

## **Appendix 12**

### **Microscopic Observation List**



Appendix 12-1 Microscopic Observation List (Thin Section)

(Palawan V Area)

Sample No.	Rock Name	Minerals and Rocks	Texture
NA-039	Radiolarian chert	McQz, Fe-hyd, Cm	
NE-002	Sandstone	Qz, K-Fel, Pl, Bi, My, Cal; Ch, Cha, Silt	
NF-033	Sandstone	Qz, K-Fel, Pl, Mi, Bi, Zi, Chl; Ch, Silt, Sh	
NF-092B	Basalt	Pl, Il, Fe-hyd	
NK-022	Radiolarian chert	McQz, Ill, Chl, Cm, Fe-hyd	

(Palawan VI Area)

Sample No.	Rock Name	Minerals and Rocks	Texture
SLR-12	Hb-Bi-granodiorite	Qz, K-Fel, Pl, Bi, Hb, Mt, Ap, Chl, Ep	Holocrystalline equigranular texture
SW-033R	Dacite	Pl, Mf, Qz, Fel, Hb, Ep, Hm	
SV-010R	Olivine-gabbro	Pl, Cpx, OPx, Ol, Mt, Pi	Holocrystalline equigranular texture
SLR-2	Hb-Px-gabbro	Pl, Cpx, OPx, Hb, Mt	Holocrystalline equigranular texture
SXR-3	Pyroxenite	CPx, Opx, Ol, Im	
SPR-5	Basalt	Mt, Pl, Cpx, OPx, Chl, Cal	Intersertal texture
SPR-28	Fel-phyric dolerite	Pl, Mf, Pl, CPx, OPx, Il, Chl, Cal	Intergranular texture
SOR-22	Gabbro	Pl, CPx, Bi, Mt, Ap, Serp, Pre, Cal	Holocrystalline equigranular texture
SOR-39	Basalt	Pl, Mf, CPx, OPx, Il, Chl, Cal	Intergranular texture
SPR-1	Act-schist	Act, Ep, Alb, Qz, Spe, Fe-ox	

## (West Negros Area)

Sample No.	Rock Name	Minerals and Rocks	Texture
BL-69R	Spessartite	Pl, Hb, Mt, Spe, Cal, Chl	Holocrystalline equigranular texture
BL-48	Hb-gabbro	Qz, Pl, Hb, CPx, OPx, Mt, Ap, Chl, Ep, Cal	Holocrystalline equigranular texture
BL-202	Qz-diorite	Qz, K-Fel, Pl, Hb, Mt, Bi, Ap, Spe, Chl, Ep	Holocrystalline equigranular texture
BL-203	Bi bearing diorite	Qz, K-Fel, Pl, Bi, Hb, Mt, CPx, OPx, Ap, Spe, Zi, Chl	Holocrystalline equigranular texture
BL-200	Qz-diorite	Qz, K-Fel, Pl, Hb, Bi, CPx, OPx, Mt, Ap, Spe, Chl, Ep	Holocrystalline equigranular texture
FR-04	Qz-diorite	Qz, K-Fel, Pl, Hb, Bi, CPx, OPx, Mt, Ap, Zi, SFe, Chl, Ep, Cal	Holocrystalline porphyritic texture
BK-55	Basalt	Pl, CPx, OPx, Mt, Cal	Intersertal texture
BL-201	Basalt tuff	Pl, Hb, Mt, Bi, Qz, Amp: Basalt	
FR-32	Porphyrite	Pl, Hb, Mt, Ap, Qz, K-Fel, Chl, Cal, Ep	Holocrystalline porphyritic texture
FR-21	Basalt	Pl, Mf, Mt, Chl, Ep, Spe	Intersertal texture

## (Samar I Area)

Sample No.	Rock Name	Minerals and Rocks	Texture
NG-02R	Basalt	Pl, OPx, Pl, CPx, Mt, Cal, Chl, Zo	Integrantular texture
NG-05R	Dacite	Qz, Pl, Mt, Chl, Zo, Ap, Spe	Felsitic texture
NK-01R	Aphyric andesite	Pl, CPx, Mt, Opx, Qz, Il	Hyalopilitic texture
NK-03R	Basalt	Pl, Mf, CPx, Opx, Mt, Chl, Cal	Integrantular texture
NK-08R	Basalt	Pl, CPx, Opx, Mt, Qz, Chl	Integrantular texture

