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A PALAEOMAGNETIC RECONNAISSANCE OF PAPUA NEW GUINEA

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SUMMARY

The palaeomagnetic results from a reconnaissance sampling of a number of rock units in Papua New Guinea, ranging in age from Palaeozoic to Pleistocene, show the following:

(a) Palaeomagnetic pole positions from at least the Permian to some time during the Tertiary all lie approximately in the same position.

(b) During the Tertiary (?pre-Miocene) Papua New Guinea appears to have rotated $118^{\circ} \pm 25^{\circ}$ anticlockwise with respect to Australia.

(c) There is an indication that the smaller islands to the east and north of the New Guinea mainland (New Britain, New Hanover, Manus) also underwent a further anticlockwise rotation of approximately 90° subsequent to that mentioned in (b).

INTRODUCTION

This reconnaissance collection was made in 1961 by the author in Papua New Guinea during the tenure of an Australian Commonwealth Scholarship at the Department of Geophysics, Australian National University, Canberra. Measurement of the collection was completed while employed by the Bureau of Mineral Resources (BMR), Department of Minerals and Energy, Canberra.

The collection, being purely for palaeomagnetic reconnaissance purposes, lacks the necessary numbers of sites needed to give precise directions from any one rock unit. However, despite this general imprecision, the results from a number of units are consistent with one another. This internal consistency indicates that the results are in general meaningful.

The ages quoted from the rock units are taken from Glaessner (1952), M^{c}Millan & Malone (1960) and Rickwood (1955), and from a geological map of New Guinea published by BMR in 1964.

RESULTS

The palaeomagnetic results obtained from Papua New Guinea are listed in Table I. The colums of this table are as follows:

Treatment: The peak alternating magnetic field (in gauss) which was used to remove unstable magnetic components from the specimens. Where no treatment was done, the natural remanent magnetisation (NRM) is used.

D: declination (of the formation mean palaeomagnetic direction) in degrees east of true north.

I: inclination (of the mean palaeomagnetic direction - north seeking pole) in degrees above (-) or below (+) the horizontal.

N: number of sites sampled.

S: total number of samples from all sites.

R: the vector resultant (Fisher, 1953) from the statistical mean of the site directions.

K: the precision (N-1)/(N-R) of the mean direction.

α: the $\frac{1}{2}$-angle in degrees of the cone of 95% confidence about the mean direction.

S pole position: the palaeomagnetic (south) pole position calculated from the mean direction.

The units sampled on the Papua New Guinea mainland come from the following areas (see Figure 1).

(a) Wau-Bulolo area: A, E, G.

(b) Port Moresby area: D, F.

(c) East Central Highlands: B, C, I.

(d) Central Highlands/Mt Hagen area: H, J.

TABLE 1

Rock Unit	Sites	Treatment	D	I	N	S	R	k	α	S pole position	
Papua-New Guinea Mainland											
A. Otibanda Beds (Pleistocene)	21, 22	AC 225	016	-21	1	2	-	-	-	071°E	74°S
B. Daulo Volcanics (Miocene)	29, 30	AC 75	015	-8	2	4	1.966	29	-	021°E	72°S
C. Dolerite (East Central Highlands) - (Tertiary)	26, 27, 28	AC 750	264	+11	2	4	1.860	7	-	241°E	7°N
D. Kwikila Volcanics (Tertiary)	6A, 6B, 6C	AC 375	303	-18	3	4	2.248	3	-	233°E	34°S
E. Lower Edie Porphyry (Tertiary)	16, 17, 18, 19	AC 225	334	-30	4	6	3.919	37	15°	216°E	63°S
F. Gabbro (?Tertiary)	3, 4	AC 225	045	+12	2	5	1.713	3	-	220°E	42°N
G. Baiune Granodiorite - (Upper Cretaceous)	7, 11a, 11b, 12, 20	AC 525	213	-6	5	11	3.091	2	-	220°E	55°N
H. Kuta Formation (Permian)	36	N.R.M.	261	-20	1	1	-	-	-	223°E	8°N
I. Yonkie Dome Granodiorite (?Palaeozoic)	23, 24, 25	AC 600	254	-25	3	5	2.634	5	-	221°E	14°N
J. Bismarck Granodiorite (Palaeozoic)	88, 89	AC 300	262	-34	2	5	1.775	4	-	216°E	6°N
New Guinea Islands											
K. Lihir Is. Volcanics (Pleistocene)	73	AC 450	015	-25	1	2	-	-	-	097°E	72°S
L. New Hanover Volcanics (?Pleistocene)	63, (64), 65	AC 450	241	-37	2	4	1.905	10	-	215°E	26°N
M. Tabar Is. Volcanics (Pleistocene)	69, 70, 71	AC 150	335	+16	3	6	2.999	2880	2°	308°E	78°S
N. Manus Is. Volcanics (Pleistocene)	52, 53, 59, 60, 61	AC 450	275	-6	4	10	3.143	4	-	234°E	5°S
O. Volcanics (Gazelle Peninsula) (?Oligocene)	81, 82	AC 450	271	+2	2	4	1.968	31	-	243°E	1°S

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TABLE 2

Australian Palaeomagnetic Pole Positions

				S pole positions	
		D	I	long.	Lat.
4-18	Mean Kiaman and Mesozoic POLE (Irving, 1966)			142°E	48°S
19	Basalts (N.S.W.) - Miocene to Eocene (Irving et al., 1961)	190	+70	137°E	63°S
20	Older Volcanics (Victoria) Oligocene (Mumme, 1963	010	-77	140°E	63°S
21	Igneous Rocks (Queensland) Miocene (Robertson, 1966)	013	-49	087°E	78°S
22	Newer Volcanics (Victoria) Plio-Pleistocene (Irving & Green, 1957)	003	-60	102°E	86°S
b.	Nandewar Volcano (17.5 ± 0.3 m.y.)			084°E	79°S
d.	Liverpool Volcano (33.7 ± 0.7 m.y.)			096°E	71°S
e.	Barrington Volcano (51.6 ± 0.7 m.y.)			126°E	71°S

b, d, e are from McElhinny and Wellman (1969)

Table 2 lists Australian palaeomagnetic pole positions for comparison with the New Guinea results.

The pole positions from New Guinea and Australia are plotted in Figure 2. This figure is an equal-angle stereographic plot of the earth. Solid symbols are plotted on the top of the stereogram (i.e. on the hemisphere centred about 180°E), and open symbols are plotted on the underneath of the stereogram (i.e. on the hemisphere centred about the Greenwich meridian).

CONCLUSIONS

Several tentative conclusions may be drawn from the results presented. However, it must be kept in mind that the results individually are rather imprecise, and the ages given are only tentative in the absence of isotope dating.

(a) The distribution of pole positions can most simply be explained by the rotation in situ of New Guinea and its surrounding islands. This is in agreement with the conclusion of Green & Pitt (1967), which was based on even less evidence than that presented here.

(b) The poles C, F, G, H, I, J from the New Guinea area all lie in the same region at the beginning of the polar wander path. Thus, by analogy with the Australian polar wander curve, it appears that the New Guinea mainland was stationary with respect to Australia from the Permian to some time during the Tertiary.

The mean pole calculated from C, F, G, H, I, J is as follows:

D	I	N	R	k	α	Pole Position	
246°	-15°	6	5.4769	10	23°	044°E	22°S
						dp = 12°	dm = 24°

dp is the angular error (P=0.05) in the direction of the palaeo-meridian, and dm is the error at right angles to this.

This pole is the 'Mean' pole plotted in Figure 1. The oval of 95 percent confidence (from dp, dm) is drawn about this pole.

(c) The total angular movement of the New Guinea mainland with respect to Australia is now given by the angular difference between the New Guinea 'Mean' pole position and the pole 4-18 of Australia. This rotation is 118° ± 25° anticlockwise.

(d) Poles A and B from the New Guinea mainland are not significantly different from the present south pole position. Thus the rotation of the mainland was complete before these rock units were formed (Pleistocene and Miocene f1 - f2)

(e) However, considering the ages given for poles L, N, O, (?Pleistocene, Pleistocene, ?Oligocene), a further anticlockwise rotation of the islands New Hanover, Manus, and perhaps New Britain may have occurred after the completion of the mainland rotation. This rotation appears to have been approximately 90° anticlockwise. It was complete by some time during the Pleistocene (poles K, M are not significantly different from the present south pole position).

To verify these conclusions, it is highly desirable that isotope age dating be carried out on the rock units sampled, and that further sampling be done.

