DEPARTMENT OF MINERALS AND ENERGY

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD 1976/33

STRATIGRAPHIC TABLES, PAPUA NEW GUINEA

Compiled by

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INTRODUCTION

This compilation presents in tabular form all of the currently available information on the stratigraphy of Papua New Guinea. Almost all the data were compiled from BMR publications: Explanatory Notes (or their drafts), which accompany the 1:250 000 geological maps; and Bulletins. The framework of the compilation follows that used in the 1:1 000 000 geological map of Papua New Guinea published in 1972, so the tables cannot be fully utilized without reference to that map.

Of the seventy 1:250 000 Sheet areas covering Papua New Guinea, at the time of writing about 50 (which incidentally cover most of the land surface) have been mapped, and of these 27 are now published. Most of the remaining 23 maps have been compiled, and dyelines of them are available on request to BMR or the Geological Survey of Papua New Guinea.

Since the 1:1 000 000 map was compiled in 1971 more mapping has been completed, and understandably there are some discrepancies between that map and the more-recently compiled 1:250 000 Sheets.

The stratigraphic tables below describe in some detail the composition of the generalized units into which the strata have been subdivided on the 1:1 000 000 map. These units are here referred to as major units so as to distinguish them from the specific map units of the individual 1:250 000 Sheets.

The tables are divided into nine sets, each set representing one of the nine regions into which the country was originally divided for the purpose of the presentation of its geology. The boundaries of these regions are shown on an inset map at the right-hand bottom corner of the 1: 1 000 000 map (see also Fig. 1).

Tables for each region are subdivided into six vertical columns which describe each major unit in turn under the headings of 'Age', 'Unit' 'Constituent unit(s) on 1:250 000 Sheets', 'Thickness', 'Lithology', and 'Additional pertinent data'.

Under 'age' are listed ages assigned to individual major units in the Reference of the 1:1 000 000 map.

In the second column, under 'Unit', are listed, in reverse chronological order (youngest at the top), the successive major stratigraphic units for the particular region of the 1:1 000 000 map.

The third column lists - by name and map symbol, or, where the name does not exist or is not available, by map symbol only, or by a brief description and a symbol - units from 1:250 000 Sheets or other large-scale maps which have been incorporated into the major units. Many of the names listed are informal and should not, at least for a time, be used outside this compilation; the status of each name is shown in Appendix 2. Where known, the age ranges* of the stratigraphic units are also quoted. Units which, whether because of incompatible lithology, or age, or environment in which they formed, do not fit in the particular major unit but are not differentiated from it on the 1:1 000 000 map because of their small size, are adequately referred to below the description of each major unit.

Known thicknesses are quoted in metres in the fourth column. Where available, the maximum, minimum, and average thicknesses are given, as are directions of thickening or thinning; approximate or estimated values are denoted by 'C'.

For the sake of brevity, the colour of a rock, which must be of doubtful value because of the absence of a standard colour chart, is omitted from the description of lithology in column five.

*The abbreviations 'e' (early) and 'l' (late) have been used for the finer age subdivisions of stratigraphic units in the stratigraphic tables.

Detailed chemical analyses of constituent units are also omitted for the sake of brevity, but where they are included in the explanatory notes on a 1:250 000 Sheet area, their existence is indicated by an asterisk at the end of the lithological description of the constituent unit. The occurrence of a given unit, as well as the variation in its lithology from one Sheet area to another where known, is clearly marked, but once again for the sake of brevity, both in the 'Lithology' and 'Additional pertinent data' columns, the words 'Sheet' or 'Sheet area' have been omitted; thus 'In Lake Kutubu 1:250 000 Sheet area.....' has been abbreviated to 'In Lake Kutubu.....'.

The sixth and last column lists all the pertinent data additional to those already given in the preceding columns. These, where available, are: environment of formation, genetic and/or stratigraphic relations, fossil dating media, fossil content, age (when age closer than that of a stage is known), absolute age and method used, mineralisation, and economic content or potential. For greater brevity, names of stratigraphic units have been shortened, where practicable, according to the system of abbreviation commonly used by the Bureau of Mineral Resources - a system which follows closely that of the Shell Petroleum Company. A key to the remaining abbreviation used in the last column is in Appendix 1.

Gaps in the information in the tables are partly shown on the accompanying map (Fig. 1). Some Sheet areas are not represented at all, whilst data from others are subject to revision:

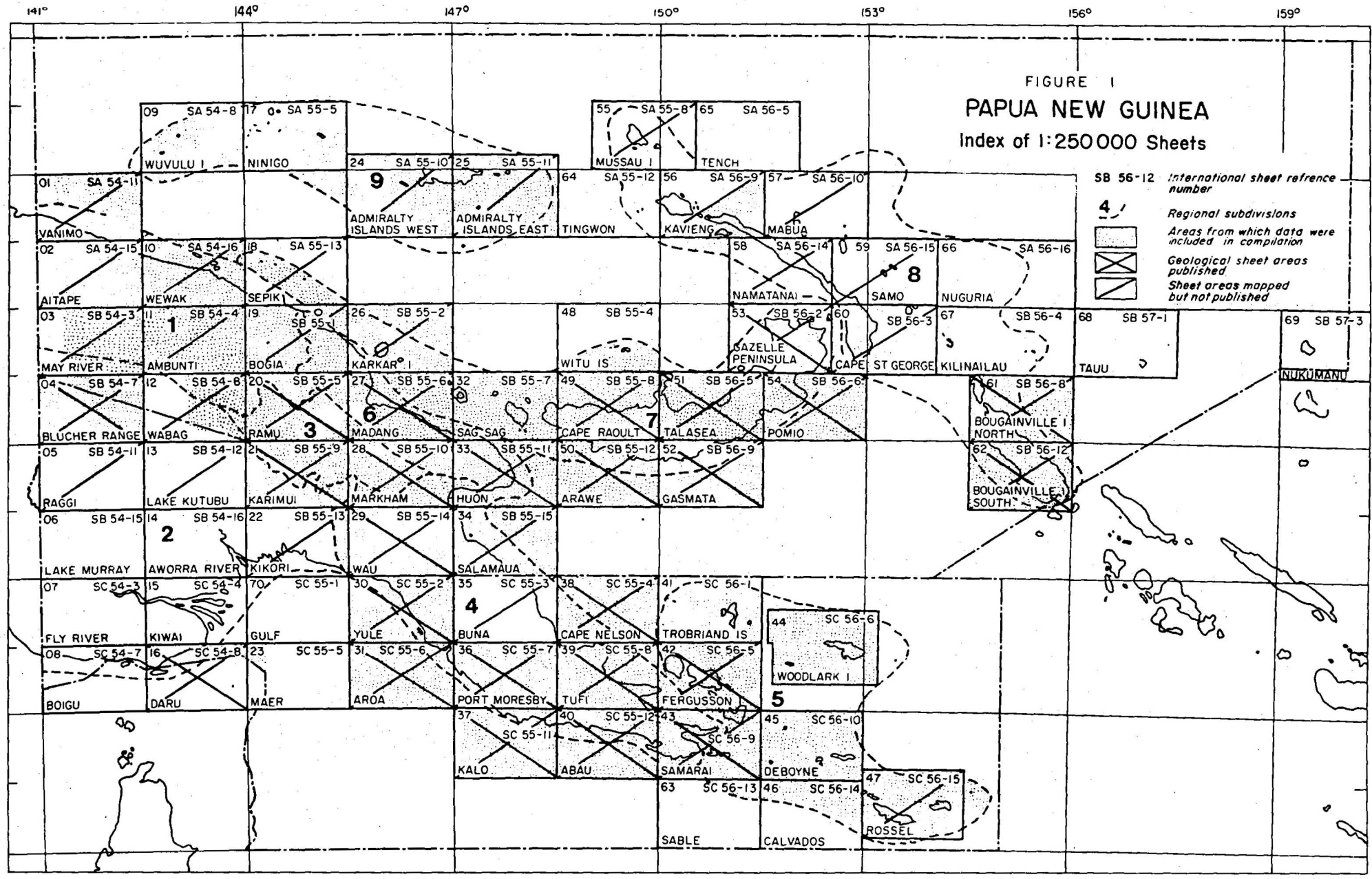
Region 1: Sheet areas and parts of Sheet areas not represented are Sepik, western May River, and western Wabag, all of which however, have been fairly recently mapped; data from Vanimo, Aitape, and Wewak were compiled recently and are thus subject to revision.

Region 2: Sheet areas not represented are Boigu, Fly River, Kiwai, Lake Murry, Aworra River, Kikori, Raggi, Lake Kutubu, and part of Wabag. Of these, only Lake Kutubu, and Kikori were recently mapped, and much of the rest of the area is covered by flat-lying Quaternary sediments.

Region 4: Buna Sheet area is not represented; information from Salamaua Sheet area is subject to revision.

Region 6: Data from the recently mapped Bogia Sheet area are subject to revision.

Region 8: Mussau and islands northeast of New Ireland are not represented; data from the recently mapped New Hanover Island are subject to revision.



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Age	Unit	Constituent unit(s) in 1:250 000 Sheet area	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Qa[1]	Qa Pleistocene–Holocene (At least partly included in Qs[1], Tmu[1], Jt[1])		AITAPE, BOGIA, VANIMO, WEWAK: Alluvium: gravel, sand, silt, mud MAY RIVER, AMBUNTI: also peat and tuffaceous sand	Locally disconf on Neumayer Beds and Wosera Beds; unconf on all older fms; grades later into Qm and Qo; includes some Qm, Qs. Source of gv
		Qm Pleistocene–Holocene	up to 50 in Wewak; up to 10 in Vanimo and Aitape	AITAPE, VANIMO, WEWAK: Beach sand: lithic and calcareous sand, silt; minor gravel, beach rock	Grades later into Qa inland; unconf on Bliri Volc in Aitape, on Qc and Wiriu Lst at Wewak, and on Serra Hills Lst in Vanimo. Source of building sand; provides well-drained stable land for village and airstrip construction
		Qr Quaternary		SE AMBUNTI: Raised alluvial deposits of fine alluvium and sandy sediments	Uplifted 9 m, possibly by recent movement on Jimi Fault
		Qs Pleistocene–Holocene		VANIMO: Colluvium: chaotic deposits of angular to rounded rock fragments	Intramontane valley fill and areas of closed drainage in karst terrain
		Qc Pleistocene–Holocene (At least partly included in Qs)	up to 50 in Wewak	VANIMO, WEWAK: Raised reef: coral-algal reef limestone, biosparite, foraminiferal limestone, sand	Low part probably equiv of Wiriu Lst, grades later into large terraces of Neumeyer Beds; up part grades later into Qa; unconf on Puwani Lst, Bliri Volc; probably unconf on Serra Hills Lst. Age from larger benth foram and physical properties. Source of road metal; provides stable, well drained land for construction; potential source of lime
		Wiriu Limestone (Qpr) Pleistocene–Holocene (At least partly included in Tmu[1], KuFe[1])	up to 100	WEWAK: Coral-algal reef limestone, algal-foraminiferal biosparite; minor marl, calcareous foraminiferal siltstone, and tufa	Equiv? to up part of Serra Hills Lst and low part of Qc in Vanimo; later? equiv of Wosera Beds, and possibly Ulahau Fgl; ?corr of Wandokai Lst in Bogia and Madang, and older coral terraces in NE Huon; disconf and unconf? on Wewak Beds, Maprik Mdst; unconf on Torricelli Intr Comp, Bliri Volc. Age from larger foram; calc tufa locally contains leaf impressions. Quarried for road construction material; suitable as foundation material; good aquifer, but subjected to salt-water encroachment near coast at times of drought
		Units not differentiated, at least in part, from Qa[1] on 1:1 000 000 map: In Aitape: Pleist? Neumayer Beds, Pleist-Holo Wosera Beds and Plio-Pleist Wuro Beds (see Qs[1]) and Serra Hills Lst (see Tp[1]); 1 Plio Romi Fm, and Plio Rofula Mem (see Tp[1]); Mio-Plio Barida Beds (see Tmu[1]); Eo Dimaie Volc and 1 Cret-Eo Salumei Fm metamorphic phase (see KuFe[1]). In Vanimo: 1 Plio-Pleist Serra Hills Lst, 1 Plio Romi Fm (see Tp[1]); e-l Mio Senu Beds and 1 Mio- e Plio Barida Beds (see Tmu[1]); and Puwani Lst (see Tmu[1]). In Wewak: Plio-Pleist Wuro Beds (see Qs[1]); ?l Plio Romi Fm (see Tp[1]); and 1 Mio-e Plio Barida Beds (see Tmu[1]).			
	Qs[1]	Qf, Qr Quaternary		BOGIA: Poorly consolidated sandstone, siltstone, mudstone, raised alluvium; clastic boulder deposits, poorly sorted gravel, sand, silt, clay	
		Wosera Beds (Qpw) Pleistocene? (at least partly included in Qa[1])		AITAPE, WEWAK: Carbonaceous and ferruginous gravel, iron-stained, micaceous sand, sandy clay, peat, ironstone concretions; some laterite	Non-marine, fluv, low-angle alluv fans dep by ancestors of present major rivers. In Aitape, non-conf on Wuro Beds; unconf on Sibi Sst Mem, Nopan Sst, and older fms. In Wewak, probably contemp with Neumayer Beds to N; non-conf on Wuro Beds, Maprik Mdst. Age from degree of dissection and superpos. Source of gv for road construction; suitable for village sites and road alignments.

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Qs^1 (contd)	Neumayer Beds (Qpn) Pleistocene? (At least partly included in Qa^1, Tmu^1)	30–120? in Vanimo up to 30 in Wewak	AITAPE, VANIMO, WEWAK: Poorly consolidated gravel, sand, silt	Estuarine and non-marine fluv dep; unconf on Bulimp Fm, Romi Fm, Bewani Fm, Barida Beds, Senu Beds, Wewak Beds, Torricelli Intr Comp; probably contemp with Wosera Beds. Some horizons with marine and estuarine molluscs; human skull frag in one place. Age from superpos and degree of dissection. Source of gv; well drained - suitable for village sites and airstrip construction
		Ulahau Fanglomerate (TQu) Pliocene?-Pleistocene? (At least partly included in Tmm^1, Tml^1)	?150+	WEWAK: Fanglomerate: unsorted angular to rounded cobbles in unsorted, kaolinized, arkosic lithic sandstone matrix	Originated in non-marine fluv, and subaerial intramontane envir. Unconf on Prince Alexander Comp, Amogu Cgl, and Sargum Cgl in type area; possibly locally unconf on Mount Turu Comp; locally unconf on Wewak Beds; may interf with or conf? underlie Ulahau Fgl. Age from superpos and equiv with Wiriu Lst. Abundant plant hash at some horizons. Where tested contains little or no Au
		Wuro Beds (Tqw) Pliocene?-Pleistocene? (At least partly included in Qa^1)	800–900 in Aitape; probably up to 200 in Wewak	AITAPE, WEWAK: Poorly consolidated lithic sandstone, carbonaceous siltstone and mudstone	Dep under estuarine, intertidal, and non-marine conditions during final regressive phase in Lumi Trough. In Aitape, non-conf overlain by Wosera Beds; conf on Sibi Sst Mem, Nopan Sst; overlaps unconf on Senu Beds locally; age from plank foram and superpos; minor lignite seams; some root structures, leaf imprints, carb logs. In Wewak, probably entirely marine where grades into Maprik Mdst; unconf on Prince Alexander Comp, Amogu Cgl, Sargum Cgl, Wewak Beds; appears to infill former valleys in Wewak Beds and Prince Alexander Comp; age from superpos and equiv? with Wiriu Lst; where tested contains little or no Au
		Tjeleba Basalt (Qpb) Quaternary	100	BOGIA: Porphyritic basalt with large plagioclase phenocrysts	Subaerial effusive volc; unconf on Kabenau Beds
		Nopan Sandstone (TQn) 1 Pliocene-Pleistocene? (At least partly included in Tml)	up to 1970 in Aitape; probably less than 500 in Wewak	AITAPE: Alternating lithic sandstone and siltstone; poorly consolidated fine to coarse silty lithic sandstone with conglomeratic horizons and minor calcareous cemented beds, laminated carbonaceous siltstone, and sandy siltstone; sporadic large concretionery nodules WEWAK: Poorly consolidated fine sandstone, siltstone and mudstone; partly micaceous, carbonaceous, or bioturbated; partly calcareous with shelly horizons	Probably dep under shallow marginal marine conditions with access to open ocean; locally under intertidal and fluv conditions; becomes completely marine where grades into Maprik Mdst. Conf below Wuro Beds; conf on Maprik Mdst. In Aitape unconf below Wosera Beds; conf on Namu Fm, Gwenif Fm in E; non-conf on Gwenif Fm, Lumi Fm, Tpgl, Senu Beds in centre and W. Contains shelly horizons in Wewak. Dated by foram (U.N. 20-21). Thin lignite seams present
		Sibi Sandstone Member (of Nopan Sandstone) (TQns) 1 Pliocene-Pleistocene?	400 at type section	AITAPE: Alternating silty, very carbonaceous, in places pebbly, lithic sandstone and laminated sandy siltstone	Possibly non-marine fluv dep; high concentrations of lignite indicate strong terr influence. Conf on Nopan Sst, and either thins or grades into Nopan Sst later; conf below Wuro Beds; unconf below Wosera Beds. Age from superpos
		Units not differentiated, at least in part, from Qs^1 on 1:1 000 000 map: In Vanimo: Pleist-Holo Qc (see Qa^1); and 1 Plio-Pleist Serra Hills Lst and Bulimp Fm, 1 Plio Romi Fm, and Plio Bewani Fm (see Tp^1). In Aitape: Pleist-Holo Qa (see Qa^1); 1 Plio-Pleist Serra Hills Lst (see Tp^1); Plio Bewani Fm, Maprik Mdst, Romi Fm, Noni Fm, Rofula Mem, Tumoflu Mdst Mem, Nengare Mem, Tplg and Gwenif Fm (see Tp^1). In Wewak: Qa (see Qa^1); and Plio-Pleist? Maprik Mdst and Plio Wewak Beds (see Tp^1) and 1 Plio Romi Fm (see Tp^1).			

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Pliocene	Tp'	Serra Hills Limestone (TQl) 1 Pliocene-Pleistocene (At least partly included in Qa', Qs', Tmu')	240 in Vanimo; up to 180 in Aitape	AITAPE, VANIMO: Coral reef limestone, biosparite, biomicritic chalk; marl; minor sandstone, siltstone at base	Dep in deep-water marine basin in S, which graded into shallow water; coral reef platform at one place. Conf on Romi Fm; low part equiv of Romi Fm and possibly Bulimp Fm; unconf on Barida Beds, Senu Beds, Puwani Lst, Bliri Volc, Torricelli Intr Comp. In Aitape dated as late N20-21 to Pleist by plank foram
		Bulimp Formation (TQb) 1 Pliocene?-Pleistocene? (At least partly included in Qs', Tmu')	up to 1600	VANIMO: Well rounded to subrounded pebble conglomerate; minor siltstone and mudstone	Includes non-marine piedmont dep, and shows signs of marine incursion. Locally conf on Serra Hills Lst
		Romi Formation (Tpr) 1 Pliocene? (At least partly included in Qa', Qs', Tmu')	0-700; probably 200 in Wewak	VANIMO, AITAPE, WEWAK: Foraminiferal mudstone, marl, thin limestone, siltstone with coquinal lenses, shelly sandstone; some conglomerate and coarse lithic sandstone towards top. In Aitape also minor thin limestone beds; some carbonaceous material in upper part	Dep in central neritic fine-clastic basin with coarse-clastic marginal lithofacies, and limited to N by deeper-water and shallower-water reef carbonates. Conf on ?Bewani Fm, and also on Neni Fm, Rofula Mem in Aitape; up part grades later to N into, and low part conf under, Bulimp Fm and Serra Hills Lst. In Aitape non-conf on Barida Beds in E; lateral equiv of Krisi Fm and probably some Bulimp Fm, Serra Hills Lst; non-conf on Barida Beds, Puwani Lst, Bliri Volc in Vanimo; dated by abundant plank foram; molluscs and abundant larger benth foram also present
		Krisi Formation (Tpks) 1 Pliocene?	600-1100	AITAPE, VANIMO: Poorly consolidated, fine to coarse, massive to thickly bedded, silty lithic sandstone; minor hard mudstone interbeds; calcareous cemented gritty horizons and thin coal seams; alternating sandstone and fossiliferous mudstone at top and bottom (see also p. 62)	Conf on Bewani Fm and under Bulimp Fm; unconf under Qa, Qs; W marginal marine lithofacies of lr part of Romi Fm. Age from superposition
		Bewani Formation (Tpx) Pliocene (At least partly included in Qs', Tmu')	up to 2500	AITAPE, VANIMO: Poorly consolidated micaceous mudstone and siltstone; some silty lithic sandstone and conglomerate	Dep in moderately deep water (outer neritic?), at least partly by t.c. Unconf below Neumayer Beds, and conf below Krisi Fm and Romi Fm; conf or disconf on Barida Beds; occupies same strat position as, and probably grades later into, Neni Fm in Aitape. Dated by plank foram (N.19-21)
		Wewak Beds (Tpw) Pliocene (At least partly included in Qs', Tml, KuTe')		WEWAK: Poorly consolidated calcareous siltstone, sandy and pebbly siltstone, fine to coarse silty lithic sandstone, polymictic and sandy conglomerate; bioturbation	Shallow-marine and perhaps fluv sed dep in shallow and deep water by t.c. Unconf below Neumayer Beds, Wiriu Lst, locally Ulahau Fgl; non-conf below Wewak Beds in conf on Marabu Lst, Sargum Cgl; non-conf on Senu Beds, Tmg; unconf on Bliri Volc, Torricelli Intr Comp, Mount Turu Comp. Dated by plank foram (N.18-21); contains shelly lenses and bioturbation strucs. Where tested contains little Au; probable source of oil seeps in places
		Neni Formation (Tpn) Pliocene (At least partly included in Qs')	up to 2300	AITAPE: Alternating mudstone and sandstone with calcareous concretions and carbonaceous laminae at bottom; fissile mudstone with pyritic clay laminae and occasional sandstone beds in middle; and sandy upper part with alternating mudstone, siltstone and sandstone, thick sandstone, conglomerate and pebbly mudstone, becoming more conglomeratic and shelly towards top	Shallow to deeper marine. Conf below Romi Fm; conf or disconf on Barida Beds, clasts of which occur in l Neni Fm; non-conf on Senu Beds, and unconf on on Bliri Volc locally; strat equiv and probably later lithofacies of Bewani Fm. Dated by plank foram.

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Pliocene	Tp^1 (contd)	Rofula Member (of Neni Formation) (Tpnr) Pliocene (At least partly included in Qa^1 and Qs^1)	700–1350	AITAPE: Poorly consolidated, thinly interbedded mudstone, siltstone, and fine lithic sandstone; thinly and irregularly interbedded sandy subangular to rounded polymictic conglomerate, lithic sandstone, and sandy siltstone; minor reef-knoll limestone; calcite-cemented concretions	Conf on Tumoflu Mdst Mem; conf below Romi Fm; unconf below Neumayer Beds; includes some Nengare Mem in S; includes some Tumoflu Mdst Mem locally. Molluscs, waterworn plant debris
		Tumoflu Mudstone Member (of Neni Formation) (Tpnt) Pliocene (At least partly included in Qs^1)	365	AITAPE: Poorly consolidated, regularly laminated fissile micaceous mudstone with pyritic clay partings; occasional sandstone beds with large lenticular concretions	Conf below Rofula Mem, and conf on Nengare Mem; probably E tongue of Bewani Fm; locally disconf overstepped by Tofula Mem; rests directly on Nengare Mem
		Nengare Member (of Neni Formation) (Tpnn) (At least partly included in Qs)	up to 610	AITAPE: Dominantly argillaceous; poorly consolidated, thinly and irregularly interbedded mudstone and sandstone; occasional thicker mudstone beds; minor thin fine conglomerate near base	Conf below Tumuflu Mdst Mem; conf and gradational or disconf on Tmpb; in places disconf below Rofula Mem; probably locally disconf overstepped by Rofula Mem and Romi Fm
		Maprik Mudstone (Tpp) 1 Pliocene (in Aitape) Pliocene–Pleistocene (in Wewak) (At least partly included in Qs^1, Tmu^1, Tml^1)		AITAPE, WEWAK: Poorly consolidated foraminiferal mudstone and siltstone, cross-bedded or laminated fine micaceous silty sandstone; minor concretionary limestone and sandstone	Marginal marine envir, possibly partly intertidal in W; becomes deep-water marine in E, and includes distal turbidites in places where represents basinward fine clastic lithofacies of units both above and below in W. Conf on Nanu Fm into which grades to W; conf below Nopan Sst. Dated by plank foram (N.19–21)
				WEWAK: Also some clay-pebble or polymictic conglomerate, shelly mudstone	Locally represents basinward fine clastic lithofacies equiv successively of Nanu Fm, Ipe Fm, Misa Fm, and in places Sargum Cgl. Conf on, and probably grades later into, Sargum Cgl, Misa Fm, Ipe Fm, Nanu Fm; disconf? on Nanu Fm in W; conf on Salumei Fm, Mount Turu Comp, Torricelli Intr Comp, Senu Beds in E; conf below and grades later into Nopan Sst, Wuro Beds. Dated by plank foram (N18?, N19–21, N22?); contains leaf imprints in places
		Nanu Formation (Tpu) Pliocene	C 60 in E, up to 1200+ in W on Wewak	AITAPE, WEWAK: Poorly consolidated, medium to fine silty sandstone, with large platy calcareous concretions; interbeds of siltstone and mudstone; sandstone partly lignitic, pebbly or cross-bedded	Probably dep under high-energy shallow-marine conditions. In Aitape, probably shales out to W into Gwenif Fm, and up part grades later to E into Maprik Mdst locally; probably conf below Maprik Mdst; conf below Nopan Sst; conf on Ipe Fm, Kamul Marl Mem, Lumi Fm; dated by plank foram (U.N.19–21). In Wewak, basal beds appear to interf to W with up Ipe Fm
		Ipe Formation (Tpi) Pliocene (At least partly included in Tmu^1)	800 in Wewak; 600+ in Aitape	AITAPE, WEWAK: Poorly consolidated, bedded, and massive calcareous mudstone and siltstone; mottled calcareous siltstone and hard marl, locally pebbly with small concretions; silty lithic sandstone and pebbly sandstone	Probably dep under quiet-water neritic conditions. In Wewak probably grades later into Maprik Mdst to E; low part possibly grades later into Boini Beds to W; conf on Misa Fm; conf below Nanu Fm, Maprik Mdst; locally uppermost beds appear to interf with basal Nanu Fm to E; some horizons rich in small molluscs or carbon material. In Aitape, also Foram (N. 19) and superpos
		Kumul Marl Member (of Ipe Formation) (Tpik) (At least partly included in Tmu^1)	230 in type section in Aitape; probably thins to W	AITAPE, WEWAK: Marl, marly and in places concretionary fine sandstone, and calcareous sandy siltstone, all with small irregular concretions; minor interbedded conglomerate and coarse, in places pebbly lithic sandstone at base	In Aitape conf below Nanu Fm; conf and trans on Mai Cgl Mem; abundant shelly horizons and plank foram (N.19). In Wewak, may grade later into undiff Ipe Fm to E; conf below Nanu Fm

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Pliocene	Tp[1] (contd)	Mai Conglomerate Member (of Ipe Formation) (Tpim) e Pliocene	250 in type section	AITAPE: Hard massive to thickly bedded polymictic conglomerate, and coarse to very coarse pebbly lithic sandstone; minor marly fine sandstone with scattered small irregular concretions	Probably grades to E into undiff Ipe Fm, Boini Beds in places with short trans sequence. Cong below and trans into Kamul Mem
		Boini Beds (Tpb) e Pliocene (At least in part included in Tml[1])		AITAPE, WEWAK: Poorly consolidated, thinly interbedded, carbonaceous and micaceous laminated sandy siltstone, fine sandstone, and slightly calcareous, partly bioturbated siltstone; minor coarse lithic sandstone and sandy conglomerate	In part dep by t.c. Conf below Mai Cgl Mem; conf? or disconf below Lumi Fm and on Senu Beds; locally conf? on Songaien Fm; grades later to E into Misa Fm and Ipe Fm. Age from plank foram (lN.18-19) and superp
		Misa Formation (Tpm) e Pliocene (At least partly included in Tmu[1], Tml[1])	900 in type section in Wewak	AITAPE, WEWAK: Poorly consolidated medium to coarse silty sandstone with small scattered concretions; pebbly sandstone; fine polymictic conglomerate with lenses of sandy conglomerate; micaceous sandy siltstone and pebbly siltstone; minor impure limestone in places	Probably dep under high-energy shallow-marine conditions. Conf on Songaien Fm in W and Sargum Cgl in E; disconf? on Puwani Lst locally; conf below Ipe Fm; grades later to W into low part of Boini Beds; grades to E from top down into Maprik Mdst. Dated by plank foram; abundant coral fragments in minor impure lst
		Songaien Formation (Tps) e Pliocene (At least partly included in Tmu[1], Tml[1])	460 in type section	AITAPE, WEWAK: Poorly consolidated massive partly micaceous foraminiferal siltstone and mudstone; subordinate interbedded siltstone and fine silty sandstone towards base; minor pebbly siltstone with slump structures, and in places graded coarse pebbly lithic sandstone with shale clasts; quartz common in pebbly horizons, or minor pebbly siltstone	Dep in moderately deep water (outer neritic?), partly by t.c. Conf on Molang Creek Fm, conf below Misa Fm, and possibly below Bomi Beds in Aitape; locally non-conf on Senu Beds. Dated by plank foram (lN.18-19).
		Molang Creek Formation (Tpo) e Pliocene (At least partly included in Tmu[1], Tml[1])	200-2000 in Wewak	AITAPE, WEWAK: Hard calcareous siltstone and mudstone; pebbly siltstone with quartz clasts; poorly consolidated interbedded carbonaceous fine silty sandstone and sandy siltstone; subordinate conglomerate and sandy conglomerate	Dep in deep water in part by t.c. In Wewak conf? or disconf on Senu Beds, and conf below and trans into Songaien Fm. Age from plank foram (lN.18-19)
		Sargum Conglomerate (Tpc) e Pliocene (At least partly included in Tmu[1], KuTe[1])		WEWAK: Poorly consolidated, massive to irregularly bedded, subangular to subrounded, granule to cobble polymictic conglomerate, sandy conglomerate and pebbly medium to very coarse silty lithic sandstone; some micaceous, carbonaceous and calcareous siltstone, sandy siltstone and pebbly siltstone	Possibly accumulated by dumping of well rounded, shallow marine or fluv gravels in deep water by t.c. and gravity sliding. Conf? or disconf on Torricelli Intr Comp, Prince Alexander Comp, Mount Turu Comp, and Salumei Fm; conf below and probably later equiv of low Misa Fm, Wewak Beds, and some Maprik Mdst; unconf below Ulahau Fangl. Dated by plank foram; includes some undiff l Mio or e Plio (N18-19), but probably all Plio; important source of alluv Au where basal on Prince Alexander Comp and Mount Turu Group
		Fuk Beds (Tpt) Pliocene	470+	AITAPE: Poorly consolidated, massive, shelly siltstone, thinly bedded mudstone; some sandstone, minor limestone	Disconf or unconf under Nopan Sst, unconf under Qsi disconf? or unconf. on Senu Beds; faulted against Senu Beds and basement units. Dated by plank and larger benth foram (N19-21); includes N19, lN17-21, N16-19 and Plio to Recent farther W

Age	Unit	Constituent unit(s) in 1:250 000 Sheet area	Thickness (m)	Lithology	Additional pertinent data
Pliocene	Tp^1 (contd)	Tp Pliocene	probably up to 100 in N	AITAPE: Poorly consolidated interbedded calcareous mudstone and micaceous siltstone, with subordinate thin sandstone and minor lignitic streaks; some conglomerate	Unconf on Senu Beds, Puwani Lst, Tom, Salumei Fm. Locally grades laterally into, and possibly represents deep-water, offshore lithofacies of part of Border Lst Beds. Dated by plank foram (N18–20)
		Border Limestone Beds (Tzl) Miocene? or Pliocene?	300?	AITAPE: Massive reef-coral limestone; nodular bedded biopelsparite; some silty coralline biomicrite	Unconf on Salumei Fm, Amanab Metadr and probably P; in E possibly grades later into Tp as deep-water, offshore lithofacies; may be correlate of Puwani Lst but may also include condensed platform sequence of Tom
		Gwenif Formation (Tpg) Pliocene (At least partly included in Qs^1, Tmu^1)	1500 in type section	AITAPE: Poorly consolidated thinly to thickly bedded micaceous sandy siltstone and shelly silty mudstone; minor fine to medium calcareous silty sandstone with occasional thin pebbly horizons; sandstone more common towards base	Probably dep under low-energy shallow-marine conditions. Conf on Lumi Fm through short trans sequence; in E, disconf below Nopan Sst, which unconf oversteps it onto Lumi Fm and Senu Beds to W; probably grades later into Neni Fm locally. Dated by plank foram (N19–21)
		Lumi Formation (Tpl) Pliocene (At least partly included in Tmu^1)	160–1030	AITAPE: Poorly consolidated, bedded or massive, angular to subrounded, granule to cobble, polymictic conglomerate, sandy conglomerate, and conglomeratic lithic sandstone; sandy siltstone, partly laminated, micaceous, carbonaceous, or pebbly; siltstone; medium to fine silty sandstone; minor carbonaceous mudstone with thin lignitic seams	Shallow-marine envir, probably partly fluv in W. Conf below Gwenif Fm; conf or disconf on Boini Beds; probably disconf, locally unconf? on Senu Beds; urconf on Salumei Fm locally; non-conf below Nopan Sst, which oversteps it locally onto Senu Beds. Dated by plank foram (N19–21)
		Tplg Pliocene (At least partly included in Qs^1)	470	AITAPE: Poorly consolidated massive shelly siltstone; thinly bedded mudstone; some sandstone; minor limestone	Non-conf below Nopan Sst; non-conf on Senu Beds; faulted against Senu Beds and basement units. Dated by plank foram (N19–?21)
		Marabu Limestone (Tpz) e Pliocene? (At least partly included in Tmu^1)	up to 90	WEWAK: Well bedded and massive, slightly silty biosparite and biopelsparite	Dep on a shallow-marine carbonate shelf with strong open-sea influence. Conf below Wewak Beds; conf? or disconf on Senu Beds, Tmg. Miocene or younger on foram only; strat and lithologic evidence point to e? Pliocene; abundant plank and larger foram, corals, algal, mollusc, and echinoderm debris
		Units not differentiated at least in part, from Tp^1 on 1:1 000 000 map: In Aitape: 1 Mio–e Plio Barida Beds (see Tmu^1) and Mio Senu Beds (see Tmu^1); 1 Oligo? Tom (see To^1). In Vanimo: 1 Mio–e Plio Barida Beds (see Tmu^1), e–1 Mio Puwani Lst (see Tmm^1). In Wewak: 1 Mio–e Plio Barida Beds (see Tmu^1).			
Middle Miocene	Tmu^1	Barida Beds (Tmpb) 1 Miocene–e Pliocene (Partly included in Qa^1, Tp^1, Tml^1)	up to 1220? in Wewak and Aitape; 200–600 in Vanimo	AITAPE, WEWAK, VANIMO: Hard massive limestone, in places silty; compact massive limestone; marl conglomerate; subordinate interbedded silty lithic or calcareous sandstone or siltstone and in places foraminiferal siltstone; minor coralline limestone in places	Dep in deep water with little terr influence. Probably conf and trans on Senu Beds; conf? on Puwani Lst in W; probably conf below Bewani Fm in W and Neni Fm in E; non-conf below Romi Fm in places; unconf below Neumayer Beds and Serra Hills Lst, and unconf on Bliri Volc. Dated by abundant plank foram (probably late N16–19) and deep-water smaller benth foram; shallow-water molluscs also present
		Senu Beds (Tms) e–1 Miocene (At least partly included in Qa^1, Tp^1, Tpm^1, Tml^1, Tml^1, $KuTe^1$, Jt^1)	up to 2700 in Aitape	AITAPE, WEWAK, VANIMO: Indurated, poorly sorted polymictic conglomerate and sandy conglomerate; poorly consolidated lithic sandstone, locally pebbly and calcareous in places; poorly consolidated siltstone and pebbly and foraminiferal siltstone; thinly interbedded graded fine silty sandstone and sandy siltstone; minor limestone, partly sandy and pebbly	Dep in shallow-water or fluv envir, but also by t.c. and rock slides in deeper water. In most places basal to Senu Beds; conf on, and grades later into Amogu Cgl and Puwani Lst; unconf on Bliri Volc, U, Torricelli Intr Comp, Salumei Fm, Prince Alexander Comp; locally non-conf below Lumi Fm; probably conf below Barida Beds; probably unconf below Tp, Nopan Sst, ?Wuro Beds; unconf below Wiriu Lst, Maprik Mdst, Neumayer Beds;