## (Samar II Area)

Sample No.	Rock Name	Minerals and Rocks	Texture
EN-09	Limestone	Cal, Foraminifera	
EJ-01	Two-Px-andesite	Pl, CPx, OPx, Mt, Ap, Spe	Intersertal texture
EQ-03R	Hb-gabbro	Pl, Hb, Tre, Bi, Mt, Cal, Chl, Spe	Holocrystalline equigranular ~ porphyritic texture
EF-01R	Harzburgite	OPx, Ol, Chr, Mt, Ta	Holocrystalline equigranular exture
EH-04R	Lherzolite	OPx, CPx, Ol, Pi, Mt	Holocrystalline equigranular exture

## (Samar III Area)

Sample No.	Rock Name	Minerals and Rocks	Texture
WB-001	Dacitic tuff	Q, K-Fel, Pl, Ser, Chl, Ep, Ap, Pyrite	
WE-009R	Diorite	Pl, CPx, OPx, Hb, Qz, Mt, Spe, Ap	Holocrystalline equigranular exture
WF-003R	Hb-gabbro	Pl, Hb, SPe, Mt, Il	Holocrystalline equigranular exture
WG-005	Andesite	Pl, Mf, Qz, Chl, Ep, Spe, Cal, Pyrite	
WK-02R	Dacitic tuff	Qz, Pl, Ser, Chl, Fe-hyd, Pyrite	
WK-012R	Dacite	Qz, Pl, K-Fel, Mt, Chl, Ep, Ser, Zo, Spe, Ap	
WL-010R	Diorite-porphyrite	Pl, Hb, K-Fel, Qz, Mt, Ap	Holocrystalline equigranular exture
WL-014R	Dacitic tuff	Qz, Pl, K-Fel, Chl, Ser, Cal, Ap, Mt, Pyrite	
WN-001R	Qz-diorite	Qz, Pl, CPx, Hb, K-Fel, My, Mt, Ap, Spe	Holocrystalline equigranular exture
WN-003R	Basalt	Pl, CPx, PRx, Chl, Mt, Il, Spe	Basaltic texture

## (Abbreviation)

Act : Actinolite	Hm : Hematite	PRx: Phombic pyroxene
Alb : Albite	Hb : Hornblende	Pl : Picotite
Amp : Amphibole	Il : Ilmenite	Pre : Prehnite
Ap : Apatite	Ill : Illite	Qz : Quartz
Bi : Biotite	Im : Iron mineral	Ser : Sericite
Cal : Calcite	K-Fel: Kalifeldspar	Serp: Serpentine
Ch : Chert	McQz: Microcrystalline quartz	Sh : Shale
Chl : Chalcedony	Mf : Mafic mineral	Silt : Siltstone
Chr : Chromite	Mt : Magnetite	Spe : Sphene
Cm : Clay minerals	My : Myrmekite	Ta : Talc
Ep : Epidote	Ol : Olivine	Tre : Tremolite
Fe-hyd: Fe-hydroxides	Pl : Plagioclase	Zi : Zircon
Fe-ox : Fe-oxides	Px : Pyroxene	Zo : Zeolite
Fel : Feldspar	CPx : Clinopyroxene	
	OPx : Orthopyroxene	

Appendix 12-2 Microscopic Observation List (Polished Section)

(Palawan V Area)

Sample No.	Ore Name	Ore Minerals	Gangue Mineral
NA037	Manganese ore	Cryp, Fe-hyd,	Qz
NA-038	Manganese mineral veinlets	Py, Cryp, Hm	
NA-040	Manganese ore	Cryp, Pyr,	Qz
NK-046	Manganese ore	Cryp, Pyr, Psi, Fe-hyd	Qz
T-1	Manganese ore	Cryp, Fe-hyd	Qz