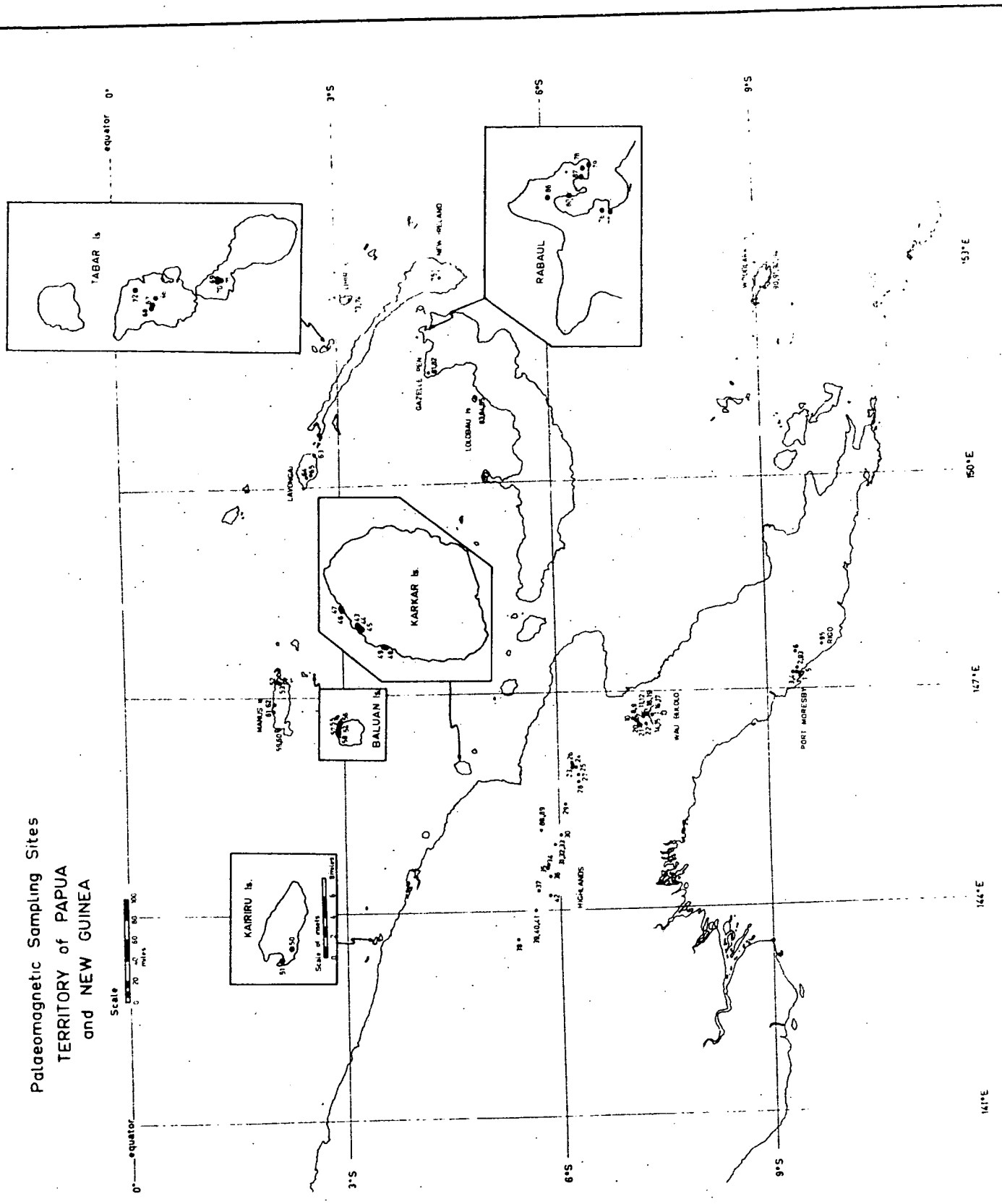
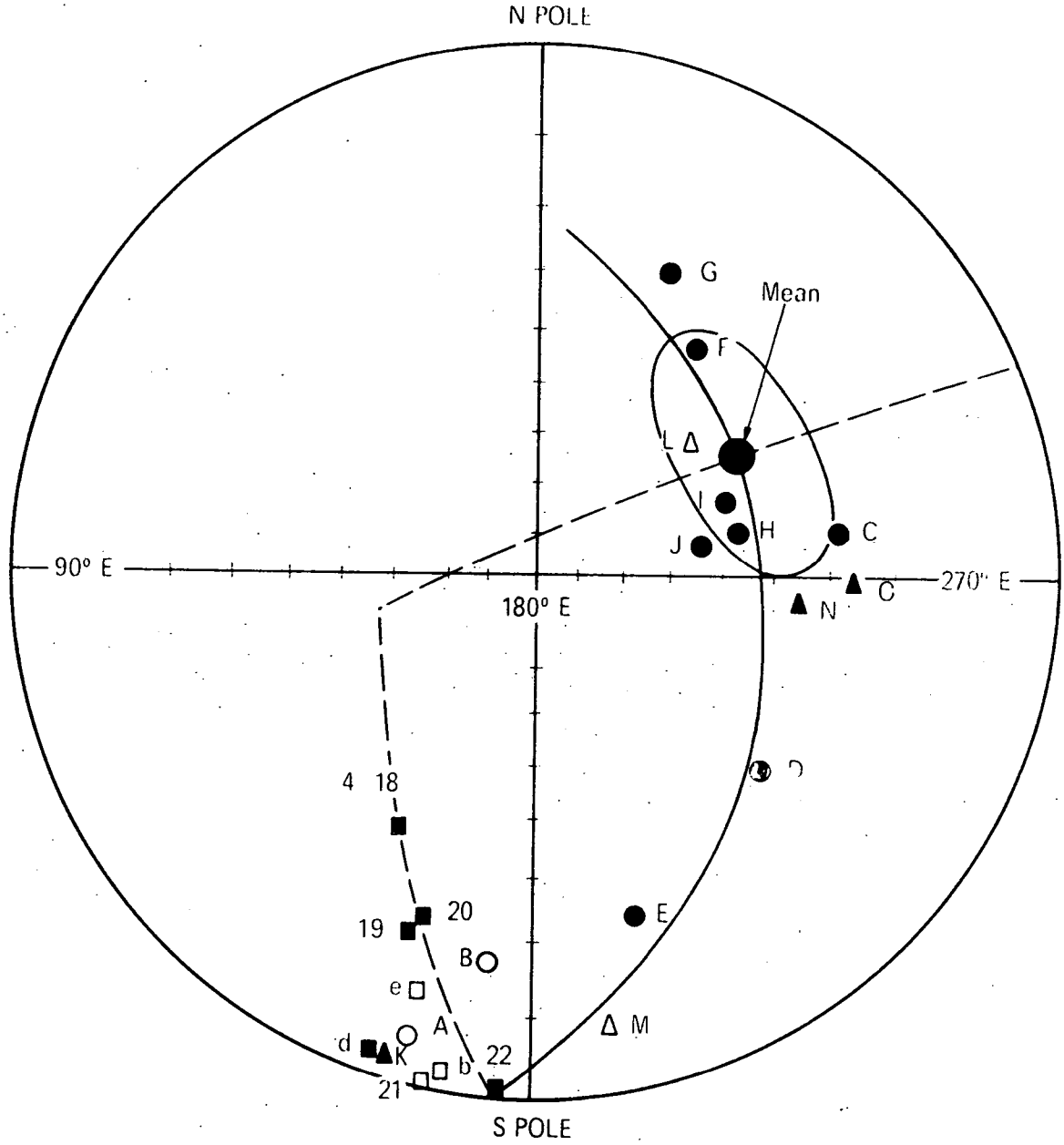


Figure I. SAMPLING SITES
The sites shown on Kairiru Is, Baluan Is, Karkar Is, and at Rabaul are recent basalts which are reported on separately. The numbers are the site numbers as given for each rock unit in the appendix.

FIGURE 2



Equal-angle stereographic plot of earth showing palaeomagnetic pole positions as listed in Tables 1 and 2.

Circles : poles from New Guinea mainland (A to J; Table 1)

Triangles : poles from New Guinea islands (K to O; Table 1)

Squares : poles from Australia (4 to 22, b,d,& e; Table 2)

Solid symbols are poles plotted on the top of the stereogram (i.e. on the hemisphere centred around 180° longitude).

Open symbols are poles plotted on the underneath of the stereogram (i.e. on the hemisphere centred around 0° longitude).

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APPENDIX

Detailed results of measurements

Detailed results are given of the measurements made on the rock units mentioned previously; some units which did not give meaningful results are listed.

In the Tabulations, the following abbreviations are used:

D: declination in degrees east of true north.

I: inclination in degrees above (-) or below (+) the horizontal.

$Mx10^{-6}$: intensity of magnetization in units of 10^{-6} emu/c.c.

N: number of specimens (in sample mean listings), or number of samples (in site mean listings), or number of sites (in mean direction list).

R: the magnitude of the vector resultant from the statistical mean of the directions.

k: the precision (N-1)/(N-R) of the mean direction.

α: the $\frac{1}{2}$-angle (in degrees) of the cone of 95% confidence about the mean direction.

M/Mo: the normalised intensity after treatment (i.e. the ratio of the intensity after treatment to the intensity before treatment).

OTIBANDA BEDS: Pleistocene

Samples were collected of small basalt flows interbedded with the sediments of the Otibanda Beds in the Eastern Highlands of New Guinea, from two sites as follows:

Site	Latitude	Longitude	Number of samples
21	7°10'S	146°34'E	1
22	7°14'S	146°33'E	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
21	KM54	A	302	-39	68
		B	350	-52	68
22	KM55	A	221	-24	7.1
		B	201	-21	8.7
	KM56	A	198	-22	5.4

Sample means

Site	Sample	D	I	N	R	k	α
21	KM54	323	-48	2	1.906	11	-
22	KM55	206	-23	2	1.992	129	22
	KM56	198	-22	1	-	-	-

Site means

Site	D	I	N	R	k	α
21	323	-48	1	-	-	-
22	202	-22	2	1.995	240	16

The mean of these two site means would not be significant. Cleaning in alternating magnetic fields was tried, initially on two pilot specimens.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM54A	NRM	302	-39	68	1.00
	75 gauss	189	-18	11	0.16
	150	168	-25	10	0.15
	225	157	-5	8	0.12
	300	200	-6	11	0.16
	375	143	-13	9	0.13
	450	161	+27	9	0.13
	600	125	+17	11	0.16
	750	172	+47	16	0.24
KM55A	NRM	211	-24	7.1	1.00
	75 gauss	019	-28	4.8	0.68
	150	022	-25	3.7	0.52
	225	015	-27	2.8	0.39
	300	024	-27	2.4	0.34
	375	026	-25	2.3	0.32
	450	025	-23	2.1	0.30
	600	012	-40	1.5	0.21
	750	329	-39	1.4	0.20

There seems to be a slight improvement in agreement between the pilot specimen directions (if KM54A is regarded as a reversed direction) at a field of 225 gauss. The remained of the specimens were cleaned in this field.

A.C. Cleaning - 225 gauss

Specimens

Site	Sample	Specimen	D	I
21	KM54	A	157	-5
		B	084	-62
22	KM55	A	015	-27
		B	013	-18
	KM56	A	017	-20

The two specimens from sample KM54 do not agree with one another so this sample and site 21, are discarded.

Sample means

Site	Sample	D	I	N	R	k	α
22	KM55	014	-23	2	1.9929	145	21
	KM56	017	-20	1	-	-	-

Site mean

Site	D	I	N	R	k	α
22	016	-21	2	1.9984	647	10

The best estimate from these results of the mean direction of the Otibanda Beds is that given by the 225 gauss site 22 mean direction.

The pole position corresponding to this direction is

$251^{\circ}E$ $74^{\circ}N$

This direction (and pole) is not significantly different from the present field direction. Little absolute reliance can be placed on this result, however, since it is the result from only one site.

1b

DAULO VOLCANICS: Miocene

Samples were collected from two sites in the Daulo Volcanics of the Central Highlands of New Guinea, as follows:

Site	Latitude	Longitude	Number of samples
29	6°14'S	145°32'E	2
30	6°02'S	145°14'E	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
29	KM69	A	016	-6	433
		B	016	-11	659
	KM70	A	015	-25	376
		B	026	-18	69
30	KM71	A	339	-12	68
		B	001	-19	120
	KM72	A	006	-13	92
		B	030	-11	88

Sample means

Site	Sample	D	I	N	R	k	α
29	KM69	016	-8	2	1.997	495	11
	KM70	021	-21	2	1.987	82	28
30	KM71	350	-16	2	1.962	27	-
	KM72	018	-12	2	1.957	23	-

Site means

Site	D	I	N	R	k	α
29	018	-15	2	1.984	66	31
30	004	-14	2	1.942	17	-

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N.R.M. Mean direction

D	I	N	R	k	α
011	-15	2	1.985	69	31

This direction is not significantly different from the present field direction, or the geocentric dipole field direction.

