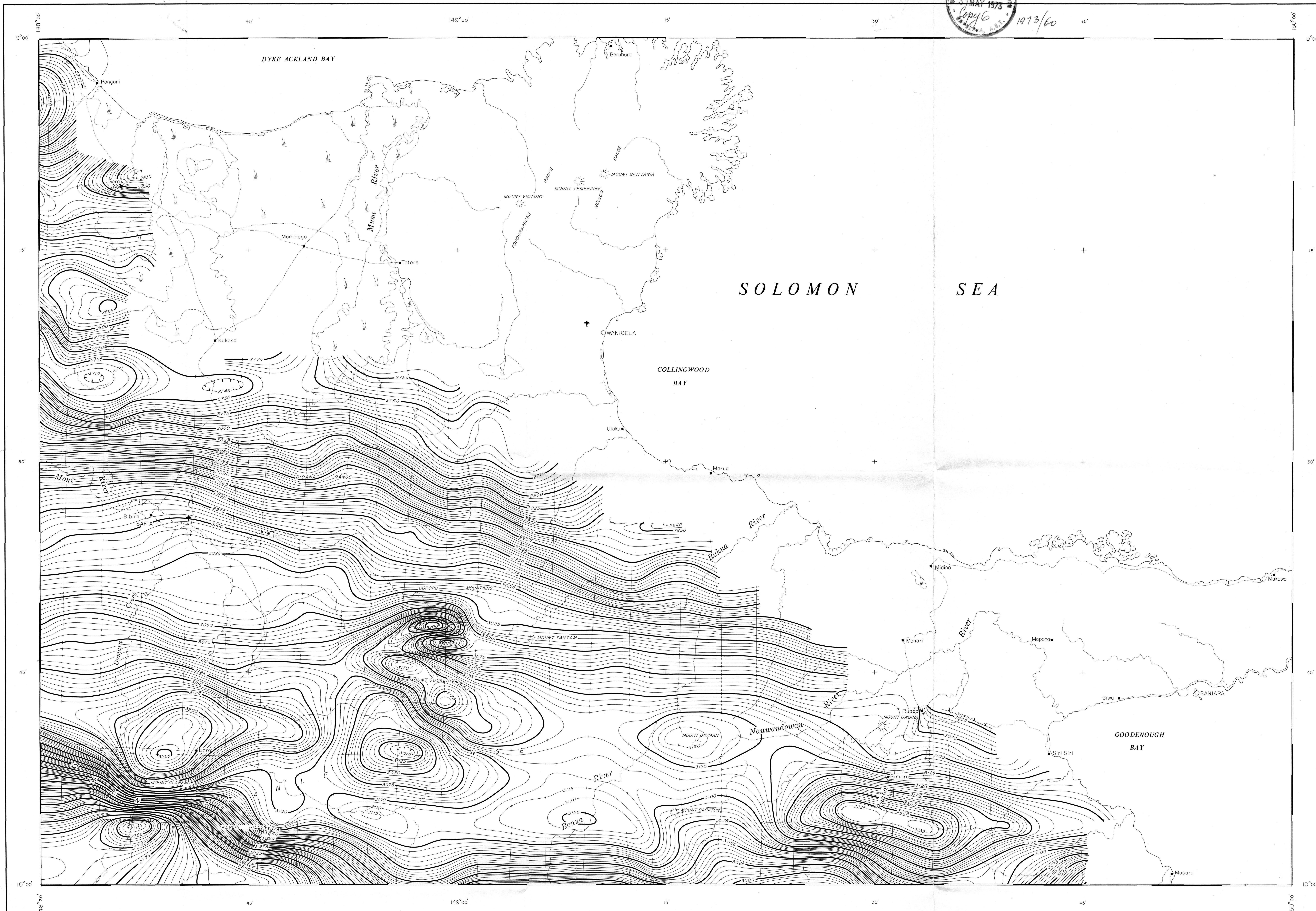
KILOMETRES 5 0 5 10 15 20 25 30 35 KILOMETRES