(Palawan VI Area)

Sample No.	Ore Name	Ore Minerals	Gangue Mineral
SOR-37B	Pyrite ore with brownish Cp and Sp	Py, Brownish Cp, Sp	Qz
SMR-1A	Py-Cp-Hm ore	Py, Cp, Hm	
SMR-1B	Pyrite-brownish Cp ore	Py, Brownish Cp, Sp, Hm	Qz
SMR-19A	Brownish Cp-Sp-Py-Mar ore	Py, Mar, Brownish Cp, Sp, Ga	Qz
SMR-9	Sp-Py ore	Py, Sp, Cp	
SLR-10C	Serpentinized peridstite with Gn	Cr, Mt, Gn	
SJ-139	Cp-Qz ore	Cp, Py, Sp, Cv	Qz
BC-1	Py-Brownish Cp ore	Py, Brownish Cp, Sp, Cv	Qz
BC-2	Py-Brownish Cp ore	Py, Brownish Cp, Ga, SP, Cv	Qz
SOR-38A	Mt-Py ore	Mt, Hm, Py, Sp	Qz

(West Negros Area)

Sample No.	Ore Name	Ore Minerals	Gangue Mineral
BA-1	Cp-py ore	Py, Cp, Sp	Qz
BA-2	Bo-Cp ore	Bo, Cp, Cv	Qz, Cal
BA-5	Mo-Cp ore	Mo, Cp, Tet, Bo, Sp, Py	Qz
SI-BG-02	Py (impregnation)	Py, Sp	Qz
SI-BG-04	Py (impregnation)	Py, Sp	
PD-0	Limenite (Fe-hyd)	Fe-hyd, Py, Ga, Sp	Qz
PD-2	Mt in sand	Mt	
SI-BC-01	Py (impregnation)	Py, Sp, Fe-hyd	Qz
C-01A	Cp (-Bo) (impregnation)	Mt, Hm, Cp, Bo, SP, Ga, Cc, Cv	
SI-BM-01	Py (impregnation)	Mt, Py	

(Samar II Area)

Sample No.	Ore Name	Ore Minerals	Gangue Mineral
EN06	Qz-Py ore	Py, Sp	Qz
EN07	Massive Py ore	Py, Sp	
EN08	Qz-Py ore	Py, Sp	Qz
EJ08	Massive Py ore	Py,	Qz
EJ10	Py ore	Py, Sp, Hm	

(Samar III Area)

Sample No.	Ore Name	Ore Minerals	Gangue Mineral
WF002R	Serpentinized peridotite	Cr, Mt, Py	
Spot No. 1	Py-Sp-Cp-Tet ore	Py, Cp, Sp, Tet, Ga, Cv	Ba, Qz
Spot No. 2	Py-Cp ore	Py, Cp, Bo, Sp, Cv	
Spot No. 3	Py-Cp-Sp ore	Py, Cp, Sp	Qz

(Abbreviation)

Ba	: Barite	Hm	: Hematite
Bo	: Bornite	Mo	: Molybdenite
Cc	: Chalcocite	Mt	: Magnetite
Cp	: Chalcopyrite	Mar	: Marcasite
Cr	: Chromite	Psi	: Psilomelane
Cal	: Calcite	Py	: Pyrite
Cryp	: Cryptomelane	Pyr	: Pyrolusite
Cv	: Covellite	Qz	: Quartz
Fe-hyd	: Fe-hydroxides	Sp	: Sphalerite
Ga	: Galena	Tet	: Tetrahedrite
Gn	: Garnierite		





## **Appendix 13**

### **Heavy Mineral Observation List**



Appendix 13-1 Heavy Mineral Observation List  
Mineralogic Composition of Heavy Mineral

(Palawan V Area)

(unit: %)