Cleaning was tried in alternating magnetic fields, initially on two pilot specimens, in an effort to improve the precision.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM69B	N.R.M.	016	-11	659	1.00
	75 gauss	009	-14	270	0.41
	150	006	-45	199	0.30
	225	044	-35	176	0.27
	300	071	-15	161	0.24
	375	045	-44	119	0.18
	450	012	-9	146	0.22
	600	045	-22	90	0.14
	750	014	-8	108	0.16
KM71A	N.R.M.	339	-12	68	1.00
	75 gauss	005	+12	47	0.69
	150	012	+25	37	0.54
	225	020	+31	35	0.51
	300	010	+27	34	0.50
	375	026	+37	26	0.38
	450	038	+39	30	0.44
	600	343	+58	31	0.46
	750	005	+63	24	0.35

The closest agreement in the directions of the pilot specimens is at 75 gauss. The remainder of the specimens were cleaned in this field.

A.C. Cleaning - 75 Gauss

Specimens

Site	Sample	Specimen	D	I
29	KM69	A	011	-16
		B	009	-14
	KM70	A	039	-12
		B	042	-8
30	KM71	A	005	+12
		B	013	-7
	KM72	A	355	-8
		B	010	-7

Sample means

Site	Sample	D	I	N	R	k	α
29	KM69	010	-15	2	1.9993	1540	6
	KM70	041	-10	2	1.9980	530	11
30	KM71	009	+2	2	1.9676	31	-
	KM72	003	-8	2	1.9816	54	35

Site means

Site	D	I	N	R	k	α
29	025	-13	2	1.9313	15	-
30	006	-3	2	1.9891	93	26

Mean direction

D	I	N	R	k	α
015	-8	2	1.9656	29	-

The pole position corresponding to this mean direction is

$201^{\circ}E$ $72^{\circ}N$

DOLERITE (East Central Highlands): Tertiary

Samples were collected from three separate dolerite dykes in the Eastern Central Highlands of New Guinea as follows:

Site	Latitude	Longitude	Number of samples
26	$6^{\circ}12\frac{1}{2}'S$	$146^{\circ}02\frac{1}{2}'E$	2
27	$6^{\circ}21'S$	$145^{\circ}57'E$	2
28	$6^{\circ}20'S$	$145^{\circ}54\frac{1}{2}'E$	2

The samples from site 27 broke up in transport.

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
26	KM63	A	352	+7	1510
		B	344	+14	1300
	KM64	A	005	-3	3650
		B	004	-2	1200
28	KM67	A	165	+29	363
		B	166	+37	488
	KM68	A	143	+39	722
		B	147	+48	255

Sample means

Site	Sample	D	I	N	R	k	α
26	KM63	348	+11	2	1.991	113	24
	KM64	005	-3	2	1.999	8600	3
28	KM67	165	+33	2	1.994	199	18
	KM68	145	+44	2	1.99s	130	22

Site means

Site	D	I	N	R	k	α
26	356	+4	2	1.964	28	-
28	156	+39	2	1.971	36	-

The mean of these two sites means would not be significant. Cleaning in alternating magnetic fields was tried, initially on two pilot specimens.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM63A	N.R.M.	352	+7	1510	1.00
	75 gauss	346	-10	365	0.24
	150	330	-13	308	0.20
	225	317	-31	151	0.10
	300	010	+8	67	0.04
	375	310	-28	64	0.04
	450	294	-40	129	0.09
	600	303	-24	54	0.04
	750	275	-29	34	0.02
KM67A	N.R.M.	165	+29	363	1.00
	75 gauss	188	+31	208	0.57
	150	100	+38	174	0.48
	225	202	+44	122	0.34
	300	191	+28	78	0.21
	375	219	+29	84	0.23
	450	177	+54	48	0.13
	600	266	+49	26	0.07
	750	254	+27	22	0.06

The nearest agreement between the directions of the two pilot specimens appears to be after cleaning in 750 gauss. The remainder of the specimens were cleaned in this field.

A.C. Cleaning - 750 Gauss

Specimens

Site	Sample	Specimen	D	I
26	KM63	A	275	-29
		B	280	-70
	KM64	A	093	-58
		B	048	+1
28	KM67	A	254	+27
		B	278	+9
	KM68	A	167	-51
		B	240	+10

Sample means

Site	Sample	D	I	N	R	k	α
26	KM63	276	-50	2	1.8761	8	-
	KM64	063	-31	2	1.6516	3	-
28	KM67	267	+19	2	1.9361	16	-
	KM68	277	+43	2	1.3810	2	-

Site means

Site	D	I	N	R	k	α
26	257	-10	2	1.4613	2	-
28	271	+31	2	1.9509	20	-

Mean direction

D	I	N	R	k	α
264	+11	2	1.8599	7	-

The (north) pole position corresponding to this mean direction is

061°E 7°S

KWIKILA VOLCANICS: Tertiary

Samples were collected from three separate flows in these volcanics at a single site near Port Moresby. The three flows have been called sites 6A, 6B, and 6C.

Site	Latitude	Longitude	Number of samples
6A	9°25'S	147°35'E	1
6B	"	"	3
6C	"	"	1

One of the samples from 6B broke up in transport.

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
6A	KM15	A	290	+19	505
		B	288	+26	314
6B	KM16	A	263	-48	1400
		B	276	-43	1220
	KM18	A	284	-50	2180
		B	278	-43	1740
6C	KM19	A	959	-40	453
		B	062	-35	398

Sample means

Site	Sample	D	I	N	R	k	α
6A	KM15	289	+23	2	1.996	329	14
6B	KM16	270	-46	2	1.991	122	23
	KM18	281	-47	2	1.995	203	18
6C	KM19	056	-38	2	1.992	126	22

Site means

Site	D	I	N	R	k	α
6A	289	+23	1	-	-	-
6B	275	-46	2	1.995	210	17
6C	056	-38	1	-	-	-

N.R.M. Mean direction

D	I	N	R	k	α
268	-23	3	2.4099	3	-

In an effort to improve the precision of the mean direction, cleaning in alternating magnetic fields was attempted, initially on three pilot specimens.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM15A	N.R.M.	290	+19	505	1.00
	75 gauss	189	+3	67	0.13
	150	163	+18	122	0.24
	225	146	+5	64	0.13
	300	112	0	24	0.05
	375	177	-22	22	0.04
	450	355	+53	28	0.06
	600	120	-12	10	0.02
	750	061	+5	25	0.05
KM16A	N.R.M.	263	048	1400	1.00
	75 gauss	114	-53	943	0.67
	150	116	-52	394	0.28
	225	088	-39	84	0.06
	300	140	032	67	0.05
	375	184	-26	84	0.06
	450	306	-24	50	0.04
	600	040	+56	30	0.02
	750	158	+52	46	0.03

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KM19A	N.R.M.	050	-40	453	1.00
	75 gauss	200	-2	449	0.99
	150	203	+3	187	0.41
	225	221	-9	103	0.23
	300	195	0	33	0.07
	375	220	-48	52	0.11
	450	103	-64	56	0.12
	600	136	-36	34	0.08
	750	180	+53	51	0.11

These pilot specimens appear to be rather unstable. However, there is some improvement in agreement at 375 gauss, The remainder of the specimens were cleaned in this field.

A.C. Cleaning - 375 Gauss

Specimens

Site	Sample	Specimen	D	I
6A	KM15	A	177	-22
		B	121	+5
6B	KM16	A	184	-26
		B	111	+19
	KM18	A	316	-66
		B	337	-45
6C	KM19	A	220	-48
		B	255	-2

Sample means

Site	Sample	D	I	N	R	k	α
6A	KM15	148	-10	2	1.7230	4	-
6B	KM16	146	-4	2	1.4790	2	-
	KM18	329	-56	2	1.9559	23	-
6C	KM19	241	-26	2	1.7794	5	-

Site means

Site	D	I	N	R	k	α
6A	148	-10	1	-	-	-
6B	147	+26	2	1.7316	4	-
6C	214	-26	1	-	-	-

Mean direction

D	I	N	R	k	α
303	-18	3	2.2483	3	-

The (north) pole position corresponding to this mean direction is

053°E 34°N

LOWER EDIE PORPHYRY: Tertiary

Samples were collected from the Lower Edie Porphyry of the Eastern Highlands of New Guinea, from four sites as follows:

Site	Latitude	Longitude	Number of samples
16	7°16'S	146°43'E	2
17	7°16'S	146°43'E	1
18	7°17'S	146°42'E	1
19	7°17'S	146°42'E	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
16	KM45	A	304	-11	58
		B	319	-27	159
	KM46	A	349	-17	26
		B	355	-6	30
17	KM47	A	334	-19	116
		B	341	-16	131
18	KM48	A	293	+25	297
		B	346	+41	285
19	KM49	A	342	-41	500
		B	342	-41	450
	KM50	A	319	+39	151
		B	082	+72	61

Sample means

Site	Sample	D	I	N	R	k	α
16	KM45	311	-19	2	1.966	30	-
	KM46	352	-12	2	1.987	81	28
17	KM47	337	-17	2	1.996	292	15
18	KM48	317	+36	2	1.838	6	-
19	Km49	342	-41	2	1.999	-	0
	KM50	342	+67	2	1.711	3	-

Site means

Site	D	I	N	R	k	α
16	332	-16	2	1.879	8	-
17	337	-17	1	-	-	-
18	317	+36	1	-	-	-
19	342	+13	2	1.171	1	-

N.R.M. Mean direction

D	I	N	R	k	α
333	+4	4	3.665	9	-

Cleaning in alternating magnetic fields was tried, initially on four pilor specimens.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM45A	N.R.M.	304	-11	58	1.00
	75 gauss	312	-26	65	1.12
	150	306	-9	18	0.31
	225	320	-15	44	0.76
	300	260	-7	31	0.53
	375	251	-62	29	0.50
	450	165	-26	21	0.36
	600	265	-36	23	0.40
	750	154	-60	45	0.78
KM47A	N.R.M.	334	-19	116	1.00
	75 gauss	336	-10	78	0.67
	150	334	-18	70	0.60
	225	338	-13	51	0.44
	300	330	-12	42	0.36
	375	332	-20	42	0.36
	450	340	-22	22	0.19
	600	022	+74	5	0.04
	750	347	+8	9	0.08

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KM48A	N.R.M.	293	+25	297	1.00
	75 gauss	323	-27	229	0.77
	150	325	-33	186	0.63
	225	328	-34	146	0.49
	300	333	-39	108	0.36
	375	347	-57	98	0.33
	450	343	-36	76	0.26
	600	344	-46	44	0.15
	750	317	-46	32	0.11
KM49A	N.R.M.	342	-41	500	1.00
	75 gauss	350	-40	234	0.49
	150	352	-37	191	0.38
	225	344	-42	156	0.31
	300	353	-37	98	0.20
	375	005	-52	88	0.18
	450	356	-50	75	0.15
	600	038	+12	20	0.04
	750	000	-47	46	0.09

The best agreement appears to be after cleaning in a field of 225 gauss. The remainder of the specimens were cleaned in this field.