Age	Unit	Constituent unit(s) in 1:250 000 Sheet area	Thickness (m)	Lithology	Additional pertinent data
	Tmu[1] (contd)				conf or disconf, locally unconf, below Sargum Cgl, Wewak Beds; conf? or disconf below Marabu Lst, Songaien Fm, and Molang Creek Fm. Dated by foram (1 N4-early 18, and partly 1 Te-e Tf)
		Tmsg e-l Miocene	probably up to 2000	WEWAK: Hard to poorly consolidated, massive to thickly bedded, subangular to well rounded, granule to cobble polymictic conglomerate, sandy conglomerate, and partly carbonaceous conglomeratic medium to very coarse silty lithic sandstone	Overlies Marabu Lst and Wewak Beds; conf below in Senu Beds with l Mio (N17-N18) plank foram dates; some submits appear to grade later into Senu Beds; locally faulted against Senu Beds with Mio (N8) dates; may include some Amogu Cgl; plant debris in interbedded prerocks
		Units not differentiated, at least in part, from Tmu[1] on 1:1 000 000 map: In Aitape: Pleist-Holo Qa (see Qa[1]); Neumayer Beds (see Qs[1]); l Plio-Pleist Serra Hills Lst, Plio Kamul Marl Mem, Romi Fm, Maprik Mdst, Gwenif Fm, and Lumi Fm (see Tp[1]); Mio Puwani Lst (see Tmm[1]); e Plio Ipe Fm, (see Tp[1]); Plio Bewani Fm, Misa Fm, Molang Creek Fm, Songaien Fm; L Cret-e Mio Torricelli Intr Comp (see Tml), and L Cret? Eo-e Mio Bliri Volc (see KuTe[1]). In Vanimo: l Plio-Pleist Serra Hills Lst and l Plio Romi Fm (see Tp[1]); l Plio-Pleist? Bulimp Fm (see Tp[1]), Plio Bewani Fm, ?Paleo-e Mio Bliri Volc (see KuTe[1]); and t Cret-l Mio Torricelli Intr Comp (see Tml). In Wewak: ?l Plio Romi Fm, Plio-Pleist? Maprik Mdst, and e Plio Ipe Fm, Kamul Marl Mem, Marabu Lst, Misa Fm, Songaien Fm, Molang Creek Fm and Sargum Cgl (see Tp[1]); and l Cret-e Mio Torricelli Intr Comp (see Tml). Palaeo?-e Mio Bliri Volc (see KuTe[1])		
Middle Miocene	Tmm[1]	Wogamush Beds (Tmw) m-l Miocene	at least 2400: volc. 300 max	E-CENTRAL MAY RIVER, W AMBUNTI: Micaceous sandstone and subgreywacke, siltstone, grit, calcarenite, conglomerate; limestone; intermediate and basic volcanics or volcanolithic conglomerate at base	Unconf on Ambunti Metam and April Ultram; probably overlies Salumei Metam and intruded by Frieda Po. Tf_{1-2} Stage foram in lst lenses near base; age of up part not known, but unlikely to be younger than Mio (Dow, et al., 1972, p.54)
		Burgers Formation (Tmb) l Miocene	1800	NE WABAG, SW AMBUNTI: Greywacke, tuffaceous sandstone and grit, crystal tuff, volcanic cobble conglomerate, calcarenite; minor coralline limestone	Vol mem at base apparently unconf on Pundugum Fm; where mem absent sed rocks apparently unconf on Pundugum Fm; top faulted. Tf_{1-2} on foram (Dow et al., 1972, p.51)
		Tarua Volcanic Member (Tmu) of Burgers Formation m-l Miocene	2700 maximum; generally less than 1500	NE WABAG: Intermediate and basic volcanic rocks; minor conglomerate, sandstone, siltstone	Apparently unconf on Pundugum Fm; forms base of Burgers Fm into which grades up and later. M Mio foram (Tf_{1-2}) at base, probably entirely Tf_{1-2} age. (Dow et al., 1972, p.53)
		Karawari Conglomerate (Tmk) m-l Miocene	At least 600	S AMBUNTI: Pebble and cobble conglomerate, pebbly sandstone; thick lenses of basic and intermediate volcanic rocks at base	Strat relat not clear; equiv of Tarua Volc Mem and Burgers Fm in S, and of Wogamush Beds to W of map area. Unfoss (Dow et al., 1972, p.49)
		Puwani Limestone (Tmd) e-l Miocene (At least partly included in Tp[1], Tmu[1], Tml, Jt[1])	less than 100 in Wewak; less than? 500 in Vanimo	AITAPE, WEWAK, VANIMO: Massive to nodular bedded, coral-algal reef limestone, sandy and pebbly limestone, pelletal biosparite, some biopelsparite, interclast-bearing biosparite, and limestone grit; minor sandstone, siltstone and conglomerate in places. In Vanimo, also interbedded foraminiferal marl, calcareous siltstone, and thin limestone; recrystallized limestone, sandy and pebbly limestone	Probably dep as fringing reefs and atolls, or on isolated shallow-water carb platforms in well aerated, shallow, agitated water alternating with somewhat deeper water close to terr source. Equiv of Amogu Cgl and some Tmg; later equiv of, conf below, and usually basal to Senu Beds, but some lst lenses also higher in succession; unconf on Bliri Volc, Torricelli Intr Comp, Prince Alexander Comp, Amanab Metadr. Salumei Fm; disconf? below Misa Fm. In Aitape and Vanimo conf? below Barida Beds, and in Vanimo non-conf below Romi Fm; unconf below Serra Hills Lst, Neumayer Beds, young dep; in Aitape unconf below Tp, Neumayer Beds. Carbonate dep widespread at this time, so other probable partial corr include: Gowop Lst of Adelbert, Finisterre and Saruwaged Ra; Yalam Lst of New Britain; and Darai Lst of W Papua. In Wewak dated by abd larger benth foram a (lte-etf) Mio; in Aitape as both e (l Te) and m (l Tf) Mio; in Vanimo a m and l Mio (N10-14)

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Miocene	Tmm[1] (contd)	Amogu Conglomerate (Tma) e–m Miocene (At least partly included in Tml[1], Tml, Jt[1])	up to c.300	AITAPE, WEWAK: Conglomerate, indurated hard to poorly consolidated, unbedded to poorly or thickly bedded, poorly sorted, partly sandy, pebble to boulder grade; subordinate conglomeratic silty lithic sandstone and pebbly limestone	Of shallow-marine or fluv origin, and at least partly displaced into deeper water by t.c. Thickens and thins, and changes lithofacies later into Senu Beds and Puwani Lst; locally overstepped to E, probably unconf by Plio rocks; conf below Senu Beds; unconf on Torricelli Intr Comp, Prince Alexander Comp, and Bliri Volc. Age from superpos and later relat with Puwani Lst and Senu Beds. Waterworn wood frag and rolled coral common.
		Units not differentiated, at least in part, from Tmm[1] on 1:1 000 000 map: In Wewak: Plio?–Pleist?. Ulahau Fgl (see Qs[1]); e Plio Sargum Cgl (see Tp[1]) L Cret–Eo Salumei Fm (see KuTe[1], Ku[2]); E Cret–e Mio Prince Alexander Complex (see Tml)			
	Tmm	Oipo Intrusives (Tmi) m Miocene (At least partly included in To[1], Ju[1]; Tmm in Region 3)		RAMU, SW MADANG: See Tmm in Region 3 SW BOGIA: Diorite, tonalite, granodiorite, gabbro, porphyry, minor acid differentiates	Intrude Wulamer Beds
		Maramuni Diorite (Tmm) m Miocene		NW RAMU: Porphyritic and non-porphyritic hornblende diorite and microdiorite; leucocratic biotite–hornblende granodiorite; less common augite–hornblende gabbro, hornblende–biotite rhyodacite, porphyry and medium-grained biotite–augite monzonite; hornblende andesite and dolerite	Part of large batholitic body, but also forms small satellite bodies; more extensive on Ambunti and Wabag; corr with Kimil Dr, Bismarck Intr Comp and Oipo Intr. 11–12.5 m.y. old by K–Ar method
	π	April Ultramafics (Tma) m Miocene (Included in)		S MAY RIVER, AMBUNTI, N WABAG: Serpentinite, periodotite, dunite, pyroxenite, anorthite gabbro*	Numerous bodies of various sizes. Probably related to ultram in N fall of central ranges of Irian Jaya. Intrude Salumei Fm; unconf below m Mio (Tf_{1-2}) Karawari Cgl and Wogamush Beds. (Dow et al., 1972, p. 62)
		Units not differentiated, in part, from π : In May River and Ambunti: ?M Triassic Ambunti Metam (see Rm–u[1])			
	Tml[1]	Frieda Porphyry (Tmx) m Miocene		CENTRAL MAY RIVER: Hydrothermally altered hornblende andesite porphyry and tuff, quartz diorite, minor monzonite*	Stocks, dykes and larger intr bodies; may consist of intr of two ages: in S intrude early Tf_{1-2} Stage, in N intrude Ambunti Metam and might be older than in Mio. Porphyry Cu-type mineraliz where intrudes Wogamush Beds. (Dow et al., 1972, p.70,81)
				SE MAY RIVER, S AMBUNTI, NE WABAG: Diorite, granodiorite, intermediate porphyry, gabbro*	Intr ranging from batholiths to small dykes; split up into Yuat intr, Karawari intr, Yuat and Karawari po; Porgera intr. Some Pt and Au shed from unit concentrated in Timun R lake beds. (Dow et al., 1972, p.64)
		Tm Miocene		WABAG: Calcareous siltstone, marl, some calcareous quartz sandstone, and minor pebbly sandstone; local limestone	Slumped calc beds (Dow et al., 1972, p.48)
		Units not differentiated, at least in part, from Tml[1] on 1:100 000 map: In Aitape: e Plio Boini Beds, Misa Fm, Songaien Fm, Molang Creek Fm (see Tp[1]), Mio Senu Beds (see Tmu[1]); and L Cret–e Mio Torricelli Intr Comp (see Tml). In Wewak: Plio Misa Fm, Songaien Fm, Wewak Beds, Boini Beds and Molang Creek Fm (see Tp[1]); Mio Senu Beds, Tmg, (see Tmu[1]) and Amogu Cgl (see Tmm[1]); L Cret–l Mio Torricelli Intr Compl (see Tml). In Ambunti and Wabag: l Oligo–e Mio Pundugum Fm (see To[1])			

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Early Miocene	Tml	Mount Turu Complex (Tt) Oligocene?–e Miocene		WEWAK: Predominantly, serpentinite, websterite, clinopyroxenite, wehrlite, lherzolite, troctolite, gabbro, olivine gabbro, olivine diorite; some diorite, rare dolerite, and biotite adamellite	In partly faulted and partly intr? contact with Salumei Fm, and unconf below Maprik Mdst, Sargum Cgl? to S; unconf below Sargum Cgl, Wewak Beds, Ulahau Fgl? to N. K-Ar age of biotite adamellite 18.2 + 0.8 m.y.; probably spurious K-Ar age (one gabbro sample) of 188 + 50 m.y.; some areas of slightly anomalous Ni possible source of road-making agg
		Amanab Metadiorite (KTa) pre Oligocene?		AITAPE: Predominantly sheared weakly foliated metadiorite, subordinate metagabbro and metagranodiorite, intruded by dolerite dykes. Original intrusives partly or completely converted to chlorite, epidote, secondary quartz and clinozoisite	Appears to grade into Salumei Fm in places, although probably intruded into Salumei Fm before metamorphism; unconf under Senu Beds, Puwani Lst, Tom, Tp, Border Lst Beds, and Qa. Source of road-making aggregate; possible source of alluvial Au around Amanab
		Torricelli Intrusive Complex (KTt) L Cretaceous– e Miocene (At least partly included in Tmu[1], Tml[1] KuTe[1], Jt[1])		AITAPE, WEWAK, VANIMO: Medium-grained gabbro, olivine gabbro, hornblende gabbro, dolerite, pyroxene diorite, diorite, monzonite; subordinate granodiorite and adamellite; rare pyroxenite, hartzburgite, pegmatitic and porphyritic equivalents of some types; minor serpentinite and sheared gabbro in large shear zones	Intrudes Bliri Volc; unconf below Amogu Cgl, Puwani Lst, Senu Beds, Neni Fm?, Tmg, Qa, Qm, and Sargum Cgl, Wewak Beds, Maprik Mdst in E. Several K-Ar dates range from 73.2 to 17.3 m.y. Minor alteration and sulphide mineraliz along shears; mineraliz po source of some alluv Au; possible source of road-making agg
		Prince Alexander Complex (KTp) E Cretaceous–e Miocene (At least partly included in Tmm[1], Jt[1])		WEWAK: Mostly crushed and mylonitized, fine to medium granodiorite and diorite; also metadiorite, dolerite, amphibolite, and orthogneiss; subordinate mica schist, biotite adamellite, biotite granodiorite, and porphyry dykes	Intensely faulted with confused relat; faulted contacts with Salumei Fm; unconf below Puwani Lst, Amogu Cgl in W, and Amogu Cgl, Sargum Cgl, and Ulahau Fgl in E. High-grade metam and some sheared intr dated by K-Ar method as 106–114 m.y. (probably oldest); adamellites and po dykes less deformed and dated by same method as 19.9–22.5 m.y. (probably youngest)
		Units not differentiated, at least in part, from Tml on 1:1,000 000 map: In Aitape: l Plio–Pleist Nopan Sst (see Qs[1]); l Plio Maprik Mdst (see Tp[1]); l Mio–e Plio Barida Beds (see Tmu[1]); Mio Senu Beds (see Tmu[1]), Puwani Lst, Amogu Cgl (see Tmm[1]); and L Cret–Eo Salumei Fm, and L Cret?, Eo–e Mio Bliri Volc (see KuTe[1]). In Vanimo: e–l Mio Puwani Lst (see Tmm[1]); Paleo?–e Mio Bliri Volc (see KuTe[1]); and ?pre–Mio U (see Jt[1]). In Wewak; Plio?–Pleist? Ulahau Fgl (see Qs); Plio–Pleist? Maprik Mdst; Plio Wewak Beds (see Tp[1]) and Palaeo?–e Mio Bliri Volc (see KuTe[1]). In Ramu: Eo-Oligo? Wulamer Beds			
Oligocene	To[1]	Pundugum Formation (Tms) l Oligocene?–e Miocene (At least partly included in Tml[1])	abt 4000	S AMBUNTI, N,NE WABAG: Greywack, tuffaceous greywacke, siltstone, fine pebble conglomerate; some small lenses of limestone	Overlies Salumei Fm, probably with angular unconf; overlain, probably unconf, by Karawari Cgl, and by Tarau Volc Mem to S. Tertiary e Stage (Dow et al., 1972, p. 43)
		Tom l Oligocene? (Included in Tp[1], Jt[1])	up to 300	W AITAPE: Massive coral-algal reef limestone, recrystallized limestone and pelletal biosparite, partly argillaceous; thin sandy siltstone and conglomeratic coarse lithic sandstone locally or base	Unconf on Salumei Fm, Amanab Metadr; unconf under Tp, Qa. Probably l Oligo on larger benth foram but may include some e Mio. Erosional hiatus present between Tom and Senu Beds
		Wulamer Beds (Tow) Eocene–Oligocene? (At least partly included in Tml, KuTe[1])	1500–3700	N RAMU: Phyllitic shale and slate, sheared calcareous sandstone, stretched pebble conglomerate, massive volcanic agglomerate, and interbedded siltstone and some cherty mudstone: laminated finely crystalline limestone	Possibly unconf on Asai Sh but contact mostly faulted; top appears faulted against Ramu-Markham Fault Zone; intruded by small gb and ultram bodies of Oipo Intr. Age unknown

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Oligocene	To[1] (contd)		3500	SW BOGIA: Greywacke sandstone and siltstone; subgreywacke, massive, weakly calcareous, with interbedded conglomerate beds of identical composition; shale, minor volcanics, foraminiferal biomicrite; interbedded argillite most common at base, non-calcareous, slightly cleaved	Dep on steep submarine slope and in deep, probably fault-bounded trough. Possible grad boundary with Asai Sh, which they conf overlie; may extend into L Cret or Asai Sh. Dated by foram
		Units not differentiated from To[1] on 1:1 000 000 map: In Bogia: Mio Oipo Intr (see Tmm)			
Late Cretaceous - Eocene	KuTe[1]	Nebilyer Limestone (Teon) m Eocene-e Oligocene	100	W RAMU: See Tel-ol[2] (see under Region 2)	
		Dimaie Volcanics (Ted) l Eocene (Included in Qa[1])		AITAPE: Chloritised amogdaloidal basalt; some andesite, submarine lava breccia, agglomerate; minor tuff; basic dykes and small intrusives	Unconformable under Qa. Dated by K-Ar method as 39.6 m.y.
		Bliri Volcanics (Tb) Paleocene?-e Miocene (in Wewak); L Cretaceous?, Eocene-e Miocene (in Aitape) (At least partly included in Tmu[1], Tml, Jt[1])	2500-10 000	AITAPE, VANIMO, WEWAK: Basic intermediate, and minor acid volcanics, and volcanically derived sediments with minor limestone lenses; volcanics include basalt, pillow basalt (brecciated and fragmented), basaltic tuff, agglomerate, breccia, andesite, andesitic tuff and agglomerate, lava, peperite; rare dacite and rhyolite; sediments include moderatley indurated mudstone pebbly mudstone, siltstone, and lithic sandstone with abundant volcanic detritus and minor agglomerate; lenses include radiolarian and foraminiferal marl and foraminiferal bioclastic limestone	Consist of two units: older of Paleo-l Eo age, with smaller sed component, more basic volc, and common deeper-water marls; younger of l Oligo-e Mio age, of greater sed component, more andesitic volc, and more common shallow-water calcaren. Dated by foram, but one K-Ar dating on basalt of 30.4 m.y. Intruded by Torricelli Intr Comp; in places unconf below Amogu Cgl, Puwani Lst, Senu Beds, Wewak Beds, Wiriu Lst, Barida Beds, Romi Fm, Serra Hills Lst, Neni Fm?, and Neumayer Beds
		Salumei Formation (metamorphic phase) (KTsm, KTc) L Cretaceous-Eocene (partly Maestrichtian and m-l Eocene) (At least partly included in Qa[1], Fmm[1], Tml, Jt[1] Jm-u[2])		AITAPE, WEWAK: Phyllite, quartz-mica schist, quartz-epidote-mica schist, garnet-mica schist; subordinate shale; slate and metasediments with limestone lenses, marble, and metavolcanics; minor amphibolite and gneiss locally. Nummulitic limestone separated out as KTc. See also Ku[2] under Region 2	Lithology variable. Locally unconf below Puwani Lst, Senu Beds, Maprik Mdst, Sargum Cgl, Tp, Tom, Border Lst Beds, Lumi Fm and Woser Beds; probably intruded by Amanab Metadr. Minor disseminated pyrite mineraliz, but little economic potential; local alluv Au probably derived from intruding po. Long narrow lenses of KTc contain larger benth foram
		Asai Shale (KuTa) L Cretaceous-Eocene (At least partly included in Ju[1])	100+ in Ramu	S MAY RIVER, AMBUNTI, N WABAG: Metamorphic phase: slate, phyllite, sericite schist, metagreywacke; recrystallized limestone and greenschist in places*. Non-metamorphic phase: mostly fine siltstone and shale, subgreywacke, and lenses of limestone and calcarenite; submarine agglomerate and lavas; rare volcanolithic pebble conglomerate in places*	Contact between Salumei Fm (Tls) and Gufug Gneiss faulted but field evidence suggests grad contact between two. Metam are equiv of Salumei Fm. Base not seen; contacts with older units faulted except locally where possibly rests conf on Jur Sitipa Sh; unconf below Pundugum Fm and Wogamush Beds. L Cret-Eo foram; possibly Neocomian ammonite. Some Cu mineraliz locally. (Dow et al., 1972, pp.25,82)
				NW RAMU: Phyllitic, schistose, and commonly carbonaceous shale and siltstone; fine greywacke, minor limestone, calcarenite, and conglomerate	Most rocks undergone low-grade (low greenschist facies) regional metam; conf on Kumbruf Volc; numerous ramifying qtz and calcite veins; minor leucocratic acid dykes; corr with Chim Fm. Dated by foram in some lst lenses

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Cretaceous - Eocene	KuTe[1] (contd)			BOGIA: Shale, with fissile slaty cleavage or subconchoidal fracture; greywacke with interbedded conglomerate; clasts of quartzite and fine siliceous sediments; calcareous argillite; well bedded foraminiferal biomicrite, forms thin lenses widely scattered throughout unit	Marine shelf which received fine terr sed, but small amount of reef detritus. Similar to Gusap Arg which may be partly equiv; possibility of continuous dep of Asai Sh through to Gusap Arg; passes up by mixed gradation into Wulamer Beds; conf on Kumbruf Volc. Dated by plank and smaller benth foram; sponge spicules also present
		Gufug Gneiss (Tmg) Cretaceous-Eocene		SE MAY RIVER: Glaucophane schist and gneiss with variable epidote, garnet, and white mica; eclogite*	Apparently as fault wedges in Salumei metam, but possible transition from Gufug Gn to Salumei metam; probably equiv to Salumei metam in age; metam probably in post-Eo and pre-m Mio (Dow et al., 1972, p.39)
		Mumb Mesozoic?		SW BOGIA: Serpentinite, dunite, peridotite, pyroxenite, gabbro (cumulate), chlorite schist, hornblendite; one small intrusion of harzburgite with some dunite, lherzolite and associated dolerite	Possibly remnants of thrust sheet of Mesozoic oceanic crust emplaced in Eo; possibly equiv to Marum Basic Belt
		Units not differentiated, at least in part, from KuTe[1] on 1:1 000 000 map: In Aitape: Mio Senu Beds (see Tmu[1]). In Wewak: Pleist-Holo Qa and Wiriu Lst (see Qa[1]); Plio Wewak Beds and e Plio Sargum Cgl (see Tp[1]); Senu Beds (see Tmu[1]), In Ramu and Bogia: Eo-Oligo Wulamer Beds (see To[1]). In Aitape, Wewak and Vanimo: L Cret-l Mio Torricelli Intr Compl (see Tml)			
Jurassic-Oligocene	Jt[1]	U pre Miocene?		AITAPE, VANIMO: Mainly sheared serpentinite	Faulted into Bliri Volc, Senu Beds, Puwani Lst, Salumei Fm and Dimaie Volc. Serp in sheared zone in Puwani Lst; minor anomalous lateritic Ni
		Units not differentiated, at least in part, from Jt[1] on 1:1 000 000 map: In Wewak: Mio Senu Beds (see Tmu[1]) and Amogu Cgl and Puwani Lst (see Tmm[1]); ?Paleo-e Mio Bliri Volc (see KuTe[1]); L Cret-e Mio Torricelli Intr Comp and, E Cret-e Mio Prince Alexander Comp (see Tml); and L Cret-Eo Salumei Fm (see KuTe[1]). In Aitape: Qa (see Qa[1]); Plio Neni Fm? and Rofula Mem (see Tp[1]); Mio Senu Beds (see Tmu[1]), and Puwani Lst and Amogu Cgl (see Tmm[1]) l Oligo? Tom (see To[1]); L Cret-l Mio Torricelli Intr Comp (see Tml); L Cret-Eo Salumei Fm and L Cret?, Eo-e Mio Bliri Volc (see KuTe[1]). In Vanimo: Palaeo?-e Mio Bliri Volc (see KuTe[1])			
Late Jurassic	Ju[1]	Kompiai Formation (Juo) L Jurassic?		NW RAMU: Siltstone, laminated greywacke, siltstone and sandstone; phyllitic shale, schistose shale, phyllite, and highly indurated cleaved shale; minor calcareous sandstone	Apparently conf below Kumbruf Volc; corr with Maril Sh
		Sitipa Shale (Jus) Kimmeridgian	Not known	W AMBUNTI: Calcareous siltstone and shale, fine greywacke	Generally bounded by faults, but in places possibly conf below Salumei Fm; later equiv of Maril Sh. Age Kimmeridgian on bivalve Malayomaorica. (Dow et al., 1972, p.22)
		Maril Shale (Jmm) Kimmeridgian	2400+	SE AMBUNTI, NE WABAG: Calcareous shale and siltstone, greywacke, quartz sandstone*	Laid down in NW-trending trough between Maramuni River and head of Jimi River. Intruded by Maramuni Dio and hornfelsed near contact; in places altered to phyllite. Thins to S. L Jur on bivalves Malayomaorica and Inoceramus. (Dow et al., 1972, p.22)
		Units not differentiated from Ju[1] on 1:1 000 000 map: In Bogia: m Mio Oipo Intr (see Tmm); L Cret-Eo Asai Sh (see KuTe[1]). In Ramu: L Cret-Eo Asai Sh (see KuTe[1]).			

Age	Unit	Constituent unit(s) in 1:250 000 Sheet area	Thickness (m)	Lithology	Additional pertinent data
Early-Middle Jurassic	$Jl-m^1$	Mongum Volcanics (Jmm) M Jurassic	240–900	SE AMBUNTI, NEW WABAG: Submarine basic volcanics and tuffaceous sediments, limestone, chert*	Conf on E Jur Balimbu Gwke and conf below L Jur Maril Sh. Not foss (Dow et al., 1972, p.21)
		Balimbu Greywacke (Jlb) Sinemurian–Pliensbachian		NW RAMU: See $Jl-m^3$ under Region 3	
	Units not differentiated, at least in part, from $Jl-m^1$ on 1:1 000 000 map: Carnian–Norian Kana Volc (see Ru^1). $Jl-m^1$ also includes, in part, the ? L Trias–E Jur Kana Volc (see below) on SE Ambunti and Ne Wabag				
Late Triassic	Ru^1	Kana Volcanics (Ruk) Carnian–Norian (At least partly included in $Jl-m^1$)	+600?	SE AMBUNTI, NE WABAG: Dacite, rhyolite and andesite tuffs and lavas, tuffaceous sandstone, pebble dacite conglomerate, tuffaceous siltstone	Overlies Jimi Gwke, probably unconf; unconf below E Jur Balimbu Gwke. Dated by fairly widespread L Trias molluscs; possibly ranges into E Jur (Dow et al., 1972, p.20)
				CENTRAL NW RAMU: See Ru^3 under Region 3	
Middle Triassic	$Rm-u^1$	Yuat Formation (Rmy) Anisian–Norian	600+	SE AMBUNTI, NE WEWAK, NW RAMU: Shale, greywacke, feldspathic sandstone*	Base not exposed; overlain, probably conf by Kana Volc. Contains ammonities, nautiloids, bivalves, and crinoid stems; dated M–L Trias (Dow et al., 1972, p.19)
		Chambri Diorite (Mc) (Age not known possibly Triassic)		AMBUNTI: Diorite, granodiorite, gabbro*	Intrudes Ambunti Metam of unknown age (Dow et al., 1972, p.62)
		Erroneously mapped as Miocene unit			
		Ambunti Metamorphics (Mbt) M Triassic? (Partly included in Jt^1, π^r)	Not known	MAY RIVER, W AMBUNTI: Slate, phyllite, sericite schist, muscovite and biotite schist; pelitic, quartz and feldspathic, and basic schists and gneisses of amphibolite facies*	Unconf below Tf_{1-2} Wogamush Beds and Karawari Cgl; later equiv (Gwin Metam, W of map area) possibly overlain by unaltered Cretaceous sed. Age probably Mesozoic, but possibly includes E Tertiary rocks; definitely older than m Mio. Metam in e Mio or older. (Dow et al., 1972, p.23)
		Hunstein Complex (Mhs) M Triassic		W AMBUNTI: Metamorphosed gabbro, quartz-biotite gneiss*	Exposures poor and relat of various rock types not known. (Dow et al., 1972, p.60)
Permian		P Permian		W AITAPE: Mainly medium to coarse grained, biotite and hornblende bearing granodiorite, diorite, and quartz diorite; subordinate hornblende tonalite, leucocratic granophyre and dolerite	Observed only as boulders derived from Irian Jaya. Dated by K-Ar method as 242–257 m.y.; assoc with cobbles and pebbles of dacitic volcanics; relat with Salumei Fm unknown

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Qa^2	Qa Holocene (At least in part included in Qs^2)		WABAG, S, KARIMUI, DARU-MAER: Clay, sand, silt, gravel, peat, alluvial soil; tuffaceous sand locally	Coastal and river alluv
		Qs Pleistocene (At least in part included in Ton-mm^2)	up to 500	CENTRAL, N BLUCHER RANGE: Chaotic deposits of angular rock fragments, slumped slated, and shale; includes some Qa	As landslip aprons. Unconf on older rocks. Not suitable for building foundations unless lithified and well drained; some buildings at Lake Kopiago on Qs
		Qpm Pleistocene (At least in part included in Ton-mm^2)	up to 20	NW BLUCHER RANGE: Glacial moraine: probably unsorted mass of limestone rock fragments	S slope of Mount Capella at about 3500 m elevation; photointerpreted; unconf on Darai Lst
	Qv^2	Sauru, Karimui and Hagen Volcanics (Qvs, Qvk) Quaternary		KARIMUI: See Qu^3 under Region 3	
		Duau, Mt Murray, Ialibu and Giluwe Volcanics (Qvd, Qvm, Qvi, Qvg) Quaternary		KARIMUI: Basaltic (shoshonite) to andesite lava, agglomerate, tuff; minor derived sediments	Poorly to well preserved volcanic cone forms; all extinct; some small satellite vents may be as young as 1000 years
		Maer Volcanics (Qpm) Pleistocene		DARU-MAER: Olivine basalt and tuff; hawaiite-mugearite composition	Tuff contains coral frag; three well preserved cones in Murray Islands
		Sugarloaf Volcanics (Qs) Quaternary		SE WABAG: Basalt and andesite lavas and tuffs; recent cumulodomes of unknown composition	Lava field of coalescing cumulodomes, with explosion craters. Younger than Giluwe Volc and probably Hagen Volc (Dow et al.,1972, p.59)
	Qa^2	Qt Quaternary		DARU-MAER: Alluvium in terraces	Forms older inland coastal plain
		Qa, Qa_1 Pleistocene	up to 600	BLUCHER RANGE: Alluvium and older alluvium: gravel, sand, silt, mud; moderately or weakly lithified conglomerate, sandstone, siltstone, mudstone; includes some lake beds and Qs	Alluv: unconf on Darai Lst and Birim Fm; discon and conf on Awia Fm; source of gv; where tested contains very little Au. Older alluv: in various highland valleys, some swampy in part with sphagnum bog on carb muds; older parts later equiv of Awia Fm; unconf on older rocks; source of gv; generally stable and suitable for building foundations, but steep slopes subject to spontaneous collapse
		Sisa Volcanics (Qps) Pleistocene (At least in part included in Tp^2)	up to 500	SE BLUCHER RANGE: Agglomerate and tuff, andesitic where sampled	One small outcrop: outlier of apron of Mount Sisa volcano (Lake Kutubu). Overlies Wongop Sst with slight angular unconf. Age from degree of dissection of Mount Sisa volcano. Source of gv

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Qs^2	Awin Formation (Qpa) Pleistocene	up to 500	S, SW BLUCHER RANGE: Sandstone, conglomerate, siltstone, mudstone, thin lignite seams; some white sandy clay	Former alluv with cut-and-fill structures; generally lower dips and lack of tuff and agglom distinguish it from Birim Fm. Later equiv of most Qa, paraconf and locally unconf? on Birim Fm; unconf on Darai Lst, Liddle Cgl, and Wongop Sst; disconf and conf below Qa. Age from strat position. Source of gv; where tested contains very little Au
		Units not differentiated at least in part, from Qs^2 on 1:1 000 000 map: On Daru-Maer: Quat Qa (see Qa^2); Plio-Pleist TQs (see TpQp); and Mio Tm (see Tou-mm^2)			
Pliocene - Quaternary	TpQp	TQs Pliocene-Pleistocene (At least in part included in Qs^2)	up to 120	DARU-MAER: Mudstone, sandstone, gravel; ferrigenous	Overlies Mio lst
		Intrusives, Star Mountains Intrusives (Tpi, Tps) 1 Miocene-Pleistocene		E, NW BLUCHER RANGE: Porphyritic micromonzonite and microdiorite, microgranodiorite, minor medium-grained equivalents; magnetite, sulphide and epidote-garnet skarns	Intr: forcefully emplaced; probably related to po sills S of Lake Kopiago; most or all stocks subvolc and source? of volc component in Birim Fm, Wongop Sst, Liddle Cgl, and Awin Fm; intr Plio?, Miocene and older sed; age 2-5 m.y. from several K-A determinations; similarity to Fubilan Stock suggests possibility of some Cu, Mo, Ag and Au mineraliz; some Cu and Zn in Bolivip Stock; some Pb and Zn in skarn associated with sills on S bank of Lake Kopiago. Star Mountains Intr; cluster of small stocks and one larger body (Antares Mons); composition similar to Tpi, but some more potassic; some stocks subvolc and source of volc component of Birim Fm and Awin Fm; intrude Plio?, and older sed; age 1.2 or 2 to 5 m.y from many K-Ar determinations; Cu mineraliz in several stocks in Tifalmin area
		Fubilan stock (Tpf) 1 Pliocene-Pleistocene		NW BLUCHER RANGE: Quartz monzonite porphyry*	Vertical cylinder. Age of potash metasomatism (and mineraliz) 1.2 m.y. from eight K-Ar determinations. Dissem and skarn Cu mineraliz estimated at 200-300 million tonnes 0.9% Cu; assoc minor Mo, Ag, Au
		Mount Ian Gabbro (Tpg) 1 Miocene-Pleistocene		NW BLUCHER RANGE: Pyroxene-bearing gabbro phase within generally felsitic intrusive complex	Part of Star Mountains Intr
		Antares Monzonite (Tpa) 1 Miocene-Pleistocene		NW BLUCHER RANGE: Monzonite, granodiorite, adamellite, fine-grained porphyritic equivalents, minor tuff, agglomerate, lava	Largest intrusive body in Star Mountains Intr. Much pyrite, some Cu mineraliz; vegetation anomalies on SE contact (airphoto-interpretation) may indicate skarn
Pliocene	Tp^2	Era Beds (TQe) Pliocene-Pleistocene	generally 300+	S KARIMUI: Fine to coarse well compacted sandstone, siltstone, and mudstone; thin shelly quartz sandstone beds	Marine and non-marine. Conf on Orubadi Fm. Coal seams, mainly in up part)

Age	Unit	Constituent unit(s) on 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Pliocene	Tp^2 (contd)	Birim Formation (Tpb) Pliocene	1450	W-CENTRAL BLUCHER RANGE: Sandstone, conglomerate, tuff; minor agglomerate; shelly sandstone and tuffaceous marl at base; rare lignitic claystone near top; conglomerate clasts mostly Tmd-type limestone and Tps/Tpi porphyry	Mostly former alluv; basal part marine. Corr of Wongop Sst and Liddle Cgl; paraconf and in places unconf? on Warre Lst and Pnyang Fm. Age based on strat position and on corr of volc with Tpi igneous activity (2-5 m.y.). High Cu in some stream-sediment samples apparently due to dissem rather than visible or economic Cu mineralis; source of gv
		Liddle Conglomerate (Tpl) Pliocene	c.100	SE BLUCHER RANGE: Conglomerate, partly volcanic, partly polymictic; clasts include Darai Lst and Tpi porphyry; some agglomerate, tuff, silty sandstone	Probably former alluv dep. Lenses out to SE. Later equiv of cgl part of Birim Fm; agglom and tuff distinguish it from Awin Fm; conf and in places uncon? on Wongop Sst; unconf below Awin Fm. Age on strat position and on corr of volc with Tpi igneous activity (2-5 m.y.). Source of gv; cliffs not regarded stable
		Wongop Sandstone (Tpw) Pliocene or younger	up to 2400	SE BLUCHER RANGE: Sandstone, minor conglomerate, siltstone, shale; calcareous near base, tuffaceous, partly carbonaceous	Foram and lithologies indicate transition from marine at base through brackish to non-marine with rare marine intercalations. Conf on Wai Asi Beds; conf and locally unconf below Liddle Cgl; unconf below Awin Fm and Sisa Volc. Age from strat position and 'Plio or younger' foram in Raggi; thin lignite seams near top; plant remains
		Units not differentiated, at least in part, from Tp^2 on 1:1 000 000 map: In Blucher Ra: Mio Tmr and Mio Tmtz (see Tou-mm^2); and one small outcrop of Pleist Sisa Volc (see Qs^2).			
Late Miocene	Tmu^2	Orubadi Formation (Tmup) l Miocene-Pliocene	100-750, av 350; thickens to E	SW KARIMUI: Well bedded mudstone with carbonaceous laminae; subordinate siltstone and sandstone; minor hard calcareous sandstone	Conf on Darai Lst. Mdst possibly bentonitic in places. Shelly beds with large and small fossils (Tg-Th) abd
		Wai Asi Beds (Tma) m?-l Miocene (Included in Tou-mm^2)	250	SE BLUCHER RANGE: Calcareous mudstone and siltstone with minor limestone beds; some glauconite	Later equiv? of Tmt and mdst phase of Pnyang Fm; conf on Darai Lst and conf below Wongop Sst. Shallow-marine foram and molluscs in some samples. Dated by plank foram
Late Oligocene - middle Miocene	Tou-mm^2	Tm Miocene (At least in part included in Qs^2)	915	DARU-MAER: Limestone, some dolomite; cherty mudstone and marl towards base	Deposited in shallow water on stable sheet during major transgression. Subsurface in E
		Tmr Miocene (At least in part included in Tp^2)		E BLUCHER RANGE: Thin-bedded limestone with mudstone, siltstone and sandstone interbeds	Lateral equiv? of Warre Lst, conf on Tmt and conf below 'Orubadi Fm' (Wabag). Dated by plank and larger foram as e Tf
		Pnyang Formation and Warre Limestone Member (Tmp, Tmp_1, Tmr) m Miocene	200-1500; limestone horizon 20-40; member 90-200, average 110	CENTRAL W BLUCHER RANGE: Soft calcareous mudstone and siltstone with limestone interbeds; tuffaceous sandstone. Member: fossiliferous fine-grained limestone with marl interbed; in W partly micritic; partly detrital with fossils and some tuff	Trans in NW to Iwoer Fm (thicker, more sandy, no lst); trans? in E to Wai Asi Beds or to top-most Darai Lst; disconf and unconf below Birim Fm. Dated by larger and plank foram as N9-14. Some sub-bituminous coal seams. Lst horizons discontinuous along strike. Mem conf on Pnyang Fm and Iwoer Fm; disconf and unconf below Birim Fm; intruded by Star Mountains Intr. Dated by larger benth foram (e Tf; l Te or e Tf), plank foram (N12), and nannoplankton (equivalent of N8-9)