Sample No.	NC-044	NE-048	ND-028	NF-098	NH-010	NK-022	NM-027	NL-059	NA-026	NB-024
Mineral										
Plagioclase	70	90	97	98	—	5	75	5	50	20
Quartz	2	2	2	1	96	92	20	90	30	70
K-Feldspar	25	5	1	1	2	1	4	2	15	3
Limonite	3	2	—	—	tr.	—	—	—	—	—
Chromite	tr.	1	—	—	—	—	—	tr.	—	—
Fossil	tr.	tr.	—	—	—	—	tr.	—	tr.	—
Hematite	—	tr.	—	—	—	1	tr.	tr.	—	1
Augite	—	tr.	—	—	—	—	—	—	—	—
Rock fragment	—	—	—	tr.	—	1	—	—	1	2
Rutile	—	—	—	—	tr.	—	tr.	—	—	—
Zircon	—	—	—	—	1	—	tr.	—	—	tr.
Hornblende	—	—	—	—	—	—	1	3	4	5

(Palawan VI Area)

(unit: %)

Sample No.	SA-021	SC-017	SE-020	SJ-142	SP-002	SO-010	SX-041	SV-016	SQ-002	SL-003
Mineral										
Magnetite	tr.	—	—	tr.	35	70	50	40	10	50
Ilmenite	tr.	20	—	tr.	5	tr.	2	5	3	10
Quartz	80	5	5	50	15	5	10	10	2	3
Feldspar	8	1	1	3	5	2	1	4	20	—
Hornblende	1	2	—	15	5	—	1	3	20	4
Augite	5	5	3	25	10	3	18	5	37	6
Hematite	4	1	1	3	3	—	1	1	—	1
Limonite	2	—	15	2	2	—	—	1	1	—
Mica	tr.	—	—	—	—	—	—	—	—	—
Apatite	tr.	—	—	—	—	—	—	—	—	—
Magnetite	—	30	50	—	—	—	—	—	—	—
Chromite	—	35	35	tr.	2.0	20	15	30	7	25
Mica	—	tr.	—	2	tr.	—	—	tr.	—	—
Zircon	—	tr.	—	—	tr.	tr.	tr.	—	—	tr.
Apatite	—	tr.	tr.	—	tr.	tr.	tr.	—	—	tr.
Rock fragment	—	—	tr.	—	—	—	tr.	1	—	—
Plagioclase	—	—	—	—	—	—	—	—	—	1
Rutile	—	—	—	—	—	—	—	—	—	tr.

## (West Negros Area)

(unit: %)

Sample No.	BB-001	BB-099	BC-050	BD-112	BF-022	BG-068	BH-021	BK-047	BL-009	BM-111
Mineral										
Magnetite	10	65	90	50	75	7	10	3	65	4
Hematite	3	2	1	5	1	3	5	3	3	5
Ilmenite	tr.	3	tr.	3	2	2	1	tr.	2	—
Hornblende	25	10	2	—	5	50	33	23	3	—
Augite	50	15	3	10	6	5	20	60	5	1
Quartz	4	1	2	3	5	25	15	10	5	10
Mica	1	tr.	tr.	—	—	tr.	tr.	—	tr.	—
Limonite	2	2	1	2	1	1	3	1	2	—
Rutile	tr.	—	—	tr.	—	4	—	—	—	—
Zircon	tr.	—	—	—	tr.	tr.	—	—	tr.	—
Chromite	3	—	1	27	4	3	3	tr.	15	—
Feldspar	—	tr.	—	tr.	1	—	10	1	tr.	—
Pyrite	—	tr.	—	—	—	—	—	—	—	80
Apatite	—	—	—	—	tr.	—	tr.	—	tr.	—

## (Samar I-III Area)

(unit: %)