A.C. Cleaning - 225 Gauss

Specimens

Site	Sample	Specimen	D	I
16	KM45	A	320	-15
		B	301	-26
	KM46	A	342	-24
		B	338	-30
17	KM47	A	338	-13
		B	339	-24
18	KM48	A	328	-34
		B	344	-42

19	KM49	A	344	-42
		B	001	-34
	KM50	A	348	-45
		B	321	-48

Sample means

Site	Sample	D	I	N	R	k	α
16	KM45	311	-21	2	1.9676	31	-
	KM46	340	-27	2	1.9957	231	16
17	KM47	338	-18	2	1.9906	106	24
18	KM48	329	-34	2	1.991	1110	4
19	KM49	353	-39	2	1.9824	57	34
	KM50	335	-48	2	1.9744	39	-

Site means

Site	D	I	N	R	k	α
16	325	-24	2	1.9457	18	-
17	338	-18	1	-	-	-
18	329	-34	1	-	-	-
19	345	-43	2	1.9814	54	35

Mean direction

D	I	N	R	k	α
334	-30	4	3.9185	37	15

The (north) pole position corresponding to this mean direction is

036°E 63°N

GABBRO: ?Tertiary

Samples of a ?Tertiary gabbro were collected from two sites near one another on Sapphire Creek, near Port Moresby in New Guinea, as follows:

Site	Latitude	Longitude	Number of samples
3	9°23'S	147°16'E	3
4	9°23'S	147°16'E	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	Mx10^{-6}
3	KM7	A	060	-26	115
	KM8	A	086	-20	206
		B	065	-3	196
	KM9	A	090	-19	220
		B	082	-18	175
4	KM10	A	066	+31	458
		B	036	+51	585
	KM11	A	039	+25	433
		B	030	-6	316

Sample means

Site	Sample	D	I	N	R	k	α
3	KM7	060	-26	1	-	-	-
	KM8	075	-12	2	1.946	19	-
	KM9	086	-19	2	1.995	212	17
4	KM10	054	+42	2	1.932	15	-
	KM11	034	+9	2	1.917	12	-

Site means

Site	D	I	N	R	k	α
3	074	-19	3	2.941	34	22
4	042	+26	2	1.897	10	-

N.R.M. Mean direction

D	I	N	R	k	α
058	+4	2	1.7765	4	-

The precision k of this mean direction is very low, so cleaning in alternating magnetic fields was tried, initially with two pilot specimens.

A.C. Cleaning - Pilot specimens

Specimens	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM8B	N.R.M.	065	-3	186	1.00
	75 gauss	058	-16	99	0.53
	150	037	07	131	0.70
	225	037	+8	69	0.37
	300	027	-8	66	0.35
	375	095	+40	24	0.13
	450	223	-82	28	0.15
	600	101	-34	37	0.20
	750	201	+13	34	0.18
KM10A	N.R.M.	066	+31	458	1.00
	75 gauss	044	+60	535	1.17
	150	085	+48	222	0.48
	225	083	+18	271	0.59
	300	101	+14	291	0.64
	375	289	+46	294	0.64
	450	158	+46	141	0.31
	600	107	+28	222	0.48
	750	115	+1	112	0.24

The pilot specimen directions appear to be rather unstable, however some agreement is obtained at 225 gauss. The remainder of the specimens were cleaned in this field.

A.C. Cleaning - 225 Gauss

Specimens

Site	Sample	Specimen	D	I
3	KM7	A	043	-25
	KM8	A	040	-41
		B	037	+8
	KM9	A	069	-11
		B	027	-20
4	KM10	A	083	+18
		B	019	+32
	KM11	A	016	+42
		B	018	+62

Sample means

Site	Sample	D	I	N	R	k	α
3	KM7	043	-25	1	-	-	-
	KM8	038	-16	2	1.8202	6	-
	KM9	049	-16	2	1.8683	8	-
4	KM10	053	+29	2	1.7353	4	-
	KM11	040	+56	2	1.8640	7	-

Site means

Site	D	I	N	R	k	α
3	043	-19	3	2.9855	139	11
4	048	+43	2	1.9365	16	-

Mean direction

D	I	N	R	k	α
045	+12	2	1.7128	3	-

This direction appears to be reversed with respect to the results from other rock units. Upon reversal, the pole position corresponding to the mean direction is:

$040^{\circ}E$ $42^{\circ}S$

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BAIUNE GRANODIORITE: Upper Cretaceous

The Baiune (or Morobe) Granodiorite is a series of upper Cretaceous granodioritic intrusions in the Eastern Highlands of New Guinea. Samples were collected from four sites in the Wau - Bulolo area, and samples of contact rock (Kaindi Metamorphics) from a fifth site.

Site	Latitude	Longitude	Number of samples	
7	7°4'S	146°37'E	3	
11a	7°17'S	146°43'E	2	(contact)
11b	7°17'S	146°43'E	2	
12	7°17'S	146°43'E	2	
20	7°09'S	146°34'E	2	

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
7	KM20	A	136	-68	371
		B	086	-73	277
	KM21	A	258	-44	177
		B	184	+80	204
	KM22	A	253	-64	193
		B	250	-73	163
11a	KM29	A	142	+61	1.8
		B	146	+56	2.8
	KM30	A	098	+76	1.3
		B	135	+61	1.2
11b	KM31	A	018	-4	3.1
		B	331	-26	9.5
	KM32	A	318	+34	5.7
		B	317	+39	5.6

12	KM33	A	007	+42	42
		B	031	+32	40
	KM34	A	350	-15	14
		B	349	-22	14
20	KM51	A	238	-81	291
		B	130	-81	237
	KM52	A	051	+56	179
		B	070	+43	223

Sample means

Site	Sample	D	I	N	R	k	α
7	KM20	114	-72	2	1.978	46	38
	KM21	246	+21	2	0.836	1	-
	KM22	252	-68	2	1.994	168	19
11a	KM29	144	+56	2	1.997	433	12
	KM30	123	+69	2	1.970	34	44
11b	KM31	356	-16	2	1.812	5	-
	KM32	317	+36	2	1.998	584	10
12	KM33	020	+38	2	1.965	29	48
	KM34	349	-18	2	1.996	268	15
20	KM51	186	-85	2	1.984	66	31
	KM52	062	+50	2	1.973	38	42

Site means

Site	D	I	N	R	k	α
7	236	-54	3	1.893	2	-
11a	135	+64	2	1.985	69	30
11b	338	+11	2	1.697	3	-
12	003	+10	2	1.706	3	-
20	069	-21	2	0.642	1	-

The scatter in these site mean directions is too great for a mean direction to have any significance.

Cleaning in alternating magnetic fields was tried, initially on four pilot specimens.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM20A	N.R.M.	136	-68	371	1.00
	75 gauss	068	-58	95	0.26
	150	033	-6	93	0.25
	255	042	-17	92	0.25
	300	024	+13	104	0.28
	375	047	-8	68	0.18
	450	048	+3	154	0.42
	525	032	+13	52	0.14
	600	046	-24	95	0.26
	750	020	+23	26	0.07
KM32A	N.R.M.	318	+34	5.7	1.00
	75 gauss	225	+49	5.4	0.94
	150	281	+82	2.0	0.34
	225	177	+52	1.9	0.33
	300	105	-7	2.4	0.41
	375	114	-5	1.3	0.22
	450	139	+49	2.6	0.45
	525	001	+33	1.1	0.18
	600	175	+52	2.9	0.51
	750	266	+29	3.9	0.67
KM34A	N.R.M.	350	-15	14	1.00
	75 gauss	333	-26	10	0.72
	150	334	-32	7.8	0.57
	225	325	-35	7.9	0.57
	300	341	-32	8.8	0.63

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	375	343	-32	5.5	0.40
	450	324	-47	5.6	0.40
	525	322	-49	4.9	0.36
	600	344	-31	3.9	0.28
	750	342	-31	3,7	0.26
KM51A	N.R.M.	238	-81	291	1.00
	75 gauss	353	-63	91	0.31
	150	008	-61	39	0.13
	225	032	-41	58	0.20
	300	358	-57	46	0.16
	375	019	-58	57	0.20
	450	353	-55	49	0.17
	525	018	-52	79	0.27
	600	026	-28	46	0.16
	750	027	-32	42	0.14

There is no obvious improvement in the agreement between the directions of the pilot specimens. To determine the best field for treatment, the precision k of the distributions in each field were calculated.

Treatment	D	I	N	R	k
N.R.M.	334	-50	4	2.098	1.6
75	336	-53	4	1.785	1.4
150	003	-14	4	2.169	1.6
225	023	-25	4	1.691	1.3
300	028	-29	4	2.582	2.1
375	045	-36	4	2.735	2.4
450	029	-27	4	1.653	1.3
525	006	-15	4	2.891	2.7
600	028	-18	4	1.946	1.5
750	350	-4	4	2.421	1.9

The remainder of the specimens were thus cleaned in a field of 525 gauss.

A.C. Cleaning - 525 Gauss

Specimens

Site	Sample	Specimen	D	I
7	KM20	A	032	+13
		B	031	+6
	KM21	A	134	-55
		B	158	-22
	KM22	A	069	-37
		B	137	+2
11a	KM29	A	145	+49
		B	141	+49
	KM30	A	144	+43
		B	156	+51
11b	KM31	A	231	+48
		B	248	+21
	KM32	A	095	+33
		B	210	+43
12	KM33	A	216	+16
		B	134	+19
	KM34	A	322	-49
		B	009	0
20	KM51	A	018	-52
		B	037	-42
	KM52	A	149	-79
		B	243	-66

Sample means

Site	Sample	D	I	N	R	k	α
7	KM20	211	-9	2	1.996	259	16
	KM21	149	-39	2	1.890	9	-
	KM22	184	+32	2	1.202	1	-
11a	KM29	143	+49	2	1.999	2180	5
	KM30	150	+47	2	1.990	130	25
11b	KM31	241	+35	2	1.932	15	-
	KM32	246	+6	2	1.333	2	-
12	KM33	175	+22	2	1.552	2	-
	KM34	170	+26	2	1.697	3	-
20	KM51	208	+47	2	1.980	51	36
	KM52	217	-77	2	1.945	18	-

Site means

Site	D	I	N	R	k	α
7	184	-6	3	2.379	3	-
11a	146	+48	2	1.997	467	12
11b	244	+21	2	1.935	15	-
12	173	+24	2	1.997	333	14
20	210	-15	2	0.938	1	-

Mean direction

D	I	N	R	k	α
213	-6	5	3.091	2	-

The (north) pole position corresponding to this mean direction is:

040°E 55°S

KUTA FORMATION: Permian

Site	Latitude	Longitude	Number of samples
36	5°50'S	144°28'E	1

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
36	KM85	A	261	-20	158
		B	261	-20	154

Sample mean

Site	Sample	D	I	N	R	k	α
36	KM85	261	-20	2	2	-	-

The pole position corresponding to this sample mean direction is:

043°E 8°S

This pole position is included in the results since the absolute agreement in direction of the two specimens indicates stability. It is also consistent with other pole positions found.