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Oligocene - middle Miocene	Tou–mm[2] (contd)	Tmts m–late Miocene (At least in part included in Tp[2])	1200	N CENTRAL, E BLUCHER RANGE: Thinly bedded laminated silty mudstone and sandy siltstone; thin interbeds of fine micaceous sandstone; in places, calcareous siltstone includes some Tmt	Includes clastic sed which appear to occupy strat level of Tmt, but differ from it in being more sandy or apparently younger; includes Tmt and 'Orubadi Fm' (Wabag). Dated by foram as m Plio or younger in Lake Kopiago area; l? Mio or Plio in Sepik headwaters
		Tmt e–m Miocene	1000	N BLUCHER RANGE: Marine mudstone and siltstone with thin very fine–grained calcareous sandstone interbeds	Dep in quiet, shallow sea. Corr with 'Lai Sltst' of Mendi area; later equiv? of Wai Asi Beds and mdst phase of Pnyang Fm; conf on Darai Lst and conf below Tmr. Rich plank foram (N8, 9) includes reworked Palaeo and L Cret elements
		Iwoer Formation (Tmi) e–m Miocene	2500	NW BLUCHER RANGE: Calcareous mudstone, siltstone, silty quartz sandstone; rare lignite	Transition S and SE into Pnyang Fm marked by appearance of lst interbeds and probable decrease in proportion of sst; conf on Darai Lst; conf below Warre Lst. Dated by foram (partly N8). Lignite seams reported in Irian Jaya
		Chuingai Limestone (Tmc) l Miocene	up to 60	WABAG: Coral and foraminiferal limestone	Unconf on Ambunti Metam. Contains Mio foram; probably l Mio (contains Tg foram to NW). (Dow et al., 1972, p.57)
		Tm Miocene	300+	WABAG: Calcareous siltstone, marl, some calcareous quartz sandstone, and minor pebbly sandstone	Slumped calc beds. (Dow et al., 1972, p.48)
		Yangi Beds (Tmy) l Oligocene?–m Miocene	c.1500	WABAG: Mudstone, marl, calcareous siltstone, sandstone; interbeds of limestone	Overlie Lagaip Beds probably unconf; grades N into Tibinini Lst Mem. Te foram locally; uppermost beds probably Tf_{1-2} (Dow et al., 1972, p.47)
		Tibinini Limestone Member (Tmt) of Yangi Beds l Oligocene?–m Miocene	900–1200	WABAG: Calcarenite, limestone, some marl and calcareous shale	Unconf on Lagaip Beds; probably grades later into Yangi Beds. Uppermost beds contain Tf_{1-2} foram locally; low half probably Te Stage. (Dow et al., 1972, p.48)
		Darai Limestone (Tr, Tr_1) l Eocene–m Miocene, but mainly l Oligocene–m Miocene	500–1300 in Blucher Range	BLUCHER RANGE: Massive to thick–bedd limestone; slight sandy and glauconitic foraminiferal biomicrite and pelsparite near base passes up into mainly algal foraminiferal biomicrite with sponge–bearing micrites, infrequent dolomitised beds, and cherty beds. Slumped limestone slab mapped as Tr_1	Folded into broad flat–topped anticline and disrupted by probably gravity–induced smaller folds and thrust faults. Disconf on Feing Gp and Ieru Fm; conf below Pnyang Fm, Iwoer Fm, and Tmt; conf or disconf overlain by Tmtz and Wai Asi Beds. Dated by foram (mainly e Te– Tf). Algae and sponges. Some e Oligo (Tc), and m or l Eo (Ta_3–Tb) float at one locality. Source of lime; minor Pb sulphides at Lake Kopiago; possibility of skarn mineraliz where intruded by Tpi, Star Mountains Intr etc
			100–1200, thickness to S in Karimui	S, SE KARIMUI; Thick–bedded to massive biosparite, biomicrite, and calcareous arenite with minor biosparudite and breccia; calcareous quartz–feldspar arenites most common at base of sequence and especially in N–most outliers	
		Aure Beds (Tm) l Oligocene–m Miocene		KARIMUI: See Tml[4] under Region 4	
		Units not differentiated from Tou–mm[2] on 1:1 000 000 map: In Blucher Range: Quat Qs and Qpm (see Qa[2]); and m?–l Mio Wai Asi Beds (see Tmu[2])			

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Eocene - early Oligocene	Tel-ol[2]	Nebilyer Limestone (Teon) m Eocene–e Oligocene	100 in Ramu; less than 100, thins to S in Karimui	NW KARIMUI, W RAMU: Calcarenite with thin silty argillaceous interbeds; fine-grained limestone	Corr with Chimbu Lst; contains plank foram (Ta_3–Tc) and algae
		Te l Paleocene–Eocene	0–200, av 50–100 in Karimui; 1000 in Lake Kutubu	S, E KARIMUI, SW MARKHAM: Fine to coarse detrital and micritic limestone; ferruginous, glauconitic, and calcareous quartz sandstone and sandy limestone; minor sandstone, siltstone and mudstone	Some e Oligo beds may be present, cf. Chimbu Lst in S and E Karimui. In Markham, possibly partly equiv to Chimbu Lst to N; possibly unconf below Aure Beds
Late Cretaceous	Ku[2]	Salumei Formation (KTs) L Cretaceous–Eocene (At least part mapped as Qp_2^1, Tmm^1, Tml^1, Jt^1, Jm–u[2])	More than 500	NE BLUCHER RANGE: Weakly schistose fine to coarse poorly sorted volcanolithic sandstone. See also $KuTe^1$ under Region 1	In other areas includes sltst, submarine basic volc lst, and metam equiv; fault bounded. Dated by foram in lst interbeds in adjoining areas
		Feing Group (undivided) (KTf, KTf_1) Valanginian, l Paleocene? or Eocene	1000–2000	N BLUCHER RANGE: Massive to well bedded fine sandstone, siltstone, and shale; clean and muddy hard quartz sandstone and quartzite, some cemented by grain overgrowth, partly glauconitic; rare dense fine-grained streaky limestone	In same strat interval as Toro Sst and Ieru Fm and of similar lithology, but lacks prominent sltst/sst which characterizes Ieru Fm; sst in KTf (KTf_1) partly younger than in Toro Sst; sltst and sh less carbon and less indurated than sltst and sh of Om Beds (where seen contact faulted); trans in S into Toro Sst and Ieru Fm; disconf below Darai Lst. Dated by ammonities and foram. Most L Cret/Jur ammonites in float at several localities may indicate presence of unmapped Om Beds
		Chim Formation (Kuc) Cenomanian–Maestrichtian		SE KARIMUI: See Ku[3]	
		Ieru Formation (Kui) Cenomanian–Campanian	670–890, rarely up to 1500	CENTRAL, NW BLUCHER RANGE: Bioturbated fine glauconitic quartzose sandstone and siltstone, with recessive glauconitic mudstone and siltstone; abundant large cone-in-cone concretions; prominent beds of fine sandstone and siltstone in mid-section and at top	Later equiv of up part of Feing Gp; conf on Toro Sst from which distinguished by lack of clean qtz sst; disconf below Darai Lst; probably continuous below Darai Lst under Fly-Strickland plains. Dated by foram and ammonites; also contains bivalves
		Unit included in Ku[2] on 1:1 000 000 map: In Wabag: M Jur–Pal Lagaip Beds (see Jm–u[2])			
Early Cretaceous	Kl[2]	Toro Sandstone (JKt) Neocomian–Albian	150–435	CENTRAL BLUCHER RANGE: Clean well sorted quartz sandstone, friable or cemented by grain overgrowth; some mudstone, siltstone, and bioturbated silty micaceous sandstone; clean sandstone, coarse cross-bedded at base – beds 30 cm to massive	Probably dep under high-energy conditions as near shore marine sand bar complex. Later equiv of Feing Gp, some of which younger; conf on Kuabgen Gp; conf below Ieru Fm. Permeable; potential hydrocarbon reservoir rock; porosity reduced in places by grain overgrowth. Dated by spores and microplankton; bivalves and belemnites also present
		Kl Aptian?–Albian?	1200–1500	S CENTRAL KARIMUI: Massive to thick-bedded dense lithic sandstone interbedded with thin-bedded mudstone/siltstone; minor shelly greywacke and limestone*	Some ripple marks. Equiv to Kondaku Tuff; overlain by Chim Fm. Dated by ammonites; gastropods also present

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Middle – Late Jurassic	$Jm-u^2$	Lagaip Beds (J-Kp) M Jurasic-Paleocene (Included in Ku^2)	c.3000	WABAG: To W: Slate, shale and siltstone, commonly pyritic; minor subgreywacke; thick beds of quartz sandstone towards top of unit. To E: lighter in colour and mostly calcareous; lenses of limestone and thin-bedded quartz sandstone common in places	Bottom not seen, but similar sed of Jur age in Strickland Gorge unconf on granitic rocks; probably unconf below e Mio marine sed. Ammonites of Callovian age; foram ranging from Albian? to L Cret and Palaeo to m Eo. Little bornite found locally; at Porgera, Au mineraliz associated with sphalerite, pyrite, galena. (Dow et al., 1972 pp.32,82)
		Kuabgen Group: Imburu Mudstone (Jui) Oxfordian	200–640	N BLUCHER RANGE: Predominantly micaceous mudstone and siltstone, partly calcareous with concretions; interbedded with fine flaggy silty micaceous quartz sandstone towards base; some mudstone and siltstone laminated; some sandstones show ripple-drift lamination	Inliers in core of Muller Anticline. In places indistinguishable photogeologically from Koi-Iange Sst, Atemin Sh; conf on Koi-Iange Sst; underlies Toro Sst; later equiv? of up part of Om Beds. Dated by ammonites, bivalves, microplankton. Possible petroleum source rock
		Koi-Iange Sandstone (Jk) Callovian-Kimmeridgian	290–550	N BLUCHER RANGE: Fine to coarse micaceous quartz sandstone, partly feldspathic; subordinate bioturbated sandy siltstone, mudstone; finer clastic intercalations locally more common near top; thin pebbly horizon and coal at base	Inliers in Muller Anticline not distinguishable photogeologically from Imburu Mdst and Atemin Sh in places; locally uncon on Strickland Gr; conf on Atemin Sh in W; conf below Imburu Mdst; later equiv? of low part of Om Beds; low part in Strickland valley probably later equiv of Atemin Sh and Bol Ark. Dated by rare ammonites and bivalves. Up part of unit hydrocarbon reservoir potential in Strickland Gorge; elsewhere sandstone tight
		Atemin Shale (Ja) Oxfordian	90–120	NW BLUCHER RANGE: Hard, slightly micaceous silty shale, calcareous and sandy in part; scattered concretions	Inliers in core of Muller Anticline; not distinguished in places from Koi-Iange Sst; conf on Bol Ark, boundary gradational in places; conf below Koi-Iange Sst and probable later equiv of part of it in E. Dated by bivalves, belemites
		Bol Arkose (Jb) Bajocian? in part	up to 710	N BLUCHER RANGE: Hard conglomeratic arkose, coarse poorly sorted, with subangular clasts of granite, adamellite, orthoclase; fine to coarse quartzose sandstone in upper part, partly feldspathic calcareous or silty; bedding thick or massive, distinct to poor	Inliers in axis of Muller Anticline; base not seen but possibly unconf on Strickland Gr at shallow depth: conf below Atemin Sh; later equiv? of low part of Koi-Iange Sst in Strickland valley. Bajocian? ammonites in probable Bol Ark locally
		Om Beds (Jo_1, Jo_2) l Bajocian-Tithonian ((to Maestrictian on Wabag)	Unknown, exceeds 3000	N BLUCHER RANGE: Carbonaceous siltstone and mudstone; minor fine quartz sandstone, pyritic chert nodules and lenses commonly with cone-in-cone structure, carbonate concretions, microdiorite dykes; some fine lithic sandstone	Complexly faulted (mostly E-W) and folded. Dep in shallow water in some places and by t.c. Later equiv of Kuabgen Gp; metam to N low limit not known, conf below Feing Gp, but contact faulted. Dated by ammonites; also belemnites, bivalves, fossil wood. Possible petroleum source rock; gas and minor oil shows in places
		Metamorphic Phase of Om Beds (Jom_1, Jom_2) l Bajocian-Tithonian		NE BLUCHER RANGE: Carbonaceous schist, phyllite, and slate; minor less schistose fine quartzite; pyritic chert nodules and lenses	Complex struc dominated by WNW-trending faults; simpler struc (broad folds) in more competent sandy units. Faulted against Salumei Fm in N and against Om Beds in S; contact with Om Beds may be gradational elsewhere. Age from corr with Om Beds and from rare ammonites near contact with Om Beds

$Jm-u^2$ mapped as Lagaip Beds in Wabag. Unit not differentiated from $Jm-u^2$: On Blucher Range: L Cret–Eo Salumei Fm (see Ku^2 also KuTe under Region 1).

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness	Lithology	Additional pertinent data
Late Permian	Pu	Strickland Granite (Ps) L Permian		E BLUCHER RANGE: Granite with chlorite, calcite, sericite, and epidote alterations	Unconf below Koi-Iange Sst. Age based on anaology with Kubor Gd (Ramu): 214 m.y. (K-Ar) or 240 m.y. (Rb-Sr); one sample of Strickland Gr dated at 214 m.y. (K-Ar)
Late Carboniferous	Cu	Badu Granite (Cub) L Carboniferous		DARU-MAER: Leucocratic biotite granites; porphyritic biotite granite and adamellite; some hornblende-biotite adamellite and granodiorite	Intrudes, and possibly comagmatic with, Torres Strait Volc. Three samples of granite dated at 295 m.y.

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Qa^3	Qa, Qha Holocene		KARIMUI, MARKHAM, RAMU, SW MADANG, WABAG: Unconsolidated alluvial and swamp deposits: clay, sand, silt, gravel, minor peat, alluvial soil	In SW Madang, fluv sed. In places overlie Qs.
		Qf, Qphf Holocene	80 in Ramu; 80+ in Markham	MARKHAM, E RAMU: Unconsolidated alluvial fault piedemont slope deposits: gravel, sand, silt and clay. In Ramu also boulder gravel with granite boulders. In Markham generally stratified, poorly sorted, coarser in fan head than in toe	In Markham, fluv sed; surface sed Holo but probably Pleist below; lenticular sand and gravel aquifers with clayey gravel aquicludes. In Ramu, may contain some fluvioglacial debris; in places veneered with Holo alluv
		Qs Quaternary (Partly included in Qu^3)		SW RAMU: Talus, scree: rock-fall debris mixed with soil beneath limestone cliffs; landslip and outwash rubble at base of steep slopes	Much of 1st talus recemented; large areas moved as debris-laden mudflows; extensively used as road construction gv
	Qv^3	Sauru, Karimui, Hagen Volcanics (Qvs, Qvk, Qvh) Quaternary		CENTRAL, NW KARIMUI: Basaltic (shoshonitic) to andesitic lava, agglomerate, tuff; minor derived sediments	All extinct. Hagen Volc derived from 3 major and at least 6 minor eruptive centres; extensive aprons and valley fill material mostly lahars; summit area of southernmost centre glaciated; all major cones deeply eroded on NW side; hypabyssal intr
			apron up to 150; cone crater up to 2000	SW RAMU: Hagen Volcanics lava also dacitic and there are pyroclastics, lahar deposits, water-laid tuff derived from Hagen Volcano	
		Crater Mountain Volcanics (TQvc) Pliocene–Holocene		KARIMUI: Andesitic and basaltic lava; minor agglomerate, tuff, derived sediments	Deeply eroded volcano or volc comp with superimposed younger minor volc centres
	Units not differentiated from Qu^3 on 1:1 000 000 map. In Karimui: Holo Ql (see Qs^3). In Ramu: Quat Qs (see Qa^3).				
	Qs^3	Ql Holocene (At least in part included in Qu^3)	c.100	NW MARKHAM: Bedded unconsolidated gravel, sand, and silt	Lake sediments
				NE KARIMUI: Quartz-rich gravel	
				W, SW RAMU: Peat present	
		Qf Quaternary	c.80	RAMU, N KARIMUI: Alluvial fans: unconsolidated clay, sand, silt, and boulder gravel derived mainly from granitic and metamorphic rocks	In Karimui, fluv sed; alluv sed may contain some fluvioglacial debris. In Ramu, locally veneered with Holo alluv
		Qp Pleistocene	800	N RAMU: Mudstone, soft carbonaceous and shelly; interbedded with friable carbonaceous sandstone and siltstone; partly conglomeratic, grading laterally into chalky limestone	Marine sediments. Overlain by fgl and alluv. Lst with corals, molluscs and bryozoans
		Kainantu Beds (Qpn) Pleistocene	30–110	NW MARKHAM: Basal conglomerate overlain by succession of clay, silt, and sand, with some thin lenses of conglomerate; uncondolidated to poorly consolidated	Lacus sed: tectonic activity formed two lakes which covered most of present up Ramu River. Age by C^{14} method from basal cgl probably 54 000 y. Source of Au from Kainantu area

Age	Unit	Constituent Unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Miocene	Tmu	Intrusives (Tmuy) 1 Miocene		SE RAMU: Monzonite, porphyritic microdiorite, quartz-feldspar andesite porphyry, leucocratic quartz-biotite andesite porphyry, and hornblende andesite porphyry	Occur as irregularly shaped dykes and veins cutting Bismarck Intr Comp. K-Ar isotopic age about 7 m.y. Possible source of Cu and Au at Yanderra
		Benembi Diorite (Tmub) 1 Miocene		SW RAMU: Porphyritic hornblende-quartz microdiorite	Age deduced from similarity to Michael Dr and Tmuy; possible source of Au at Kuta
		Michael Diorite (Tmum) 1 Miocene		E KARIMUI: Porphyritic hornblende microdiorite	Large hypabyssal stock with parts of roof preserved. Strongly py; moderate late-stage hydrothermal alteration. Age by K-Ar method 7.3 ± 0.2 m.y.
		Elandora Porphyry (Tme) 1 Miocene		MARKHAM: Hornblende andesite porphyry; subordinate porphyritic microdiorite; minor serpentinite; propylitization common	Isolated outcrops of microdr and serp in places assigned to Elandora Po. Intrudes Yaveufa Fm, Akuna Intr Comp, Omaura Gwke, Bena Bena Fm; probably intrudes Aifunka Volc. Age by K-Ar method 7.9 m.y. Py mineraliz common; prominent source of Au in Kainantu area; Mt Victoria mine on faulted contact with Mt Victoria Gd
Middle Miocene	Tmm	Oipo Intrusives (Tmi) m Miocene (At least partly included in Tmm in Region 1)		RAMU, SW MADANG: Gabbro, granodiorite, tonalite, dolerite, diorite, pyroxenite, lamprophyre	In Ramu occurs as stocks and dykes. Intrudes Asai Sh. 15–17 m.y. old by K-Ar method. Textures range from fine-grained to pegmatitic; felsic stockworks and complex veining common. Py and pyrrh common; hornblende more common than biotite. In Madang dated as 12.5 m.y. by K-Ar method
		Bismarck Intrusive Complex (Tmb) m Miocene (At least in part included in JK?)		SE RAMU: Hornblende gabbro, hornblende-biotite-quartz diorite; subordinate hornblende-pyroxene-biotite tonalite and granodiorite; minor mangerite, granite, aplite, muscovite, pegmatite, hornblendite, dunite, peridotite, and anorthosite	In Ramu, smaller bodies SW of main batholith of less varied lithology. Bulk of rock 13 m.y. old from 50 samples dated by K-Ar and Rb-Ar method; pegmatite 9–10 m.y. old
				NE KARIMUI: Hornblende diorite, microgabbro	In Karimui rocks mainly fine-grained, darker and more po than those of main batholith in Ramu
				NW MARKHAM: Granodiorite, quartz diorite; minor tonalite and serpentinite; rocks sometimes porphyritic, but mainly equigranular	In Markham, main part of batholith 12.5 m.y. old as dated by K-Ar method. Intrudes Goroka Fm; contemp with Tmm
				SW MADANG: Gabbro, diorite, dolerite, microdiorite, tonalite, pyroxenite and granodiorite	Intrudes Goroka Fm
		Kimil Diorite (Tmk) m Miocene		CENTRAL RAMU: Diorite, gabbro, tonalite, granodiorite, andesite porphyry; dolerite and basalt dykes and veins; minor trachyandesite; fine to coarse and porphyritic varieties; alteration common	Dr commonly intruded by complex network by bs, dl, and gb dykes and veins. Some py. 15 m.y. old by K-Ar method. Size and distribution pattern similar to Oipo Intr; both possibly earliest cooled uppermost portions of batholithic bodies comagmatic with more deeply eroded Maramuni Dr and Bismarck Intr Comp
		Akuna Intrusive Complex (Tmak) e Miocene		MARKHAM: Olivine and hornblende gabbro, porphyritic dolerite, diorite; minor granodiorite and serpentinite	Intr Bena Bena Fm, Goroka Fm, and Omaura Gwke; intr by Elandora Po; unconf below Aifunka Volc. Age of dl, dr, and gd in Markham 14 to 16.5 m.y. by K-Ar method
		At Mt Wilhelm and Mt Hagen, small glacial deposits of 10–20 m of unconsolidated moraine and fluvioglacial gravels not distinguished from Tmm on 1:1 000 000 map			

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Middle Miocene	Tmm^3	Kenangi Gabbro (Tmke) m Miocene		NE KARIMUI: Hornblende gabbro, mangerite, granodiorite; commonly porphyritic and altered	Sills, dykes, and small stocks in Movi Beds and Yaveufa Fm; thermal aureoles up to 12 m wide; strong petrographic similarity to and very close spatial relationship with lavas of Yaveufa Fm. Suitable as road gv
		Yaveufa Formation (Tma) m Miocene	2000–4800 in Karimui	NE KARIMUI: Coarse polymictic agglomerate and interbedded porphyritic andesite and basic lava; welded ash-flow tuff; volcanolithic sediments; waterlaid tuff, polymictic volcanic pebble, cobble, and boulder conglomerate, greywacke and calcarenite	In Karimui and Ramu, volc and volcanolithic sed interf, former being dominant locally. In Karimui dated as 12.5 to 15 m.y. by K–Ar method
				S RAMU: Shoshonitic agglomerate	
				W MARKHAM: Also subordinate tuff, greywacke, and minor reef limestone lenses	In Markham, unconf on Movi Beds, Aure Beds, and Omaura Gwke; intruded by Elandora Po; equiv to Langimar Beds
		Aifunka Volcanics (Tmf) m Miocene		W MARKHAM: Andesitic lava, tuff, agglomerate	Unconf on Omaura Gwke and Akuna Intr Comp; intruded by probable Elandora Po. Major source of Au in Kainantu area
Oligocene – middle Miocene	To	Marum Basic Belt (Tmmb) Miocene (At least in part included in π)		RAMU: Gabbro; minor norite, pyroxenite; anorthosite and gabbro pegmatite veins; dunite, commonly serpentinized	Banding common in main NW gb body
Early Miocene	$Tml–m^3$	Movi Beds (Tmo) e–m Miocene		W MARKHAM: Well bedded volcanolithic and tuffaceous sandstone, shale, and siltstone, and polymictic pebble conglomerate	Unconf below Yaveufa Fm; later equiv of up part of Aure Beds. Abd foram
			500–4000 and thins to NW in Karimui; 500 in E Ramu	E KARIMUI, S RAMU: Similar suite, but beds more calcareous, and coral limestone beds and lenses present	In E Karimui, well bedded shallow-water clastic sed with abd interbedded benth and plank foram, gastropods, bivalves, echinoids, and corals also present. In S Ramu, unconf on Chimbu Lst; strongly folded and faulted in Bismarck Fault Zone. Massive lenses have abd foram (l Te to e Tf). Ripple marks, thin persistent lst beds, fine pebble lenses, and worm tracks
	Units also included, at least partly, in $Tml–m^3$ on 1:1 000 000 map. In Karimui, Ramu: m Oligo–m Mio Aure Beds (see Tml^4 under Region 4)				
Late Oligocene	Tou^3	Tou l Oligocene–m Miocene	800	SW MADANG: Algal foraminiferal biomicrite, siltstone, shale, greywacke; algal foraminiferal biomicrite in lenses and highly fractured; bedding very irregular	Possible fringing reef comp. Unconf on Goroka Fm; paraconf on Teh. Dated by larger foram (Te, e Tf); algae and corals also present
		Omaura Greywacke (Tou) l Oligocene (At least in part included in JK^3, π)		E KARIMUI: Shale and siltstone; cross-bedded feldspathic sandstone; schistose serpentinite	Lithologically similar to younger Movi Beds faulted against it; serp along Kami Fault.

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Oligocene	Tou[3] (contd)		3000+ on Markham	MARKHAM, WAU: Tuffaceous shale and siltstone interbedded with massive volcanolithic greywacke, pebble conglomerate, and lithic sandstone; extensive calcareous breccia near base; reef limestone lenses common; minor lava and pyroclastics; thick massive foraminiferal limestone locally near top	Turbidite sed in Aure Trough. Contains abd derived Eo foram in calc lenses, and hence considered unconf on Chimbu Lst; conf on Nasananka Cgl; unconf on Bena Bena Fm; unconf below Yaveufa Fm, Babwaf Cgl, lava and pyroclastics of Marawaka area, and Pleist lacustrine beds; lateral equiv of part of Aure Beds; W into sed of trough facies; intruded by Elandora Po and Akuna Intr Comp. Foram abundant
				SW MADANG: Foraminiferal biomicrite, siltstone, shale, greywacke; biomicrite in lenses or highly fractured; bedding irregular	Unconf on Goroka Fm; paraconf on Teh. Younger than in Markham; dated by larger foram; algae and foram also present
		Nasananka Conglomerate (Ton) Oligocene	1500–2500 thins E and W	NW MARKHAM: Pebble and boulder conglomerate; subordinate arkose, greywacke, and siltstone; conglomerate matrix commonly carbonaceous	Rapid vertical and lateral variations in lithology. Conf below Omaura Gwke; unconf on Bena Bena Fm; overlies Mt Victor Gd; calc breccias at base of Omaura Gwke may be later equiv. Detrital Au probably derived from Bena Bena Fm
Middle Eocene – early Oligocene	Tem–ol[3]	Chimbu Limestone (Teoc) m Eocene–e Oligocene	300–1000	NW MARKHAM: Foraminiferal limestone, subordinate siltstone	In Markham abundant foram probably equiv in part to Eo lst of Aure Trough Zone; probably unconf on Goroka Fm and Bena Bena Fm; possibly unconf below Omaura Gwke
			c.300 in Karimui	NE KARIMUI, S RAMU: Fine-grained algal limestone, nummulitic limestone, coarse calcarenite, and finer-grained foraminiferal limestone	In Karimui and Ramu, richly foss, some beds composed almost entirely of cemented foram; gastropods, bivalves, and echinoids also abundant
		Teh m–l Eocene (At least in part included in JK[3])		SW MADANG: Biocalcirudite, foraminiferal-algal biomicrite	Fringing reef comp?. Unconf on Goroka Fm but undiff from it locally; overlain paraconf by Tou; equiv? to Chimbu Lst in Ramu, Karimui, and Markham
Late Palaeocene	Tau[3]	Pima Sandstone (Tap) l Paleocene–Eocene	2000–3000?	CENTRAL KARIMUI: Thick-bedded fine to coarse feldspatholithic sandstone with small lenticular coquina beds, tuff, and rare conglomerate; mudstone and siltstone with laminations and thin interbeds of sandstone	Detritus from weathering of Kondaku Tuff and Chim Fm; mdst/slst rich in carb material, rock fragments and clay minerals; sandstone clasts rare; fine laiminations, ripple marks, small-scale cross-bedding in sst beds
Early – Late Cretaceous	Ku[3]	Chim Formation (Kuc) Cenomanian–Maestrichtian	Av c.2000; max c.3000 in Karimui	N KARIMUI, SW RAMU: Massive finely laminated calcareous shale, some with fine-grained calcareous nodules and cone-in-cone structures; laminated sandstone, siltstone, and shale with minor calcarenite and tuff beds; minor laminated tuff; altered volcanics, volcanolithic greywacke, calcarenite, and conglomerate	Coarse-grained rock characterized by soft sed slump strucs mostly confined to up part of fm; shallow-water dep indicated by small-scale cross-bedding, ripple marks, and well sorted sandy beds. Conf on Kondaku Tuff; unconf under Chimbu Lst. Mostly Cen–e Camp locally in Karimui; Cen–Tur with Camp–Maest in places in Ramu. Volc and volcanolithic rocks confined to Kundiawa area
		Mount Victor Granodiorite (Kuv) L Cretaceous (Included in Kl)		CENTRAL MARKHAM: Biotite–hornblende granodiorite	Exposed in core of Arau Anticline SE Kainantu. Possibly intrudes Bena Bena Fm; overlain by Nasananka Cgl. Dated at 90 m.y. by K–Ar method. Mt Victor Au mine on faulted contact of Mt Victor Gd and Elandora Po

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Early - Late Cretaceous	Ku^3 (contd)	Intrusives (Kle) E Cretaceous? (At least in part included in Ju^3)	c.15 on Karimui	N KARIMUI: Pyroxene-hornblende diorite and microdiorite, mostly altered (especially chloritized) and veined with coarsely crystalline calcite	Intr Maril Sh in both Karimui and Ramu. In Karimui, sills in Maril Sh; age unknown; comp similar to that of volc rocks in overlying Kondaku Tuff, and apparent absence of these intr in rocks younger than L Jur, suggest E Cretaceous age. In W Ramu, may be corr of Kera Sill as intrudes Maril Sh, but age not known
				W RAMU: Altered quartz-hornblende microdiorite, augite dolerite, gabbro	
		Kumbruf Volcanics (Klku) Cretaceous?	1800 in Ramu	RAMU: Epidotized basaltic agglomerate and pillow lava, volcanolithic conglomerate, amygdaloidal lava; indurated calcareous siltstone and lithic and feldspathic sandstone	Conf below Asai Sh; underlying relation unclear - probably conf on Kompiai Fm; corr with Kondaku Tuff. Commonly altered
			6000 in Bogia	SW BOGIA: Massive indurated, strongly jointed basaltic to andesitic marine volcanic breccia, pillow lava, lava, volcanically derived greywacke, sandstone, and siltstone; subordinate tuff, agglomerate; metamorphosed in part; some sandstone tuffaceous	Dep on steep submarine slope and in deep, probably fault-bounded trough. Conf below Asai Sh; possibly conf on Kompiai Fm exposed in Ramu. Contains plank and smaller benth foram
Early Cretaceous	Kl^3	Kondaku Tuff (Klk) Aptian-Albian	300-2450, thins towards Kubor Anticline	N KARIMUI, S RAMU: Coarse lithic sandstone, greywacke, tuffaceous sandstone, shale, and siltstone; subordinate conglomerate, agglomerate, volcanic breccia, and amygdaloidal lava	Sh and sltst most common but least prominent part of sequence; volc mostly confined to low part of fm. Dated by ammonites and bivalves; gastropods and belemnites also present; abd charred wood frag, some leaf impressions
Jurassic - Cretaceous	JK^3	Goroka Formation (Mg) Mesozoic, E Tertiary?		SW MADANG: Phyllite, slate, schist carbonaceous siltstone, minor greywacke, quartzite; low-grade metamorphics of pelitic derivation, mostly quartz-veined; some metamorphosed intermediate dykes	Dep in deep trough and on steep submarine slope which received very fine terr detritus. Intruded by Bismarck Intr Comp; unconf below Teh, Tou; lithologically similar to Gusap Arg which may be younger, high-level, less meta equiv; possibility of continuous dep of Goroka Fm through Gusap Arg, i.e. Goroka Fm may be E Tert in part
				NW MARKHAM: Also contains biotite-andalusite schist, carbonaceous schist; minor limestone, calcareous siltstone, and andalusite hornfels	Possible corr of less metam units of Owen Stanley Metam; possibly less metam part of Bena Bena Fm; intruded by Bismarck Intr Comp
				SE RAMU: In addition contains minor gneiss (commonly with lit-par-lit injections, of Bismarck Intrusive Complex rocks), amphibolite, and marble	Bedding well preserved with schistosity parallel to it. Age not known; may contain some E Tertiary metased; intruded by Bismarck Intr Comp
				NE KARIMUI: Also contains massive quartzite and pyritic quartz-veined siltstone	
		Bena Bena Formation (Mb) Mesozoic	Unknown, probably several thousand in Markham; uncertain, minimum 450 in Karimui	NW MARKHAM, NW KARIMUI: Mainly low-grade metamorphics; actinolite-chlorite schist, quartz-sericite schist, mica schist (schists partly garnetiferous); minor knotted hornblende-feldspar gneiss, granitic gneiss; less metamorphosed phyllite, meta-greywacke, and meta-arkose	Possible corr of Owen Stanley Metam; base not exposed; unconf below Nasananka Cgl and Omaura Gwke; intruded by Karmantina Gneissic Gr, Akuna Intr Comp, and Elandora Po; possibly intr by Mount Victor Gd. In NW Karimui two episodes of meta recognized
		Units not differentiated, at least in part, from JK^3 on 1:1 000 000 map: In SW Madang: l Oligo Omaura Gwke (see Tou^3); m Mio Bismarck Intr Comp (see Tmm); and m-l Eo Teh (see $Tem-ol^3$)			

Age	Unit	Constituent unit(s) in 1:250 000 Sheet area	Thickness (m)	Lithology	Additional pertinent data
Late Jurassic	Ju^3	Maril Shale (Jum) Kimmeridgian	400–2000	RAMU, N KARIMUI: Moderately indurated shale and siltstone with variable carbonate and mica content; commonly pyritic, especially more carbonaceous beds; subordinate fine to medium sandstone, calcilutite, and shale; basal unit of arkose, silicified and calcareous shale/slate breccia, and conglomerate	In Karimui, unconf overlain by Chimbu Lst; py common as beds, nodules, and dissem. In Ramu, massive or well bedded; basal unit present only in Kubor Anticline; elsewhere conf on Balimbu Gwke or Mongum Volc; dated by bivalve fauna in up part
	Unit not differentiated at least in part, from Ju^3 on 1:1 000 000 map: In Karimui and Ramu: E Cret Intrusives (see K1)				
Early – Middle Jurassic	$J1–m^3$	Karmantina Gneissic Granite (Kjk) M Jurassic (Included in J1)		NW MARKHAM: Biotite–muscovite gneissic granite	Intr Bena Bena Fm. Dated at 172 m.y. by Rb–Sr method, but possibly emplaced in Trias
		Intrusives (Jlu) E Jurassic?		NE KARIMUI, SE RAMU: Deeply weathered granodiorite and diorite with aplite and dolerite dykes	In Karimui, unconf overlain by Chimbu Lst. Dated at 180–190 m.y. by Rb–Sr method
		Mongum Volcanics (Jmm) Jurassic	250	S CENTRAL RAMU: Basaltic agglomerate and pillow lava, interbedded with pebble and cobble conglomerate and feldspathic greywacke; basalt	Age inferred from conf strat position between E Jur Balimbu Gwke and Jur Maril Sh
		Balimbu Greywacke (Jlb) Sinemurian–Pleinsbachian	280–2000	S CENTRAL, NW RAMU: Calcareous and volcanolithic greywacke and interbedded siltstone, fine sandstone, and siltstone; minor shale	Conf below Maril Sh and Mongum Volc; unconf on Kana Volc – probably partly derived by reworking of Kana Volc; well indurated resistant sst beds rhythmically interbedded with recessive sltst and sh. Ammonites, belemnites, bivalves, and brachiopods poorly preserved; dated by ammonites
	Unit also included in J1 on 1:1 000 000 map: In Markham: M Jur Karmantina Gneissic Granite (see $J1–m^3$)				
		Kuta Formation (PRK) ? Norian–Rhaetian (Included in $PuRl^3$)	100–250	N KARIMUI, SW RAMU: Limestone, sandy limestone, minor arkose in lower part	Contains mixed fauna of brachiopods, bivalves, ammonites, corals, foram, and conodonts,
	Included in $PuRl^3$ on 1:1 000 000 map: In Karimui and Ramu: L Trias Kuta Fm (see Ru^3)				
Late Triassic	Ru^3	Kana Volcanics (Ruk) Carnian–Norian	200–3500	CENTRAL, NW RAMU, N KARIMUI: Massive basic to intermediate agglomerate, basalt lava, and dykes; tuff and conglomerate, acid? lava, fine volcanic breccia (lapilli? tuff); pillow lava; greywacke; recrystallized coral limestone, calcarenite; volcanolithic and feldspathic sandstone; extensively epidotized and recrystallized to low greenschist facies; lavas mainly andesitic, but some basalt, dacite, rhyolite	Mostly marine but some subaerial lavas and pyroclastics. In Ramu extensively intr by Mio plutonic and hypabyssal rocks and unconf overlain by Balimbu Gwke or younger fms; bivalves in headwaters of Jimi River
		Jimi Greywacke (Ruj) Carnian–Norian	800+ base not seen	RAMU: Highly indurated fine to medium greywacke and siltstone; commonly micaceous and calcareous; coarse beds generally carbonaceous; minor shale, siltstone, and feldspathic sandstone	Grades upwards through transition zone into Kana Volc. Dated by ammonites; also contains bivalves, gastropods, and brachiopods