Sample No.	EG-003	EM-013	EP-003	EP-004	EP-010	WE-100	WH-001	WN-030	WP-029
Mineral									
Magnetite	8	5	35	3	10	5	30	3	25
Chromite	65	35	30	65	50	70	25	30	20
Ilmenite	15	12	15	17	10	13	10	20	18
Hematite	5	3	2	5	5	3	7	40	3
Fe oxide	2	tr.	tr.	3	3	—	2	2	tr.
Olivine	tr.	2	tr.	—	2	2	8	tr.	4
Diopside	3	40	8	2	5	2	10	—	20
Augite	tr.	3	3	—	—	1	3	5	5
Hypersthene	—	tr.	—	—	—	—	1	tr.	2
Hornblende	—	—	—	—	tr.	2	—	—	tr.
Epidote	tr.	—	—	—	2	tr.	tr.	—	tr.
Plagioclase	2	—	5	3	10	2	4	—	3
Quartz	tr.	—	2	2	3	tr.	tr.	—	tr.
Pyrite	—	—	—	—	—	tr.	—	—	—
Zircon	tr.	—	tr.	—	tr.	tr.	tr.	—	—
Gold (?)	—	—	—	—	—	—	tr.	—	—





## **Appendix 14**

### **Photographs of Samar Survey Field**





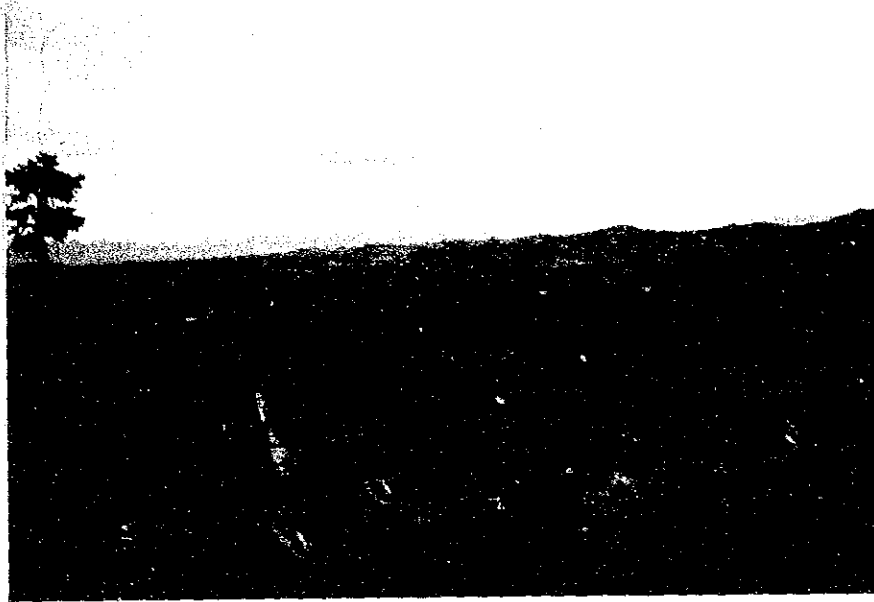


Stream sediment sample sieving



Data arrangement in PETROLAB





Mountain view in Samar III area

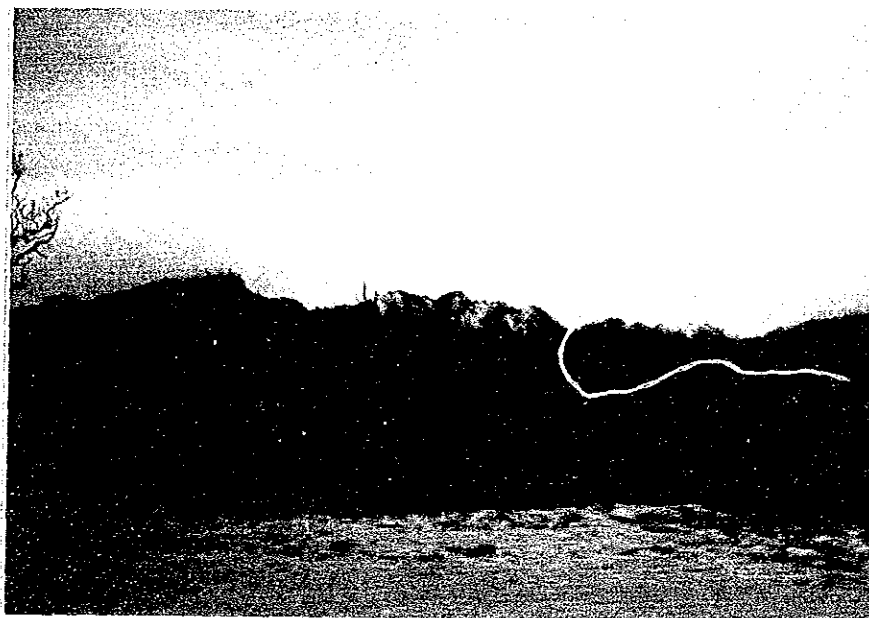


Access to Branch Camp with Banca boat.