YONKIE DOME GRANODIORITE - ?Palaeozoic

The Yonkie Dome is a granodioritic intrusion in the Eastern Central Highlands of New Guinea. The age of this intrusion is unknown, except that it intrudes the Palaeozoic Bena Bena Formation.

Samples of the granodiorite were collected from one site, and of the contact rock (Bena Bena Formation) from two sites, as follows:

Site	Latitude	Longitude	Number of samples	
23	6°13'S	145°56'E	2	
24	6°13.5'S	145°57'E	2	Contact
25	6°14'S	145°57.5'E	1	Contact

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
23	KM57	A	098	-27	387
		B	076	-5	221
	KM58	A	143	+55	329
		B	132	+67	338
24	KM59	A	265	-51	0.52
		B	104	-53	0.70
	KM60	A	154	+28	0.37
		B	236	-36	1.6
25	KM62	A	000	+24	0.53
		B	015	+19	0.64

Sample means

Site	Sample	D	I	N	R	k	α
23	KM57	086	-16	2	1.930	14	-
	KM58	139	+61	2	1.986	72	30
24	KM59	192	-83	2	1.583	2	-
	KM60	193	-5	2	1.282	1	-
25	KM62	008	+22	2	1.982	57	34

Site means

Site	D	I	N	R	k	α
23	103	+24	2	1.443	2	-
24	193	-44	2	1.558	2	-
25	008	+22	1	-	-	-

A mean of these site mean directions would not be significant. Cleaning in alternating magnetic fields was tried, initially on three pilot specimens.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM58A	N.R.M.	143	+55	329	1.00
	75 gauss	153	+56	148	0.45
	150	162	+58	108	0.33
	225	147	+44	57	0.17
	300	141	+36	69	0.21
	375	130	+51	57	0.17
	450	178	+48	40	0.12
	600	149	+49	32	0.10
	750	055	+33	30	0.09
KM59A	N.R.M.	265	-51	0.52	1.00
	75 gauss	268	-66	0.51	0.98
	225	038	-10	0.37	0.71
	300	085	+11	0.23	0.44

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	375	209	-25	0.30	0.58
	450	289	-49	0.48	0.92
	600	268	0	0.52	1.00
	750	268	+21	0.76	1.46
KM62A	N.R.M.	000	+24	0.53	1.00
	75 gauss	019	+2	0.48	0.91
	150	006	+16	0.30	0,57
	225	000	+7	0.30	0.57
	300	356	+9	0.20	0.38
	375	007	+3	0.10	0.19
	450	325	+25	0.08	0.15
	600	082	+29	0.79	1.49
	750	086	+26	0.67	1.26

The optimum field for treatment appears to be 600 gauss. The remainder of the specimens were cleaned in this field.

A.C. Cleaning - 600 Gauss

Specimens

Site	Sample	Specimen	D	I
23	KM57	A	118	+19
		B	085	+43
	KM58	A	138	+49
		B	121	+58
24	KM59	A	268	0
		B	308	-9
	KM60	A	208	+4
		B	228	-36
25	KM62	A	082	+29
		B	015	-9

Sample means

Site	Sample	D	I	N	R	k	α
23	KM57	104	+32	2	1.8949	10	-
	KM58	131	+54	2	1.9858	71	30
24	KM59	288	-5	2	1.8761	8	-
	KM60	218	-16	2	1.8556	7	-
25	KM62	046	+12	2	1.5943	2	-

Site means

Site	D	I	N	R	k	α
23	115	+44	2	1.9353	15	-
24	253	-13	2	1.6408	3	-
25	046	+12	1	-	-	-

Upon reversal of the mean directions from sites 23 and 25, the following mean direction is obtained:

Mean direction

D	I	N	R	k	α
254	-25	3	2.6342	5	-

The (north) pole position corresponding to this mean direction is:

$041^{\circ}E$ $14^{\circ}S$

BISMARCK GRANODIORITE: Palaeozoic

Samples were collected from two sites in the Bismarck Granodiorite on Mount Wilhelm in the Central Highlands of New Guinea, as follows:

Site	Latitude	Longitude	Number of samples
88	$5^{\circ}47\frac{1}{2}'S$	$145^{\circ}02'E$	2
89	$5^{\circ}47\frac{1}{2}'S$	$145^{\circ}01\frac{1}{2}'E$	3

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
88	KM195	A	212	+11	7770
		B	244	+8	2490
		C	208	+35	4290
		D	209	+32	4720
	KM196	A	006	-75	10800
		B	356	-33	6730
89	KM197	A	064	+4	> 70000
		B	074	+6	..
	KM198	A	200	+57	3290
		B	150	+64	4440
	KM199	A	283	+1	8940
		B	280	-15	6920

Sample means

Site	Sample	D	I	N	R	k	α
88	KM195	219	+22	4	3.786	14	25
	KM196	359	-54	2	1.866	8	-
89	KM197	069	+5	2	1.991	124	23
	KM198	178	+63	2	1.953	22	-
	KM199	282	-7	2	1.980	51	36

The site mean directions from these sample means would have no significance. Cleaning in alternating magnetic fields was attempted, initially on three pilot specimens.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM195A	N.R.M.	212	+11	7770	1.00
	75 gauss	177	+18	870	0.11
	150	168	+21	823	0.11
	300	276	-23	396	0.05
	375	217	+18	419	0.05
	450	224	-1	619	0.08
	600	078	-14	1090	0.14
	750	100	-29	1100	0.14
KM198B	N.R.M.	150	+64	4440	1.00
	75 gauss	228	+66	1010	0.23
	150	201	+60	731	0.16
	225	231	+56	827	0.19
	300	252	+33	519	0.12
	375	254	+37	487	0.11
	450	228	+19	558	0.13
	600	284	+62	306	0.07
	750	180	+72	1130	0.25
KM199A	N.R.M.	283	+1	8940	1.00
	75 gauss	315	-13	1600	0.18
	150	325	-28	793	0.09
	225	339	-35	650	0.07
	300	269	-58	450	0.05
	375	270	-28	535	0.06
	450	266	-71	462	0.05
	600	268	-24	508	0.06
	750	080	-47	642	0.07

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The best agreement in directions appears to be after cleaning in 300 gauss. The remainder of the specimens were cleaned in this field.

A.C. Cleaning - 300 Gauss

Specimens

Site	Sample	Specimen	D	I
88	KM195	A	276	-23
		B	223	-18
		C	250	-35
		D	174	-86
	KM196	A	001	-66
		B	143	+8
89	KM197	A	022	-18
		B	065	+45
	KM198	A	204	+44
		B	252	+33
	KM199	A	269	-58
		B	336	-49

Sample means

Site	Sample	D	I	N	R	k	α
88	KM195	248	-42	4	3.388	5	-
	KM196	154	+38	2	1.6997	3	-
89	KM197	040	+15	2	1.596	2	-
	KM198	230	+41	2	1.8910	9	-
	KM199	306	-58	2	1.887	9	-

Site means

Site	D	I	N	R	k	α
88	293	-49	2	1.7046	3	-
89	241	-14	3	1.9202	2	-

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Mean direction

D	I	N	R	k	α
262	-34	2	1.7745	4	-

The (north) pole position corresponding to this mean direction is:

036°E 6°S

LIHIR ISLAND VOLCANICS: Pleistocene

Samples of the Pleistocene volcanics from Lihir Island, east of New Ireland, were collected from two sites as follows:

Site	Latitude	Longitude	Number of samples
73	3°9.5'S	152°37.5'E	2
74	3°9.5'S	152°38'E	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
73	KM162	A	011	-24	3470
		B	016	-20	3800
	KM163	A	026	-27	2550
		B	031	-30	992
74	KM164	A	019	-17	1590
		B	012	-14	1690
	KM165	A	351	+5	1150

Sample means

Site	Sample	D	I	N	R	k	α
73	KM162	013	-22	2	1.996	293	15
	KM163	028	-28	2	1.998	526	11
74	KM164	016	-15	2	1.995	236	16
	KM165	351	+5	1	-	-	-

Site means

Site	D	I	N	R	k	α
73	020	-25	2	1.983	60	33
74	003	-5	2	1.922	13	-

N.R.M. Mean direction

D	I	N	R	k	α
011	-15	2	1.948	19	-

The mean direction is not significantly different from the present geomagnetic field direction, and has a small precision k. Cleaning in alternating magnetic fields was tried, initially on two pilot specimens.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM162A	N.R.M.	011	-24	3470	1.00
	75 gauss	004	-24	1988	0.57
	150	009	-22	1460	0.42
	225	005	-21	1210	0.35
	300	003	-23	1053	0.30
	375	006	-20	890	0.26
	450	004	-21	742	0.21
	600	006	-21	599	0.17
	750	006	-20	496	0.14
KM164A	N.R.M.	019	-17	1590	1.00
	75 gauss	005	-10	654	0.41
	150	001	-17	334	0.21
	225	017	+2	131	0.08
	300	001	+7	126	0.08
	375	008	-29	139	0.09
	450	008	-18	144	0.09
	600	095	-44	60	0.04
	750	010	-10	124	0.08

The optimum field for treatment appears to be 450 gauss. The remainder of the specimens were cleaned in this field.

A.C. Cleaning - 450 Gauss

Specimens

Site	Sample	Specimen	D	I
73	KM162	A	004	-21
		B	030	-22
	KM163	A	016	-27
		B	011	-31
74	KM164	A	008	-18
		B	077	-1
	KM165	A	306	+27

The directions of the specimens from site 74 are obviously randomly scattered. This site is therefore discarded.

Sample means

Site	Sample	D	I	N	R	k	α
73	KM162	017	-22	2	1.9553	22	-
	KM163	013	-29	2	1.9976	417	12

Site mean

Site	D	I	N	R	k	α
73	015	-25	2	1.9951	205	18

This site mean direction is the best estimate obtainable from these results of the mean direction of magnetisation of the Lihir Island Volcanics. The pole position corresponding to this direction is:

$277^{\circ}E$ $72^{\circ}N$

This direction is not significantly different from the present geomagnetic field direction.

NEW HANOVER VOLCANICS: ?Pleistocene

Samples were collected from three sites in the volcanics of New Hanover Island, north of New Ireland, as follows:

Site	Latitude	Longitude	Number of samples
63	$2^{o}38.5'S$	$150^{o}27'E$	2
64	$2^{o}31'S$	$150^{o}7.5'E$	2
65	$2^{o}34'S$	$150^{o}10'E$	2

The samples from site 64 broke up in transport.