MILES 5 0 5 10 15 20 MILES

NEW GUINEA 1:250,000

TUFI

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS PLATE 58



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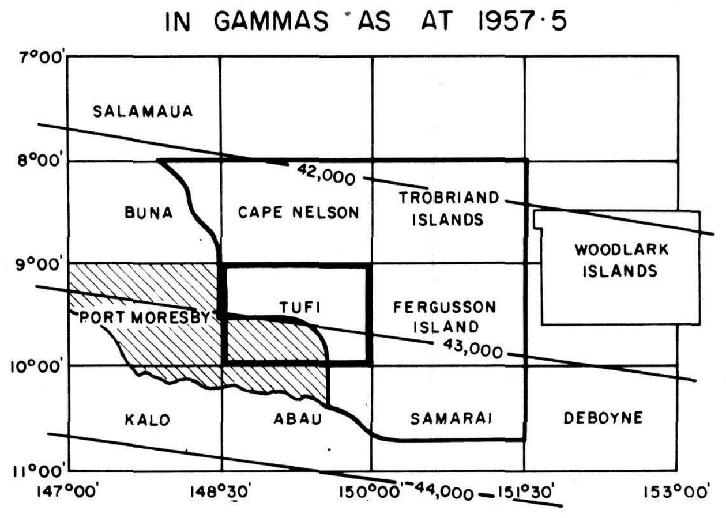


Regional Gradient as shown on the map diagram has been removed.

Area flown at 15,000' A.S.L.

TOTAL MAGNETIC INTENSITY

CONTOUR INTERVAL 5 GAMMAS

ALTITUDE 15,000 FEET

SCALE 1:250,000

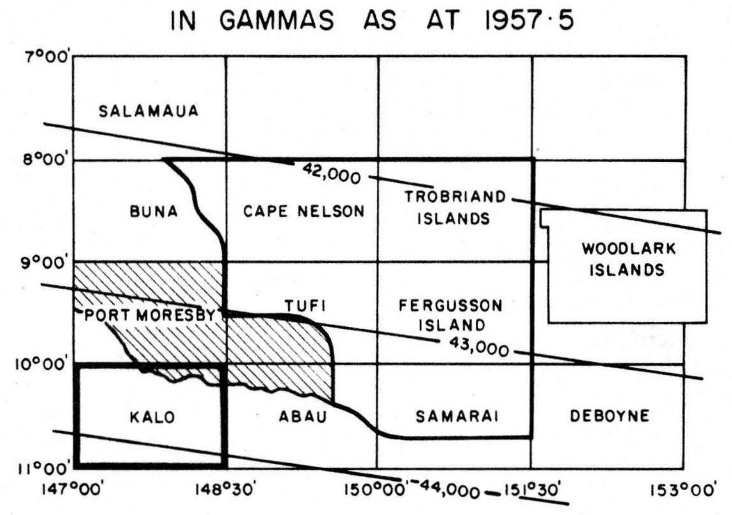
KILOMETRES 5 0 5 10 15 20 25 30 35 KILOMETRES

MILES 5 0 5 10 15 20 MILES

KALO

COMPAGNIE GENERALE DE GEOPHYSIQUE

REFERENCE TO 1:250,000 MAP SERIES
SHOWING REGIONAL TOTAL MAGNETIC INTENSITY
IN GAMMAS AS AT 1957·5



Regional Gradient as shown on the map diagram has been removed.

Area flown at 15,000' A.S.L.