Fan Fanico Bridge  
(Between Samar Is. to Leyte Is.)

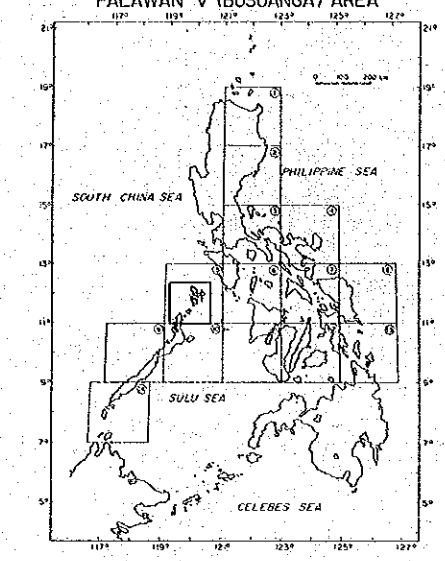


Northern view from Samar Cross road  
(Western part of Samar III Area)

JICA

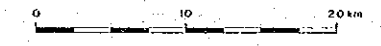
THE MINERAL EXPLORATION  
- MINERAL DEPOSITS AND TECTONICS OF TWO  
CONTRASTING GEOLOGIC ENVIRONMENTS -  
IN  
THE REPUBLIC OF THE PHILIPPINES  
PHASE IV  
GEOLOGICAL MAP AND SECTION

PALAWAN V (BUSUANGA) AREA



JAPAN INTERNATIONAL COOPERATION AGENCY  
METAL MINING AGENCY OF JAPAN  
Mar. 1988

Scale 1 : 250,000



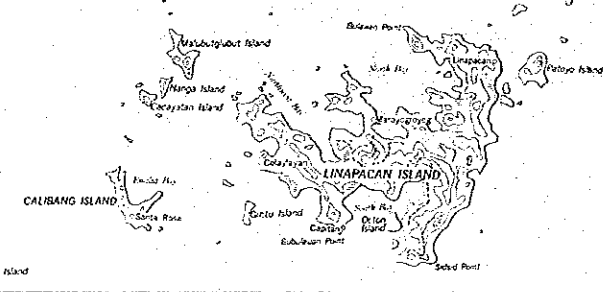
LEGEND

Quaternary	Qal	Quaternary Alluvium
Late Tertiary	CF	Coron Formation creamy to light gray, massive marbled limestones.
Middle Tertiary	LF2	Limnangung Formation chert
Early Tertiary	LF1	Limnangung Formation bedded chert interbedded sandstone and shale
Late Permian	Mf	Minilog Formation creamy to darkgray, massive, marbled limestone