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Permian	Pu	Kubor Granodiorite (Puk) L Permian		N-CENTRAL KARIMUI, SW RAMU: Coarse biotite-hornblende granodiorite and tonalite commonly altered and deeply weathered; small stocks and dykes of diorite and gabbro; dykes and veins of aplite and muscovite pegmatite	In core of Kubor Anticline; probably contains unmapped roof pendants of Omung Metam. Sulphide minerals (mainly pyrite) very sparse. Dated as 244 m.y. by Rb-Sr method
Carboniferous?-Permian	Pz^3	Omung Metamorphics (Pzo) L Palaeozoic	2000+	N-CENTRAL KARIMUI, S RAMU: Slate, phyllite, sericite schist, and partly recrystallized indurated siltstone and shale; less common metagreywacke, basic metavolcanics, spotted slate, and hornfels; quartz veins and pods. In Karimui low-grade low pressure metam, hornfels	In Karimui, slaty cleavage only in fine-grained rocks; contains numerous small unmapped Kubor Gd bodies; age unknown, but older than upper Kubor Gd. In Ramu metagwke and slightly metam sh and sltst have blocky jointing, poorly developed cleavage, some graded and fine current-bedding, and interformational brec; slaty cleavage only in finer-grained rocks and commonly parallels bedding; secondary strain-slip cleavage and resultant small folds and crenulation lineations on main cleavage surfaces present locally; in places tightly folded beds have axial-plane cleavage; post-metam chevron folds and kink bands in phyllite

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Q_a^4	Qhc, Qe Pleistocene–Holocene (At least in part included in $Tmm\text{-}p^4$)	100	PORT MORESBY–KALO AROA, N YULE: Colluvium: angular rock fragments in clay matrix, unsorted, unconsolidated; includes some alluvium	Steeply-dipping chaotic scree dep and talus cones; peripheral to cliff-bounded volc plateau remnants where talus cones coalesce to form debris apron
		Qa, Qa_1, Qha Pleistocene, Holocene	up to 500	YULE, PORT MORESBY–KALO–AROA, SAMARAI, ABAU, SALAMAUA, TUFI–CAPE NELSON, SE MARKHAM, S WAU: Alluvium, littoral and beach deposits: gravel, sand, silt, carbonaceous mud, clay; some swamps and organic remains locally. Older alluvium includes poorly consolidated conglomerate, sandstone, siltstone, shale. Raised coral reef in Port Moresby–Kalo–Aroa	In Samarai, Salamaua, and Abau, coastal plains and river valleys. Unconf on Kuta Volc and East Cape Gb on Samarai. In Tufi–Cape Nelson contains some alluv Au locally. In Markham alluv Au still worked in river gv. In Yule and on Port Moresby–Kalo–Aroa dep currently accumulating; locally contain Mt but not in economic quantities; locally gv from river courses used as road agg
		Qt Pleistocene, Holocene (At least in part included in Tmm^4)	60	YULE: Alluvial terraces: unconsolidated deposits of boulders and rounded cobbles admixed with gravel and sand; predominantly volcanic material	Fluv dep derived from reworked scree form elongate gravel banks which coalesce to form terraces
		Qpc Pleistocene (At least in part included in Tmm^4)	6	YULE: Raised reef: cavernous coralgal reef limestone with large solitary corals apparently in position of growth; raised reef and chaotic reef talus	Remnants of former fringing reef comp. Unconf on Chiria Fm. Reefal fauna of corals, algae, bryozoans, bivalves, gastropods
		Qp Pleistocene?–Holocene (At least partly included in Tmm^4)		WAU: Coarse unsorted angular conglomerate; unconsolidated gravel, sand, and silt in uplifted flood plains	Cgl torrentially dep near Wau; fluv sed
		Ubo and Wakioki Fanglomerates (Qhu, Qhx) Holocene	50	E TUFI–CAPE NELSON: Gravel, sand, silty clay with scattered large subangular boulders	
		Kwagira Beds, Agaun and Silimidi Conglomerate (Qpk, Qpa, Qpa_1) Pleistocene (At least in part included in Tp^4)	100–500	TUFI–CAPE NELSON: Conglomerate, poorly sorted sandstone, siltstone; marl locally	Kwagira Beds mostly non-marine; no age evidence; lap on to Tapio Marl. Agaun Cgl raised former alluv; overlies Goropu Metab and Yau Gb with angular unconf. Silimidi Cgl also raised former alluv, overlies Domara River Cgl with angular unconf; interf with Sivai Brec Mem, Iban Brec; no definite age evidence; tilted but not folded
		Units not differentiated, at least in part, from Qa^4 on 1:1 000 000 map: In Port Moresby–Kalo–Aroa: Mio Plio Yaifa Fm, Kupiano Beds, and Siro Cgl (see $Tmm\text{-}p^4$); and Mio Kido Lst (see Tmm^4)			
	Qv^4	Sivai Breccia Member (of Silimidi Conglomerate) (Qpv) Pleistocene (At least in part included in Qs^4, [illegible])	Individual sheets 10–20	TUFI–CAPE NELSON: Ultramafic breccia; peridotite clasts in matrix of finer peridotite grains*	Origin probably colluvial or volc (i.e., fluidized by volc gasses). Sheets interbedded with Silimidi Cgl; pipes reportedly intrude Tectonite ultram. No definite evidence of age. Erosion surfaces probably too young to permit development of Ni residual soils

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Qv^4 (contd)	Manna Volcanics (Qm) Pleistocene–Holocene	750	NW TUFI–CAPE NELSON, NE PORT MORESBY–KALO–AROA: Rhyodacitic and rhyolitic ash and lava; much ash-flow deposits	In Tufi–Cape Nelson, small volc cones and tholoids; larger dissected ash cones; interf with Uoivi Volc; overlaps Sesara Volc and Lokanu Volc; some ash layers dated at 10 000 and 80 000 years by K–Ar method. In Port Moresby–Kalo–Aroa, small linear volc comp of similar age; interf with Uoivi Volc; partly overlie Lokanu Volc, Cumulate gb, Sesara Volc, Qpm, and Hydrographers Range Volc
		Qpg Pleistocene (Partly at least included in π)	up to 300	NE PORT MORESBY–KALO–AROA: Andesitic ash	Distal ash dep, possibly related to Hydrographers Range Volc; interf with Managalase Volc; unconf on Tectonite ultram, Cumulate ultram, Cumulate gb, and Granular gb
		Managalase Volcanics (Qpma) Pleistocene	500	NE PORT MORESBY–KALO–AROA: Andesitic ash; minor agglomerate and some mud flows	Distal apron of finer pyroclastics and volc derived sed, possibly associated with stratovolc of Hydrographers Range Volc. Age from degree of dissection, and possibly from relat with Hydrographers Range Volc. Unconf on Tectonite ultram, Cumulate ultram, Granular gb, and Qpm
		Qpu Pleistocene		NE PORT MORESBY–KALO–AROA: Andesitic and basaltic volcanics, including lava; little known	Small volc complex; possibly related to other Pleis volc. Unconf on Tectonite ultram, Cumulate ultram, Granular gb, and KTk
		Efogi Volcanics (Qpe) Pleistocene (Partly at least included in JK^4)	60	PORT MORESBY–KALO–AROA: Porphyritic basaltic to andesitic lava; shoshonitic affinities*	Local volc activity, probably related to fracturing as result of regional uplift; mostly valley-fill dep. Unconf on Kagi Metam. Age estimated from degree of dissection
		Qpa Pleistocene (At least partly included in Tou^4)	up to 50	S MARKHAM: Tuffaceous and calcareous sand and gravel; acid and intermediate volcanic components derived from Mt Yelia	Lacus dep; lake formed by volc activity of Mt Yelia. Plant remains
		Qhw, Qvy Pleistocene–Holocene		WAU, S MARKHAM: Dacitic lava, agglomerate, crystal tuff; locally andesitic lava, obsidian	Qhw derived from Koranga volcano near Wau; volcano still retains crater form. Qvy derived from recent volc activity at Mt Yelia
		Waiowa Volcanics (Qhw) Holocene	25	CENTRAL TUFI–CAPE NELSON: Andesitic ash and unconsolidated agglomerate	Products of Waiowa volcano erupted in 1943–4
		Victory Volcanics (Qv) Pleistocene–Holocene	2500	TUFI–CAPE NELSON: Andesite, basaltic andesite; minor basaltic and dacitic flows; agglomerate; unconsolidated pyroclastics	Stratovolcano with breached central vent and small subsidiary eruptive centres
		Sesagara Volcanics (Qz) Pleistocene–Holocene	up to 300	TUFI–CAPE NELSON: Mainly andesitic pyroclastics	
		Uoivi Volcanics (Qu) Pleistocene–Holocene	600 in Port Moresby–Kalo–Aroa	NE PORT MORESBY–KALO–AROA, NW TUFI–CAPE NELSON: Basaltic and andesitic lava flows with shoshonitic affinities*	In Port Moresby–Kalo–Aroa, lava flows, flow domes, scoria mounds, cinder cones, and explosion craters in places; volc cluster; interf with Manna Volc; partly overlies Lokanu Volc, Sesara Volc, Hydrographers Range Volc, Managalase Volc; K–Ar dates range from 80 000 to 350 000 years. In Tufi–Cape Nelson, overlaps Sesara Volc and Lokanu Volc

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Qv^4 (contd)	Hydrographers Range Volcanics (Qph) Pleistocene (At least in part included in Qpu^4)	up to 2500	NW TUFI-CAPE NELSON, PROT MORESBY-KALO-AROA: Basalt, andesitic and dacitic agglomerate, ash and lava	Dissected stratovolcano. Unconf on Lokanu Volc and Tectonite ultram; underlies Mount Lamington Volc, Uoivi Volc, and Manna Volc. Dated as 670 000–1 450 000 years by K-Ar method
	Qpv^4	Mount Lamington Volcanics (Ql) Pleistocene–Holocene	200	PORT MORESBY-KALO-AROA: Andesitic ash and agglomerate*	Outer ash slopes of Mount Lamington volcano. In fault contact with and probably overlies Tectonite ultram; overlies Hydrographers Range Volc. Age up to 90 000 ± 10 000 from radiocarbon dating
		Cape Nelson Volcanics (Qpn) Pleistocene	up to 2500	TUFI-CAPE NELSON: Andesite, basaltic andesite; minor basalt and dacite flows, agglomerate, unconsolidated pyroclastics	Dissected volcano. Age estimated from degree of dissection. Lapped on by Victory Volc on Cape Nelson Peninsula
		Units not differentiated, at least in part, from Qpv^4 on 1:1 000 000 map: In Port Moresby-Kalo Aroa and Tufi-Cape Nelson: Pleist Hydrographers Range Volc (see Qv^4)			
	Qs^4	Qa, Qa_1 Holocene	up to 500	SW SALAMAUA: Alluvium and older alluvium; gravel, sand, silt, clay	Older alluv forms higher in middle of Waria Valley. Some Au and Pt in rivers
		Qs Pleistocene–Holocene	up to 100	S TUFI-CAPE NELSON: Colluvium: chaotic deposits of angular rock fragments in fine matrix; some alluvium	Landslide and creep dep
		Qc Qtaternary	up to 50	TUFI-CAPE NELSON, SAMARAI: Raised coral reef	In Tufi-Cape Nelson, source of lime. In Samarai, unconf on Kutu Volc and East Cape Gb
		Ibau Breccia (Qpi) Pleistocene (At least in part included in Tp^4, π)	up to 150	TUFI-CAPE NELSON: Ultramafic breccia of peridotite clasts in finer matrix; thick chaotic deposits	Origin probably colluvial. Might be lateral equiv of Sivai Brec Mem; overlies Tectonite ultram, Goropu Metab, and probably Domara River Cgl and Silimidi Cgl. Erosion surfaces probably too young to permit development of Ni residual soils
		Ararabu Conglomerate (Qpar) Pleistocene (At least in part included in Tc)	80	PORT MORESBY-KALO-AROA: Poorly consolidated conglomerate, sandstone, and siltstone	Lacus and alluv sed dep in small tectonically controlled basins. Unconf on Bomuguina Beds, Sadowa Gb, Gidobada Lst, Kwikila Aglm, and Kupiano Beds. No definite age evidence except for strat relationship and poor consolidation. Used for road-making agg
		Units not differentiated at least in part, from Qs^4 on 1:1 000 000 map: In Tufi-Cape Nelson: Pleist Sivai Brec Mem (see Qv^4); and Plio Cloudy Bay Volc (see Tp^4). In Port Moresby-Kalo-Aroa: Eo Bomuguina Beds (see Te^4)			
Pliocene - Quaternary	TpQp	Edie Porphyry (Tpp) Miocene–Pliocene (At least in part included in JK^4)		E WAU, SE MARKHAM: Biotite and hornblende andesite and dacite, porphyry stocks and dykes, many hydrothermally altered*	Several phases of po intrusion; main intrusion antedates Bulolo Aglm. Dated by K-Ar method as 3.5 m.y.; many intrusions probably younger and possibly main Au mineralizers; isolated K-Ar dating of 2.5 m.y. from one of younger po. Intrudes Owen Stanley Metam; fragments constitute large part of Bulolo Aglm and Namie Brec

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Pliocene—Quaternary	TpQp (contd)	Bonua Porphyry (Tpb) Pliocene		S TUFI-CAPE NELSON: Microdiorite and micromonzonite prophyry stocks and related lamprophyre dykes*	Dykes within ultram rocks. Possibly related to volc of Domara River Cgl and its Musa Volc Mem. Age based on K-Ar date of 5.3 ± 0.2 m.y. (biotite). Possible source of Au and Cu and possible agent in Ni sulphide mineraliz
Pliocene	Tp^4	Kwinimaga Sandstone (Tpk) Pliocene	200	TUFI-CAPE NELSON: Sandstone, conglomerate, siltstone, claystone	Cyclic dep, possibly marginal marine. Overlies Ruaba Sst with angular unconf; possible later equiv of Awaitapu Clst. Undatable plant fossils
		Domara River Conglomerate (Tpd) Pliocene	1500	TUFI-CAPE NELSON, E PORT MORESBY-KALO-AROA: Polymictic conglomerate, sandstone, siltstone, mudstone; moderately consolidated; some agglomerate and lava*	In Tufi-Cape Nelson, entirely non-marine or possibly with minor shallow marine intercalations; dep in intermontane basin during uplift of Tectonite ultram, Granular gb, Lokanu Volc, Kutu Volc, etc; age tentatively based on K-Ar date of related? dyke of Bonua Po (5.3 ± 0.2 m.y. biotite), and of volc clast (2.36 ± 0.05 m.y., whole rock). In Port Moresby-Kalo-Aroa, unconf on Papuan Ultram Belt, Kagi Metam, Emo Metam, Kemp Welch Beds, and Kuta Volc; contains gastropods, some bivalves, and carb wood
		Musa Volcanic Member (of Domara River Conglomerate) (Tpz) Pliocene	130	E PORT MORESBY-KALO-AROA, W TUFI-CAPE NELSON: Basaltic agglomerate with shoshonitic affinities*	Remnants of volc cone(s). Interbedded with basal portion of Domara River Cgl. In Tufi-Cape Nelson unconf on Tectonite ultram, Granular gb and Lokanu Volc
		Apinaipi Formation (Tpn) Pliocene	200	See Tmm-p^4 (Port Moresby-Kalo-Aroa)	
		Cloudy Bay Volcanics (Tpc, Tpt) Pliocene (At least partly included in Qs^4)	200–300	SW TUFI-CAPE NELSON, NW ABAU, SE PORT MORESBY-KALO-AROA: Basaltic and andesitic pyroclasts and lava; porphyritic, vesicular; shoshonitic affinities* Tpt: also tuff and tuffaceous sandstone (little known) in Port Moresby-Kalo-Aroa	In Tufi-Cape Nelson, facies equiv? of Domara River Cgl and its member; unconf on Kutu Volc. In Abau, probably unconf on Juliade Lst and Kutu Volc. In Port Moresby-Kalo-Aroa, unconf on Kutu Volc; tentatively corr with Tpy, Kwikila Aglm, Astrolabe Aglm and Mount Davidson Volc. Tpt unconf on Kutu Volc and Bomuguina Beds; probably related to Cloudy Bay Volc
		Awaitopu Claystone (Tpw) Pliocene	350	TUFI-CAPE NELSON: Claystone, laminated marl; some sandstone, siltstone, conglomerate	Overlies Ruaba Sst with angular unconf. Age of N outcrop from microfoss; age of SW outcrop inferred
		Gwoira Conglomerate (Tpr) Pliocene	1000	E TUFI-CAPE NELSON: Poorly sorted conglomerate; sandstone, siltstone	Dep in high-energy envir during rapid uplift of Kutu Volc; N margin subsequently uplifted. Unconf on Goropu Metab and Tectonite Ultram
		Tpa, Uga and Mailu Sandstone (Tpu, Tpl) Pliocene	up to 500	NW, NE ABAU, SAMARAI, SE TUFI-CAPE NELSON: Poorly consolidated sandstone, siltstone, conglomerate	In Abau, fluv sed raised, tilted, and folded; unconf on Juliade Lst. In Samarai, Abau and Tufi-Cape Nelson fluv and shallow marine? sed unconf on Kutu Volc.
		Fife Bay Volcanics and Mount Suau Member (Tpf, Tpfs) Pliocene	500	SE ABAU, SAMARAI: Basaltic and andesitic lava, agglomerate, and tuff; some pillow lava; minor tuffaceous sedimentary rocks; many dykes*. 200m of 'welded' basaltic agglomerate (Tpfs)	In Abau, unconf on Badila Beds. In Samarai unconf on Kuta Volc, Badila Beds, Modewa River Beds; member unconf on Kutu Volc, Modewa River Beds; may be basal part of Fife Bay Volc

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Pliocene	Tp^4 (contd)	Tms 1 Miocene–l Pliocene	300	SE YULE: Calcareous and non-calcareous siltstone; minor mudstone and tuffaceous sandstone	Closer to source of sed than Miaru Mdst; only known equiv of Miaru Mdst in Ovoi area; conf on Lavao Fm; conf below Apinaipi Fm
		Babwaf Conglomerate (Tpb) Pliocene?	1300+	S MARKHAM: Massive pebble and cobble conglomerate; subordinate coarse micaceous sandstone and siltstone; well sorted, poorly indurated WAU: Thickly bedded polymictic conglomerate and minor interbedded lithic sandstone, silty calcareous mudstone, and brecciated conglomeratic coral limestone	Shallow-water sed in partly faulted syncline; last phase of sedim in Aure Trough. Unconf on Langimar Beds, Omaura Gwke, and Owen Stanley Metam. Contains plant remains and Mio and Plio foram. Regarded as Plio on field relat and similarity to Leron Fm. In Wau, contains Mio–Plio foram
		Tp Pliocene	650–1600	S WAU: In E, poorly consolidated conglomerate, sandstone, mudstone, tuffaceous sandstone, and interbedded dacite and andesite pyroclastics; in W, sandstone, siltstone, and mudstone, commonly calcareous or carbonaceous; pebble conglomerate and coral limestone concretions	Conf on l Mio (Tg stage) rocks; overlaps onto Owen Stanley Metam. Abd foram; barren top of unit might be Pleist
		Otibanda Formation (Tpo) Pliocene	up to 765	NE WAU: Poorly consolidated tuffaceous siltstone, sandstone, conglomerate, and tuff	Lacus and fluv envir. Unconf on Edie Po, Bulolo Aglm, and Owen Stanley Metam. Contains vertebrate foss. 3.5 m.y. old by K-Ar method on biot, hbl, and plag
		Bulolo Agglomerate (Tpg) Pliocene	not known 300+	NW WAU: Massive dacitic and andesitic agglomerate with minor tuff bands; rare obsidian flows	Unconf on Morobe Gd; derived from several centres of eruption; 3.5 m.y. old by K-Ar determination on biot hbl, and plag
		Namie Breccia (Tpv) Pliocene		NE WAU: Volcanic breccia of angular fragments of schist and dacitic and andesitic porphyry in fine-grained hydrothermally altered matrix; vague banding and some tuff beds discernible in upper parts	Pipes probably diatremes, up to 1 km across, intruding Owen Stanley Metam. Erupted at about same time as Bulolo Aglm. Host rock for some Au; contains veins and stringers of manganocalcite, rhodocrosite, qtz, auriferous py, sphalerite, marmatite, galena, and free Au; sulphides also dissem.
		Sesara Volcanics (Tps) l Miocene–e Pliocene	550	NE PORT MORESBY–KALO–AROA, NW TUFI–CAPE NELSON: Basaltic agglomerate, lava, tuff; shoshonitic affinities; minor volcanic sandstone*	Remnants of large central volcano. Unconf on Lokanu Volc, Granular gb and High-level gb; overlain by Qpma, Manna Volc, and Uoivi Volc. Dated by K-Ar method as 5.4–5.7 m.y.
	Units not differentiated at least in part, from Tp^4 on 1:1 000 000 map: In Tufi–Cape Nelson: Pleist Ibau Breccia (see Qs^4) and Kwagira Beds, Agaun, and Silimidi Cgl (see Qa^4). In Ibau: l Oligo?–mMio Magavara Syenite (see Tmm). In Port Moresby–Kalo–Aroa: Eo Bomuguina Beds (see Te^4)				
Late Miocene – Pliocene	$Tmm–p^4$	Apinaipi Formation (Tpn, Tpn_1) Pliocene (At least in part included in Tmu^4)	2000 in Yule; 200 in Port Moresby–Kalo–Aroa	PORT MORESBY–KALO–AROA, YULE: Immature calcareous tuffaceous sandstone, pebble and cobble conglomerate, siltstone, mudstone; minor reefal limestone, volcanic agglomerate, tuff and brecciated lava*	Dep during period of rapid uplift and renewed volc; rapid facies variations from fluv to deltaic to littoral to shallow-water marine envir. In Yule, locally unconf flanks Lavao Fm; conf over Miaru Mdst; interf with and conf on Wedge Hill Lst; to E largely derived from and partly overlies contemp Mount Davidson Volc; poorly preserved foram, algae and bryozoans; many plant remains, silicified wood, fragmented bivalves and gastropods; shallow-water marine and brackish-water Plio assem identified; post Tg; cgl used as road agg. In Port Moresby–Kalo–Aroa, unconf on Lavao Fm

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Miocene - Pliocene	Tmm-p[4]	Tpy Pliocene	20-100	PORT MORESBY-KALO-AROA: Basaltic and andesitic pyroclastics; minor lava	Subaerial deposition of volc. Tentatively corr with Mount Davidson Volc and Astrolabe Aglm; unconf on Kagi Metam, Kemp Welsch Beds, Port Moresby Beds, Kuta Volc, and Sadowa Gb
		Kwikila Agglomerate (Tpk) Pliocene	80	PORT MORESBY-KALO-AROA: Basaltic and andesitic agglomerate; minor interbedded tuff; tuffaceous sandstone and volcanic conglomerate confined to base of unit*	Subaerial deposition of frag volc close to volc centre. Tentatively corr with Mount Davidson Volc and Astrolabe Aglm; cunconf on Sadowa Gb and Gidobada Lst; Aglm potential source of agg
		Astrolabe Agglomerate (Tpa) Pliocene	300	PORT MORESBY-KALO-AROA: Basaltic and minor andesitic laharic agglomerate and tuff with interbeds of volcanically derived conglomerate and sandstone*	Dep of nuee ardente-type and airfall pyroclastics and also reworked volc in form of avalanches, lahars, and volc derived sed in shallow lakes in tectonically controlled depression. Volc centre unknown. Up part of Mount Cameron Volc Comp (m Mio to Plio). Unconf on Kagi Metam, Kemp Welch Beds, Port Moresby Beds, and Sadowa Gb; conf on Siro Cgl; probably corr of Mount Davidson Volc. Coniferous wood, casts of tree logs and trunks. Exploration for bx not successful; matrix-poor aglm used for concrete agg for local hydroelectric scheme
		Mount Davidson Volcanics (Tpda) Pliocene	600 in Yule; up to 80 in Port Moresby-Kalo-Aroa	YULE, NW PORT MORESBY-KALO-AROA: Basaltic and minor andesitic agglomerate, tuff, lava, lava breccia, with intercalated volcanically derived coarse conglomerate and sandstone increasing	In Yule, subaerial volc - pyroclastics and lava brec with intercalated laharic and fluv sed; eruptive centres not identified; paraconf on Yaifa Fm; grades later into and partly overlain by derived contemp Apinaipi Fm; no dating from foss but adjacent, probably contemp Apinaipi Fm contains Plio foram and overlies Tg stage mdst. In Port Moresby-Kalo-Aroa unconf on Kagi Metam, Kemp Welch Beds, and Port Moresby Beds? conf on Yaifa Fm; age from contemp Apinaipi Fm
		Wedge Hill Limestone (Tpw) Pliocene	350	COASTAL YULE: Coralgal limestone, calcareous sandstone, pebble conglomerate; minor calcareous mudstone and siltstone; mudstone interbedded with resistant limestone at base; reef derived sediments	Linear reef comp developed on rising anticlines forming tectonic islands; reefs initially flanked by own debris, but generally development of lst inhibited by rapid encroachment of Apinaipi Fm sed. Conf on Miaru Mdst; below and interf with Apinaipi Fm; deeper water mdst (Miaru Mdst) grades up into calc mdst overlain by shallow-water calc facies molluscs, echinoid spines, bryozoans, reef-associated larger benth foram. Used as road agg
		Yaifa Formation (Tmy) l Miocene-e Pliocene (At least in part included in Qa[4])	300 in Yule; up to 100 in Port Moresby-Kalo-Aroa	SE YULE, PORT MORESBY-KALO-AROA: Massive, tuffaceous sandstone with pebble horizons which grade through paraconglomerate into massive cobble conglomerate with tuffaceous sandstone matrix; lenses of soft siltstone, mudstone, and claystone*	In W, SW Yule, fluv and lacus sed derived from and dep over Talama Volc and accumulated locally during period of volc quiescence; possibly shallow-marine in part in core of Kurai Anticline. Age based on probable equiv to Miaru Mdst; paraconf on Talama Volc; paraconf overlain by Mount Davidson Volc; to W probably grades into Miaru Mdst; intruded by Tmi. In Port Moresby-Kalo-Aroa, overlain by Mt Davidson Volc; probable corr of Siro Cgl
		Siro Conglomerate (Tms) Miocene-e Pliocene (At least in part included in Qa[4], To)	60	W PORT MORESBY-KALO-AROA: Polymictic orthoconglomerate, sandstone, siltstone, mudstone; moderately consolidated*	Fluv and lacus dep. Unconf on Port Moresby Beds, Kemp Welch Beds?, and Sadowa Gb; conf overlain by Astrolabe Aglm; tentatively corr with Yaifa Fm contains non-marine gastropods. Age from tentative corr with Yaifa Fm

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Miocene - Pliocene	Tmm-p^4 (contd)	Kupiano Beds (Tpku) l Miocene- e Pliocene (At least in part included in Qa^4)	up to 200	PORT MORESBY-KALO-AROA: Sandstone, shelly sandstone, siltstone, mudstone, and limestone; minor conglomerate	Dep in shallow-water marine envir. Unconf on Port Moresby Beds and Bomuguina Beds; unconf below Arabu Cgl. Dated by larger benth foram; gastropods, corals, and bivalves also present; some fine-grained rocks contain plank foram and opaline and qtz spicules, and tests of sponges and other micro-organisms. Of construction material, particularly road-making agg
		Talama Volcanics (Tmt) m-l Miocene (At least included in JK^4)	1500	E YULE: Andesitic and basaltic agglomerate, tuff, lava breccia, lava, and interbeds of derived conglomerate, sandstone, and minor mudstone*	Subaerial volc in which pyroclastics predominated over lava flows; penecontemp erosion resulted in intercalated laharic and fluv derived sed. Unconf on Kagi Metam, Auga Beds, Aibala Volc; disconf on Tmx to E, and probably conf overlies Tmx to W; to W grades later into Chiria Fm and Lavao Fm; intruded by Tmi. At one place calc tuffaceous sst at base contains e Tf larger benth foram; possible corr with Chiria and Lavao Fm suggests partly m-l Mio age
		Tapio Marl (Tmt) l Miocene	60	TUFI-CAPE NELSON: Marl and shale with interbedded limestone and thin lenses of sandstone and conglomerate	On Cape Vogel Pen, conf on Castle Hill Lst; later equiv of and unconf overlain by Ruaba Sst. Dated by foram
		Ruaba Sandstone (Tmr) m Miocene-Pliocene	3500	TUFI-CAPE NELSON: Lithic sandstone, polymictic conglomerate, siltstone; some silty claystone and tuff	On Cape Vogel Pen, unconf overlain by Awaitapu Clst. Some plant remains. Maximum age based on e Tf foram. Reported petroleum gas and oil shows in three shallow wells drilled in 1927-8
		Units not differentiated, at least in part, from Tmm-p^4 on 1:1 000 000 map: In Port Moresby-Kalo-Aroa: Qs. On Yule: Qhc (see Qa^4); and Jur?-Cret Kagi Metam and L Cret-Eo Auga Beds (see JK^4)			
Late Miocene	Tmu^4	Miaru Mudstone (Tmu, Tmm) l Miocene-e Pliocene	900 (Tmu); 300 (Tmm)	COASTAL YULE: Tmu: Soft, finely bedded mudstone, shale, minor thin interbeds of siltstone, sandstone, limestone and conglomerate; in places volcanic interbeds towards base; local conglomerate. Tmm: Calcareous and non-calcareous siltstone, minor mudstone, and tuffaceous sandstone	Tmu: Overlain and underlain by shallow-water marine sed; in extreme NW, conf on Aure Beds; elsewhere, on Talama Volc and probably Lavao Fm; probably contemp with fluv Yaifa Fm; in coastal anticline conf overlain by Wedge Hill Lst and elsewhere by Apinaipi Fm; contains abundant pelagic foram of Tg stage; shallow water benthonic foram at intervals. Tmm: Local equiv of Miaru Mdst; conf on Lavao Fm; overlain conf by Apinaipi Fm; closer to source of sed than Miaru Mdst
		Tmu l Miocene	400-2000	S, SW WAU: Marl, mudstone, and siltstone, with interbeds of argillaceous sandstone, pebble conglomerate, and coral and algal limestone towards base; conglomerate predominates to E	Unconf on m Mio shelf and trough facies. Abundant Tg foram in mdst; basal beds probably Tf$_3$
		Oveia Diorite (Tmo) l Miocene (Partly at least included in JK^4)		N PORT MORESBY-KALO-AROA: Diorite, monzonite	Partly unroofed stock, probably related to Mio and Plio volc. Intrudes Kagi Metam and Emo Metam; minor py mineraliz on joint surfaces

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Miocene	Tmu^4 (contd)	Lavao Formation (Tml) l Miocene (Included in Tmm^4)	600; lenses up to 200	YULE, NW PORT MORESBY-KALO-AROA: Calcareous tuffaceous sandstone and conglomerate, lenses of biohermal limestone with reef debris* Lenses of coralgal limestone with calcareous sandstone; breccia, siltstone and mudstone mapped separately	Shallow-water marine lagoonal envir in which biohermal reefs flanked and intermittently engulfed by reef talus and coarse-grained tuffaceous sed from adjacent delta compl. Conf on Chiria Fm; unconf below Apinaipi Fm; may be unconf below Miaru Mdst in concealed synclinal cores; interf with Talama Volc and Aure Beds. Contains l Tf larger benth and plank foram; corals, algae, bryozoans, bivalves and gastropods also present
		Tms l Miocene (Included in Tmm^4)	0–800	S-CENTRAL WAU: Biohermal limestone and marl grading laterally into marl, limestone, with some sandstone and conglomerate	Unconf on Omaura Gwke and Owen Stanley Metam; abd foram (e Tf) in calc beds
		Unit not differentiated from Tmu^4: In Yule: Plio Apinaipi Fm (see $Tmm-p^4$)			
Middle Miocene	Tmm^4	Chiria Formation (Tmc) m Miocene	1700+, (base not exposed in Yule; 1200 in Port Moresby-Kalo-Aroa	PORT MORESBY-KALO-AROA, SE YULE: Greywacke sandstone, siltstone, mudstone; minor pebble and cobble conglomerate; calcareous sandstone, mudstone, siltstone and minor limestone increase towards top; mudstone increase near base	Rapidly dep in open marine, but nearshore envir on E margin of Aure Trough; immature sed derived from emerging metam and volc terrain to N and E. To W probably grades into trough facies Aure Beds; to E probably grades later to Tmt; grades conf up into Lavao Fm; probably overlies shallow-water marine Te stage (Tmx) sed possibly equiv of Kido Lst in Aroa. Dated as e Tf by larger benth and plank foram contains Eo and Te stage derived lst clasts. Frag macrofoss occur throughout
		Gidobada Limestone (Tmg) m Miocene (Partly at least included in Tou^4)	up to 100	PORT MORESBY-KALO-AROA: Reefal limestone, calcarenite, calcirudite	Reef complex. Unconf on Port Moresby Beds; non-conf on Sadowa Gb; conf on Kore Volc; unconf below Kwikila Aglm. Dated by larger benth foram; tabulate and rugose corals, frag of bivalves and gastropods also present. Potential raw material for cement manufacture
		Iauga Formation (Tmi) m Miocene	c.1500	S-CENTRAL SALAMAUA: Basalt tuff, mostly shallow-marine, some subaerial	Unconf on Eia Beds. Dated by larger foram (e Tf)
		Langimar Beds (Tmg) m Miocene	up to 3000, thins to S	S-CENTRAL MARKHAM: Volcanolithic pebble and cobble conglomerate in tuffaceous matrix; lenses of silty sandstone, basaltic and andesitic agglomerate near base; large detritus limestone lenses; finer-grained and thinner towards S	Shelf facies of late-stage sed in Aure Trough. Unconf on Omaura Gwke and Own Stanley Metam; unconf overlain by Babwaf Cgl; equiv of Yaveufa Fm to NW. Abd foram in lst lenses
			500–3600	N-CENTRAL WAU: Conglomerate and sandstone, interbedded marl, mudstone and calcarenite to N, with basaltic and andesitic lava and pyroclastics in bottom half; silty mudstone and siltstone with sandstone, grit, and conglomerate to S; biohermal limestone	Unconf on Omaura Gwke and Owen Stanley Metam. Abd Tf_{1-2} foram in calc beds
		Castle Hill Limestone (Tmh) m Miocene	120	E TUFI-CAPE NELSON: Reef limestone and calcarenite, moderately to thick bedded; basal conglomerate	Basal cgl laps on to Dabi Volc; unconf on Woruka Sltst; conf below Topio Marl. Dated as e Tf by foram. Possible source of lime

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Middle Miocene	Tmm^4 (contd)	Kido Limestone (Tmkd) e–m Miocene (At least in part included in Qa^4)	200 max	PORT MORESBY–KALO–AROA: Fossiliferous limestone; fine–grained, well bedded, locally contains volcanic material, partly recrystallized	Reef complex. Although partly younger, may be corr with 1 Oligo to e Mio seds and volcs; possibly facies equiv and partly time–equiv of Boera Lst, Bootless Inlet Lst, and Dokuna Tuff. Dated by larger benth foram; corals, echinoderms, bryozoans, bivalves, cirripeds and Lithothamnium also present
		Adau Limestone (Tma) e–m Miocene	100	SW TUFI–CAPE NELSON: Reef limestone and shelly calcarenite	Unconf on Kuta Volc. Dated by foram (1 Te, e Tf). Possible source of lime
		Units not differentiated, at least in part, from Tmm^4 on 1:1 000 000 map: In Yule: Quat Qt, Qpc and Qp (see Qa^4), Eo? Aibala Volc (see Te), and m–l Mio Aure Beds and e Mio Tmx_4 (see Tml^4). In Wau: l Mio Tms (see Tmm^4); and Eo Te (see Te^4). In Salamaua: Eo Eia Beds (see Te^4). In Port Moresby–Kalo–Aroa: l Mio Lavao Fm (see Tmu^4)			
	Tmm	Mai'iu Monzonite (Tpx) l Miocene–e Pliocene		S TUFI–CAPE NELSON: Zenolithic granodiorite, biotite monzonite, biotite hornblendite*	Intrudes Goropu Metab and probably Granular gb and Tectonite ultram. Dated by K–Ar method as 4.37, 6.03, and 6.76 m.y. (hornblende)
		Suokling Granite (Tmk) l Miocene		TUFI–CAPE NELSON: Medium and coarse granite	Intrudes Tectonite ultram and Goropu Metab; may be intruded by Mai'iu Monz. K–Ar ages based on hbl (9.4 and 10.8 m.y.) and biotite (3.2 and 3.3 m.y.), and may indicate uplift about 3.3 m.y. ago
		Morobe Granodiorite (Tmm) m Miocene		E WAU, NW SALAMAUA, SE MARKHAM: Granodiorite, adamellite; subordinate monzonite, diorite, and pegmatite	In Wau, intrudes Owen Stanley Metam; relat with Omaura Gwke and Langimar Beds not known; possibly contemp with basal volc of Langimar Beds in E Wau. In Salamaua, probably postdates some movements on Owen Stanley Fault system. In Markham contemp with Bismarck Intr Comp; dated by K–Ar and Rb–Sr method as 12 m.y. and 14.5 m.y. Source of some Au in Wau and SE Markham
		Magavara Syenite (Tmm) l Oligocene?–m Miocene (At least in part included in Tp^4)		ABAU: Syenite, monzonite, minor gabbro; trachybasalt, latite, sanidine melanite porphyry dykes	Dissem py, minor alluv Au S of Dogura Bay
		Imudat Monzonite (Tmi) l Oligocene?– m Miocene		ABAU: Monzonite, minor trachyandesite	Intrudes Kutu Volc. Dissem py and minor alluv Au
		Gabalmsuhusu Syenite (Tmg, Tmg) l Oligocene?–m Miocene		SAMARAI: Syenite, monzonite, diorite, minor gabbro; dunite mapped separately (Tmg^1)	Intrudes Kutu Volc. Minor Au and Pt mineraliz
		Ulo Ulo, Watuti, and Sige Lele Gabbro (Tmo, Tmw, Tmw, Tmb) l Oligocene?–m Miocene		SAMARAI: Gabbro; in places monzonite, pyroxenite; dunite mapped separately (Tmw^1)	Intrude Kutu Volc. Ulo Ulo Gb has Cu and Au mineraliz dissem py and possibly Pt. Watuti Gb overlain by Mount Suau Mem of Fife Bay Volc; has diss py; may be source of alluv Pt. Sige Lele Pg contains dissmd py and ch
Early Miocene	Tml	Tmi Miocene–Pliocene (Partly at least included in JK^4)		NE YULE: Hornblende diorite, augite micro–diorite, intrusive augite and hornblende andesite, augite–hornblende and minor biotite monzonite, pyroxene gabbro/diorite, feldspar–hornblende–biotite granodiorite; hand specimens leucocratic, fine to medium, weakly pyritic, and partly silicified*	Intrude Kagi Metam, Auga Beds, Aibala Volc, Talama Volc, Yaifa Fm, Mount Davidson Volc; part of Mio–Plio volc comp. Age based on probable relat with Talama Volc and Mount Davidson Vol; intr postdate deformation of Kagi Metam, Auga Beds, and Aibala Volc