TOTAL MAGNETIC INTENSITY

CONTOUR INTERVAL 5 GAMMAS

ALTITUDE 15,000 FEET

SCALE 1:250,000

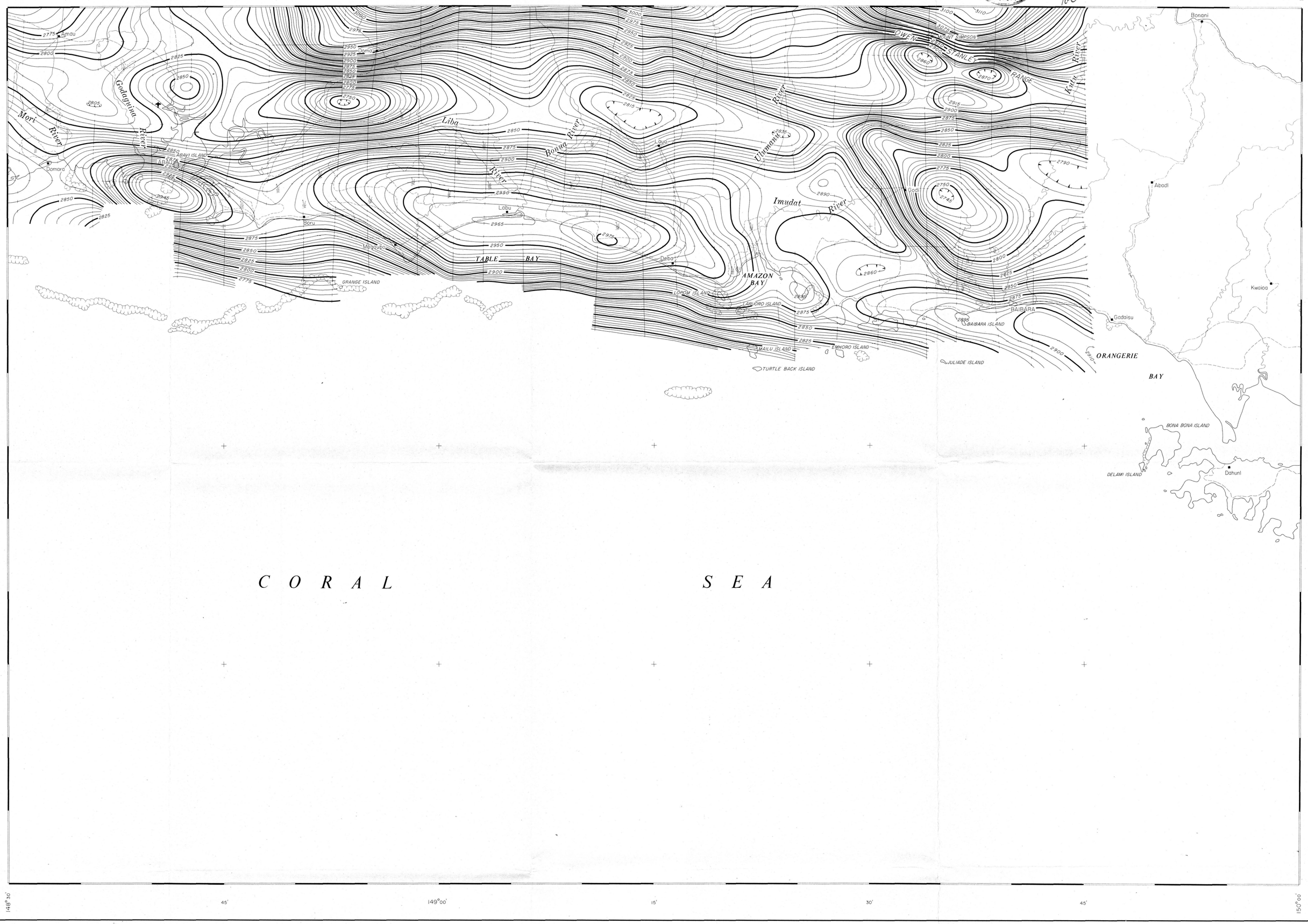
KILOMETRES 5 0 5 10 15 20 25 30 35 KILOMETRES

MILES 5 0 5 10 15 20 MILES

NEW GUINEA 1:250,000

ABAU

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS PLATE 88



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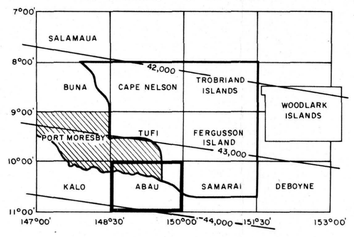
IN GAMMAS AS AT 1957·5



Regional Gradient as shown on the map diagram has been removed.