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
63	KM141	B	118	-63	655
	KM142	A	184	-41	1770
		B	180	-20	1170
65	KM145	A	228	-29	673
		B	295	-26	701
	KM146	A	291	-35	794
		B	286	-26	782

Sample means

Site	Sample	D	I	N	R	k	α
63	KM141	118	-63	1	-	-	-
	KM142	182	-30	2	1.967	31	-
65	KM145	292	-27	2	1.996	253	16
	KM146	288	-30	2	1.992	138	21

Site means

Site	D	I	N	R	k	α
63	161	-51	2	1.802	5	-
65	290	-29	2	1.998	670	10

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The mean of these two site mean directions would not be significant. Cleaning in alternating magnetic fields was attempted, initially on two pilot specimens.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM141B	N.R.M.	118	-63	655	1.00
	75 gauss	187	-57	546	0.83
	150	224	-51	485	0.74
	225	211	-53	420	0.64
	300	212	-45	328	0.50
	375	211	-42	289	0.44
	450	233	-39	172	0.26
	600	215	-37	122	0.19
	750	248	-27	47	0.07
KM145A	N.R.M.	228	-29	673	1.00
	75 gauss	261	-15	430	0.64
	150	252	-20	262	0.39
	225	259	-7	234	0.35
	300	257	-25	212	0.32
	375	266	-6	146	0.22
	450	250	-28	139	0.21
	600	271	-36	79	0.12
	750	280	+8	94	0.14

The optimum cleaning field appears to be 450 gauss. The remainder of the specimens were cleaned in this field.

A.C. Cleaning - 450 Gauss

	Specimens			
Site	Sample	Specimen	D	I
63	KM141	B	223	-39
	KM142	A	209	-54

53

		B	226	-51
65	KM145	A	250	-28
		B	259	-22
	KM146	A	253	-20
		B	265	-28

Sample means

Site	Sample	D	I	N	R	k	α
63	KM141	223	-39	1	-	-	-
	KM142	218	-53	2	1.9916	119	23
65	KM145	254	-25	2	1.9929	140	21
	KM146	259	-24	2	1.9858	70	30

Site means

Site	D	I	N	R	k	α
63	221	-46	2	1.9842	63	33
65	257	-25	2	1.9987	830	9

Mean direction

D	I	N	R	k	α
241	-37	2	1.9045	10	-

The (north) pole position corresponding to this mean direction is:

035°E 26°S

VOLCANICS OF TABAR ISLANDS: Pleistocene

Samples of the Pleistocene volcanics on two of the islands of the Tabar group, off the east coast of New Ireland, were collected.

TABAR ISLAND

Site	Latitude	Longitude	Number of samples
69	2°53'S	152°0.5'E	1
70	2°53'S	152°00'E	2
71	2°53.5'S	152°00'E	3

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
69	KM154	A	357	+9	2800
		B	002	+12	2810
70	KM155	A	354	+14	2290
		B	357	+19	2340
	KM156	A	000	+7	3850
		B	357	+5	3310
71	KM157	A	348	-14	1430
		B	353	-3	1270
	KM158	A	345	-6	1590
		B	341	-5	1180
	KM159	A	010	-1	1390
		B	012	-12	1630

Sample means

Site	Sample	D	I	N	R	k	α
69	KM154	000	+10	2	1.997	405	12
70	KM155	356	+16	2	1.997	337	14
	KM156	358	+6	2	1.999	1010	8

71	KM157	350	-9	2	1.990	100	25
	KM158	343	-6	2	1.998	777	9
	KM159	011	-6	2	1.991	117	23

Site means

Site	D	I	N	R	k	α
69	000	+10	1	-	-	-
70	357	+11	2	1.991	121	23
71	355	-7	3	2.937	32	22

N.R.M. Mean direction

D	I	N	R	k	α
357	+5	3	2.966	60	16

Cleaning in alternating magnetic fields was tried in an effort to improve these results.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM154A	N.R.M.	357	+9	2800	1.00
	75 gauss	358	+14	1120	0.40
	300	354	+3	490	0.18
	450	343	+7	21	0.01
	600	307	+29	15	0.01
	750	350	+34	17	0.01
KM155A	N.R.M.	354	+14	2290	1.00
	75 gauss	352	+14	1660	0.72
	300	356	+27	603	0.26
	450	357	+15	326	0.14
	600	355	+2	282	0.12
	750	019	+24	147	0.06

KM157A	N.R.M.	348	-14	1430	1.00
	75 gauss	348	+14	408	0.29
	300	018	+5	191	0.13
	450	043	+37	89	0.06
	600	271	0	109	0.08
	750	050	+45	102	0.07

The optimum field for treatment is 150 gauss. The remainder of the specimens were cleaned in this field.

A.C. Cleaning - 150 Gauss

Specimens

Site	Sample	Specimen	D	I
69	KM154	A	358	+14
		B	352	+17
70	KM155	A	352	+14
		B	356	+24
	KM156	A	358	+14
		B	358	+15
71	KM157	A	349	+14
		B	000	+25
	KM158	A	354	+18
		B	359	+15
	KM159	A	351	+11
		B	349	+9

Sample means

Site	Sample	D	I	N	R	k	α
69	KM154	355	+16	2	1.996	315	14
70	KM155	354	+19	2	1.991	117	23
	KM156	358	+15	2	1.999	13000	2
71	KM157	354	+20	2	1.982	57	34
	KM158	356	+17	2	1.997	476	11
	KM159	350	+10	2	1.999	4100	4

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Site means

Site	D	I	N	R	k	α
69	355	+16	1	-	-	-
70	356	+17	2	1.997	346	13
71	353	+15	3	2.989	186	9

Mean direction

D	I	N	R	k	α
355	+16	3	2.9993	2880	2

The (north) pole position corresponding to this mean direction is:

$128^{\circ}E$ $78^{\circ}N$

KORUMBO ISLAND

Site	Latitude	Longitude	Number of samples
66	$2^{\circ}47.5'S$	$151^{\circ}59'E$	3
67	$2^{\circ}47'S$	$151^{\circ}58'E$	2
68	$2^{\circ}47'S$	$151^{\circ}58'E$	2
72	$2^{\circ}46'S$	$151^{\circ}59.5'E$	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
66	KM147	A	228	+40	649
		B	298	+72	613
	KM148	A	294	+83	713
		B	014	+80	496
	KM149	A	002	-3	762
		B	013	+27	959
67	KM150	A	067	-44	240
		B	336	-27	492
	KM151	A	111	+39	304
		B	120	+32	281

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68	KM152	A	025	+4	403
		B	357	-60	498
	KM153	A	045	+14	419
		B	023	+13	407
72	KM160	A	356	+12	1400
		B	350	+6	951
	KM161	A	012	+16	1430
		B	002	+5	1070

Sample means

Site	Sample	D	I	N	R	k	α
66	KM147	246	+60	2	1.840	6	-
	KM148	342	+83	2	1.990	108	24
	KM149	007	+12	2	1.923	23	-
67	KM150	015	-45	2	1.616	3	-
	KM151	116	+36	2	1.992	130	22
68	KM152	016	-29	2	1.660	3	-
	KM153	034	+14	2	1.964	28	-
72	KM160	353	+9	2	1.995	203	18
	KM161	007	+10	2	1.984	63	32

These directions are so scattered that they are of no significance. Cleaning in alternating magnetic fields was tried, initially on four pilot specimens.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM147A	N.R.M.	228	+40	649	1.00
	150 gauss	176	+51	88	0.14
	300	130	+59	162	0.25
	450	127	+58	36	0.06
	600	319	+17	17	0.03
	750	016	-48	52	0.08

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KM150A	N.R.M.	067	-44	240	1.00
	150 gauss	266	-26	25	0.10
	300	168	0	124	0.52
	450	292	+42	56	0.23
	600	230	-72	25	0.10
	750	259	-29	67	0.28
KM152A	N.R.M.	025	+4	403	1.00
	150 gauss	049	-31	60	0.15
	300	050	-47	105	0.26
	450	232	+1	41	0.10
	600	265	-7	38	0.09
	750	312	-70	60	0.15
KM160A	N.R.M.	356	+12	1400	1.00
	150 gauss	007	+16	274	0.20
	300	001	+11	132	0.09
	450	321	-52	25	0.02
	600	186	-56	24	0.02
	750	344	-11	25	0.02

The pilot specimens appear to be rather unstable, and their directions randomly scattered. However, the remainder of the specimens were cleaned in 300 gauss to give a better picture of the scatter in directions.

A.C. Cleaning - 300 Gauss

Specimens

Site	Sample	Specimen	D	I
66	KM147	A	130	+59
		B	150	-32
	KM148	A	038	+9
		B	079	-15

	KM149	A	021	+8
		B	045	-23
67	KM150	A	168	0
		B	202	-41
	KM151	A	150	+13
		B	185	-10
68	KM152	A	050	-47
		B	166	-10
	KM153	A	134	+58
		B	175	-28
72	KM160	A	001	+11
		B	010	-7
	KM161	A	028	+6
		B	349	-7

It is apparent from inspection that these results are extremely scattered. Any means calculated would have no significance.

No mean direction or pole position can be obtained from these results.