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Early Miocene	Tml[4]	Woruka Siltstone (Tmz) e. Miocene	45	SE TUFI-CAPE NELSON: Laminated siliceous siltstone and claystone; minor thin beds of glauconitic silty sandstone	Laps on to Dabi Volc; unconf overlain by Castle Hill Lst. Dated by foram
		Aure Beds (Tma) Oligocene-m Miocene (m-l Miocene in Yule) (At least in part included in Tmm[4], Tou[4])	2500-2900 thins to W in Wau and Markham; 1000-5700, thickens to E in Karimui; 2000 in Yule	W WAU: Greywacke and siltstone with minor interbedded marl, calcareous siltstone, argillaceous limestone, tuffaceous greywacke, and lenses of pebble conglomerate; towards top commonly pebble and boulder conglomerate with abundant volcanic clasts	Base not seen, but cgl contains pebbles of metam rocks; therefore unit probably unconf on Owen Stanley Metam. Abd foram (e Te-l Tf)
				SW MARKHAM: Mainly well-bedded turbidites; folded massive greywacke with subordinate siltstone, pebbly sandstone, and shale; also pelagic limestone lenses	Turtidites dep in Aure Trough. Sequence repeated by much folding and faulting. Possibly unconf on Te; later equiv of Omaura Gwke and Kovi Beds; unconf below Yaveufa Fm. Abd plank foram (Td-e Tf)
				SE KARIMUI: Mainly massive siltstone; minor hard shale, marl, and thin pelagic limestone beds; conglomerate, pebble greywacke, detrital and conglomeratic limestone, mudstone, and greywacke siltstone	Apart from trans basin facies, formation consists largely of turbidites; rapid later and vertical variations; well bedded; contains facies trans to Darai Lst. Abd benth and plank foram (Te-Tf); fragmental macrofoss
				NW YULE: Massive resistant medium to coarse poorly sorted greywacke, siltstone, and mudstone give way upsequence to thinly-bedded fine-grained greywacke interbedded with increasing proportion of less resistant soft, finely laminated siltstone and marly mudstone; minor calcareous interbeds; rare lignitic bands and carbonaceous lenses of massive conglomerate	Deep-water sed derived from emerging metam and volc terrain to N and E, and rapidly dep in Aure Trough. Locally grade upward through trans mdst into Miaru Mdst; base of unit not seen; in places overlain by Miaru Mdst; offshore interf with Chiria Fm, Lavao Fm and Tmx?; offshore overlain by thick Pleist-Holo sed. Rare frag corals and molluscs; foram poor, but beds can be corr with Aure Beds in Wau area
				RAMU: Thin-bedded to laminated calcareous mudstone and siltstone, and volcanolithic greywacke; minor siltstone and limestone	Basinal facies of Aure Beds, but much less extensive than in Karimui; formed in deep-water envir close to rapidly eroding landmass; provenance volc; extensively covered by Holo volc ash
		Tmx e Miocene (At least partly included in Tmm[4], JK[4])		E YULE: Calcareous sandstone, limestone, pebble conglomerate*	Shallow-water marine envir. Unconf on Kagi Metam, Auga Beds, and Aibala Volc; to E, probably discon below Talama Volc; to W probably conf below Talama Volc, Chiria Fm; probably interf with Aure Beds. Contains coralgal reef faunas with larger benth foram assem (1? Te stage); many clasts contain derived Eo faunas
		Modewa River, Padowa, and Debolina Beds (Tme, Tme', Tmp, Tmd) l Oligocene-Miocene	200-1000	SAMARAI: Tuffaceous sandstone. Modewa River Beds also contain limestone, tuffaceous siltstone and graded-bedded sandstone and siltstone	All unconf on Kuta Volc, and dated by foram; Modewa River Beds also unconf on Badila Beds and overlain by Fife Bay Volc and its Mount Suau Mem
Late Oligocene - Middle Miocene	Tou[4]	Kore Volcanics (Tmk) m Miocene	up to 250	PORT MORESBY-KALO-AROA: Basaltic and andesitic pyroclastics, lava, volcanic sandstone; to E, includes fine-grained marine tuff with volcanic conglomerate near base	Subaerial and shallow marine volc; broken up, altered, and weathered pyroclastics of intermediate to basic comp. Unconf on Port Moresby Beds; non-conf on Sadowa Gb; conf below Gidobada Lst

Age	Unit	Constituent units in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Oligocene - Middle Miocene	Tou[4] (contd)	Boera Limestone (Tmbo) 1 Oligocene–e Miocene	c.300	W PORT MORESBY–KALO–AROA: Reefal limestone, tuff, lapilli tuff, tuffaceous sandstone, limestone breccia*	Reef comp with contemp volc erosion of Port Moresby Beds and older landmass. In fault contact with Port Moresby Beds; possibly facies and time equiv of Bootless Inlet Lst and Dokuna Tuff, and partly time equiv of Kido Lst. Dated by larger benth foram; corals and indeterminate plant remains also present; some foss reworked from older units
		Bootless Inlet Limestone (Tmb) 1 Oligocene–e Miocene (Partly at least included in Te[4])	40	W PORT MORESBY–KALO–AROA: Calcarenite with volcanic detritus; minor calcareous tuff	Patchy reef comp in shallow–marine envir with nearby explosive volc; adjacent landmass probably to N. Deformed after dep. May be corr of Boera Lst. Dated by larger benth foram; sponge spicules, echinoderms, and bryozoans also present
		Dabi Volcanics (Tod) 1 Oligocene	50	E TUFI–CAPE NELSON: Basaltic lava, pillow lava; minor tuff, limestone	Probably represent basement of Cape Vogel Basin. Unconf overlain by Woruka Sltst, etc. Dated by K–Ar whole–rock method as 28 ± 1 m.y. and by associated Te foram; some conflicting evidence of Paleocene or older age
		Units not differentiated from Tou[4] on 1 000 000 map: Oligo–Mio Aure Beds (see Tml[4])		In Markham: Pleist Qpa (see Qv[4]). In Port Moresby–Kalo–Aroa: Mio Gidobada Lst (see Tmm[4]); and	
Oligocene - early Miocene	To	Dokuna Tuff (Tnd) 1 Oligocene–e Miocene (Included in Te[4])	80–500	W PORT MORESBY–KALO–AROA: Andesitic and basaltic vitric, crystal, and lithic tuff; minor agglomerate; partly calcareous with volcanic fragments set in matrix of brecciated limestone	Submarine explosive volc with nearby reef growth. Interf with Bootless Inlet Lst; unconf on Port Moresby Beds; non–conf on Sadowa Gb; may be corr with Boera Lst and Kido Lst. Dated by larger benth foram in calc matrix; some Eo derived foram. Pavement agg for unsealed roads
		Sadowa Gabbro (Tos) 1 Eocene–m Oligocene	+700	PORT MORESBY–KALO–AROA: To W, gabbro with medium to coarse granular allotriomorphic/hypidiomorphic minor ophitic and glomeroporphyritic textures; diorite and other acid differentiates (granophyre); to E, fine–grained gabbro, dolerite and basalt; generally gabbro chilled against host rock; chemical composition low–K tholeiite*	Elongate intrusive (possibly partly intrusive) body of batholith size. Intrudes Kemp Welch Beds, Port Moresby Beds, and Kutu Volc; unconf below Bootless Inlet Lst, Dokuna Tuff, Kore Volc, Gidobada Lst, Siro Cgl, Astrolabe Aglm, Kwikila Aglm, and Tpy; intruded by shallow intr bodies related to Mount Cameron volc comp. Age from struc and strat contact relat with Port Moresby Beds, Dokuna Tuff, and Bootless Inlet Lst. Selected Cu mineraliz of dissem ch; secondary minerals cc, ml, az. Weathered gb used for surfacing roads
		Units not differentiated from To on 1:1 000 000 map. and Nebire Limestone (see Te[4])		In Port Moresby–Kalo–Aroa: Pleist Ararabu Cgl (see Qa[4]); Mio–Plio Siro Cgl (see Tmm–p[4]);	
Middle Eocene	Te	Imo Tonalite (Tei) e Eocene		E PORT MORESBY–KALO–AROA, W TUFI–CAPE NELSON: Tonalite; some granophyric diorite	In Port Moresby–Kalo–Aroa, intrudes Cumulate gb, High–level gb, Lokanu Volc; age 50–55 m.y. from tentative corr with Eo tonalites in N part of Papuan Ultramafic Belt; potential for Au and Cu mineraliz. In Tufi–Cape Nelson intrudes only Lokanu Volc
		Kui Tonalite (Tek) Eocene		SALAMAUA: Hornblende tonalite (quartz diorite), augite tonalite, and some diorite	Intrudes Tectonite ultram, Granular gb, High–level gb, and Lokanu Volc normally near contact of Granular gb, High–level gb with Lokanu Volc; genetically related? to volc component of Eia Beds. Source? of Au and Cu mineraliz; some late–stage alteration to qtz, ep, py, and ch

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Middle Eocene	Te (contd)	East Cape Gabbro (Tee) m Eocene?		SAMARAI: Gabbro	Mineralogically similar to Kutu Volc; dissem py
		Aibala Volcanics (Tea) Eocene? (At least in part included in Tmm[4])	3000	E YULE: Spilitized submarine basalt intruded by dolerite dykes; minor lenses of chert, limestone, siltstone, and shale*	Submarine envir in which autobrec spilitized lavas intercalated with deep-water siliceous mdst and chert. May interf with and possibly partly overlie Auga Beds; unconf below Tmx and Talama Volc; Eo? age based on occurrence of Aibala Volc-type basalt within foss Eocene lst of Auga Beds, on occurrence of chert horizons in both Aibala Volc and Auga Beds, and on intercalations of Aibala Volc and Auga Beds locally
Eocene	Te[4]	Bomuguina Beds (Teb) Eocene (At least in part included in Qs[4], Tp[4])	500+	SE PORT MORESBY-KALO-AROA: Calcilutite, siltstone, sandstone; minor chert; well bedded	Dep in shelf and deep-sea envir. Possibly corr with Port Moresby Beds; unconf below Cloudy Bay Volc, Kupiano Beds, and Ararabu Cgl. Dated by plank foram
		Godaguina Beds (Teg) Eocene	c.100	SW TUFI-CAPE NELSON: Marl and calcilutite	Probably lenticular body within Kutu Volc. Dated by foram
		Juliade Limestone (Tej) m Eocene	500-1000	ABAU: Limestone with flint nodules; finely interbedded limestone and chert	May conf overlie or interf with Kutu Volc. Dated by plank foram
		Te Eocene (At least in part included in Tmm[4])		WAU: In S, siliceous marl and chert; in N, lenses of coral limestone with some conglomerate	Siliceous sed corr with Eo chert of Port Moresby Beds; lst contains possibly derived Eo foram
		Eia Beds (Tee) Eocene (At least in part included in Tmm[4])		COASTAL SALAMAUA: Marine dacitic/andesitic tuff, breccia, lava, and volcanic necks	Unconf? on Lokanu Volc; unconf? below Iauga Fm. Volc component probably genetically related to Eocene tonalites. Age based on Plank foram
		Kutu Volcanics (KTk, KTk_1, KTk_2) L Cretaceous-m Eocene (Partly at least included in Ku[4], Te[5])	3000-4000 in Tufi-Cape Nelson; 2000 in Port Moresby-Kalo-Aroa	TUFI-CAPE NELSON: Basaltic lava, pillow lava and dykes; minor calcilutite	Eo in W(KTk_2), Cret in E (KTk_1), based on foram in intercalated lst lenses (also in Samarai and Abau). Some ch and py in qtz veins; rare native Cu in lavas
		Kutu Volcanics and Touiawaira Limestone Member (KTk, KTk_1, KTk_2, Tet) (Partly included at least in Ku[4])		SAMARAI, ABAU: Also minor gabbro, microgabbro, and rare ultramafics; some tuffaceous arenite, argillite; foraminiferal limestone lens (Tet in Samarai only)	Minor s mineraliz near Mio intrusives. In Abau scattered evidence from foram suggests L Cret age in N (KTk_1), m Eocene remainder (KTk_2), possible Paleo hiatus
		Kutu Volcanics (KTk) Eocene		PORT MORESBY-KALO-AROA: As above but also some dolerite intrusions and dykes	Probably oceanic crust formed during rifting open of Coral Sea in L Cret and Eo. Overlies and interf with Kemp Welch Beds; unconf below Domara River Cgl, Kusa Volc Mem, Tpy, and Cloudy Bay Volc; relat with Papuan Ultramafic Belt not clear - probably imbricate thrust fault contact; intruded by Sadowa Gb. Dated by plank foram. Minor sulphide mineraliz near Mio intr

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Eocene	Te^4 (contd)	Foasi River Limestone Member (of Kutu Volcanics) (Tef) Eocene	up to 50	SE PORT MORESBY-KALO-AROA: Recrystallized laminated limestone; numerous calcite veinlets	Dep in deep-sea envir. Lenses in Kutu Volc. Dated by poorly preserved plank foram
		Amora Conglomerate (Tea) Eocene	c.300	E PORT MORESBY-KALO-AROA: Conglomerate with schist, quartz, metadolerite, and basalt clasts; minor agglomerate	Probably littoral to sublittoral envir. Overlies? Lokanu Volc; presence of clasts of Kagi Metam, Emo Metam rock types, and basic volc material suggests dep during or after emplacement of Papuan Ultramafic Belt; degree of lithification and jointing suggests Palaeogene rather than Neogene
		Port Moresby Beds (Tem) Paleocene-m Eocene	c.2000	COASTAL PORT MORESBY-KALO-AROA: Argillite, siliceous argillite, shale, calcilutite; minor chert and calcarenite; generally well bedded but other sedimentary structures rare	Dep in deep sea envir mostly on continental slope or rise; occurrence of calcaren suggests local shelf envir. Unconf on Bogoro Lst; contact with Kemp Welch Beds obscured by intrusion of Sadowa Gb, but probably partly overlies and partly grades later into Kemp Welch Beds; unconf below Bootless Inlet Lst, Dokuna Tuff, Kore Volc, Gidobada Lst, Siro Cgl, Astrolabe Aglm, Kwikila Aglm, Tpy; corr with Bomuguina Beds, up part of Auga Beds in Yule, and Juliada Beds in Abau; includes Varirata Argil, Paga Chert, Nebire Lst, and Tatana and Baruni Calc arenites, only diff in areas of detailed mapping. Dated by plank and larger benth foram; radiolarians, sponge spicules, bryozoans, echinoderms, molluscs, plates and columnal joints of crinoids, corals? and fish teeth? also present
		Nebire Limestone (Ten) e-m Eocene (Partly at least include in To)	140	W PORT MORESBY-KALO-AROA: Thick-bedded fine-grained argillaceous biomicrite	Marine low-energy envir, probably bathyal. Most probably near base of Eo part of Port Moresby Beds; contact relat with other subunits not clear. Dated by plank foram; corals and algae also present. Source of crushed agg and building stone
		Unit not differentiated, at least in part, from Te^4 on 1:1 000 000 map. In Port Moresby-Kalo-Aroa: l Oligo-e Mio Bootless Inlet lst (see Tou^4) and Dokuna Tuff (see To); and L Cret Bogora Lst (see Ku^4)			
Early Palaeocene	K	Unit mapped as K on 1:1 000 000 map: In Tufi-Cape Nelson: L Cret Yau Gabbro (see Ku^4)			
Late Cretaceous	Ku^4	Badila Beds (Ktb) L Cretaceous-m Eocene	1000 in Abau	E ABAU, W SAMARAI: Limestone, calcilutite, shale, argillite, calcareous tuff; minor basalt	May interf with Kuta Volc. Some interbeds in Samarai contain uneconomic grades of ph. Dated by plank foram
		Goropu Metabasalt and Bonenau Schist Member (Kw, Kw_1; Kb, Kb_1, Kb_2) L Cretaceous	3000-4000; Member 1000	TUFI-CAPE NELSON: Metamorphosed basalt, dolerite, ophitic gabbro, some hyaloclastite, some impure limestone interbeds; metamorphosed to prehnite-pumpellyite and pumpellyite-bearing greenschist and greenschist facies*. Member consists of calcareous schist and variably schistose limestone; some hornfels*	Originally pile of deep ocean bs (oceanic up crust) metam by underthrusting?. Metam grade decreases systematically to SE; metam equiv of Cret part of Kutu Volc; later equiv of Lokanu Volc. Rare dissem ch. Includes calc beds mapped separately as mem; originally lst lens or lenses within pile of oceanic bs; dated by plank foram
		Yau Gabbro (Ky) L Cretaceous (Included in K)		S TUFI-CAPE NELSON: Gabbro, diorite, granophyric tonalite*	Probably subvolcanic pluton related to Goropu Metab and Kutu Volc. Intrudes and has hornfelsed Bonenau Schist Mem before area regionally metam; age deduced from these relat

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Cretaceous	Ku^4 (contd)	Bogoro Limestone (Kub) L Cretaceous (Partly at least included in Te^4)	up to 30	COASTAL E PORT MORESBY–KALO–AROA: Argillaceous biomicrite; minor calcareous shale generally sheared or contorted	Bathyal envir. In fault contact with or unconf below Port Moresby Beds. Dated by plank foram. Potential raw material for cement manufacture
		Nipanata Beds (Ku) Jurassic?–Cretaceous	c.500	W SALAMAUA: Marl, impure limestone; fine-grained arenitic and pelitic sediments, mostly calcareous; some low greenschist facies metamorphism	Probably interf with Lokanu Volc. Dated in part by poor forams of Salamaua
		Lokanu Volcanics (Kl) Jurassic?–Cretaceous	+100 in Port Moresby–Kalo–Aroa; c.1000 in Tufi–Cape Nelson	E PORT MORESBY–KALO–AROA, TUFI–CAPE NELSON: Massive basalt, basaltic and spilitic lava and pillow lava; uralite, epidote, chlorite, and silica alteration; locally metamorphosed to prehnite–pumpellyite, greenschist, and amphibolite facies near major faults; include some fine-grained and calcareous sediments in Tufi–Cape Nelson	In Port Moresby–Kalo–Aroa, probably overlie Granular gb and High-level gb with trans contact; unconf below Sesara Volc, Domara River Cgl, Musa Volc Mem, Amora Cgl, and Manna Volc; intruded by Imo Tonalite; probably unmetam equiv of Emo Metam; dating by K–Ar method of 116 m.y. based on assoc with gb and ultram of Papuan Ultramafic Belt; host for minor cb–py (py–ep qtz) mineraliz. In Tufi–Cape Nelson, probable later equiv of Cret part of Kuta Volc and Goropu Metab; some ch in amygdules
		Units not differentiated at least in part, from Ku^4 on 1:1 000 000 map. On Abau and Tufi–Cape Nelson: L Cret–Eo Kuta Volc (see Te^4), and Jur?–Cret Owen Stanley Metam (see JK^4)			
Jurassic? – Eocene?	JK^4	Auga Beds (KTa) L Cretaceous–Eocene (part Senonian, part m Eocene) (At least in part included in $Tmm\text{–}p^4$)	5000	NE YULE: Massive siltstone, indurated shale, calcareous subgreywacke, feldspathic sandstone, pebble conglomerate; massive, algal foraminiferal biosparite, detrital limestone, calcareous sandstone, siliceous limestone, chert*	Fore-reef envir. In places difficult to distinguish from Kagi Metam into which may grade with increase of metam; may interf with and possibly partly underlie Aibala Volc; intruded by Tmi. Senonian foram at one locality; Eo and m Eo plank and benth foram; algae and bryozoans in some other lenses
		Kemp Welch Beds (KTw) L Cretaceous–e Eocene	c.3000	PORT MORESBY–KALO–AROA: Argillite, shale, slate, siltstone; minor lithic and feldspathic sandstone and greywacke; rare argillaceous biomicrite, polymictic orthoconglomerate, and interbedded spilitic volcanics; slate at base of section and calcareous sediments most common in upper part of sequence*	Turbidites dep on continental slope and deep ocean floor. Partly overlie and partly grade later into Kagi Metam.– arbitrary contact along chl isograd; underlie and partly grade later into Port Moresby Beds; probably interf with Kutu Volc; intruded by Sadowa Gb; unconf below Mount Davidson Volc, Astrolabe Aglm, and Tpy, and intruded by shallow prophyritic intr related to these volc; corr with Auga Beds in Yule. Dated by plank foram. Py along joint linings and in fracture zones where intr by small bodies of pq ch and pyrrh
		Owen Stanley Complex: Emo Metamorphics (Ke) Jurassic?–Cretaceous	800–1200	NE PORT MORESBY–KALO–AROA: Massive basic schist derived from basalt, dolerite, gabbro, volcanic sediment; minor calcareous and sialic phyllite and schist; metamorphism intermediate between greenschist facies and lawsonite–glaucophane schist facies; chemical analysis suggests low-K oceanic tholeiitic composition of basic schist*	Oceanic crust. Discordant contact with Kagi Metam possibly due to thrusting rather than strat unconf; probably metam equiv of Lokanu Volc; equiv of Goropu Metab and Bonenau Schist Mem in Tufi. Age based on corr with these units
		Owen Stanley Complex: Kagi Metamorphics (Kk) Jurassic?–Cretaceous (At least in part included in $Tmm\text{–}p^4$)	10000	NE YULE, PORT MORESBY–KALO–AROA: Slate, phyllite, schist, minor gneiss; predominantly pelitic metasediments: pyritic slate, and sericite, chlorite, quartz–graphite and quartz–albite–mica–chlorite schists; rarer low-grade psammites identifiable as metamorphic sub-greywacke, quartzite, siltstone,	In Yule, thick marine sed possibly dep in deep geosynclinal basin peripheral to N margin of Australian cratonic landmass; base of fm not exposed; unconf below Tms, Talama Volc; appears to grade with decreasing metam into, and be conf under, Auga Beds up part may grade into Auga Beds with Senonian and mid Eocene

Age	Unit	Constituent unit(s) in 1:250 000 Sheet area	Thickness (m)	Lithology	Additional pertinent data
Jurassic? - Eocene?	JK^4 (contd)			pebble conglomerate, interbeds of metavolcanics. Higher-grade schistose metamorphics: quartz-mica, quartz-garnet-mica, epidote-quartz-mica, and albite-epidote-quartz mica schists; metavolcanic epidote-actinolite schist with rare assemblages of amphiboles including glaucophane. In Port Moresby-Kalo-Aroa, Barrovian-type greenschist facies with progressive metamorphism from chlorite zone, through biotite zone, to garnet zone	fossils; underlies and grades later into Kemp Welch Beds; unconf below Mount Davidson Volc, Astrolabe Aglm, Sesara Volc, and Efogi Volc; intruded by shallow intr (Lavao Fm) comagmatic with Mio, Plio volc and Oveia Dr; Cret macrofoss in related metam near Wau; strat relat with Goldie River Sed and Auga Beds suggest age older than L Cret; age of metam not certain; isotopic age determination of Kaindi Metam and Goroka Fm suggest Oligo-e Mio age; if metam coeval with emplacement of Papuan Ultramafic Belt, age would be Eo or Oligo; Au assoc with py in qtz veins, in gossan, and in alluv; py very common; ch and py rare; gt common accessory in pelitic metam. In Port Moresby-Kalo-Aroa generally similar; overlain also by Tpy; arbitrary contact with Kemp Welch Beds established along chl isograd
		Owen Stanley Metamorphics (Name now obsolete) (Ko) Jurassic?-Cretaceous (Partly at least included in Ku^4)	c.10 000	E WAU, W SALAMAUA, SE MARKHAM: Predominantly low-grade metamorphics; quartz-sericite, andalusite, and quartz-chlorite schist; slate, phyllite; in places, metagreywacke, metaconglomerate, recrystallized limestone; in other places, higher-grade rocks such as quartz-albite-sericite, quartz-albite-muscovite, and epidote-chlorite-actinolite schist with occasional amandine and amphibole	Main metam probably in Eo or Oligo; again possibly in Mio (between Te and Tf_{1-2}). Base of metam not exposed. Cret macrofoss in Wau but age probably Jur-Cret. In Wau and Markham, intruded by Edie Po, Morobe Gd; unconf below Babwaf Cgl and Langimar Beds. In Salamaua, intruded by Tmm; metam source of alluv Au
				SW TUFI-CAPE NELSON: Fine-grained basic and quartz-calcite-sericite schist of greenschist facies; typical assemblage quartz-chlorite-albite-actinolite	Possibly mark trace of thrust; fault lateral equiv of Bonenau Schist Mem and Goropu Metab. Age based on struc interpretation
		Units not differentiated at least in part, from JK^4 on 1:1 000 000 map. In Yule: Mio-Plio Tmi (see Tml); and Mio Talama Volc (see Tmm-p^4) and Tmx (see Tml^4). In Port Moresby-Kalo-Aroa: Pleist Efogi Volc (see Qv^4); and Mio Oveia Dr (see Tmu^4). In Markham: Mio-Plio Edie Po (see TpQp).			
Jurassic - Cretaceous	JK	High-level gabbro (Kh) Jurassic?-Cretaceous	1000	NE PORT MORESBY-KALO-AROA, SE TUFI-CAPE NELSON, W SALAMAUA: Gabbro with zoned plagioclase and/or ophitic texture	Occurs at top of gb zone and probably trans to bs zone. Age from assoc with other units of Papuan Ultramafic Belt
		Granular gabbro (Kg) Jurassic?-Cretaceous (Partly at least included in $\mathcal{T}$)	3000-4000	NE PORT MORESBY-KALO-AROA, SE TUFI-CAPE NELSON, W SALAMAUA: Granular gabbro; includes streaky gabbro, gabbro pegmatite and undifferentiated High-level gabbro and Cumulate gabbro fragments; texture allotriomorphic or hypidiomorphic*	Intrudes Tectonite ultram, Cumulate ultram, and Cumulate gb; probably cogenetic with Cumulate ultram, Cumulate gb, High level gb and Lokanu Volc. Jur age (147-150 m.y.) suggested by K-Ar determinations in Buna; Cret age suggested by assoc with Lokanu Volc and Kuta Volc. Potential for Cu and Ni sulphide mineraliz
		Cumulate gabbro (Kc) Jurassic?-Cretaceous (Partly at least included in $\mathcal{T}$)	c.1000	NE PORT MORESBY-KALO-AROA, SE TUFI-CAPE NELSON, W SALAMAUA: Cumulate gabbro, some with compositional layering, mineral-graded bedding, and scour-and-fill structures*	Low oceanic crust, probably subvolc plutons related to Lokanu Volc. Intruded by Granular gb; may be trans to Cumulate ultram. Potential for Cu and Ni sulphide mineraliz
		Cumulate ultramafics (Ku) Jurassic?-Cretaceous (Partly at least included in $\mathcal{T}$)	up to 500	NE PORT MORESBY -KALO-AROA, TUFI-CAPE NELSON, W SALAMAUA: Ultramafic rock with cumulus texture*	Probably trans upwards into Cumulate gb

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Triassic? - Cretaceous	π	Tectonite ultramafics (U) Mesozoic or older	4000–8000	NE PORT MORESBY–KALO–AROA, TUFI–CAPE NELSON, SALAMAUA, E WAU: Ultramafic rock with tectonite texture, indicating recrystallization in solid state; typical rocks: hartzburgite and dunite with enstatite pyroxenite*	Includes some Cumulate ultram in areas mapped in lesser detail; underlies Cumulate ultram with presumed non–conf, and probably with them represent up mantle; may be refractory residue formed by partial melting of pyrolite mantle to produce bs magma. No age evidence
		Units not differentiated, at least in part, from π on 1:1 000 000 map: In Port Moresby–Kalo–Aroa: Pleist Qpg (see Qv^4). In Tufi–Cape Nelson: Pleist Sivai Brec Mem (see Qv^4) and Ibau Brec (see Qs^4); and Jur?–Cret Cumulate gabbro (see JK). In Salamaua: Jur?–Cret Granular gabbro and Cumulate ultramafics (see JK)			

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Qa^5	Qa, Qs Quaternary	up to 500	SAMARAI, FERGUSSON I: Alluvium: gravel, sand, silt, clay; beach deposits. Colluvium: talus, landslide debris; angular boulders of various sizes commonly in clay matrix	On N coast of Basilak; Sideia and Sariba Is; N, SW and SE coast of Goodenough I: alluv Au; large groundwater reservoir; heavy-mineral (rut) potential, but quantity limited
		Qc Pleistocene–Holocene	up to 100	FERGUSSON I, DEBOYNE: Raised coral limestone (bioherm), mostly not recrystallized	On E and S Sanaroa I, and on Deboyne Is (Smith & Pieters, 1969): inter with alluv and volc dep; source of lime and cement
			90+	TROBRIAND IS: Includes also swamp mud, alluvium, marine clay, and conglomerate	Kiriarina, Kitava and Kaileuna Is
	Qv^5	Goodenough Volcanics (Qg) Quaternary	up to 500	FERGUSSON I: Basaltic andesite lava, some agglomerate, some rhyolite or dacite; mostly porphyritic	On E Goodenough I, overlie metam ultram, and alluv. Suitable for concrete agg and road gv
		Sebutuia Volcanics (Qe) Pleistocene–Holocene	1000–2000	FERGUSSON I: Rhyolite pumice and obsidian, ashflow tuff; trachyte?, dacite?, minor dolerite	On SE Fergusson I, N Sanaroa and Dobu I, overlie metam and ultram. Pumice may be suitable for lightweight concrete agg
		Unit also included in Qv^5 on 1:1 000 000 map. In Fergusson I: Plio–Pleist Kukuia Volc (see TpQp)			
	Qs^5	Q, Qa, Ql, Qc Quaternary		DEBOYNE, SAMARAI, WOODLARK: Raised coral limestone, commonly recrystallised to coarse calcite; in places, soft marine clay and silt with large thick lenses of boulder and pebble conglomerate; in places, clay becomes more calcareous upwards and grades into overlying coral limestone	On Woodlark (Trail, 1967) and Marshall Bennett Is, unconf on volc rocks; raised from 50 to 427; contain abd marine macrofauna – apparently Recent – and carb wood and seeds in places; Au has been worked from cgl; around volc outcrops fine and coarse sed contain alluv Au accumulated on top of coral 1st. Also present on E islands of Engineer Group, other very small and scattered islets, and Deboyne Group (Smith & Pieters, 1969). On S Misima I (de Keyser, 1961), contains corals, algae, bryozoans
		Unit not differentiated from Qs^5 on 1:1 000 000 map: Tert vent brecoia (see Tmm-p)			
Pliocene–Quaternary	TpQp	Pana rora Volcanics (Tpu) Pliocene–Pleistocene? (Partly at least included in Tmu^5)	200	CALVADOS: Bedded coarse unsorted volcanic agglomerate, medium massive well sorted conglomerate, minor tuff, and one lava flow; agglomerate contains pyroxene and hornblende andesites	In Calvados Chain: Moterina I and islands W of it (Smith & Pieters, 1969), overlies Calvados; schist and intermediate intr; no evidence for age, apart from fresh appearance
		Luboda, Omara, Observation Is Gidogidora Granodiorites (Tpg, Tpgl, Tpgo, Tpgb, Tpgg) Pliocene		FERGUSSON I: Granodiorite; minor tonalite, adamellite, granite; xenoliths of altered gabbro hornfelsed metamorphics and ultramafics	On NW Normanby I, overlain by Normanby Volc. On NW Normanby I and Ubuia I, intrudes metam and ultram. On Fergusson and Normanby Is, 1.8–2.7 m.y. old by K-Ar method on biotite separates from seven samples. On Fergusson, Normanby, and Goodenough Is, base metal and Au mineralis probably related to these intr
Pliocene	Tp^5	Mwatebu Sandstone (Tpt) Pliocene	100	SAMARAI: Poorly consolidated sandstone, conglomerate, and siltstone with shelly interbeds	On Normanby I, fluvial and shallow marine sed; unconf on Kurada Metavolc and Mb

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Pliocene	Tp^5 (contd)	Tpv Pliocene (Partly at least included in Te^5)		SAMARAI: Basic volcanics	Islands in Samarai
		Kukuia Volcanics (TpQk) Pliocene-Pleistocene	up to 500	FERGUSSON I: Rhyolite, rhyolite obsidian, trachyte, andesite ashflow tuff, some basalt	On SW Fergusson I, overlie metam and alluv
		Normanby and Amphlett Volcanics (Tpn, Tpm) Pliocene (Tpn partly at least included in JK^5)	up to 2000	FERGUSSON I, SAMARAI (Normanby Volcanics only): Andesitic lava with some rhyolite, dacite, trachyte, trachyandesite, and olivine basalt; basaltic agglomerate	On Normanby I, Dutchess I, and islands NE of Fergusson I, lack of volc landforms suggests Plio. Agg for roads
Middle Miocene - Pliocene	$Tmm-p^5$	Vent breccia Tertiary (Included in Qs^5)		WOODLARK I: Large angular blocks of porphyritic andesite or basalt in matrix of small rock fragments	Manam Hill, Woodlark I (Trail, 1967)
		Granite, porphyry, felsite Tertiary		WOODLARK I: Coarse biotite-hornblende granite with elongated xenoliths of basic volcanic rock in medium groundmass of orthoclase, albite, quartz, and pyrite; porphyries with phenocrysts of feldspar and mafic minerals in fine groundmass; boulders of felsite	On SW Woodlark I (Trail, 1967), Au-bearing
Late Miocene	Tmu^5	Liak Conglomerate (Tml) l Miocene	c.213	DEBOYNE: Conglomerate with mostly well rounded boulders and pebbles up to 30 cm; composed of amphibolite, greenschist, porphyry, quartz, schists, and dolerite, with rare pebbles of Tertiary limestone; sandy in places; pebbles coated with limonite	On central Misima I (de Keyser, 1961), overlaps and probably interf with Gulewa Fm possibly with local unconf. Dated by foram
		Gulewa Formation (Tmg) l Miocene		DEBOYNE: Conglomerate, sandstone, greywacke, siltstone, pebbly sandstone, interformational breccia, tuffaceous and calcareous beds, partly corallogene limestone member; conglomerate and breccia, fine to coarse, well to poorly sorted with pebbles and cobbles of variable roundness; sandstone ranges from fine to very coarse, poorly sorted, and rounded; mudstone and siltstone generally massive	On N Misima I (de Keyser, 1961), abd bivalves, corals, bryozoans, foram
		Kobel Volcanics (Tmk) l Miocene	c.305	DEBOYNE: Agglomerate, volcanic conglomerate, tuff, ash beds, and flows generally of trachytic and andesitic lava	On N Misima I (de Keyser, 1961), in places volc interf with and succeeded by sed of Gulewa Fm
		Unit not differentiated at least in part, from Tmu^5 on 1:1000 000 map: In Calvados: Plio-Pleist? Pana rora Volc (see TpQp)			
Early Miocene	Tml^5	Nasai Limestone (Tn) Miocene	183	WOODLARK I: Fine-grained massive hard limestone, well-bedded when weathered	On SW Woodlark I (Trail, 1967) unconf on Loluai Volc and assoc dl sills. Dated by foram; may be younger than Okiduse Volc, but field evidence definitely younger only than intr of Tert dl