Area flown at 15,000' A.S.L.

TOTAL MAGNETIC INTENSITY

CONTOUR INTERVAL 5 GAMMAS

ALTITUDE 15,000 FEET

SCALE 1:250,000

KILOMETRES 5 0 5 10 15 20 25 30 35 KILOMETRES

MILES 5 0 5 10 15 20 MILES

COMPAGNIE GENERALE DE GEOPHYSIQUE

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PLATE 10 B

AIRBORNE MAGNETOMETER SURVEY

EASTERN PAPUA

TOTAL MAGNETIC FIELD CONTOURS

SCALE 1:500,000

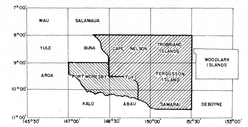
LEGEND

TOTAL MAGNETIC INTENSITY CONTOURS — 3000 — 2980

5 0 5 10 15 20 25 30 35 40 KILOMETRES
5 0 5 10 15 20 25 MILES

COMPAGNIE GENERALE DE GEOPHYSIQUE

REFERENCE TO 1:250,000 MAP SERIES



LOCATION DIAGRAM

AREA FLOWN AT 8000 FEET ABOVE SEA LEVEL

AREA FLOWN AT 15000 FEET ABOVE SEA LEVEL

SOLOMON SEA

CORAL SEA

147°00' 148°00' 149°00' 150°00' 151°00' 151°30'

8°00' 9°00' 10°00' 11°00'

BASED ON C55/80-46.