MANUS ISLAND VOLCANICS: Pleistocene

Samples of the Pleistocene volcanics were collected from five sites on Manus Island as follows:

Site	Latitude	Longitude	Number of samples
52	2°01'S	147°15'E	3
53	2°2.5'S	147°15'E	2
59	2°00'S	146°33'E	3
60	2°00'S	146°33'E	2
61	1°56'S	146°49'E	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
52	KM116	B	308	+48	3190
	KM117	A	289	+42	2270
		B	288	+36	1360
	KM118	A	312	+42	896
		B	308	+38	922
53	KM119	A	123	-10	225
		B	135	-15	219
	KM120	A	109	-51	170
		B	108	-55	200
59	KM132	A	316	+89	191
		B	125	+83	163
	KM133	A	103	-55	64
		B	291	-56	44
	KM134	A	303	0	81
		B	320	-1	79
60	KM135	A	331	-37	72
		B	299	-48	83

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	KM136	A	319	-27	274
		B	310	-34	224
61	KM137	A	163	+50	2250
		B	163	+61	1380
	KM138	A	120	-21	17000
		B	118	-20	15000

Sample means

Site	Sample	D	I	N	R	k	∝
52	KM116	308	+48	1	-	-	-
	KM117	288	+39	2	1.996	320	14
	KM118	310	+40	2	1.998	553	11
53	KM119	129	-12	1	1.988	85	27
	KM120	109	-53	2	1.999	1320	7
59	KM132	122	+87	2	1.994	187	18
	KM133	034	-87	2	1.650	3	-
	KM134	311	0	2	1.976	42	40
60	KM135	316	-44	2	1.952	21	-
	KM136	315	-31	2	1.992	136	22
61	KM137	163	+56	2	1.990	109	24
	KM138	119	-21	2	1.999	3140	4

Site means

Site	D	I	N	R	k	∝
52	302	+43	3	2.967	62	16
53	121	-33	2	1.854	7	-
59	315	0	3	0.957	1	-
60	315	-37	2	1.986	76	29
61	135	+19	2	1.476	2	-

N.R.M. Mean direction

D	I	N	R	k	∝
310	+4	5	4.2967	6	35

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An attempt to improve the results by cleaning in alternating magnetic fields was again made, initially by cleaning five pilot specimens.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM117A	N.R.M.	289	+42	2270	1.00
	75 gauss	283	+52	3130	1.38
	150	287	+55	1570	0.69
	300	279	+69	814	0.36
	450	147	+56	897	0.40
	600	144	+65	621	0.27
	750	305	+82	900	0.40
KM119A	N.R.M.	123	-10	255	1.00
	75 gauss	024	-52	124	0.49
	150	055	-34	26	0.10
	300	091	-1	77	0.30
	450	196	-8	23	0.09
	600	118	+30	35	0.14
	750	321	-24	35	0.14
KM132A	N.R.M.	316	+89	191	1.00
	75 gauss	348	+42	32	0.17
	150	332	+2	21	0.11
	300	325	-9	17	0.09
	450	321	-42	19	0.10
	600	344	31	14	0.07
	750	342	-13	7.8	0.04
KM136A	N.R.M.	319	-27	274	1.00
	75 gauss	300	-9	192	0.70
	150	306	-19	75	0.27
	300	303	+15	42	0.15
	450	004	-53	33	0.12
	600	026	+16	17	0.06
	750	301	-42	42	0.15

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KM137A	N.R.M.	163	+50	2250	1.00
	75 gauss	166	+16	2820	1.25
	150	165	+11	2160	0.96
	300	165	+12	754	0.34
	450	155	-19	374	0.17
	600	164	-11	154	0.07
	750	214	+19	47	0.02

From an inspection of the pilot specimen directions, it appears that the sites from Manus Island can be divided into two groups, an eastern (sites 52 and 53, to be cleaned in 600 gauss), and a western (sites 59 and 60, to be cleaned in 450 gauss). Site 61, on the northern coast, cannot be assigned to either of these groups, so is neglected for the time being.

MANUS ISLAND (EAST)

A.C. Cleaning - 600 Gauss

Specimens

Site	Sample	Specimen	D	I
52	KM116	B	061	+69
	KM117	A	144	+65
		B	283	+74
	KM118	A	025	+13
		B	350	+7
53	KM119	A	118	+30
		B	074	-49
	KM120	A	025	0
		B	270	-55

Sample means

Site	Sample	D	I	N	R	k	α
52	KM116	061	+69	1	-	-	-
	KM117	308	+5	2	0.6483	1	-
	KM118	279	-10	2	0.6005	1	-
53	KM119	099	-10	2	1.4374	2	-
	KM120	228	-31	2	1.5764	2	-

Site means

Site	D	I	N	R	k	α
52	286	-17	3	2.2572	3	-
53	255	-12	2	1.6982	3	-

Mean direction

D	I	N	R	k	α
270	-15	2	1.9300	14	-

MANUS ISLAND (WEST)

A.C. Cleaning - 450 Gauss

Specimens

Site	Sample	Specimen	D	I
59	KM132	A	321	-42
		B	306	-22
	KM133	A	343	-34
		B	342	-48
	KM134	A	313	-14
		B	284	-18
60	KM135	A	086	-24
		B	104	-12
	KM136	A	004	-53
		B	193	+46

Sample means

Site	Sample	D	I	N	R	k	α
59	KM132	313	-32	2	1.9565	23	-
	KM133	342	-41	2	1.9854	69	31
	KM134	299	-16	2	1.9394	16	-
60	KM135	095	-18	2	1.9668	30	-
	KM136	189	+51	2	1.9937	159	11

Site means

Site	D	I	N	R	k	α
59	316	-31	3	2.8479	13	35
60	243	+43	2	1.6012	3	-

Mean direction

D	I	N	R	k	α
283	+7	2	1.2901	1	-

The mean of the four site directions (52, 53, 59 and 60) then is as follows:

Mean direction

D	I	N	R	k	α
275	-6	4	3.1429	4	-

The (north) pole position corresponding to this mean direction is

$054^{\circ}E$ $5^{\circ}N$

VOLCANICS (GAZELLE PENINSULA): ?Oligocene

Samples of volcanics of possibly Oligocene age were collected from two sites on the NW tip of the Gazelle Peninsula of New Britain, as follows:

Site	Latitude	Longitude	Number of samples
81	$4^{\circ}13\frac{1}{2}'S$	$151^{\circ}33'E$	2
82	$4^{\circ}13\frac{1}{2}'S$	$151^{\circ}33'E$	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
81	KM178	A	347	-29	332
		B	347	-58	156
	KM179	A	358	+5	390
		B	354	+5	370
82	KM180	A	194	+25	365
		B	194	+26	383
	KM181	A	269	+22	211
		B	207	+16	421

Sample means

Site	Sample	D	I	N	R	k	α
81	KM178	347	-43	2	1.935	16	-
	KM179	356	+5	2	1.999	1280	7
82	KM180	194	+25	2	1.999	9450	3
	KM181	237	+22	2	1.750	4	-

There is little point in computing site means, or an N.R.M. mean direction. Cleaning in alternating magnetic fields was attempted, initially of two pilot specimens.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM178A	N.R.M.	347	-29	332	1.00
	75 gauss	007	-14	95	0.29
	150	001	-18	43	0.13
	225	355	-21	58	0.17
	300	018	+61	30	0.09
	375	351	-40	31	0.09
	450	075	+28	39	0.12
	600	350	+61	56	0.17
	750	332	-35	65	0.20
KM180A	N.R.M.	194	+25	365	1.00
	75 gauss	168	+26	82	0.22
	150	162	+29	39	0.11
	225	170	+43	68	0.19
	300	319	+51	40	0.11
	375	105	+78	54	0.15
	450	092	+36	69	0.19
	600	089	+54	24	0.07
	750	165	+60	50	0.14

These specimens appear to be somewhat unstable, but some agreement is achieved after cleaning in a field of 450 gauss. The remainder of the specimens were cleaned in this field.

A.C. Cleaning - 450 Gauss

Specimens

Site	Sample	Specimen	D	I
81	KM178	A	075	+28
		B	280	+11
	KM179	A	043	-27
		B	345	-25

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82	KM180	A	092	+36
		B	184	+50
	KM181	A	312	+2
		B	096	-12

Sample means

Site	Sample	D	I	N	R	k	α
81	KM178	268	-9	2	1.8417	6	-
	KM179	285	-2	2	0.8721	-	-
82	KM180	234	+10	2	1.0658	1	-
	KM181	294	+7	2	1.8962	10	-

Site means

Site	D	I	N	R	k	α
81	277	-6	2	1.9745	39	-
82	264	-10	2	1.7376	4	-

Mean direction

D	I	N	R	k	α
271	+2	2	1.9677	31	-

The (north) pole position corresponding to this mean direction is

063°E 1°N

ASTROLABE AGGLOMERATE: Tertiary

This is an essentially horizontal sequence of Tertiary volcanic agglomerate in the Port Moresby/Rigo area of Papua. Samples were collected from three sites as follows:

Site	Latitude	Longitude	Number of samples
2	9°23'S	147°17'E	2
93	9°23'S	147°17'E	4
95	9°47'S	147°41'E	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	Mx10^{-6}
2	KM5	A	134	+11	4710
		B	127	+5	4460
	KM6	B	124	-30	950
93	KM205	A	130	-42	2290
		B	123	-43	1810
	KM206	A	358	-54	634
		B	331	-67	9020
	KM207	A	353	-38	1870
		B	009	-34	2300
	KM208	A	125	+26	8770
		B	125	+47	13200
95	KM211	A	190	+4	324
		B	128	-37	3200
	KM212	A	023	-32	1750
		B	121	-34	758

Sample means

Site	Sample	D	I	N	R	k	α
2	KM5	131	+8	2	1.994	170	19
	KM6	124	-30	1	-	-	-
93	KM205	126	-43	2	1.997	477	11
	KM206	347	-61	2	1.974	41	-
	KM207	001	-36	2	1.985	71	-
	KM208	125	+36	2	1.967	31	-
95	KM211	163	-19	2	1.628	3	-
	KM212	071	-44	2	1.544	2	-

Site means

Site	D	I	N	R	k	α
2	127	-11	2	1.888	9	-
93	072	-52	4	1.979	1	-
95	125	-41	2	1.553	2	-

N.R.M. Mean direction

D	I	N	R	k	α
113	-37	3	2.704	7	-

Cleaning in alternating magnetic fields was tried.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM5A	N.R.M.	134	+11	4710	1.00
	75 gauss	157	-4	1980	0.42
	150	173	-14	673	0.14
	300	188	-27	261	0.06
	450	157	-53	173	0.04
	600	079	-43	67	0.01
	750	269	-42	55	0.01

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KM296B	N.R.M.	331	-67	9020	1.00
	75 gauss	005	-60	6780	0.75
	150	007	-60	5610	0.62
	300	010	-62	4060	0.45
	450	006	-59	2770	0.31
	600	004	-57	2350	0.26
	750	359	-57	1900	0.21
KM208A	N.R.M.	125	+26	8770	1.00
	75 gauss	116	+42	4340	0.49
	150	113	+49	2980	0.34
	300	106	+55	1790	0.20
	450	131	+47	1170	0.13
	600	127	+44	958	0.11
	750	121	+46	796	0.09
KM211B	N.R.M.	128	-37	3200	1.00
	75 gauss	077	-63	2220	0.69
	150	070	-67	1500	0.47
	300	077	-64	762	0.24
	450	059	-22	188	0.06
	600	162	-67	72	0.02
	750	221	-22	107	0.03
KM212A	N.R.M.	023	-32	1750	1.00
	75 gauss	313	-17	2130	1.22
	150	305	-11	1230	0.70
	300	311	-14	361	0.21
	450	331	+12	177	0.10
	600	247	+30	93	0.05
	750	199	+48	268	0.15

It is not worthwhile continuing with this treatment, since the pilot specimen directions do not, at any stage, approach agreement with one another. No significant mean direction can be obtained from these results.

MOUNT HAGEN VOLCANICS: Pleistocene

Samples were collected from six sites in the Pleistocene volcanics around and to the west of Mount Hagen in the Western Highlands of New Guinea.