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Early Miocene	Tml^5 (contd)	Okiduse Volcanics (Toa, Tov, Toc) Miocene	610	WOODLARK I: Banded hard tough tuffs overlain by thick lava, tuff, volcanic agglomerate, and conglomerate; mainly porphyritic and non-porphyritic andesitic basalt*	In SW Woodlark I (Trail, 1967), disconf on Winai Hill Fm; main source of alluv dep; py common to abd
		Wonai Hill Formation (Twe, Twt, Twm) e Miocene	260	WOODLARK I: Group of tuffaceous rocks at base, fine to medium, massive and well-bedded apparently unmetamorphosed; thin beds of tuffaceous siltstone, shale and conglomerate interbedded with tuffs; overlying conglomerate has fragments of volcanic rocks in tuffaceous matrix; mudstone massive, uniform, with few silty lenses, some thick*	On SW Woodlark I (Trail, 1967), unconf on Loluai Volc and dl; in places fm and underlying Tabukui Beds separated by disconf; in some places topmost mdst overlain by sltst of Okiduse Volc but in others by cgl; locally probable source of alluv Au
		Tabukui Beds (Ttc, Ttv) e Miocene	550	WOODLARK I: Fine-grained tuff and subordinate siltstone and thin beds of mudstone with common thin lenses of massive volcanic conglomerate and agglomerate, and occasional large lens of conglomerate near base; beds massive to well laminated, usually cleaved, hard and tough*	On SW Woodlark I (Trail, 1967), basal cgl in places probably unconf on Suloga Lst; in other places tuff overlies lst; at one place tuff grades down into calc sltst at top of Suloga Lst. Probable source of Au in Suloga area; py abundant; layers represented by thin beds of massive lim
		Suloga Limestone (Ts) e Miocene	152	WOODLARK I: Limestone, fine-grained, massive to well bedded, with small pyrite crystals both in matrix and thin calcareous veins	On SW Woodlark I (Trail, 1967), dated by foram
		Panasia Limestone (Tme) e Miocene		CALVADOS: Medium to fine limestone composed of calcareous microfaunal remains in matrix of fine-grained calcite	In W Calvados Chain, Panasia, Panavara and Narakdi Is (Smith & Pieters, 1969; Smith 1973), old reef dated by Te foram
		Sewa Beds (Tms) e Miocene	1000–2000?	FERGUSSON I, SAMARAI: Andesitic lava, agglomerate; volcanolithic conglomerate and arenite; dense limestone	On central Normanby I, unconf overlain by Normanby Volc; dated by foram (1 Te) S of Fergusson I map area
Eocene - Oligocene	Tl	Dolerite Tertiary (Tl^5)	610+	WOODLARK I: Medium-grained massive dolerite with many xenoliths of basic volcanic rock*	On SW Woodlark I (Trail, 1967), separate Loluai Volc, or overlie pillow lava of Loluai Volc, or invade cgl member of Tabukui Beds: skarn rock developed on margin of dl sill comp contains in places 0.2 to 6% Cu; some Cu-Fe mineraliz also present; mt bodies in skarn outcrops; mt and ch mineraliz in dl
		Loluai Volcanics (Tls, Tlv) Tertiary? (Tl^5)	460+	WOODLARK I: Massive tuff, lava, pillow lava, and thin agglomerate, thermally metamorphosed, sheared and intruded, and cut by irregular veins of epidote and quartz; partly recrystallized; mainly pyroxene andesite or andesitic basalt; interbedded indurated siltstone and mudstone with shale and thin beds of quartzite; local dolerite with large inclusions of indurated basalt	On SW Woodlark I (Trail, 1967), overlain unconf by e Mio Wonai Hill Fm and probably unconf by e Mio Suloga Lst; very similar to Tert volc higher up in succession; base not visible; probable source of Au in Suloga area; contain small lode of mn oxides at Wasilas Point; mt, hem, and ml mineraliz also occurs in these beds; both Fe and Cu mineraliz confined to skarn
		Acid intrusives (Tgr?) Tertiary		ROSSEL: Granite	On W Sudest I (Smith & Pieters, 1969), possible source of Au-bearing qtz veins intruding schists
		Basic and intermediate intrusives (not differentiated) (Ti) Tertiary		DEBOYNE, ROSSEL: Basic intrusives, medium to coarse; intermediate intrusives consists of diorite, microdiorite, porphyritic micro-diorite; andesite markely porphyritic*	On S Rossel, Sudest, Panapompom, and Nivani Is of Deboyne Gp (Smith & Pieters, 1969), intrude Calvados Schist

Units included in Tl^5: In Woodlark I: Tert Dolerite and Tert? Loluai Volc (see Tl)

Age	Unit	Constituent unit(s) in 1:250 000 Sheet area	Thickness (m)	Lithology	Additional pertinent data
Eocene	Te^5	Unit not differentiated, at least in part, from Te^5:		In Samarai: Plio Tpv (see Tp^5); and L Cret–m Eo Kutu Volc (see Te^4 under Region 4)	
Jurassic - Early Cretaceous	JK^5	D'Entrecasteaux Complex: Md Cretaceous?	3000+	FERGUSSON I: Undifferentiated gneiss and schist, mostly quartzofeldspathic; includes some small granitic intrusions	On N Normanby I, some Cu, Pb, and possibly Au mineraliz
		Kurada Metavolcanics (Mk) Cretaceous?	1000+	SAMARAI, FERGUSSON I: Metabasalt and basic schist, basalt mylonite, contorted laminated limestone; greenschist facies*	On S Normanby I, originally pile of probably submarine bs and bs tephra with minor lst; submarine in Awaiara Bay; may overlie Prevost Metam
		Prevost Metamorphics (Mp) Cretaceous?	2000+	SAMARAI, FERGUSSON I: Layered sequence of chloritic basic schist, calcic schist, and quartz–feldspar–mica schist; greenschist facies	In Samarai, minor alluvial Au. On Fergusson I, originally mainly quartzo-feldspathic sed with some interbedded lst and basic volc; may underlie Kuroda Metavolc
		Potai Amphibolite (Mt) Cretaceous?	500–1000	FERGUSSON I: Massive amphibolite; minor ultramafics; amphibolite facies*	On NW Fergusson I and inland Goodenough I, originally stocks of gb with minor ultram; lacks comp layering
		Mebulibuli Metamorphics (Mi) Cretaceous?	600+	FERGUSSON I: Layered sequence of amphibolite, calcic gneiss, and quartzofeldspathic gneiss; amphibolite facies*	On NW and E Fergusson I, N inland Goodenough I, originally basic lava and tuff and calc sed; underlain by Amawa Metam; some Cu, Pb, and possibly Au mineraliz
		Amawa Metamorphics (Ma) Cretaceous?	1000	FERGUSSON I: Layered sequence of quartzo–feldspathic gneiss with 10% amphibolite and calcic gneiss; amphibolite facies*	On Goodenough and Fergusson I, layered, originally bedded sed, possibly volcanogenic with bulk comp approximating gd; overlain by Mebulibuli Metam, and underlain by Gudani Metam
		Gudanai Metamorphics (Mn) Cretaceous?	600+	FERGUSSON I: Quartzofeldspathic gneiss; some amphibolite and calcic gneiss, part migmatite; amphibolite facies	On S Goodenough I and N Fergusson I, lacks layering; originally sed sequence like that which formed Amawa Metam; overlain by Amawa Metam, and intruded by Omara Gd
		Morima Metamorphics (Mr) Cretaceous?	600+	FERGUSSON I: Leucocratic quartzofeldspathic gneiss with consistent layering; amphibolite facies	On S Fergusson I, originally sed sequence with bulk composition approximating leuco; overlain by Amawa Metam, and intruded by Omara Gd
		Deboyne Metavolcanics (Kl) Mesozoic?		DEBOYNE: Metamorphosed basic volcanics and interbedded fine–grained deep–water sediments invaded by basic and intermediate dykes; metavolcanics uniformly medium to fine commonly well jointed; interbedded sediments fine–grained sandstone and siltstone*	Louisiade Archipelago: Panaete and Panpompom Is of Deboyne Gp (Smith & Pieters, 1969)
		Porphyry Palaeozoic or Mesozoic?		DEBOYNE: Dacitic, andesitic, and feldspar porphyries, and felsites; some granodiorite*	On central and E Misima I (de Keyser, 1961), responsible for mineraliz
		Metagabbro Palaeozoic or Mesozoic?		ROSSEL: Metagabbro and metabasalt: medium to fine, with foliated texture	NE Rossel or Yela I, locally Sudest I (Smith & Pieters, 1969)
		Trondhjemite Palaeozoic or Mesozoic?		DEBOYNE: Trondhjemite	Misima I (de Keyser, 1961)
		Ultramafics	150	ROSSEL: Pyroxenite, medium–coarse grained; serpentinite, fine–grained*	On SW Rossel I (Smith & Pieters, 1969), conf on low-grade (Calvados) schist

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Jurassic - Early Cretaceous	JK[5] (contd)	Calvados Schist (K or Ke) Cretaceous?	600+	ROSSEL: Pelitic siltstone, sandstone, and minor conglomerate; lowermost greenschist facies or lower grade*	Au in quartz veins on Sudest, Ylia, and possibly other islands; minor py, chromite, and rare Mn associated with Au-bearing qtz veins on Sudest I (Smith & Pieters, 1969; Smith, 1973)
		Umuna Schist (M/Pzu) Mesozoic?		DEBOYNE: Phyllite; graphitic, mica, quartz, and banded schist	Misima I (de Keyser, 1961)
		St Patrick Limestone (M/Pzs) Mesozoic?	0-33	DEBOYNE: Marble and impure limestone, in places with silica bands (recrystallised chert? and lenses and bands of sandy limestone	Misima I (de Keyser, 1961)
		Ara Greenschist (M/Psa) Mesozoic?	100-170+	DEBOYNE: Chlorite-albite-epidote-actinolite schist (metamorphosed basic volcanics)	Misima I (de Keyser, 1961)
		Oiatau Gneiss (M/Pzo) Mesozoic?	830+	DEBOYNE: Gneiss and schist; minor amphibolite*	Misima I (de Keyser, 1961)
		Lalama Amphibolite (M/Pzb) Mesozoic?		DEBOYNE: Massive plagioclase amphibolite, foliated amphibolite, banded hornblende, gneiss, garnetiferous in part, minor intercalated gneiss	Misima I (de Keyser, 1961)
		Units not differentiated at least in part, from JK[5] on 1:1 000 000 map. In Samarai: Plio Normanby Volc (see Tp[5])			
Early Cretaceous	JK	Mb Cretaceous or older		SAMARAI: Gabbro; diopside-hypersthene-bytownite rock, some olivine, hornblende; fine granular texture	On Normanby I, similar to gb of Papuan Ultramafic Belt
		Gabbro (Mb) Cretaceous?	500?	FERGUSSON I: Gabbro and norite*	On Goodenough I, partly covered by Qg
		In Samarai, JK also includes Plio Mwatebu Sst (see Tp[5]) on the 1:1 000 000 map			
Late Triassic? -Early Cretaceous	π	Ultramafics (Mu) Cretaceous or older	3000 on Fergusson I	FERGUSSON I, SAMARAI: Ultramafics: dunite, hartzburgite, wehrlite, enstatite pyroxenite, websterite*	On Fergusson I, possible source for lateritic Ni, Ni sulphides, Pt, Cr Mt, As; fault bounded blocks intruded by Tpg, Omara Gd, Observation Island Gd; partly covered by Tpn, Qg, and Qe. Also present on SW Normanby I

Age	Unit	Constituent unit(s) in 1:250 000 Sheet area	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Qa^6	Qa Holocene (Partly at least included in Qs^6)	600 in low Markham valley; 200 in Madang	HUON-SAG SAG, NE RAMU, NE BOGIA, KARKAR I, MADANG, MARKHAM: Alluvium and beach deposits: gravel, sand, silt, mud, clay; minor peat, colluvium, soils, and swamps; lenticular gravel aquivers	In Madang and Karkar I, gv source of road agg; prospected unsuccessfully for heavy minerals in Astrolabe Bay and on Karkar I
		Qs Quaternary (Partly at least included in $Tmm\text{-}u^6$, Tml^6, Tou^6)	up to 200 on Madang	S, W HUON-SAG SAG, S MADANG: Colluvium: chaotic boulder deposits of angular rock fragments	Landslides: mainly debris avalanches, and combination of debris avalanches and large rotational slumps
		Qf Holocene-?Pleistocene (Partly at least included in Tp^6)	80+	NW MARKHAM, SW MADANG: Unconsolidated to poorly consolidated pebble, cobble, and boulder gravel, sand, and silt; generally stratified, poorly sorted; coarser in fanhead than in toe	Surface sed Holo, probably Pleist below; piedmont slope sed; lenticular sand and gravel aquifers with clayey gv aquicludes
		Units not differentiated, at least in part, from Qa^6 on 1:1 000 000 map: In Madang: Quat Wandokai Lst (see Qs^6)			
	Qs^6	Wandokai Limestone (Qw) Quaternary (Partly at least included in Qa^6, Tml^6, Tou^6)	2000 in Huon-Sag Sag; 400 in Bogia; 800 in Madang; 200 on Karkar I	BOGIA, COASTAL HUON-SAG SAG, MADANG, KARKAR I: Massive or crudely bedded, cavernous biocal-cirudite, calcarenite, calcilutite, calcareous mudstone, subordinate lithic arenite, conglomerate; subordinate volcanically derived sandstone and conglomerate	In coastal Huon-Sag, fringing and patch reef comp; in NW, unconf on Kabenau Beds, Gusap Arg, Finisterre Volc; on coast N of Finisterres, unconf on Tipsit Lst; in part unconf on, and in part facies equiv of Timbe River Cgl; corals, algae, bryozoans, bivalves, gastropods, larger and smaller foram; corr with lst dated by radiocarbon and Th-230 methods in Huon Pen as greater than 250 x 10^3 to 6 x 10^3 years. In Bogia, interf with and partly overlies Kabenau Beds; dated by plank foram as N21-22 in part. In Huon-Sag Sag in part unconf on Song River Calc and Kabwum Lst Mem. In Madang unconf on Gusap Arg, Finisterre Volc. Tipsit Lst, and Kabenau Beds; partly overlain by and partly facies equivalent of Timbe River Cgl; used for road agg and manufacture of stabilized bricks; aquifer for Madang and coastal villages; potential commercial source of lime; clay used for pottery
		Timbe River Conglomerate (Qpt) Pleistocene (Partly at least included in Tp^6)	800 in Madang; 100 in Huon-Sag Sag	MADANG, HUON-SAG SAG: Pebbly sandstone, sandstone, conglomerate; conglomerate very poorly sorted, well rounded; limestone pebbles and cobbles predominant; crudely to evenly bedded	In NW Huon-Sag Sag and coastal S Madang, raised deltas and alluvial fans; facies equiv of dated Pleist reefs; overlies Kabwum Lst Mem; grades later into more volc derived parts of Wandokai Lst. In W Madang, unconf on Tipsit Lst, Kabwum Lst Mem; partly conf overlies and partly facies equiv of Wandokai Lst; plank foram indicate N21-22 in part
		Qpg Pleistocene (Partly at least included in $Tmm\text{-}u^6$, Tou^6)	20 on Madang; c.30 on Markham	SE MADANG: Fluvioglacial deposits: poorly sorted crudely bedded gravel, sand, silt and clay MARKHAM: Also boulder beds	Valley-dammed lakes which received fluioglacial dep during Pleist glaciation
		Qpm Pleistocene (Partly at least included in $Tmm\text{-}u^6$)	10	CENTRAL HUON-SAG SAG: Glacial moraine: unsorted and unconsolidated massive till with limestone clasts	Remnant of Pleistocene glaciation: terminal glacial moraine. Overlies Gowop Lst

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Qs^6 (contd)	Qp Pleistocene	800	NE RAMU: Mudstone, soft, carbonaceous, and shelly, interbedded with friable carbonaceous sandstone and siltstone, partly conglomeratic, grading laterally into chalky limestone	Marine. Overlain by fgl and alluvium. Contains corals, molluscs, and bryozoans
		Qp Quaternary		E, NE HUON-SAG SAG: Raised coral	Fringing reefs
		Units not differentiated at least in part from Qs^6 on 1:1 000 000 map: Qa (see Qa^6) and Kabenau Beds (see Tp^6)			
Pliocene	Tp^6	Ouba Beds (Tpo) Pliocene	1000-3000	NE RAMU: Mudstone, massive to thinly-bedded; interbedded soft mudstone, siltstone and sandstone; minor conglomerate and limestone; pebble boulder conglomerate, partly calcareous	In places unconf on unnamed Oligo? to e? Mio Beds (Tlm). Lowermost cgl beds grade later into richly foss lst with abd corals, bryozoans, and molluscs. Foram common throughout
		Leron Formation (Tpl) m Miocene-l Pliocene-Pleistocene?	up to 1000 in Markham; 2000 in Madang; 100 in Huon-Sag Sag	NE MARKHAM: Alternating well bedded sandstone, pebbly sandstone, and conglomerate; subordinate siltstone and minor limestone lenses; minor lignite; poorly indurated and generally well sorted	Flanking dep derived from erosion of rising Sarawaged Range; dep in shallow-water marine and estuarine envir. Probably equiv to Babwaf Cgl; unconf on Mena Beds. Foram in lst lenses; plant remains
				HUON-SAG: Conglomerate with basalt and andesite clasts predominating; crudely bedded and poorly sorted	Unconf on Finisterre Volc. Plio foram
				MADANG: Greywacke, pebbly lithic arenite, conglomerate, some very coarse siltstone, minor limestone; lignite common	In SW Madang, shallow-marine envir of shelf type which received abd terr detritus from uplifted Finisterre Ranges; unconf on Gusap Arg; facies equiv of Kabenau Beds; basal beds contain larger foram dated as Te-e Tf; includes rocks previously described as Leron Fm and Mena Beds; grades up into non-marine Qf
		Tp, Tpi Pliocene (Partly at least included in $Tmm\text{-}u^6$, Tml^6)	100	SW HUON-SAG SAG: Basic volcanics: mainly horizontal flows of basalt with clinopyroxene and olivine phenocrysts*	Horizontal basalt filling depressions between tilted fault blocks. Postdates probably e Plio uplift and block faulting. Unconf on Tipsit Lst
				BOGIA: Fine-grained dolerite, microdolerite, microtonalite, diorite, granodiorite, gabbro	Intr Kabenau Beds
				CENTRAL MADANG: Gabbro, diorite, clinopyroxene diorite, hypersthene gabbro, dolerite, microdiorite, quartz gabbro, tonalite, microtonalite, granophyric differentiates	Intr; limited contact metam, with minor mineraliz of py and ch; intrude Tipsit Lst, Kabwum Lst Mem and Finisterre Volc; intrude Kabwum Lst Mem as stocks, dykes, and sills; evidence of po-type mineraliz
		Uvo Volcanics (Tpu) Pliocene-Pleistocene (At least partly included in Tou^6)	500	E BOGIA: Andesitic agglomerate, lapilli tuff, tuff; agglomerate fine-grained and of high-silica andesite composition	Subaerial volc. Unconf on Finisterre Volc
		Kabenau Beds (Tpk) m Miocene-l Pliocene/Pleistocene (Partly at least included in Qs^6, Tml^6, Tou^6)	5000 in Madang 3500 in Karkar I	W MADANG, BOGIA, KARKAR I: Well bedded, cross-bedded calcareous lithic arenite, siltstone, mudstone, paraconglomerate (some very coarse); lignite common; interbedded biomicrite (and basaltic to andesitic volcanics in places in Bogia and Karkar I only)	In Madang and Bogia, shallow-marine and deltaic envir which received abd terr detritus; abd plank (N11-N21, 22) and, in places benth smaller foram; frag carb plant remains; bivalve frags; 1 Te-e Tf date obtained from Karkar I. In Bogia, unconf on Finisterre Volc; intert with and in part unconf on Gowop Lst; partly conf below and interf with Wandokai Lst; in SE unconf on Gusap Arg. In Madang, in NW, unconf below Wandokai Lst; elsewhere unconf on Finisterre Volc and unconf

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Pliocene	Tp^6 (contd)				below Timbe River Cgl; facies equiv of Leron Fm and Tipsit Lst and Kabwum Lst Mem in part; probably greatest thickness in W Madang; distinguished from Leron Fm by finer and more persistent bedding and better sorting
	Units not differentiated at least in part from Tp^6 on 1:1 000 000 map: In Huon-Sag Sag: Pleist Timbe River Cgl (see Qs^6). In Madang: Oligo-Mio Kwama Bs (see Tou^6). In Markham and Madang Quat Qt (see Qa^6)				
Late Miocene	$Tmm-u^6$: In E Bogia, Oligo-Mio Finisterre Volc (see Tou^6) erroneously? included in Tmu				
Middle - Late Miocene	$Tmm-u^6$	Song River Calcarenite (Tms) m Miocene-Pliocene	2800	E HUON-SAG SAG: Calcarenite, well bedded, fine-grained, moderately well sorted, interbedded with g calcilutite to E; bedding regular; fine grained to SE becoming predominantly micritic near Finschhafen; minor lava breccia*	Deep-water marine envir receiving sed from reef comp which also shielded envir from terr detritus; rhythmic local alterations of calcaren and calcilut show beds turbiditic, implying intermittent density currents transporting fine reef detritus into bathyal envir. Inter with Pindiu Sst; to W, changes gradually into largely non clastic algal-foraminiferal biomic of Gowop Lst; unconf on Kabwum Lst Mem; probably gradually thins to E
		Gowop Limestone and Kabwum Limestone Member (Tmgo, Tmgk) e or m Miocene-Pliocene	up to 3200 in Huon-Sag Sag; up to 1300 in Markham; 3000 in Bogia; member 3500 in Huon-Sag Sag; 2500 in Madang	HUON-SAG SAG, N, NE MARKHAM: Resistant, crudely bedded or massive algal-foraminiferal biomicrite; minor calcarenite and calcilutite	In Huon-Sag Sag, reef core of barrier and platform reef comp; unconf on Finisterre Volc in S; partly later equiv of and partly overlain by Kabwum Lst Mem and Song River Calc area; algae, larger and smaller foram (l Te-Tg), molluscs, corals. In Markham, unconf on Finisterre Volc; low part complexly interf with Tipsit Lst; gradational into Kabwum Lst Mem; contemp with Membu Beds and Mena Beds; foss similar to those in Huon-Sag Sag. In Bogia, small fringing and barrier reef comp; interf with and partly conf below Kabenau Beds; larger and plank foram indicate l Te-e Tf in part
				Member IN HUON-SAG SAG, MARKHAM, MADANG: Algal-foraminiferal biomicrite, biocalcirudite, soft well bedded calcarenite, calcilutite; calcareous mudstone at top; biomicrite more porous, slightly less resistant and better bedded than remaining part of Gowop Limestone	In Huon-Sag Sag, forereef and reef core of platform reef comp; conf on Tipsit Lst, unconf below Wandokai Lst and Timbe River Cgl; later equiv of much of Gowop Lst farther S; contain plank and larger foram, algae, corals, bryozoans, bivalves, gastropods; algal-foram biomic contains larger foram of l Te to e Tf age; calc mdst contains plank foram of N9 to N18-22 age. In Markham, gradational from Gowop Lst; conf on Tipsit Lst; contains larger and plank foram, algae, corals, and molluscs. In Madang, conf on Tipsit Lst; unconf below Wandokai Lst and Timbe River Cgl; partly facies equiv of Kabenau Beds and Leron Fm; thins to S and W; base dated by larger foram from algal foram biomic as l Te-e Tf; calc mdst with plank foram of N_{18}-N_{21} age at top of fm; suitable as source of lime
		Tipsit Limestone (Tmp) e or m Miocene (At least partly included in Tou^6)	500 in Huon-Sag Sag; 1000 in Madang	HUON-SAG SAG: Soft, micritic limestone, biomicrite, calcilutite, lignite, and calcareous shale; silt and fine sandstone at base; some calcarenite with limestone and organic fragments in micritic groundmass; paraconglomerate at base in places	Restricted lagoonal envir which received terr detritus, changing with time into open back-reef envir shielded from terr detritus. Wedges abruptly to N; conf below Kabwum Lst Mem; in part conf on Kwama Bs. Contains sponges, bivalves, gastropods, frag plant remains; plank and larger foram indicate e Mio

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Middle - Late Miocene	Tmm-u[6] (contd)			MARKHAM: Also lignitic and clacareous shale; siltstone and fine-grained sandstone at base	Grad over Kwama Bs; comp interf with low part of Gowop Lst; conf below Kabwum Lst Mem; dated foram as l Te
				MADANG: Also calcareous conglomerate near base in places	Unconf on Finisterre Volc; conf below Kabwum Lst Mem; on coast, unconf below Timbe River Cgl; facies equiv in part of Kabenau Beds; wedges abruptly to NE; thins gradually to W
		Units not differentiated, at least in part, from Tmm-u[6] on 1:1 000 000 map: In Huon-Sag Sag and Madang: Quat Qs (see Qa[6]) e Mio, l Oligo Kwama Bs and Oligo-Mio Finisterre Volc (see Tou[6]). In Madang and Markham: Pleist Qpg (see Qs[6]) and e Mio, e Oligo Kwama Bs (see Tou[6]). In Huon-Sag Sag, Bogia, and Finisterre Volc (see Tou[6])			In Huon Sag Sag: Pleist Qpm (see Qs[6]).
Early Miocene	Tml[6]	Ts (Unnamed intrusives) e Miocene? (At least partly included in Tou[6])		NE MARKHAM: Gabbro, andesite porphyry, diorite	Intrudes Mebu Beds and Finisterre Volc. Commonly pyritic; minor Cu mineraliz
		Mena Beds (Tml) e-m Miocene		NE MARKHAM: Interbedded micaceous sandstone, greywacke, lithic siltstone, conglomerate, minor limestone lenses	Geosynclinal sed in S part of Northern New Guinea Basin; clastic sed contemp with part of Gowop Lst. Probably unconf on Mebu Beds; unconf below Leron Fm. Contains foram and plant remains
		Pindiu Sandstone (Tmq) e-m Miocene (At least partly included in Tou[6])	5000	E CENTRAL HUON-SAG SAG: Well bedded, poorly sorted tuffaceous and in places carbonaceous sandstone and siltstone; fine to coarse, with argillaceous matrix	Deep-water marine envir which received turbiditic sed from volc source area to SW. Up part of Finisterre Volc probably up-slope lateral equiv of Pindiu Sst; conf below Song River Calc area and Gowop Lst; probably conf on low part of Finisterre Volc. Plank foram (l Te-e Tf) and carbon plant remains
		Units not differentiated, at least in part, from Tml[6] on 1:1 000 000 map: In Bogia: Quat Qs (see Qa[6]) and Wandokai Lst (see Qs[6]); and Plio Tp (see Tp[6]). In Karkar Mio-Pleist Kabenau Beds (see Tp[6])			
Late Oligocene	Tou	Tu Tertiary or older (from early report, substantiated by neither private mining company investigation nor recent regional mapping		W HUON-SAG SAG: Ultrabasic intrusions: coarse, even grained peridotite and serpentinized peridotite	Small intr; seem to intrude Finisterre Volc and Tipsit Lst
Late Oligocene	Tou[6]	Kwama Basalt (Tmk) e Miocene, l Oligocene (Partly at least included in Tp[6], Tmm-u[6])	500 in Madang; 150 in Huon-Sag Sag	N HUON-SAG SAG, E MADANG, MARKHAM: Basaltic lava, generally much less brecciated than Finisterre Volcanics; porphyritic basalt*	In Huon-Sag Sag and Madang, flat-lying submarine platform which received series of lava flows; up part interf with Tipsit Lst; in S comp interf relat with both Gowop Lst and Tipsit Lst; Miocene; in N conf overlain by Kabwum Lst Mem and Tipsit Lst; probably conf on Finisterre Volc in S, Pindiu Sst in N. Also present in Markham, but of Oligocene age
		Mebu Beds (Tom) l Oligocene-m Miocene		NE MARKHAM: Greywacke, argillite, basaltic-andesitic volcanolithic conglomerate; minor basaltic lava, pyroclastics, and limestone lenses; rocks strongly indurated, veined, sheared	Dep in course of geosynclinal clastic sedimentation in S part of Northern New Guinea Basin. Unconf on Finisterre Volc; probably unconf below Mena Beds; intruded by unnamed e Miocene minor intr; contemp with Tipsit Lst and low part of Gowop Lst. Contains foram

Age	Unit	Constituent units in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Oligocene	Tou^6 (contd)	Finisterre Volcanics (Tof) e Oligocene–e Miocene (l Oligocene on Markham) (Partly at least included in Tmu, $Tmm-u^6$)	5500 in Huon Sag Sag; 2500–5000 in Madang; 4500 on Karkar I	S, NW MADANG, SE BOGIA, W HUON-SAG SAG, KARKAR I: Basaltic and andesitic flow breccia, indurated tuffaceous lithic greywacke, lithic and crystal tuff, paraconglomerate, peperite and peperitic breccia, palagonite breccia, lava, pillow lava, pillow breccia; minor agglomerate, argillite, limestone lenses	In Huon-Sag Sag submarine volcanoes and slopes with volcanolithic sed, rubble slides, paraogl, and associated turbidite dep; conf below Gowop Lst in S-centre and Kwama Bs in N; interf with Pindiu Sst in N; possibly conf below Song River Calcaren in E; probably up part intert with and partly conf below Pindiu Sst. In Markham, conf below Kwama Bs; unconf below Gowop Lst and Mebu Beds; intruded by unnamed e Mio minor intr; conf on Gusap Arg; in E unconf below Tipsit Lst and Kabwum Lst Mem; in W unconf below Kabenau Beds, Leron Fm, and Wandokai Lst; contains larger foram and algae; dated by K-Ar method at 34.4 ± 1 m.y. to 24.1 ± 0.7 m.y.
		Gusap Argillite (Teg) m Eocene–m–l Eocene	5000 in Madang	W MADANG, SW BOGIA, KARKAR I (section only): Indurated, strongly jointed, veined cherty argillite, chert beds, tuffaceous lithic greywacke, lithic greywacke, subordinate basalt and andesite flow breccia, pillow lava, lava, volcanic breccia dolerite and microdiorite, lithic and crystal tuff cherty micritic limestone, paraconglomerate	Deep, probably fault-bounded trough and steep submarine slope which received at first fine terr detritus and plank foram, and later coarser volc detritus, lava flows, and tuff. May overlie oceanic crust; grades up into Finisterre Volc; unconf below Leron Fm in SW Kabenau Beds and Wandokai Lst in NW; probably thins gradually to N; Dated by plank foram and nannoplankton (P12-14). Grades into Finnisterre Volc indicating that either Teg extends into e Oligo or Finisterre Volc extend into l Eo; lithological similarity with Goroka Fm, which may be older, deeper level, more metam equiv; possibility of continuous dep of Goroka Fm through to Teg, i.e., Teg may range to Cret or M9 may be E Tert in part
		Units not differentiated at least in part, from Tou^6 on 1:1 000 000 map: On Karkar I: Quat Wandokai Lst (see Qs^6). In Huon-Sag Sag: Pleist Qs (see Qs^6); e or m Mio Tipsit Lst (see $Tmm-u^6$); and e–m Mio Pindiu Sst (see Tml^6). In Markham: Pleist Qpg (see Qs^6); and e Mio? Ts (see Tml^6). In Bogia: Plio–Pleist Uvo Volc (see Tp^6). In Bogia, Karkar I, Madang: Mio–Pleist Kabenau Beds (see Tp^6)			

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Qa^7	Qa, Qab (At least partly included in Qs^7)	up to 500	POMIO, N and TALASEA-GASMATA, N and S CAPE RACULT-ARAWE, GAZELLE PENINSULA: Alluvium and beach sand; gravel, sand, silt, clay. Fanglomerate and raised boulder beds: gravel, sand, silt, mud; poorly consolidated	In Pomio, Talasea-Gasmata, and Cape Raoult-Arawe, mainly Holo but probably includes some Pleist sed; boundaries with Kimbe Volc, Qo, and Cape Glouster Volc poorly defined, gradational and arbitrary in some areas; in places source of road metal and concrete agg. In Gazelle Pen, minor alluv An; mt beach sands under investigation; gr used for road-making and agg; overlies Sai Beds and forms discontinuous capping on Ti (Toi); plant remains and some mollusos
	Qv^7	Qv Quaternary	up to 100	NE MADANG, KARKAR I: Tholeiitic basalt and andesitic pyroclastics; highly prophyritic; agglomerate, tuff, ash, reworked*	In Madang strat relations unknown; subaerial volc, largely explosive; reworking of pyroclastics; part of active Bismarck Volcanic Arc
		Qav Holocene (Not mapped in detail)		N, NE GAZELLE PENINSULA: Volcanolithic gravel, sand, silt, minor primary ash; some current bedding	Reworked volc ejectamenta from Rabaul eruptive centres
				SAG SAG, MADANG, KARKAR I, BOGIA, SEPIK: Basalts, low- and high-silica andesites, very rare dacites; mostly high porphyritic*	Westernmost New Britain, Umboi, Ritter, Tolokiwa, Sakar, Siassi Is, Long I, Crown Is, Bagabag, Karkar I, Manam, Boise, Bain, and all remaining Schouten Is (Johnson, Taylor, & Davies, 1972)
		Kimbe Volcanics (Qk) Pleistocene-Holocene	up to 1200 in Cape Raoult-Arawe; up to 2500 in Talasea-Gasmata; up to 3000 in Gazelle Peninsula	NW CAPE RACULT-ARAWE, TALASEA-GASMATA, SW GAZELLE PENINSULA: Andesitic, dacitic, rhyolitic and basaltic lava, pyroclastics, and reworked pyroclastics; principally ash, lapilli, scoria, and rubble; minor obsidian; high level hypobyssals, superficial ash and pumice	In Cape Raoult-Arawe, potential coral source of good-quality crushed agg. In Talasea-Gasmata, includes all volc and assoc material on N coast of Talasea-Gasmata; youngest rocks erupted from Mt Ulawun in 1970; S on Mt Bamus, Pagop, and Garbuna. In Gazelle Pen, some S in crater of Mt Lolobau; include all volc and their products between Likurnanga and Willaumes Pen W of map
		Cape Glouster and Andewa Volcanic Complex and Rabaul Volcanics (Qg, Qa, Qv) Pleistocene-Holocene	up to 2000 in Cape Raoult-Arawe; 1000-5000 in Gazelle Peninsula	NW CAPE RACULT-ARAWE, NE TALASEA-GASMATA: Basaltic, andesitic, and dacitic lava, pyroclastics, and reworked pyroclastics; andesitic porphyry and microdiorite	In Cape Raoult-Arawe, bulk occurs W of area as product of Tangi and Talawe volcanoes; volcanoes probably Pleist as inferred from degree of dissection, but young cores present in places; overlie Aria Beds; potential local source of good quality crushed agg. In Gazelle Pen, volc ejectamenta from Rabaul eruptive centres from NE lowland; also eruptive centre at Watom I; pumice may be suitable for use as lightweight concrete agg
	Qs^7	Qc, Qpc Pliocene?, Quaternary	up to 300; 50-100 in Gazelle Peninsula	S TALASEA-GASMATA, S POMIO, S CAPE RACULT-ARAWE, S, E GAZELLE PENINSULA: Raised coral: porous coral bioherms; mostly not crystallized; calcarenite, calcirudite, calcareous mudstone, siltstone, sandstone and conglomerate; marl beach rock	Equiv to Qpc in Gazelle Pen includes all reefs and lagoonal sed elevated above high-tide level; possibly as old as Plio in places; source of road and airstrip surfacing material (coranous) and lime
		Ip and Riet Beds (Qpi, Qpr) Pleistocene-Holocene	up to 400 in Pomio; 300-500 in Gazelle Peninsula	POMIO, GAZELLE PENINSULA: Semiconsolidated conglomerate, sandstone, siltstone; minor sandstone with molluscs; clasts include Baining Volc, unnamed plutonics, and Yalam Lst some current bedding	In Pomio, fluv and marine; overlain by Qo; dep along fault; equiv to Qab in Sai River dated by plank foram. In Gazelle Peninsula, formed by erosion of Baining Mts, with some volc ejecta higher in section; single C^{14} date of 50 000 years; some bs dykes and sills; unconf on Sinewit Fm and Meulo Volc; conf and disconf below Rabaul Volc
	In Pomio, Qs^7 also includes some Qa (see Qa^7)				