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS

AIRBORNE MAGNETOMETER SURVEY
EASTERN PAPUA
GEOLOGICAL MAP

SCALE 1:500 000

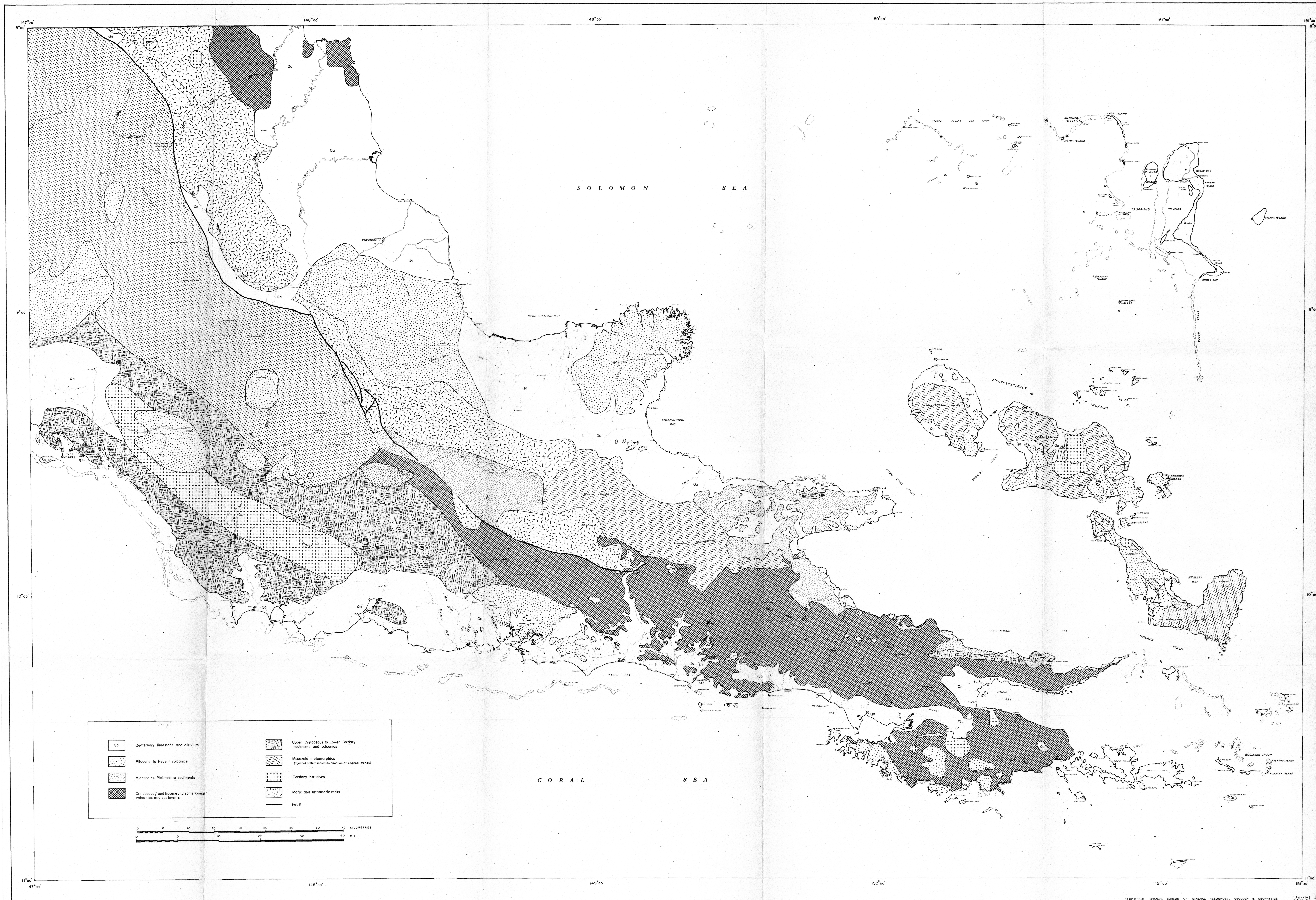
REFERENCE TO 1:250 000 MAP SERIES

LOCATION DIAGRAM

AREA FLOWN AT 8000 FEET ABOVE SEA LEVEL

AREA FLOWN AT 15000 FEET ABOVE SEA LEVEL

COMPAGNIE GENERALE DE GEOPHYSIQUE



BASED ON C55/B0-46, C55/B1-44

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS C55/B1-45

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PLATE : 12 bis

AIRBORNE MAGNETOMETER SURVEY

EASTERN PAPUA

INTERPRETATION MAP

SCALE : 1/500,000

LEGEND

MAJOR BASEMENT ZONE BOUNDARY

MINOR BASEMENT ZONE BOUNDARY

MAGNETIC BASEMENT FEATURES { Mu1 , Mm1 , LM+1 , L PR+1 , T:1

MAGNETIC BASEMENT DEPTH ESTIMATE (BELOW SEA LEVEL) 2,000'

THIN PLATE INTERPRETATION HYPOTHESIS N

BASEMENT DEPTH CONTOURS 5,000' 10,000'

MAGNETIC TREND (Positive)

MAGNETIC TREND (Negative)

FAULT (Movement Unknown)

FAULT VERTICAL MOVEMENT (Barb Points to Downthrow)

ANTICLINE

SYNCLINE

MAGNETIZATION (1:60γ)

5 0 5 10 15 20 25 30 35 40 KILOMETRES

5 0 5 10 15 20 MILES

COMPAGNIE GENERALE DE GEOPHYSIQUE

REFERENCE TO 1:250,000 MAP SERIES

LOCATION DIAGRAM

AREA FLOWN AT 8000 FEET ABOVE SEA LEVEL

AREA FLOWN AT 15000 FEET ABOVE SEA LEVEL

C55/BI-68