Site	Latitude	Longitude	Number of samples
37	5°43½'S	144°11½'E	2
38	5°28'S	143°44'E	2
39	5°42'S	143°58'E	2
40	5°43'S	143°58½'E	2
41	5°43'S	143°58½'E	2
42	5°47'S	144°08½'E	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	Mx10^{-6}
37	KM86	A	032	-5	2770
		B	013	-10	3190
	KM87	A	052	+10	3300
		B	047	+9	3010
38	KM88	A	004	+54	3160
		B	017	+54	3650
	KM89	A	012	+31	2790
		B	007	+37	2880
39	KM90	A	003	-16	2390
		B	007	-11	2200
	KM91	A	007	-11	1310
		B	002	-13	1340
40	KM92	A	268	-50	1950
		B	256	-45	2090
	KM93	A	253	-36	3180
		B	255	-36	3340

41	KM94	A	133	+60	1890
		B	155	+62	2150
	KM95	A	140	+71	1730
		B	145	+66	1840
42	KM96	A	002	-15	7000
		B	001	-20	7220
	KM97	A	011	-20	3020
		B	012	-19	3110

Sample means

Site	Sample	D	I	N	R	k	α
37	KM86	022	-8	2	1.971	35	-
	KM87	050	+9	2	1.998	517	10
38	KM88	010	+54	2	1.996	254	16
	KM89	010	+34	2	1.995	238	16
39	KM90	005	-14	2	1.996	333	14
	KM91	004	-12	2	1.997	456	12
40	KM92	262	-48	2	1.993	144	21
	KM93	254	-36	2	1.999	7320	3
41	KM94	144	+61	2	1.991	118	23
	KM95	143	+68	2	1.997	426	12
42	KM96	001	-17	2	1.998	526	11
	KM97	012	-19	2	1.999	13000	2

Site means

Site	D	I	N	R	k	α
37	036	+1	2	1.921	13	-
38	010	+44	2	1.968	32	-
39	005	-13	2	1.999	3900	4
40	257	-42	2	1.986	75	29
41	143	+65	2	1.996	283	15
42	006	-18	2	1.992	137	21

The mean of these site mean directions would have no significance.

Cleaning in alternating magnetic fields was attempted, initially on six pilot specimens.

A.C. Cleaning - Pilot specimens

Specimen	Treatment	D	I	$Mx10^{-6}$	M/M_o
KM86A	N.R.M.	032	-5	2770	1.00
	75 gauss	351	-4	1620	0.58
	150	351	-2	811	0.29
	300	353	+1	373	0.13
	450	356	+10	274	0.10
	600	034	-28	100	0.04
	750	325	-17	32	0.01
KM88A	N.R.M.	004	+54	3160	1.00
	75 gauss	001	+48	2600	0.82
	150	006	+52	1940	0.61
	300	011	+51	1230	0.39
	450	006	+48	1000	0.32
	600	003	+42	587	0.19
	750	358	+48	522	0.17
KM90A	N.R.M.	003	-16	2390	1.00
	75 gauss	000	-16	1980	0.83
	150	356	-13	1420	0.60
	300	354	-16	702	0.29
	450	001	-5	400	0.17
	600	000	-21	277	0.12
	750	002	-23	188	0.08
KM92A	N.R.M.	268	-50	1950	1.00
	75 gauss	251	-45	1710	0.88
	150	251	-52	987	0.51
	300	251	-40	438	0.22
	450	261	-33	195	0.10

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	600	226	-52	70	0.04
	750	224	-19	98	0.05
KM94A	N.R.M.	133	+60	1890	1.00
	75 gauss	168	+64	1540	0.82
	150	182	+57	1130	0.60
	300	178	+63	564	0.30
	450	154	+68	324	0.17
	600	161	+61	97	0.05
	750	163	+62	141	0.07
KM96A	N.R.M.	002	-15	7000	1.00
	75 gauss	000	-15	6720	0.96
	150	001	-16	5970	0.85
	300	003	-15	4640	0.66
	450	358	-14	3670	0.52
	600	359	-15	2800	0.40
	750	354	-15	2190	0.31

A very minor improvement in the agreement between the pilot specimen directions (from k = 1.7 to k = 1.9) is found at 450 gauss. The remainder of the specimens were cleaned in this field.

A.C. Cleaning - 450 Gauss

Specimens

Site	Sample	Specimen	D	I
37	KM86	A	356	+10
		B	340	+8
	KM87	A	008	-13
		B	335	-10
38	KM88	A	006	+48
		B	006	+56
	KM89	A	004	+55
		B	001	+55

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39	KM90	A	001	-5
		B	001	-17
	KM91	A	009	-18
		B	003	-21
40	KM92	A	261	-33
		B	234	-54
	KM93	A	251	-39
		B	269	-27
41	KM94	A	154	+68
		B	172	+60
	KM95	A	189	+69
		B	188	+71
42	KM96	A	358	-14
		B	359	-17
	KM97	A	008	-17
		B	009	-17

Sample means

Site	Sample	D	I	N	R	k	α
37	KM86	348	+9	2	1.981	55	-
	KM87	351	-12	2	1.922	13	-
38	KM88	006	+52	2	1.995	204	18
	KM89	003	+55	2	1.999	2630	5
39	KM90	001	-11	2	1.989	94	26
	KM91	006	-20	2	1.997	392	13
40	KM92	250	-44	2	1.938	16	-
	KM93	261	-33	2	1.971	36	-
41	KM94	164	+64	2	1.991	113	24
	KM95	188	+70	2	1.999	6650	3
42	KM96	358	-16	2	1.999	1550	2
	KM97	008	-17	2	1.999	41500	1

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Site means

Site	D	I	N	R	k	α
37	350	-2	2	1.964	28	-
38	004	+53	2	1.998	729	9
39	003	-15	2	1.991	121	23
40	256	-39	2	1.985	71	30
41	175	+68	2	1.990	108	24
42	003	-17	2	1.992	143	21

The mean of these site mean directions would have no significance, so that no mean direction and pole can be calculated.

However, because of the apparent stability of the directions within each site, it is of interest to calculate the pole positions for each individual site, as follows:

Site	Latitude	Longitude
37	79°S	210°E
38	51°S	329°E
39	86°S	019°E
40	11°N	210°E
41	44°S	148°E
42	86°S	102°E

It is noted that the poles from sites 37, 39, and 42 lie close to the present south pole, and almost exactly upon the proposed polar wander curve for New Guinea. Site 40 also lies close to this curve, but at the other (older) end of it. Even though sites 38 and 41 appear to be of no significance, it is apparent that this rock unit could have been formed during the rotation of New Guinea, and deserves further collection and study. The polar wander curve could perhaps be delineated quite accurately from the single rock unit.

OTHER FORMATIONS

A number of other formations were sampled at single sites only. Since no real significance can be attached to the results from a single site, A.C. cleaning was not attempted. The N.R.M. results, however, are as follows:

1. DOLERITE (New Ireland): ?Neogene

Site	Latitude	Longitude	Number of samples
75	$4^{\circ}22'S$	$152^{\circ}52'E$	2

Natural remanent magnetisation results

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
75	KM166	A	206	+48	320
		B	208	+52	320
	KM167	A	111	+30	76
		B	322	+61	229

These directions are so scattered that it is not worthwhile computing any means.

2. DOLERITE (Western Highlands): Tertiary

Site	Latitude	Longitude	Number of samples
31	$6^{\circ}05'S$	$145^{\circ}09'E$	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
31	KM73	A	236	+53	207
		B	232	+57	218
	KM74	B	283	-65	330

Sample means

Site	Sample	D	I	N	R	k	α
31	KM73	234	+55	2	1.998	5	-
	KM74	283	-65	1	-	-	-

Site mean

Site	D	I	N	R	k	α
31	255	-5	2	0.919	1	-

3. GABBRO (Woodlark Island): Tertiary

Site	Latitude	Longitude	Number of samples
91	$9^{o}11'S$	$152^{o}41'E$	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
91	KM202	A	163	+13	6910
		B	174	+8	6210
	KM203	A	218	+1	4600
		B	241	+13	2300

Sample means

Site	Sample	D	I	N	R	k	α
91	KM202	168	+11	2	1.989	99	25
	KM203	229	+7	2	1.947	19	-

Site mean

Site	D	I	N	R	k	α
91	199	+10	2	1.727	4	-

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4. GRANODIORITE (Woodlark Island): Tertiary

Site	Latitude	Longitude	Number of samples
92	9°11'S	152°41'E	1

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
92	KM204	A	035	-52	176
		B	036	-42	137

Sample mean

Site	Sample	D	I	N	R	k	α
92	KM204	035	-47	2	1.992	128	22

5. SERPENTINE (Port Moresby): Tertiary

Site	Latitude	Longitude	Number of samples
1	9°28'S	147°11'E	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
1	KM1	A	031	-57	159
		B	009	-55	200
	KM2	A	128	-7	367
		B	143	-23	333

Sample means

Site	Sample	D	I	N	R	k	α
1	KM1	020	-57	2	1.988	87	27
	KM2	135	-15	2	1.963	27	-

The site mean would not be significant.

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6. UPPER EDIE PORPHYRY: Tertiary

Site	Latitude	Longitude	Number of samples
13	7°20'S	146°41'E	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
13	KM36	A	175	-22	198
		B	177	-23	195
	KM37	A	181	-33	274

Sample means

Site	Sample	D	I	N	R	K	
13	KM36	176	-23	2	1.999	2750	5
	KM37	181	-33	1	-	-	-

Site mean

Site	D	I	N	R	k	
13	178	-28	2	1.989	99	25

7. SNAKE RIVER GREYWACKE: Cretaceous

Site	Latitude	Longitude	Number of samples
9	7°02'S	146°37'E	2

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
9	KM25	A	004	+62	1.7
		B	019	-29	1.1
	KM26	A	041	+6	2.1
		B	010	-20	1.4

Sample means

Site	Sample	D	I	N	R	k	α
9	KM25	014	+17	2	1.386	2	-
	KM26	026	-7	2	1.881	8	-

Site mean

Site	D	I	N	R	k	α
9	020	+5	2	1.946	19	-

8. KAINDI METAMORPHICS: Palaeozoic

Site	Latitude	Longitude	Number of samples
14	$7^{o}17'S$	$146^{o}43'E$	3

Natural remanent magnetisation measurements

Specimens

Site	Sample	Specimen	D	I	$Mx10^{-6}$
14	KM38	A	165	+7	2.2
		B	179	+10	4.5
	KM39	A	324	-19	78
		B	343	-16	60
	KM40	A	158	-14	170
		B	161	-17	185

Sample means

Site	Sample	D	I	N	R	k	α
14	KM38	172	+9	2	1.985	69	31
	KM39	333	-17	2	1.974	40	-
	KM40	159	-16	2	1.998	772	9

Site mean

Site	D	I	N	R	k	α
14	341	-3	3	2.8827	17	-