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Pliocene	Tp^{7}	Johanna Beds (Tpj) Pliocene and younger (At least partly included in Tm[1])	up to 200	CAPE RACULT-ARAWE: Soft calcareous siltstone, sandstone, mudstone, and conglomerate; limestone and shelly pumiceous siltstone	Pumiceous detritus suggests equiv to Kapiura Beds; unconf on Baining Volc, Kapuluk Volc, and Yalam Lst; overlies Aria Beds; equiv in part to Aria Beds; overlain by and partly equiv to Qc, possibly extending into Pleist. Dated by plank foram (N19-21)
		Aria Beds (Tpa) Pliocene	up to 500	CAPE RACULT-ARAWE: Semiconsolidated marine volcanolithic sandstone, siltstone, mudstone, and conglomerate; calcareous in part	Overlie Yalam Lst and overlain by Schrader-Andewa Volc and Johanna Beds; probably equiv to Johanna Beds. Dated by plank foram (N19-21)
		Sai Beds (Tps) l Miocene, Pliocene or slightly younger	150-500	N POMIO, S GAZELLE PENINSULA, TALASEA-GASMATA: Soft calcareous mudstone and siltstone; limestone lenses and interbeds. Locally in Gazelle Peninsula some sandy (?tuffaceous) interbeds in mudstone; coral bioherms and bioclastic	In Pomio, overlie Baining Volc, Merai Volc, Yalam Lst, Sinewit Fm; dated by plank foram. In Gazelle Peninsula, later equiv of Lakit Lst and possibly of up part of Sinewit Fm; unconf below Qab; dated by foram (N19 and lower N20); molluscs also present. In Talasea-Gasmata dated at N17-19
		Lakit Limestone (Tpl) Pliocene or slightly younger	200-300	GAZELLE PENINSULA: Bioclastic limestone; poorly consolidated; soft clayey calcareous matrix	Later equiv of Sai Beds; probably slight angular unconf on Sinewit Fm. Algal, coral bryozoan, and molluscan debris. Dated by foram. Possible commerical source of lime
Late Miocene - early Pliocene	$Tmu-p^{7}$	Penk Volcanic Complex (Tpp) Pliocene? (At least in part included in Tou[7])	up to 300	CAPE RACULT-ARAWE: Acid and intermediate pyroclastics and lava; porphyritic dacite or rhyolite plugs; volcanolithic conglomerate	Volc hbl-bearing. Possibly Plio on ground of preservation. Overlies Kupuluk Volc and marl facies of Yalam Lst
		Kapiura Beds (Tpk) Pliocene	up to 450	CENTRAL W TALASEA-GASMATA: Semiconsolidated massive to well-bedded and tuffaceous sandstone, siltstone, conglomerate, tuff, volcanolithic conglomerate; minor limestone and calcareous sediments	Acid volc source indicated by abundant qtz and pumice grains; similar to Sinewit Fm in Gazelle Peninsula. Unconf on Baining Volc, Kupuluk Volc, unnamed plutonic rocks, and Yalam Lst; underlies Kimbe Volc; dissected and unconf on Yalam Lst. Age inferred from uplift
		Mungu Volcanics (Tpm) Pliocene	up to 450	W TALASEA-GASMATA: Dacite, rhyodacite, andesite, pumiceous tuff	Probable source of volc detritus in Kapiura Beds; may interf with Kapiura Beds: age inferred from degree of dissection
		Toki Andesite (Tpt) Pliocene (At least in part included in Tm[1])		NW TALASEA-GASMATA: Porphyritic hornblende andesite and microdiorite	Plio on grounds of preservation and probable intr relat with Sai Beds. Contains hbl, unlike Kimbe Volc ad
		Sigule Volcanics (Tmps) Miocene-Pliocene	500-1000	E GAZELLE PENINSULA: Thick-bedded subaerial basaltic and andesitic lava, agglomerate, and tuff; minor marine calcareous tuff	Underlain by Merai Volc; overlain by raised coral and Rabaul Volc. Dated by foram which are similar in Sinewit Fm (later equiv)
		Sinewit Formation and Melvo Volcanic Member (Tmpi, Tmm) l Miocene, Pliocene, Plio-Pleistocene	up to 500	NE POMIO, GAZELLE PENINSULA: Semiconsolidated marine and fluviatile tuffaceous arenite and lutite derived from acid and intermediate volcanic rocks; minor conglomerate, some limestone. In Gazelle Peninsula, also some rare thin lignite beds and calcareous facies; dacitic and andesitic glassy lavas and ash-flow tuffs with some pumiceous semiwelded tuffs separated as member Tmm	In Pomio, unconf on Merai Volc; dated by foram. In Gazelle Peninsula, source of all clastics; contemp volc probably centred in Sigule Volc area; later equiv of Sigule Volc; unconf on Baining Volc, Tl, Merai Volc, Yalam Lst; conf on Melvo Volc Mem; overlain by Lakit Lst and unconf by Riet Beds; dated by foram; thin local interbeds of lignite probably too small for commercial development. Member possibly represents final stage of eruption of Nengmukla Fm; unconf on Baining Volc and (or possibly intruded by) Ti; may be conf on Nengmukla Fm; conf below Sinewit Fm

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Miocene - early Pliocene	Tmu-p[7] (contd)	Esis Beds (Tmpe) 1 Miocene-Pliocene	up to 600	POMIO: Well bedded to massive soft calcareous shale and siltstone; interbedded subordinate soft porous limestone (chalk)	Overlies Yalam Lst; probable part later equiv of Sinewit Fm and Sai Beds. Dated as N18-19 by plank foram
		Nengmukta Formation (Tmn) e-l Miocene? (At least in part included in Teu[7])		GAZELLE PENINSULA: Volcanic arenite and lutite with volcanic conglomerate interbeds; some fine carbonaceous interbeds, rare nodules and lenses of fine limestone; arenite and lutite show graded bedding and soft sediment deformation	Source subaerial or shallow marine explosive eruptions, volc detritus partly redistributed by t.c. Unconf on Baining Volc; may be conf below Mevlo Volc Mem; unconf below Riet Beds. No fossil evidence of age; probably e-l Mio
Early - middle Miocene	Tm[7]	Yalam Limestone (Tmy) Miocene	up to 500 in Cape Raoult-Arawe; up to 1300 in Talasea-Gasmata, Pomio; 1000-1200 in Gazelle Peninsula	E CAPE RAOULT-ARAWE, W POMIO, TALASEA-GASMATA, NW GAZELLE PENINSULA: Compact to porous, massive to well bedded, coral-algal limestone; massive to well-bedded calcarenite, calcilutite and minor calcirudite; soft calcareous siltstone, sandstone and mudstone, with interbedded chalky limestone. In NW Gazelle Peninsula, rare calcareous sandstone and conglomerate at base; limestone partly recrystallized and dolomitised	In Cape Raoult-Arawe, overlies Kapuluk Volc, and overlain by Penk Volc, Aria Beds, and Johanna Beds; dated by larger and smaller foram a l Te and e, l Tf; potential source of pure lime. In Pomio, dated by larger foram at Tf, some l Te. In Talasea-Gasmata, unconf on Baining Volc, Merai Volc, Kapuluk Volc, and unnamed plutonic rocks; potential source of pure lst; dated l Te-Tf by foram. In Gazelle Peninsula deposited in shallow water during long gradual subsidence with no volc and no nearby eroding landmass; unconf on Baining Volc, Ti, Merai Volc; unconf below Sinewit Fm; only low part dated by foram; contains algae, corals, bryozoan, and molluscan remains
	Units not differentiated, at least in part, from Tm[7] on 1:1 000 000 map: In Talasea-Gasmata: Oligo Merai Volc (see Tou[7]). In Cape Raoult-Arawe: Plio Johanna Beds (see Tp'). On Talasea-Gasmata: Plio Toki Ad (see Tmu-p'). In Pomio: L Mio-Plio Esis Beds (see Tmu-p')				
Late Oligocene	Tou[7]	Kapuluk Volcanics (Tok) 1 Oligocene	up to 1500	E CAPE RAOULT-ARAWE, TALASEA-GASMATA: Massive to well bedded moderately indurated volcanic breccia, tuff, lapilli tuff, volcanic sandstone, siltstone, and conglomerate; volcanics are basaltic to dacitic; minor limestone*	In Cape Raoult-Arawe, less indurated and jointed than Baining Volc; overlie Baining Volc, and overlain by Yalam Lst and Penk Volc; dated by large and small foram as e Te. In Talasea-Gasmata, probably partly terr and partly marine; less indurated and jointed than Baining Volc
		Merai Volcanics (Tom) 1 Oligocene (At least in part included in Tm[7])	up to 1000	N, CENTRAL POMIO, S GAZELLE PENINSULA, TALASEA-GASMATA: Massive to well bedded, moderately indurated volcanic conglomerate and breccia, volcanic arenite and tuff, minor lutite and basic lava POMIO: Zeolite alteration common; carbonate detritus and impure limestone abundant locally GAZELLE PENINSULA: Also includes carbonate debris and rare thin beds of bioclastic limestone; some fine-grained dykes and sills; volcanic material mostly andesitic TALASEA-GASMATA: Also some minor basaltic lava and limestone	In Pomio, generally less indurated jointed, and faulted than Baining Volc which they overlie unconf; dated by larger foram (e Te); thin, poor coal seams reported from one locality. In S Gazelle Pen, also less strongly indurated, jointed, sheared, and more carbonate debris than Baining Volc; source contemp-volc partly submarine, some erosion of emergent Baining Volc and shoal and reef lst; unconf on Baining Volc and probably most Ti; unconf below Yalam Lst, Sinewit Fm, and Sigule Volc; dated by foram as e Te. In Talasea-Gasmata, equiv but geographically distinct from Kapuluk Volc, less indurated, jointed and folded than Baining Volc; unconf on Baining Volc
	Unit not differentiated, at least in part, from Tou[7] on 1:1 000 000 map: In Cape Raoult-Arawe: Plio? Penk Volc Compl (see Tmu-p[7])				

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Oligocene	Tou	Intrusives (Toi, Ti) 1 Oligocene–e Miocene		E CAPE RAOULT–ARAWE: Intrusive–extrusive complex of rhyolite, dacite, andesite, tuff; rhyodacite porphyry	Exhibit intr relat with surrounding Baining Volc?, but may also be partly eruptive; probably related to l Oligo plutonic rocks of Kori River pluton
				POMIO: Tonalite, gabbro, diorite, granodiorite and adamellite; related porphyries and micro–plutonic rocks	Probably intr equiv of Merai Volc; intrude Baining Volc 24.3–28.6 m.y. old by K–Ar method. Disseminated py common; ch from stream boulders N of Sheet area
				W TALASEA–GASMATA: As in POMIO but also some monzonite and mangerite; intrusive breccias and pyroclastic rocks	Probable intr equiv of Merai Volc and Kapuluk Volc. Unconf below Yalam Lst and Kapiura Beds. Igneous brec and pyroclastics from intr bodies. 22.0–28.7 m.y. old by K–Ar method; po mineraliz at Plesyumi, Kulu River, and Uasilan
				CENTRAL GAZELLE PENINSULA: Leucogabbro, dolerite, basic diorite, diorite, microdiorite, tonalite, granodiorite, monzonite, adamellite	Mostly Oligo, some comagmatic with Baining Volc, some definite Mio (14 m.y. old by K–Ar method), some may be comagmatic with base of Sinewit Fm. Intermediate and acid calc–alkaline in N Baining Mtns; high–K calc–alkaline central and S Baining Mtns. Prospective for po Cu–type mineralis; Cu and Mo sulphides in dr; some Cu–Pb–Zn sulphide in contact zones, Cu sulphides in outcrop and boulders; Fe ore in contact zone at one locality; Au in quartz veins associated with Ti
Late Eocene	Teu[7]	Baining Volcanics (Teb) 1 Eocene	2000+ in most areas	E CAPE RAOULT–ARAWE: Massive, indurated, strongly jointed basaltic and andesite lava, agglomerate, volcanic breccia, and tuff; minor recrystallized limestone	Probably underlie younger rocks throughout much of New Britain; overlain by Kapuluk Volc, and intruded by Ti?
				E POMIO: As above, but also some volcanogenic arenite and lutite; limestone lenses rare	May intrude Merai Volc in places. More indurated, jointed and sheared than Merai Volc. Carbonate detritus uncommon. Slight metam apparent in many areas, with alteration to and chl. Py common. Base not exposed; older rocks unknown. Dated by larger foram (T6)
				CENTRAL, SW, AND W TALASEA–GASMATA: Also some intermediate lavas and hypabyssal rocks	Py common. Base not exposed. More indurated, jointed, and sheared than Merai and Kapuluk Volc. Carbonate detritus uncommon. Slight metam apparent in many areas, with alteration to ep and chl. Dated by foram, but no dates from W of 150°47'
				GAZELLE PENINSULA: As above but lava flows rare; rare limestone clasts in volcaniclastic rocks; volcanic material mostly andesitic; some hornfels near intrusives; biotite and hornblende schist in narrow zone	Core of Gazelle Pen source explosive ad submarine volc. Some redistribution of volc debris by slumping and t.c. Intruded by Ti; unconf below Merai Volc, Yalam Lst, Nengmukta Fm, Mevlo Volc Mem, Sinewit Fm, probably Sigule Volc, Riet Beds, raised coral. Dated by foram in volc clasts. Iron ore and some Cu–Pb–Zn sulphide in former lst and slst of Teb at contact with Ti near Rangavere (N Baining coast)
		Unit not differentiated, at least in part, from Teu[7] on 1:1 000 000 map: In Gazelle Peninsula: 1? Mio Nengmukta Fm (see Tmu–p[7])			

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Qa[8]	Q, Qre Quaternary	over 300 on Bougainville	BOUGAINVILLE, NEW IRELAND: Silt, sand, gravel, coral	On Bougainville, derived mainly from volc material, and partly from organic material; also air-fall type ash dep; unconf veneer on hills of older dep. In New Ireland (Hohnen, in prep), in places alluv overlaps raised coral
	Qv[8]	BOUGAINVILLE GROUP: Tore, Balbi, Bagana, Billy Mitchell, Numa Numa, Reini, Bakanovi, Takuan, and Taroka Volcanics, Emperor Range Volcanic Beds (Czo, Czb, Czg, Czm, Czn, Czr, Czk, Czt, Czl, Cze) Pliocene, Pleistocene, Holocene	460–2135	BOUGAINVILLE: Andesitic lava, agglomerate, tuff, derived fan deposits; locally basaltic lava	Mainly products of individual stratovolc; some not assigned to specific centres, but others derived from more than one centre; some as old as Plio but most others younger; some still active or semi-active. Tore Volc overlie Emperor Range Volc Beds and abut against Balbi Volc. Balbi Volc unconf on Emperor Range Volc Beds, unnamed volc, and Keriaka Lst; abut against Tore and Numa Numa Volc. Bagana Volc unconf on Kieta Volc; unnamed volc and Billy Mitchell Volc abut against Reini Volc. Billy Mitchell Volc unconf on Kieta, unnamed, Numa Numa and Reini Volc; unconf below Bagana Volc. Numa Numa Volc overlain by Billy Mitchell Volc. Reini Volc unconf on Kieta Volc; abut against Bagana Volc. Bakanovi Volc unconf on Keriaka Lst and Kieta Volc. Takuan Volc unconf on Kieta Volc; interf with Taroka Volc. Taroka Volc unconf on Kieta Volc. Emperor Range Volc Beds unconf below Tore and Balbi Volc; abut against Sohano Lst; intruded by dr
	Qs[8]	Qrc Holocene		S NW IRELAND: Raised coral reefs, coarsely or finely laminated	Back-reef facies made up of Tridacna, foram tests, colonial corals in situ along margins and locally oolites; offlapping coral terraces at many levels (Hohnen, in prep)
		Sohano Limestone (Qs) e Miocene?–Pleistocene		N BOUGAINVILLE: Elevated reef complex of massive coralline and shelly limestone	Unconf on Buka Fm; abuts against Emperor Range Volc Beds. Pleist because of little dissection. Rich fauna of corals, algae, molluscs, bryozoans, echinoid spines and foram
		Maton Conglomerate (Qrm) Pleistocene–Holocene	200–300	S NEW IRELAND: Coarse, current-bedded, cobble and boulder conglomerate and interbedded pebbly sandstone; well sorted, well rounded fragments of Jaulu Volcanics in sand matrix	Probably fgl deposits reworked locally by wave action. Unconf on Jaulu Volc, Rataman Fm and Punam and Surker Lst; unconf below Quater coral terraces (Hohnen, 1975)
		Uluputur Beds (Qpu) 1? Pleistocene	c.100	NEW IRELAND: Finely bedded calcareous cobble and boulder conglomerate with clasts of tuff and volcanolithic arenite and lutite, overlain by coquinoid lithic sandstone which passes upwards into alternating siltstone and lithic coquinoid sandstone	Inner neritic facies dep on Rataman Beds in small, shallow embayments in coastline. Abuts against and forms restricted embayments in Punam Lst, which may be coeval in part; unconf on Rataman Fm in type section. Abundant molluscan fauna (Hohnen, in prep)
		Punam Limestone (QPp) Pliocene or younger	200–1000	NEW IRELAND: Finely bedded, friable, moderately recrystallised chalky calcarenite; coral-rich facies occur locally	Unconf on Rataman Fm and Jualu Volc. Abundant foram (Hohnen, in prep)
Pliocene–Quaternary	TpQp	Diorite (Czd) Oligocene?–Pleistocene?		N, S BOUGAINVILLE: Microdiorite, diorite, monzonite, granodiorite, syenite, granophyre	Intrudes Kieta Volc, unnamed volc, and Emperor Range Volc Beds. Associated with Au and Cu mineraliz of probable Oligo and e Mio age; main Cu ores ch, bornite, and ml on weathered surfaces; ore reserves at Panguna Cu mine. 890 000 000 tonnes of 0.47% Cu ore and 0.54 gm/tonne of Au (as at Dec, 1973)

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Miocene - Pliocene	Tm-p[8]	Lelet Limestone (PMl) le Miocene–Pliocene–Pleistocene ?	up to 1400	NEW IRELAND: Coral and algal biostromal calcarenite, calcirudite, and minor foraminiferal biomicrite; limestone pure, completely recrystallized at base and only slightly at top	Probably dep on igneous 'basement' elongated volc islands. Unconf on Jaulu Volc and Lemau Intr, and conf on Lossuk River Beds; partly abuts against and partly overlies Rataman Fm; probably partly equiv to Surker Lst. Corals and algae abundant; some foram (Hohnen, 1975)
		Lossuk River Beds (Mll) e Miocene	c. ± 150 at type section	NW NEW IRELAND: Finely laminated siltstone, well cemented angular calcirudite, pebbly feldspath labile sandstone and conglomerate	Unconf on Jaulu Volc from which largely derived; overlain, apparently conf by Miocene parts of Lelet Lst. Dated by pelagic foram; corals, algae, and bivalves occur locally (Hohnen, in prep)
Late Miocene : Late Pliocene	Tmu-p[8]	Rataman Formation (PMu) l Miocene–e Pliocene	c.500	NEW IRELAND: Poorly lithified ash-fall, andesitic and dacitic tuff, volcanolithic arenite and lutite, and foram marl and limestone; small local lenses of coal and conglomerate	Dep in course of radical changes in conditions of bottom envir. Overlies Jaulu Volc and Surker Lst with high-angle unconf; locally unconf below Punam Lst and Uluputur Beds. Abundant corals, molluscs, and foram (Hohnen, in prep.)
Early Miocene	Tml[8]	Surker Limestone (Mls) e Miocene	c. + 500 in type section thickens to 1300 in S?	S NEW IRELAND: Lepidocyclina chalk, clayey calcarenite and calcirudite; minor arenaceous limestone with rare calcareous, volcanolithic sandstone	Unconf on Jaulu Volc and Lemau Intr; abuts against Rataman Fm in N and E. Foram (Te) and bivalves (Hohnen, in prep.)
		Kariaka Limestone (Tl) e Miocene	1200+	NW, E BOUGAINVILLE: Foraminiferal, shelly, coralline, and algal limestone	Uplifted reef complex. Unconf on Kieta Volc; unconf below Bakanovi, Billy Mitchell, Numa Numa, and Balbi Vol. Rich algae; some bryozoans, corals, molluscs, and datable foram (Te stage)
Late Oligocene	Tou	Lemau Intrusive Complex (Ol) e-m Oligocene		NEW IRELAND: Gabbro, norite, diorite, tonalite, trondhjemite, granodiorite, and leucocratic dyke rocks; gabbro and norite, in places alkali-metasomatized and in places with igneous flow-foliation	Discontinuous along length of island as dykes and stocks in Jaulu Volc; abundant volc xenoliths. Overlain by e Mio part of Lelet Lst. Finely disseminated and vein-forming py abundant; K-Ar ages 17.5 ± 0.6 m.y., 13.8 ± 0.5 m.y. (po rhyodacite); 31.8 ± 1.0 m.y. (Hohnen, in prep.)
Oligocene	To[8]	Czn Miocene?–Pliocene?		NW BOUGAINVILLE S: Andesitic, basaltic, and dacitic lava, tuff, agglomerate	Unconf below Balbi, Numa Numa, Billy Mitchell, and Bajana Volc; intruded by dr; may be equiv to Kieta Volc on location, geomorphology and petrography
		Buka Formation (Tb) l Oligocene–e Miocene	490+	BOUGAINVILLE N: Well bedded sandstone and siltstone composed of volcanic material and locally cross-bedded, graded bedded and with slump structures; tuff, agglomerate, basaltic lava	Unconf below Sohano Lst. Age uncertain but thought similar to Kieta Volc
		Kieta Volcanics (Tk) Oligocene?, e Miocene?	1500+	CENTRAL, SE BOUGAINVILLE: Agglomerate, tuff; sandstone, siltstone, and conglomerate, composed of volcanic material; cross-bedded; andesitic and basaltic lava erupted subaerially; pillow lava	Coarser dep probably laid down in alluv fans adjacent to high volc mtns. Unconf below Keriaka Lst and Bougainville Gp. Dated by foram
		Jaulu Volcanics (Oj) m-l Oligocene	2000+	NEW IRELAND: Mainly coarse andesitic lapilli tuff and agglomerate; clasts subangular with chilled or altered margins; less common welded ash-flow tuff, amagdaloidal and pillow lava, and tuffaceous limestone; local small lenses of coralline limestone	Form 'basement' of much of New Ireland; possibly built up from sea floor and some erupted in subaqueous envir. Unconf below e Mio and younger biogenic Lelet and Surker Lst and some clastic sed rocks (Lossuk River Beds). Dated by foram (e Te); K-Ar dating of 30.7 ± 1.0 m.y. from one sample (Hohnen, in prep.)

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Quaternary	Qa^9	Qa Pleistocene–Holocene	50	ADMIRALTY I E, W: Alluvium and beach deposits: gravel, sand, silt, mud, clay	Coastal Manus and Rambutyo Is
		Qc Pleistocene–Holocene	20	ADMIRALTY I E, W: Raised coral reefs: biocalcirudite, algal–coralline biomicrite, biocalcarenite	Smaller islands; fringing and platform reef comp. Corals algae, bryozoans, bivalves, gastropods. Dated by plank and larger foram. Unconf on Larengau Bs, Naringel Lst, Lauis Fm
		Coral Sand Pleistocene–Holocene	up to 4	WUVULU, NINIGO: Coral sand, soil, boulders	Phosphate–crust and guano on Wuvulu and Aua Is (White & Warin, 1964)
		Naringel Limestone (Tpn) Pliocene–Pleistocene (At least in part included in Qu^9)	100	ADMIRALTY I E: Biocalcirudite, algal–foraminiferal biomicrite, biocalcarenite	Fringing and platform reef compl. Unconf overlies Lorengau Bs and Lauis Fm. Contains corals, algae, bryozoans, bivalves, gastropods, and larger foram. Post–Miocene in age. Source of road agg; potential source of lime
	Qv^9	Likum Basalt (Qpl) Pleistocene	200	W ADMIRALTY I W: Basaltic lava, commonly vesicular, including olivine basalt; thin acidic tuff and lapilli tuff near base	Shallow–water marine explosive volc activity followed by slow, mainly subaerial, effusive activity. Unconf on Tasikim Aglm, Lauis Sst. Dated by K–Ar method as 1.73 ± 0.3 m.y. Prospective for bx as area covered by red clays
		Tasikim Agglomerate (Tpt) m–l Pliocene	400	W ADMIRALTY I W: Coarse andesitic agglomerate, lapilli tuff; tuff partly reworked; minor lava, flow–banded in places	Explosive volc activity in and around shallow marine envir and coastal area of low relief. Unconf on Tinniwi Volc, Mundrau Lst and Lauis Fm; unconf below Likum Volc. Possibly thickest in SW
		Rambutyo Beds (Tpr) l Miocene–m or l? Pliocene (At least in part included in Qu^9)	1000	ADMIRALTY I E: Tuffaceous calcareous lithic arenite, siltstone, and mudstone; well bedded; interbedded paraconglomerate in places	Lithologically similar to Lauis Fm. Unconf below Qc. Dated by plank foram as N.17–19 in part
	Units not differentiated, at least in part, from Qv^9 on 1:1 000 000 map: Plio–Pleist Naringel Lst (see Qa^9), in Mio–Plio Lorengau Bs, L Mio–Plio Lauis Fm, l Mio–m or l? Plio Rambutyo Sst and m–l Mio? Tml (see Tmu^9)				
Late Miocene	Tmu^9	Lorengau Basalt (Tmb) m Miocene–Pliocene (At least in part included in Qv^9)	200	ADMIRALTY I E: Basaltic andesitic lava, commonly feldsparphyric; basalt, olivine basalt	Widespread subaerial flows in W, and submarine followed by subaerial flows in E. Unconf. on Tinniwi Volc, Mundrau Lst, and in part on Lauis Fm with which partly interf; unconf below Naringel Lst. Older portions exposed in S. Two main periods of volc indicated: Miocene and l Miocene–Pliocene. Dated at 13.5 ± 0.8 m.y. and 7.9 ± 0.5 and 8.6 ± 0.6 m.y. by K–Ar method. Bx in places
		Lauis Formation and Tingau Conglomerate m (Tl, Tpg) l Miocene– Pliocene (At least in part included in Qv^9, Tmm^9)	3000	ADMIRALTY I E, W: Tuffaceous, calcareous lithic arenite, siltstone, and mudstone; well bedded with some conglomerate horizons, rare limestone horizons; lignitic in places; interbedded basalt flows in places; also cut by basaltic dykes. Coarse conglomerate, pebble conglomerate, minor coarse lithic arenite	Partly paralic but mainly deeper–water clastics. Capped by Lorengau Bs in places. Contains molluscs, bryozoans, coral fragments. Dated by plank foram as N.16–19 in part. Facies equiv of Tingau Cgl

Age	Unit	Constituent unit(s) in 1:250 000 Sheet areas	Thickness (m)	Lithology	Additional pertinent data
Late Miocene	Tmu^9 (contd)	Tml m-l Miocene? (At least in part included in Qv^9)		ADMIRALTY I E: Porphyritic microdiorite and feldspar porphyry	Small po accompanied by alteration and py mineraliz. Intrudes Rambutyo Sst; equiv of Yirri Intr Comp?
		Unit not differentiated, at least in part, from Tmu^9 on 1:1 000 000 map m Eo–e Mio Tinniwi Volc (see To^9)			
Middle Miocene	Tmm^9	Yirri Intrusive Complex (Tmy) m Miocene (At least in part included in To^9)		ADMIRALTY I E, W: Medium-grained quartz diorite, quartz monzodiorite, quartz monzonite, tonalite. Dacite porphyry at margins of complex	Generally unaltered, mainly medium-grained composite intr; possibly multiphase. Dates range from 10.1 ± 0.8 m.y. to 17.1 ± 0.7 m.y. possibly indicating a number of pulses. Intruded by po phases with concomitant alteration; intrudes Tinniwi Volc
		Dremsel alunitic phase (of Yirri Intrusive Complex) (Tmyd) m Miocene (At least in part included in To^9, Tou)	300 max	ADMIRALTY I E, W: Quartz alunite, zeolite, pyrite-bearing breccia; altered and brecciated intermediate pyroclastics and breccia	Overlies Yirri Intr Comp; directly overlies po phases; presence of Tmyd clasts in Tp? indicates up age limit of l Miocene. Widespread brec, silicif, pyritiz, and advanced argillic alteration thought to be caused by late-stage resurgent boiling of intr. May represent altered coeval ad volc and subvolc pile, or may be altered basement Tinniwi Volc. Some Cu mineraliz, possibility of secondary enrichment near base
		Mundrau Limestone (Tmm) e–m Miocene	200	ADMIRALTY I E, W: Massive to poorly bedded algal-foraminiferal biomicrite, well bedded calcarenite at base	Probably developed as fringing reefs about volc islands. Unconf on Tinniwi Volc; unconf below Tp? and Lauis Fm. Probably suitable for lime production. Dated by large foram as l Te–e Tf. Contains mollusos, echinoid and serpulid fragments
		Units not differentiated, at least in part, from Tmm^9 on 1:1 000 000 map: m Eo–e Mio Tinniwi Volc (see To^9); and l Mio–Plio Lauis Fm (see Tmu^9)			
Late Oligocene	Tou	Unit not differentiated, at least in part, from Tou: m Mio Dremsel Alunitic phase			
Oligocene	To^9	Tinniwi Volcanics (Tot) m Eocene–e Miocene (At least partly included in Tmu^9, Tmm^9)		ADMIRALTY I E, W: Andesitic and basaltic pyroclastic and breccia, including flow breccia lava	Oldest rocks exposed on Manus I. Unconf below Mundrau Lst. Dated by K-Ar method as 44.6 ± 5.0, 47.8 ± 5.0 and 20.2 ± 0.8 m.y.
		Units not differentiated, at least in part, from To^9: m Mio Dremsel alunitic phase (see Tou) and Yirri Intru Compl (see Tmm^9) and e–m Mio Mundrau Lst (see Tmm^9)			
		Krisi Formation (Tpks) l Pliocene?	600–100	NW WEWAK: Poorly consolidated, fine to coarse, massive to thickly bedded, silty lithic sandstone; minor hard mudstone interbeds; calcareous cemented gritty horizons and thin coal seams; alternating sandstone and fossiliferous mudstone at top and bottom	Western, marginal marine lithofacies of low part of Romi Fm on strat and contained structures; conf on Bewani Fm; conf under Bulimp Fm; conf under Qa, Qs; age from superposition; fossil wood common

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APPENDIX 1

ABBREVIATIONS USED IN 'ADDITIONAL PERTINENT DATA' COLUMN

Abundant	abd	Differentiated	diff
Agglomerate(ic)	aglm	Diorit/-e, -ic	dr
Aggregate	agg	Disconform/-able, -ably, -ity	disconf
Alluv/-ium, -ial	alluv	Disseminat/-ed, -ions	dissem
Andesit/-e, -ic	ad	Dolerit/-e, -ic	dl
Argillite	arg	East	E
Arkose	ark	Encironment	envir
Asbestos	as	Eocene	Eo
Assemblage	assem	Epidote	ep
Associat/-ed, -ion	assoc	Equivalen /-t, -ce	equiv
Azurite	az	Fanglomerate	fgl
Basalt(ic)	bs	Fluviatile	fluv
Bauxite	bx	Foraminiferida	foram
Benthonic	benth	Formation	fm
Biomicrite	biomic	Fossil(iferous)	foss
Biotit/-e, -ic	biot	Fragment	frag
Breccia(ted)	brec	Gabbro	gb
Calcarenite	calcaren	Glauconit/-e, -ic	gl
Calc/-ite, -areous	calc	Gold	Au
Calcilutite	calcilut	Gradational	grad
Campanian	Camp	Granodiorit/-e, ic	gd
Carbon/-aceous, -ized	carb	Graphit/-e, ic	gt
Cenomanian	ceno	Gravel	gv
Chalcocite	cc	Greywacke	gwke
Chalcopyrite	ch	Hematite	hem
Chlorit/-e, -ic	chl	Hornblende	hbl
Claystone	clst	Interfinger	interf
Complex	comp	Intrus/-ion, -ive	intr
Composition	comp	Iron	Fe
Conform/-able, -ably		Lacustrine	lacus
Conglomerate	cgl	Lateral(ly)	later
Contemporaneous	contemp	Limestone	lst
Copper	Cu	Limonit/-e, -ic	lim
Correlat/-e(d), ive	corr	Lower	low
Deposit(ed)	dep	Maestrichtian	Maest
Magnesite	Ms	South	S
Magnetite	mt	Strat/-a, -igraphic	strat
Malachite	ml	Structure	struc
Manganese	Mn	Sulphur	S
Member	Mem	Superposition	superpos
Metabasalt	metabs	Terrestial / Terrigenous	terr
Metadiorite	metadr		
Metamorph/-ic(s), -ism	metam	Thorium	Th
Middle	m	Transitional	trans
Mineralization	mineraliz	Turbidity currents	t.c.
Miocene	Mio	Turonian	Tur
Molybdenum	Mo	Ultramafics	ultram
Monazite	Mz	Unconform/-ity, -able, -ably	unconf
Mountains	Mt	Undifferentiated	undiff
Mudstone	mdst	Upper	up
Nickel	Ni	Volcan/-ic(s), -ically, -ism	volc
North	N	West	W
Oligocene	Oligo	Zinc	Zn
Palaeocene	Palaeo		
Paraconformable	paraconf		
Peninsula	Pen		
Phosphat/-e, -ic	ph		
Plagioclase	plag		
Planktonic	plank		
Platinum	Pt		
Pleistocene	Pleist		
Porphyry(itic)	po		
Pyrit/-e, -ic	py		
Pyritization	pyritiz		
Pyrrhotite	pyrrh		
Quartz	qtz		
Relation	relat		
Rutile	rut		
Sandstone	sst		
Sediment(ary)	sed		
Serpentin/-e, -ite	serp		
Shale	sh		
Silicification	silicif		
Siltstone	sltst		
Silver	Ag		

APPENDIX 2:

ALPHABETICAL LIST OF 1:250 000 SHEETS AND MAIN REFERENCES

Abau (SC55-12): Smith & Davies (1973a)
Admiralty Is E and W (S55-10,11): Jaques (in prep.)
Aitape (SA54-15,11): (see Vanimo-Aitape)
Ambunti (SB54-4): Davies & Hutchison (in prep.c); Dow, Smit, Bain, & Ryburn (1972)
Arawe (SB55-12): (see Cape Raoult-Arawe)
Aroa (SC55-6): (see Port Moresby, Kalo, and Aroa)
Aworra River (SB54-16): Not mapped
Blucher Range (SB54-7): Davies & Norvick (1974)
Boigu (SC54-7): Not mapped
Bogia (SB55-1): Jaques & Robinson (1975); Johnson, Taylor & Davies (1972)
Bougainville I N and S (SB56-8): Blake (1967); Blake & Miezitis (1967)
Buna (SC55-3): Davies (in prep.)
Calvados (SC56-14): Not mapped
Cape Nelson (SC55-4): (See Tufi-Cape Nelson)
Cape Raoult-Arawe (SB55-8, 12): Ryburn (in press)
Cape St George (SB56-3): (See 'New Ireland')
Daru-Maer (SC54-8, 55-5): Willmott (1972)
Deboyne (SC56-10): Mapped in part by de Keyser (1961)
Fergusson I (SC56-5): Davies (1973a)
Fly River (SC54-3): Not mapped
Gasmata (SB56-9): (See Talasea-Gasmata)
Gazelle Peninsula (SB56-2): Davies (1973b)
Gulf (SC55-1): Not mapped
Huon-Sag Sag (SB55-11,1): Robinson (1974)
Kalo (SC55-11): (See Port Moresby, Kalo, and Aroa)
Karimui (SB55-9): Bain & Mackenzie (1974); Bain, MacKenzie, & Ryburn (1975)
Karkar I (SB55-2): Robinson & Jaques (in press); Johnson, Taylor & Davies (1972)
Kavieng (SA56-9): (See 'New Ireland'); Brown (New Hanover - in prep).
Kikori (SB55-13): Pieters (in prep.)
Kilinailau (SB56-4): Not mapped
Kiwai (SC54-4): Not mapped
Lake Kutubu (SB54-12): Brown & Robinson (in prep.)
Lake Murray (SB54-15): Not mapped
Mabua (SA56-10): Mapped but state of progress not known
Madang (SB55-6): Robinson, Jaques, & Brown (in press); Johnson, Taylor, & Davies (1972)
Maer (SC55-5): (See Daru-Maer)
Markham (SB55-10): Grainger & Tingey (in press)
May River (SB54-3): Davies & Hutchison (in prep.b); Dow, Smit, Bain, & Ryburn (1972)
Mussau I (SA55-8): Wallace (in prep.)
Namatanai (SA56-14): (See 'New Ireland')
'New Ireland' (SA56-14): Hohnen (in prep.)
Ningo (SA55-5): Not mapped (but see White & Warin, 1964)
Nuguria (SA56-16): Not mapped
Nukumanu (SB57-1): Not mapped
Pomio (SB56-6): Ryburn (1974)
Port Moresby, Kalo, and Aroa (SC55-7, 11, 6): Pieters (1974, in prep.)
Ramu (SB55-5): Bain & Mackenzie (1975); Bain, Mackenzie, & Ryburn (1975)
Raggi (SB54-11): Mapped but state of progress not known
Rossel (SC56-5): Smith & Pieters (1969)
Sable (SC56-13): Not mapped
Sag Sag (SB55-7): Partly mapped (See Huon-Sag Sag; also Johnson, Taylor, & Davies, 1972)
Salamaua (SB55-15): Mapped but state of progress not known
Samarai (SC56-9): Smith & Davies (1973b)
Samo (SA56-15): (See 'New Ireland')
Sepik (SA55-13): Hutchison (in prep.); Johnson, Taylor, & Davies, 1972
Talasea-Gasmata (S56-5, 9): Ryburn (1974)
Tauu (SB57-1): Not mapped
Tench (SA56-5): Not mapped
Tingwon (SA55-12): Not mapped
Trobriand (SC56-1): Not mapped
Tufi-Cape Nelson (SC55-8, 12): Davies & Smith (1974)
Vanimo-Aitape (SA54-11): Norvick & Hutchison (in prep.)
Wabag (SB54-8): Davies & Hutchison (in prep.a); Dow, Smit, Bain, & Ryburn (1972)
Wau (SB55-14): Dow, Smit, & Page (1974)
Wewak (SA54-16): Hutchison & Norvick (in prep.)
Witu Is (SB55-4): Not mapped (but see Johnson, Taylor, & Davies, 1972)
Woodlark (SC56-6): Trail (1967)
Wuvulu I (SA54-8): Not mapped (but see White & Warin, 1964)
Yule (SC55-2): Brown (1974, in prep.)

APPENDIX 3

ALPHABETICAL LISTS OF STRATIGRAPHIC UNITS AND UNNAMED MAP SYMBOLS

Listed below, in alphabetical order, are all the stratigraphic names and symbols which are discussed in the compiled tables. The names have unequal status, and a special effort has been made to ensure that the status of each is clearly stated.

Firstly, there are the formal names, marked by an asterisk (*), which have been officially defined in geological literature. Then there are those which, although used in published literature for some time, have never been formally defined; these are marked by a cross (+). Names reserved but not as yet officially defined in published literature are denoted by a minus (-) sign. Names marked with a diagonal stroke (/) are those which though never formally defined have been used in literature, though in a different form, e.g. as series rather than beds.

(a) Stratigraphic Units

Adau Limestone (+) 37
Agaun Conglomerate (+) 29
Aibala Volcanics (+) 40
Aifunka Volcanics (*) 24
Akuna Intrusive Complex (+) 23
Amanab Metadiorite (-) 11
Amawa Metamorphics (+) 48
Ambunti Metamorphics (*) 14
Amogu Conglomerate (-) 10
Amora Conglomerate (*) 41
Amphlett Volcanics (+) 46
Andewa Volcanic Complex (+) 55
Antares Monsonite (+) 16
Apinaipi Formation (+) 33
April Ultramafics (+) 10
Ara Greenschist (*) 49
Ararabu Conglomerate (+) 31
Aria Beds (-) 56
Asai Shale (+) 12
Astrolabe Agglomerate (+) 34
Atemin Shale (+) 20
Auga Beds (+) 42
Aure Beds (+) 18, 38
Awaitopu Claystone (+) 32
Awin Formation (+) 16
Babwaf Conglomerate (+) 33
Badila Beds (+) 41
Badu Granite (*) 21
Bagana Volcanics (*) 59
Baining Volcanics (+) 58
Bakanovi Volcanics (*) 59
Balbi Volcanics (*) 59
Balimbu Greywacke (*) 14, 27
Barida Beds (+) 8
Baruni Calcarenite (see Port Moresby Beds) 41
Bena Bena Formation (*) 26
Benembi Diorite (+) 23
Bewani Formation (+) 5
Billy Mitchell Volcanics (*) 59
Birim Formation (+) 17
Bismarck Intrusive Complex (+) 23
Bliri Volcanics (+) 12
Boera Limestone (-) 39
Bogoro Limestone (+) 42
Boini Beds (-) 7
Bol Arkose (+) 20
Bomuguina Beds (-) 40
Bonenau Schist Member (+) 41
Bonua Porphyry (+) 32
Bootless Inlet Limestone (+) 39
Border Limestone Beds (+) 8
Bougainville Group (*) 59
Buka Formation (*) 60
Bulimp Formation (+) 5
Bulolo Agglomerate (+) 33
Burgers Formation (*) 9
Calvados Schist (+) 49
Cape Glouster Volcanic Complex (-) 55
Cape Nelson Volcanics (+) 31
Castle Hill Limestone (+) 36
Chambri Diorite (+) 14
Chim Formation (+) 19, 25
Chimbu Limestone (*) 25
Chiria Formation (+) 36
Chuingai Limestone (*) 18
Cloudly Bay Volcanics (+) 32
Crater Mountain Volcanics (+) 22
Dabi Volcanics (+) 39
Darai Limestone (+) 18
Debolina Beds (+) 38
Deboyne Metavolcanics (-) 48
D'Entrecasteaux Complex (+) 48
Dimsie Volcanics (+) 12
Dokuna Tuff (+) 39
Domara River Conglomerate (+) 32
Duau Volcanics (+) 15
East Cape Gabbro (+) 40
Edie Porphyry (+) 31
Efogi Volcanics (-) 30
Eia Beds (-) 40
Elandora Porphyry (-) 23
Emo Metamorphics (-) 42
Emperor Range Volcanic Beds (+) 59
Era Beds (+) 16
Esis Beds (+) 57
Feing Group (*) 19
Fife Bay Volcanics (+) 32
Finisterre Volcanics (+) 54
Foasi River Limestone Member (*) 41
Frieda Porphyry (+) 10
Fuk Beds (+) 7
Gabahusuhusu Syenite (+) 37
Gibobada Limestone (+) 36
Gidogidora Granodiorite (+) 45
Giluwe Volcanics (+) 15
Godaguina Beds (+) 40
Goodenough Volcanics (+) 45
Goroka Formation (*) 26
Goropu Metabasalt (+) 41
Gowop Limestone (+) 52
Gudanai Metamorphics (+) 48
Gufug Gneiss (*) 13
Gulewa Formation (*) 46
Gusap Argillite (-) 54
Gwenif Formation (-) 8
Gwoira Conglomerate (+) 32
Hagen Volcanics (*) 15, 22
Hunstein Complex (+) 14
Hydrographers Range Volcanics (+) 31
Ialibu Volcanics (+) 15
Ianga Formation (*) 36
Ibau Breccia (+) 31
Ieru Formation (+) 19
Imburu Mudstone (+) 20
Imo Tonalite (+) 39

(b) Unnamed Map Symbols

List of other informal terms

(b.) Unnamed Map Symbols

QUATERNARY

Q: 45; Qa: 3, 15, 22, 29, 31, 45, 50, 55, 59, 61; Qa_1: 15, 29, 31; Qab: 55; Qav: 56; Qc: 3, 31, 45, 51, 55, 61; Qf: 3, 22, 50; Qha: 22, 29; Qhc: 29; Qhw: 30, Ql: 22, 45; Qm: 3; Qphf: 22; Qpm: 15, 50; Qpu: 30; Qr: 3; Qra: 59; Qrc: 59; Qs: 3, 15, 22, 29, 31, 45, 50; Qt: 15, 24; Qv: 55; Qvy: 30; TQs: 16

TERTIARY

PLIOCENE

Czn (Mio?-Plio?): 60; Qc (Plio?-Quat): 56; Qpc (Plio?, Quat): 56; Tmi (Mio-Plio): 37; Tms (l Mio-late Plio): 30; Tp (Plio): 8, 30, 51; Tpa (Plio): 32; Tpi (Plio): 51; Tplg (Plio): 8; Tpv (Plio): 46; Tpy (Plio): 34

MIOCENE

Czn (Mio?-Plio?): 60; Tm (Mio): 10, 17, 18; Tmsg (e-l Mio): 9; Tmi (Mio-Plio): 37; Tml: (m-l Mio?): 62; Tms (l Mio): 36; Tms (l Mio-l Plio): 33, 36; Tmsg (e-l Mio): 9; Tmt (e-m Mio): 18; Tmt_g (m-l Mio): 18; Tmu (l Mio): 35; Tmx (e Mio): 17, 38; Tou (l Oligo-m Mio): 24; Ts (e Mio?): 53

OLIGOCENE

Tom (l Oligo?): 11; Tou (l Oligo-m Mio): 24; U (pre Mio?): 13

EOCENE

Te (l Palaeo-Eo): 19; Te (Eo): 40; Teh (m-l Eo): 25

PALAEOCENE

Te (l Palaeo-Eo): 19

"TERTIARY"

Tu (Tert or older):53

MESOZOIC

Mumb (Meso?): 13

CRETACEOUS

Kl (Apt?-Alb?): 19; Mb (Cret or older): 49; Md (Cret?): 48

JURASSIC

Mb (Cret or older): 49

APPENDIX 4

LISTS OF STRATIGRAPHIC AND DESCRIPTIVE NAMES AND UNNAMED MAP SYMBOLS IN CHRONOLOGICAL ORDER

(a) Stratigraphic and descriptive names

QUATERNARY

PLEISTOCENE, HOLOCENE

Agaun Conglomerate (Pleist):29; Andewa Volcanic Complex (Pleist-Holo):55; Antares Monzonite (l Mio-Pleist):16; Ararabu Conglom (Pleist):31; Awin Formation (Pleist):16; Bagana Volcanics (Plio, Pleist, Holo); Bakanovi Volcanics (Plio, Pleist, Holo):59; Balbi Volcanics (Plio, Pleist, Holo):59; Billy Mitchell Volcanics (Plio, Pleist, Holo):59; Bougainville Group (Plio, Pleist, Holo):; Bulimp Formation (l Plio?-Pleist?):5; Cape Glouster Volcanic Complex (Pleist-Holo):55; Cape Nelson Volcanics (Pleist):31; Coral Sand (Aust):61; Crater Mountain Volcanics (Plio-Holo):22; Diorite (Oligo?-Pleist):59; Duau Volcanics (Quater):15; Efogi Volcanics (Pleist):30; Emperor Range Volcanic Beds (Plio, Pleist, Holo):59; Era Beds (Plio, Pleist): 16; Fubilan stock (l Plio, Pleist):16; Giluwe Volcanics (Quater):15; Goodenough Volcanics (Quater):15,22; Hydrographers Range Volcanics (Pleist):31, 28; Ialibu Volcanics (Quater):15; Ibau Breccia (Pleist):31; Ip Beds (Pleist-Holo):55; Johanna Beds (Plio and younger):56; Kabenau Beds (m Mio-l Plio-Pleist): 51; Kainantu Beds (Pleist):22; Karimui Volcanics (Quater):15,22; Kimbe Volcanics (Pleist-Holo):55; Kukuia Volcanics (Plio, Pleist):46; Kwagira Beds (Pleist):29; Lakit Limestone (Plio or slightly younger):56; Lelet Limestone (l Eo, Mio, Plio, Pleist?):60; Leron Formation (m Mio, l Plio, Pleist):51; Likum Basalt (Pleist): 61; Maer Volcanics (Pleist):15; Managalase Volcanics (Pleist):30; Manna Volcanics (Pleist-Holo):30; Maprik Mudstone (Plio-Pleist):6; Maton Conglomerate (Pleist-Holo):59; Mevlo Volcanic Member (l Mio, Plio, Plio-Pleist):56; Mount Ian Gabbro (l Mio-Pleist):16; Mount Lamington Volcanics (Pleist, Holo):31; Mt Murray Volcanics (Quater):15; Naringel Limestone (Plio, Pleist):61; Neumeyer Beds (Pleist?):4; Nopan Sandstone (Plio-Pleist?):4; Numa Numa Volcanics (Plio, Pleist, Holo):59; Pana roroa Volcanics (Plio, Pleist?):45; Punam Limestone (Plio or younger):59; RabaultVolcanics (Pleist-Holo):56; Reini Volcanics (Plio, Pleist, Holo):59; Riet Beds (Pleist, Holo):55; Sai Beds (l Mio, Plio, or younger):56; Sauru Volcanics (Quater):15,22; Sebutuia Volcanics (Pleist, Holo):45; Serra Hills Limestone (l Plio-Pleist):5;

QUATERNARY (cont.)

Sibi Sandstone Member (l Plio-Pleist?):4; Silimidi Conglomerate (Pleist):29; Sinewit Formation (l Mio, Plio, Plio-Pleist):56; Sisa Volcanics (Pleist):15; Sivai Breccia Member (Pleist):29; Sohano Limestone (e Mio?-Pleist):59; Star Mountains Intrusives (l Mio-Pleist):16; Sugarloaf Volcanics (Quater):15; Takuan Volcanics (Plio, Pleist, Holo):59; Taroka Volcanics (Plio, Pleist, Holo):59; Timbe River Conglomerate (Pleist):50; Tjeleba Basalt (Quater):4; Tore Volcanics (Plio-Pleist-Holo):59; Ubo Fanglomerate (Holo):29; Ulahau Fanglomerate (Plio?-Pleist?):4; Uluputur Beds (l? Pleist):59; Uoivi Volcanics (Pleist-Holo):30; Uvo Volcanics (Plio, Pleist):51; Victory Volcanics (Pleist-Holo):30; Waiowa Volcanics (Holo):30; Wakioki Fanglomerate (Holo):29; Wandokai Limestone (Quater):50; Wiriu Limestone (Pleist-Holo):3; Wongop Sandstone (Plio or younger):17; Wosera Beds (Pleist?):3; Wuro Beds (Plio?-Pleist?):4

PLIOCENE

Amphett Volcanics (Plio):46; Antares Monzonite (l Mio-Pleist):16; Apinaipi Formation (Plio):32; Aria Beds (Plio):56; Astrolabe Agglomerate (Plio):34; Awaitopu Claystone (Plio):32; Babwaf Conglomerate (Plio?):33; Bagana Volcanics (Plio, Pleist, Holo):59; Bakanovi Volcanics (Plio, Pleist, Holo):59; Balbi Volcanics (Plio, Pleist, Holo):59; Barida Beds (l Mio-e Plio):59; Bewani Fm (Plio):5; Border Limestone Beds (Mio?, Plio?):8; Bougainville Group (Plio, Pleist, Border Limestone Beds (Mio?, Plio?):8; Bougainville Group (Plio, Pleist, Holo):59; Bulimp Formation (l Plio?-Pleist?):5; Bulolo Agglomerate (Plio):33; Cloudy Bay Volcanics (Plio):32; Crater Mountain Volcanics (Plio-Holo):22; Diorite (Oligo?-Pleist?):59; Domara River Conglomerate (Plio):32; Edie Porphyry (Mio-Plio):31; Emperor Range Volcanic Beds (Plio, Pleist, Holo):59; Era Beds (Plio, Pleist):16; Esis Beds (l Mio-Plio):57; Fife Bay Volcanics (Plio):32; Fubilan Stock (l Plio-Pleist):16; Fuk Beds (Plio):7; Gidogidora Granodiorite (Plio):45; Gowop Limestone (e or m Mio-Plio):52; Gwenif Formation (Plio):8; Gwoira Conglomerate (Plio):32; Intrusives (Plio):16; Ipe Formation (Plio):6; Johanna Beds (Plio and younger):56; Kabenau Beds (m Mio-late Plio Pleist):51; Kabwum Limestone Member (e or m Mio-Plio):52; Kamul Marl Member (Plio):6; Kapiura Beds (Plio):6; Krisi Formation (l Plio?):42; Kukuia Volcanics (Plio, Pleist):46; Kupiano Beds (l Mio, e Plio):35; Kwikila Agglomerate (Plio):34; Kwinimaga Sandstone (Plio):32; Lakit Limestone

(Plio, or slightly younger):56; Lauis Formation (l Mio–Plio):61; Liddle Conglomerate (Plio):17; Lelet Limestone (l e Mio–Plio–Pleist?):60; Leron Formation (m Mio, l Plio, Pleist?):51; Lorengau Basalt (m Mio–Plio):6; Luboda Granodiorite (Plio):45; Lumi Formation (Plio):8; Mai Conglomerate Member (e Plio):7; Mai'iu Monzonite (l Mio–e Plio):37; Mailu Sandstone (Plio): 32; Maprik Mudstone (Plio–Pleist):6; Marabu Limestone (e Plio?):8; Mevlo Volcanic Member (l Mio, Plio, Plio–Pleist):56; Miaru Mudstone (l mio–e Plio):35; Misa Formation (e Plio):7; Molang Creek Formation (e Plio):7; Mount Davidson Volcanics (Plio):34; Mount Ian Gabbro (l Mio–Pleist):16; Mount Suau Member (Plio): 32; Munga Volcanics (Plio):56; Musa Volcanic Member (Plio:32; Mwatebu Sandstone (Plio):45; Namie Breccia (Plio):33; Nanu Formation (Plio):6; Naringel Limestone (Plio, Pleist):61; Nengare Member (Plio):6; Neni Formation (Plio):5; Nopan Sandstone (Plio–Pleist):4; Normanby Volcanics (Plio):46; Numa Numa Volcanics (Plio, Pleist, Holo):59; Observation Island Granodiorite (Plio):45; Omara Granodiorite (Plio):45; Orubadi Formation (l Mio–Plio):17; Otibanda Formation (Plio):33; Ouba Beds (Plio):51; Pana roroa Volcanics (Plio, Pleist?:45; Penk Volcanic Complex (Plio?):56; Punam Limestone (Plio or younger):59; Rambutyo Beds (l Mio–m or l? Plio):61; Rataman Formation (l Mio–e Plio):60; Reini Volcanics (Plio, Pleist, Holo):59; Rofula Member (Plio):5; Romi Formation (l Plio?):5; Ruaba Sandstone (m Mio–Plio):35; Sohano Limestone (e Mio?–Pleist): 59; Sai Beds (l Mio, Plio, or younger):56; Sargum Conglomerate (e Plio):7; Serra Hills Limestone (l Plio–Pleist):5; Sesara Volanics (l Mio–e Plio):33; Sibi Sandstone Member (Plio–Pleist?):4; Sigule Volcanics (Mio–Plio):56; Sinewit Formation (l Mio, Plio, Plio–Pleist):56; Siro Conglomerate (Mio–e Plio): 34; Sohans Limestone (e Mio?–Pleist):59; Song River Calcarenite (m Mio–Plio):52; Songaien Formation (e Plio):7; Star Mountains Intrusive (l Mio–Pleist):16; Taknan Volcanics (Plio, Pleist, Holo):59; Taroka Volcanics (Plio, Pleist, Holo): 59; Tasikim Agglomerate (m–l Plio):61; Tingau Conglomerate (l Mio–Plio):61; Toki Andesite (Plio):56; Tore Volanics (Plio, Pleist, Holo):59; Tumoflu Mudstone Member (Plio)L6; Uga Sandstone (Plio):32; Ulahau Fanglomerate (Plio?–?Pleist):4; Uvo Volcanics (Plio–Pleist):51; Wedge Hill Limestone (Plio): 34; Wewak Beds (Plio):5; Wongop Sandstone (Plio or younger):17; Wuro Beds (Plio?–Pleist?):4; Yaifa Formation (l Mio–e Plio):34

Adau Limestone (e–m Mio):37; Aifunka Volcanics (m Mio):24; Akuna Intrusive Complex (e Mio):23; Amogu Conglomerate (e–m Mio):10; Antares Monzonite (l Mio–Pleist):16; April Ultramafics (m Mio):10; Aure Beds (Oligo–m–Mio):18,38; Benembi Diorite (l Mio):23; Barida Beds (l Mio–e Plio):8; Birsmark Intrusive Complex (m Mio):23; Bliri Volcanics (L Cret? Palaeo?–Mio):12; Boera Limestone (l Oligo–e Mio):39; Bootless Inlet Limestone (l Oligo–e Mio):39; Border Limestone Beds (Mio?–Plio?):8; Buka Formation (l Oligo–e Mio):60; Burgess Formation (l Mio):9; Castle Hill Limestone (m Mio):36; Chiria Formation (m Mio):36; Chuingai Limestone (l Mio):18; Darai Limestone (l Eo–m Mio):18; Debolina Beds (l Oligo–Mio):38; Diorite (Oligo?–Pleist?):59; Dokuna Tuff (l Oligo–e Mio):39; Dremsel Alunitic Phase (m Mio):62; Edie Porphyry (Mio–Plio):31; Elandora Porphyry (l Mio):23); Esis Beds (l Mio–Plio):57; Finisterre Volcanics (e Oligo–e Mio):54; Frieda Porphyry (m Mio):10; Gabahusuhusu Syenite (l Oligo?–m Mio):37; Gidobada Limestone (m Mio):36; Gowop Limestone (e or m Mio–Plio):52; Gulewa Formation (l Mio):46; Iauga Formation (m Mio):36; Imudat Monzonite Formation (l Oligo?– m Mio):37; Intrusives (l Mio):23; Intrusives (l Oligo–e Mio):58; Iwoer Formation (e–m Mio):18; Kabenau Sandstone (m Mio–l Plio Pleist):51; Kabwum Limestone Member (e or m Mio–Plio):52; Karawari Conglomerate (m–l Mio):9; Kariaka Limestone (e Mio):60; Kenangi Gabbro (m Mio):24; Kido Limestone (e–m Mio):37; Kieta Volcanics (Oligo?–e Mio?):60; Kimil Diorite (m Mio):23; Kobel Volcanics (l Mio):46; Kore Volcanics (m Mio):38; Kwama Basalt (e Mio, l Oligo):53; Kupiano Beds (l Mio–e Plio):35; Kwama Basalt (l Oligo–e Mio):53; Langimar Beds (m Mio):36; Lauis Formation (l Mio–Plio):61; Lavao Formation (l Mio): 36; Lelet Limestone (l e Mio–Plio–Pleist?):60; Leron Formation (m Mio–late Plio–Pleist?):51; Liak Conglomerate (l Mio):46; Lorengau Basalt (m Mio–Plio):61; Lossuk River Beds (e Mio):60; Magavara Syenite (l Oligo?–m Mio):37; Mai 'iu Monzonite (l Mio–e Plio):37; Maramuni Diorite (m Mio):10; Marum Basic Belt (Mio):24; Mebu Beds (l Oligo–m Mio):53; Mena Beds (e–m Mio):53; Mevlo Volcanic Member (l Mio, Plio, Plio–Pleist):56; Miaru Mudstone (l Mio–e Plio):35; Michael Diorite (l Mio):23; Modewa River Beds (l Oligo–Mio):38; Morobe Granodiorite (m Mio):37; Mount Ian Gabbro (l Mio–Pleist):16; Mount Turu Complex (Oligo?–e Mio):11; Movi Beds (e–m Mio):24; Mundrau Limestone (e–m Mio):62; Nasai Limestone (e Mio):46; Nengmukta Formation (l Mio?):57; Oipo Intrusives (m Mio):10,23; Okiduse Volcanics (e Mio):47; Orubadi Formation (l Mio–Plio):17; Oveia Diorite (l Mio):35; Padowa Beds (l Oligo–Mio):38; Panasia Limestone (e Mio):47; Pindiu Sandstone (e–m Mio):53; Pnyang Formation (m Mio):17; Prince Alexander Complex (E Cret–Mio):11; Pundugum Formation (l Oligo?–e Mio):11; Puwani Limestone (e–l Mio):9; Rambutyo Beds (l Mio–m or l? Plio):61; Rataman Formation (l Mio–e Plio):60; Ruaba Sandstone (m Mio–Plio):35; Sai Beds (l Mio, Plio, or younger):56;

MIOCENE (cont.)

Senu Beds (e-l Mio):8; Sesara Volcanics (l Mio-e Plio):33; Sewa Beds (e Mio):47; Sigi Lele Gabbro (l Oligo?-m Mio):37; Sigule Volcanics (Mio-Plio):56; Sinewit Formation (l Mio, Plio, Plio-Plesit):56; Siro Conglomerate (l Mio-e Plio):34; Sohano Limestone (e Mio?-Pleist):59; Song River Calcarenite (m Mio-Plio):52; Star Mountains Intrusives (l Mio-Pleist):16; Suckling Granite (l Mio):37; Suloga Limestone (e Mio):47; Surker Limestone (e Mio):60; Tabukui Beds (e Mio):47; Talama Volcanics (m-l Mio):35; Tapio Marl (l Mio):35; Tarua Volcanic Member (m-l Mio):9; Tibinini Limestone Member (l Oligo?-m Mio):18; Tingau Conglomerate (l Mio-Plio):61; Tinniwi Volcanics (m Eo-e Mio):62; Tipsit Limestone (e or m Mio):52; Torricelli Intrusive Complex (L Cret-e Mio):11; Ulo Ulo Gabbro (l Oligo?-m Mio):37; Wai Asi Beds (m?-l Mio):17; Warre Limestone Member (m Mio):17; Watuti Gabbro (l Oligo?-m Mio):37; Wogamush Beds (m-l Mio):9; Wonai Hill Formation (e Mio):47; Woruka Siltstone (e Mio):38; Yaifa Formation (l Mio-e Plio):34; Yalam Limestone (Mio:57; Yangi Beds (l Oligo?-m Mio):18; Yeveufa Formation (m Mio):24; Yirri Intrusive Complex (m Mio):62

OLIGOCENE

Aure Beds (Oligo-m Mio):18,38; Bliri Volcanics (L Cret?, Palaeo?-e Mio):12; Boera Limestone (l Oligo-e Mio):39; Bootless Inlet Limestone (l Oligo-e Mio): 39; Buka Formation (l Oligo-e Mio):60; Chimbu Limestone (m Eo-e Oligo):25; Dabi Volcanics (l Oligo):39; Darai Limestone (l Eo-m Mio):18; Debolina Beds (l Oligo-Mio):38; Diorite (Oligo?-Pleist?):59; Dokuna Tuff (l Oligo-e Mio):39; Finisterre Volcanics (e Oligo-e Mio):54; Gabahusuhusa Syenite (l Oligo?-m Mio):37; Imudat Monzonite (l Oligo?-m Mio):37; Intrusives (l Oligo-e Mio):58; Jaulu Volcanics (m-l Oligo):60; Kapuluk Volcanics (l Oligo):57; Kieta Volcanics (Oligo?-e Mio?):60; Kwama Basalt (e Mio, l Oligo):53; Lemau Intrusives (e-m Oligo): 60; Magavara Syenite (l Oligo?-m Mio):37; Mebu Beds (l Oligo-m Mio):53; Merai Volcanics (l Oligo):57; Modewa River Beds (l Oligo-Mio):38; Mount Turu Complex (Oligo?-e Mio):11; Nasanaka Conglomerate (Oligo):25; Nebilyer Limestone (m Eo-e Oligo):12, 19; Omaura Greywacke (l Oligo):24; Padowa Beds (l Oligo-Mio): 38; Prince Alexander Complex (E Cret-e Mio):11; Pundugum Formation (l Oligo?-e Plio):11; Sadowa Gabbro (l Eo-m Oligo):39; Sigi Lele Gabbro (l Oligo?-m Mio): 37; Tibinini Limestone Member (l Oligo?-m Mio):18; Tinniwi Volcanics (m Eo-e Mio):62; Torricelli Intrusive Complex (L Cret-e Mio):11; Ulo Ulo Gabbro (l Oligo?-m Mio):37; Watuti Gabbro (l Oligo?-m Mio):37; Wulamer Beds (Eo-Oligo?):37; Watuti Gabbro (l Oligo?-m Mio):37; Wulamer Beds (Eo-Oligo?):11; Yangi Beds (l Oligo?-m Mio):18

EOCENE

Aibala Volcanics (Eo?):40; Amanab Metadiorite (pre Oligo?):11; Amora Conglomerate (Eo):41; Asai Shale (L Cret-Eo):12; Auga Beds (L Cret-Eo (part Senonian, part m Eo)):42; Badila Beds (L Cret-m Eo):41; Baining Volcanics (l Eo):58; Baruni Calcarenite (e-m Eo):41; Bliri Volcanics (L Cret? Palaeo?-e Mio):12; Bomuguina Beds (Eo):40; Chimbu Limestone (m Eo-e Oligo):25; Darai Limestone (l Eo-m Mio):18; Dimaie Volcanics (l Eo): 12; East Cape Gabbro (m Eo?):40; Eia Beds (Eo):40; Feing Group (Valang, l Palaeo? or Eo):19; Foasi River Limestone Member (Eo):41; Godaguina Beds (Eo):40; Gufung Gneiss (Cret-Eo):13; Gusap Argillite (m Eo-m l Eo):54; Imo Tonalite (Eo):39; Juliade Limestone (m Eo):40; Kemp Welch Beds (L Cret, Palaeo, E Eo):42; Kui Tonalite (Eo):39; Kutu Volcanics (L Cret-m Eo):40; Nebilyer Limestone (m Eo-e Oligo):12,19; Nebire Limestone (e-m Eo):41; Paga Chert (e-m Eo):41; Pima Sandstone (l Palaeo-Eo):25; Port Moresby Beds (Palaeo-m Eo):41; Prince Alexander Complex (E Cret-e Mio):11; Sadowa Gabbro (l Eo-m Oligo):39; Salumei Formation (L Cret-Eo):12,19; Tatana Calcarenite (e-m Eo):41; Tauiawaira Limestone Member (L Cret-m Eo):40; Tinniwi Volcanics (m Eo-e Mio):62; Torricelli Intrusive Complex (L Cret-e Mio):11; Varirata Argillite (e,m Eo):41; Wulamer Beds (Eo-Oligo?):11;

PALAEOCENE

Amanab Metadiorite (pre Oligo?):11; Asai Shale (L Cret-Eo):12; Auga Beds (L Cret-Eo (part Senonian, part m Eo)):42; Badila Beds (L Cret-m Eo):41; Bliri Volcanics (L Cret?, Palaeo?-e Mio):12; Feing Group (Valang, Palaeo? or Eo):19; Gufug Gneiss (Cret-Eo):13; Kemp Welch Beds (L Cret, Palaeo, e Eo):42; Kutu Volcanics (L Cret-m Eo):40; Langaip Beds (M Jura-Palaeo):20; Pima Sandstone (l Palaeo-Eo):25; Port Moresby Beds (Palaeo-m Eo):41; Prince Alexander Complex (E Cret-e Mio):11; Salumei Formation (L Cret-Eo):12,19; Tauiawaira Limestone Member (L Cret-m Eo):40; Torricelli Intrusive Complex (L Cret-e Mio):11

TERTIARY

Acid intrusives (Tert):47; Basic and intermediate intrusives (Tert):47; Dolerite (Tert):47; Gorcka Formation (Mesozoic, E Tert?):26; Granite, Porphyry, Felsite (Tert): ; Loluai Volcanics (Tert?):47; Mount Turu Complex (Tert?):11; Prince Alexander Complex (Tert?):11; Vent Breccia (Tert):46

MESOZOIC

CRETACEOUS

Amawa Metamorphics (Cret?):48; Ara Greenschist (Mesoz?):49; Asai Shale (L Cret-Eo):12; Auga Beds (L Cret-Eo (part Senonian, part m Eo)):42; Badila Beds (L Cret-m Eo):41; Bena Bena Formation (Mesoz):26; Bliri Volcanics (?L Cret, Eo-e Mio):12; Bogoro Limestone (L Cret):42; Bonenau Schist Member (L Cret):41; Calvados Schist (Cret?):49; Chim Formation (Cenom-Masst):19.25; Cumulate ultramafics, teotonite ultramafics (Jura-Cret):43,44; Deboyne Metavolcanics (Mesoz?):48; D'Entrecasteaux Complex (Cret?):48; Emo Metamorphics (Jura?, Cret):42; Feing Group (Valang, Palaeo? or Eo):19; Gabbro (Cret?):49; Goroka Formation (Mesoz, E Tert?):26; Goropu Metabasalt (L Cret):41; Gudanai Metamorphics (Cret?):48; Gufug Gneiss (Cret-Eo):13; High-level gabbro, Granular gabbro, Cumulate Gabbro (Jura-Cret):42; Ieru Formation (Cenom-Camp):19; Intrusives (E Cret?):26; Kagi Metamorphics (Jura?-Cret):42; Kemp Welch Beds (L Cret, Palaeo, e Eo):42; Kondaku Tuff (Apt-Alb):26; Kumbruf Volcanics (Cret?):26; Kurada Metavolcanics (Cret?):48; Kutu Volcanics (L Cret-m Eo):40; Lagaip Beds (M Jura-Palaeo):20; Lalama Amphibolite (Mesoz?):48; Lokanu Volcanics (Jura?-Cret):42; Mebulibuli Metamorphics (Cret?):48; Morima Metamorphics (Cret?):48; Mount Victor Granodiorite (L Cret):25; Nipanata Beds (Jura?-Cret):42; Oiatau Gneiss (Mesoz?):49; Om Beds (l Bajoc-Tith (to Maestr locally)):20; Owen Stanley Metamorphics (Jura?-Cret):43; Potai Amphibolite (Cret?):48; Prevost Metamorphics (Cret?):48; Prince Alexander Complex (E Cret-e Mio):11; Saint Patrick Limestone (Mesoz?):49; Salumei Formation (L Cret-Eo):12,19; Tauiawaira Limestone Member (L Cret-m Eo):40; Toro Sandstone (Neocom-Alb):10; Torricelli Intrusive Complex (L Cret-e Mio):11; Ultramafics (Cret or older):49; Ultramafics (Jura-Cret):48; Umuna Schist (Mesoz?):49; Yau Gabbro (L Cret):41

JURASSIC

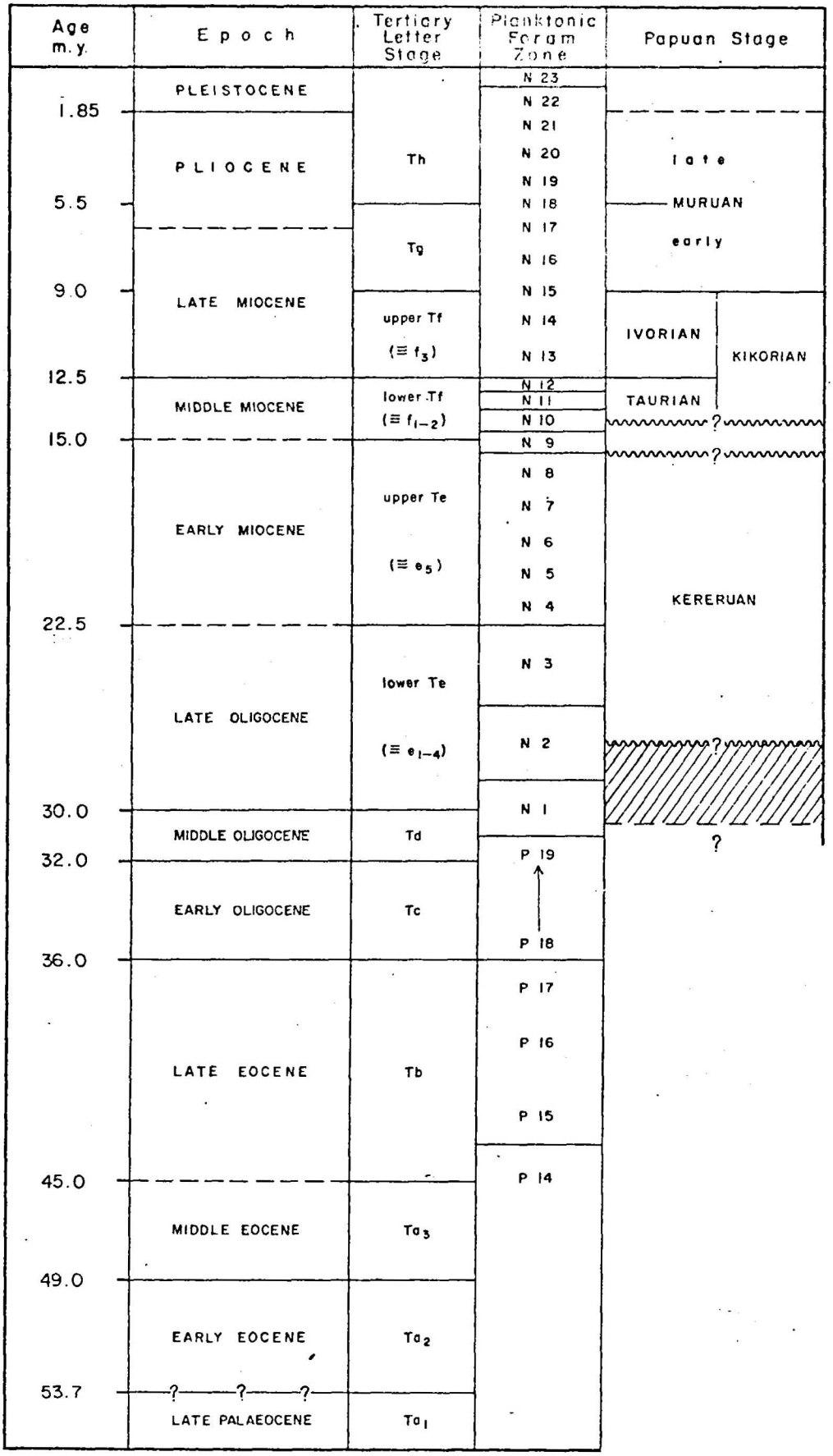
Ara Greenschist (Mesoz?):49; Atemin Shale (Oxford):20; Balimbu Greywacke (Sine-Pliens):14,27; Bena Bena Formation (Mesoz):26; Bol Arkose (Bajoc? in part): 20; Cumulate Ultramafics, Tectonite Ultramafics (Jura-Cret):43,44; Deboyne Metavolcanics (Mesoz?):48; Emo Metamorphics (Jura?-Cret):42; Goroka Formation (Mesoz, E Tert?); High-level gabbro, Granular gabbro, Cumulate Gabbro (Jura-Cret):43; Imburu Mudstone (Oxford):20; Kagi Metamorphics (Jura?-Cret):42; Karmantina Gneiss Granite (m Jura):27; Koi Iange Sandstone (e Callov-Kimmer):20; Kompiai Formation (L Jura?):13; Kuabgen Group (M-L Jura):16,17; Lagaip Beds (M Jura-Palaeo):16; Lagaip Beds (M Jura-Palaeo):20; Lalama Amphibolite (Mesoz?):49; Lokanu Volcanics (Jura?-Cret):42; Maril Shale (Kimmer):13,27; Mongum Volcanics (Jura):14,27; Nipanata Beds (Jura?-Cret):42; Oiatau Gneiss (Mesoz?):49; Om Beds (Bajoc-Tith (to Maestricht locally)):20; Owen Stanley Metamorphics (Mesoz):43; Saint Patrick Limestone (Mesoz?):49; Sitipa Shale (Kimmer):13; Ultramafics (Cret or older):49; Ultramafics (Jura-Cret): ; Umuna Schist (Mesoz?):49

TRIASSIC

Ambunti Metamorphics (M Trias?):14; Ara Greenschist (Mesoz?):49; Bena Bena Formation (Mesoz):26; Chambri Diorite (Trias?):14; Deboyne Metavolcanics (Mesoz?):48; Goroka Formation (Mesoz, E Tert?):26; Hunstein Complex (M Trias):14; Jimi Greywacke (Carnian-Norian):27; Kana Volcanics (Carnian-Norian):14,27; Kuta Formation (l Norian-Rhaetian):27; Lalama Amphibolite (Mesoz?):49; Oiatau Gneiss (Mesoz?):49; Owen Stanley Metamorphics (Jura?-Cret):43; Saint Patrick Limestone (Mesoz?):49; Umuna Schist (Mesoz?):49; Yuat Formation (Anisian-Norian):14

PALAEOZOIC

Badu Granite (L Carbonif):21; Kubor Granodiorite (L Perm):28; Metagabbro (Palaeoz or Mesoz):48; Omung Metamorphics (L Palaeoz):28; Porphyry (Palaeoz or Mesoz):48; Strickland Granite (L Perm):21; Trondhjenisti (Palaeoa or Mesoz):48; Ultramafics (Palaeoz or Mesoz):48



Appendix 5
Standard Cainozoic Time Scale for Papua New Guinea