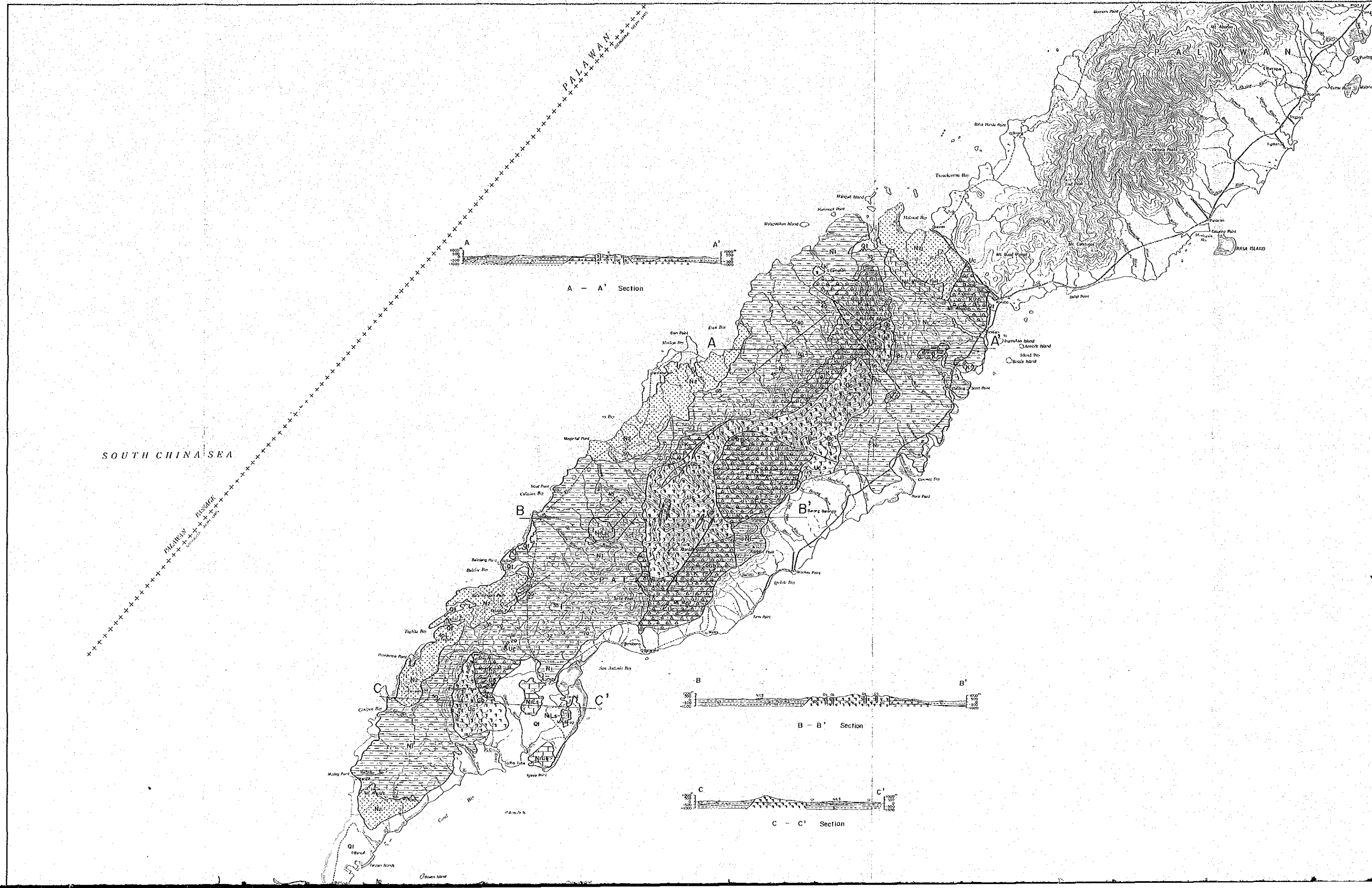
S E A



PROVINCE OF PALAWAN



P A S S  
E S T



SOUTH CHINA SEA

PALAWAN PASSAGE

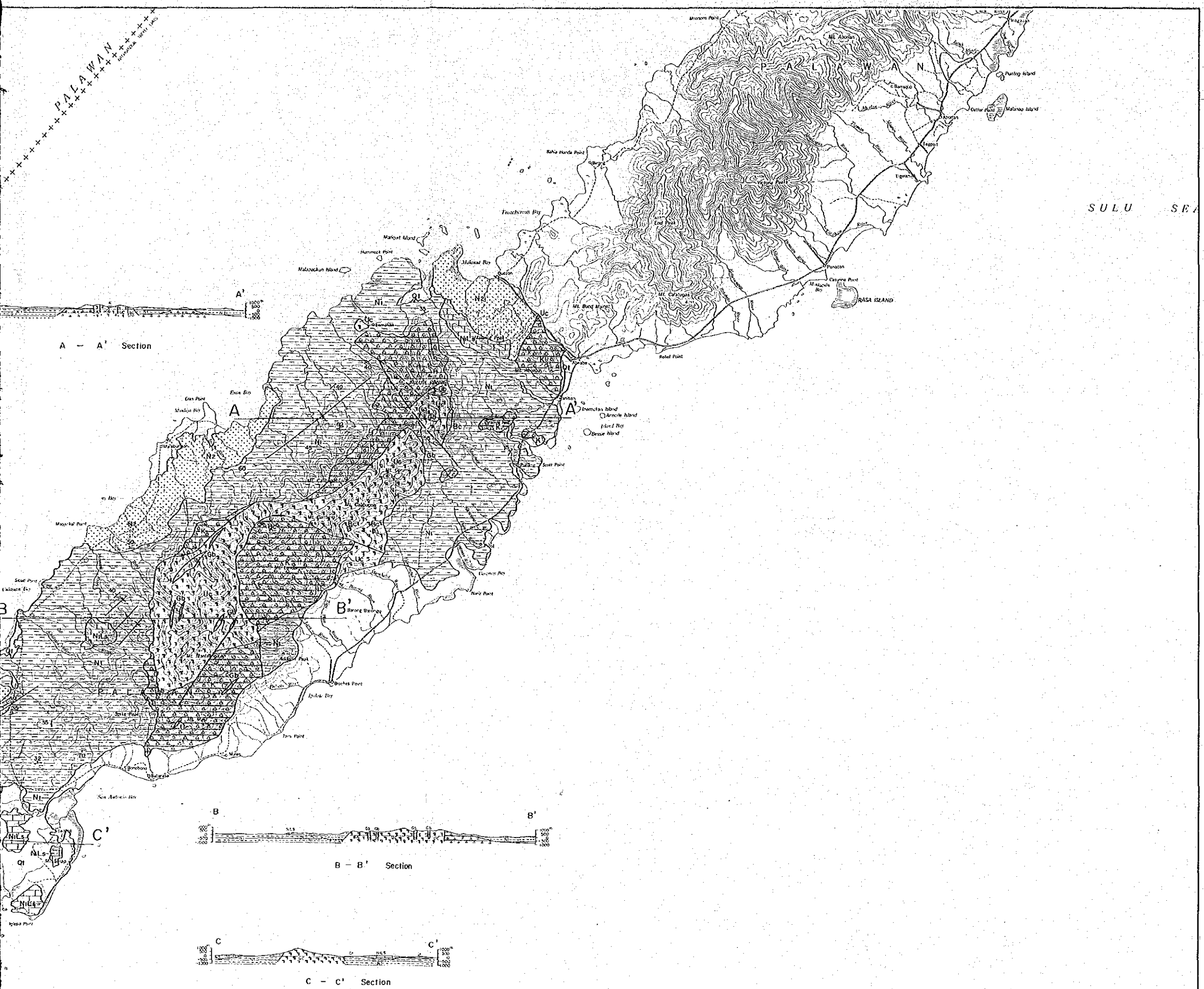
PALAWAN

A - A' Section

B - B' Section

C - C' Section

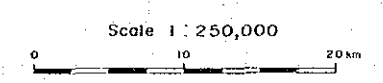




PL. 1-2

THE MINERAL EXPLORATION  
- MINERAL DEPOSITS AND TECTONICS OF TWO  
CONTRASTING GEOLOGIC ENVIRONMENTS -  
IN  
THE REPUBLIC OF THE PHILIPPINES  
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GEOLOGICAL MAP AND SECTION  
PALAWAN VI (QUEZON-RIO TUBAJ) AREA

JAPAN INTERNATIONAL COOPERATION AGENCY  
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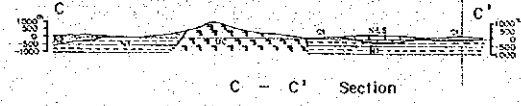
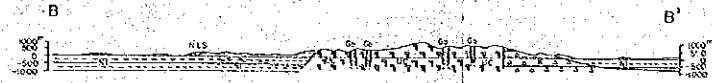
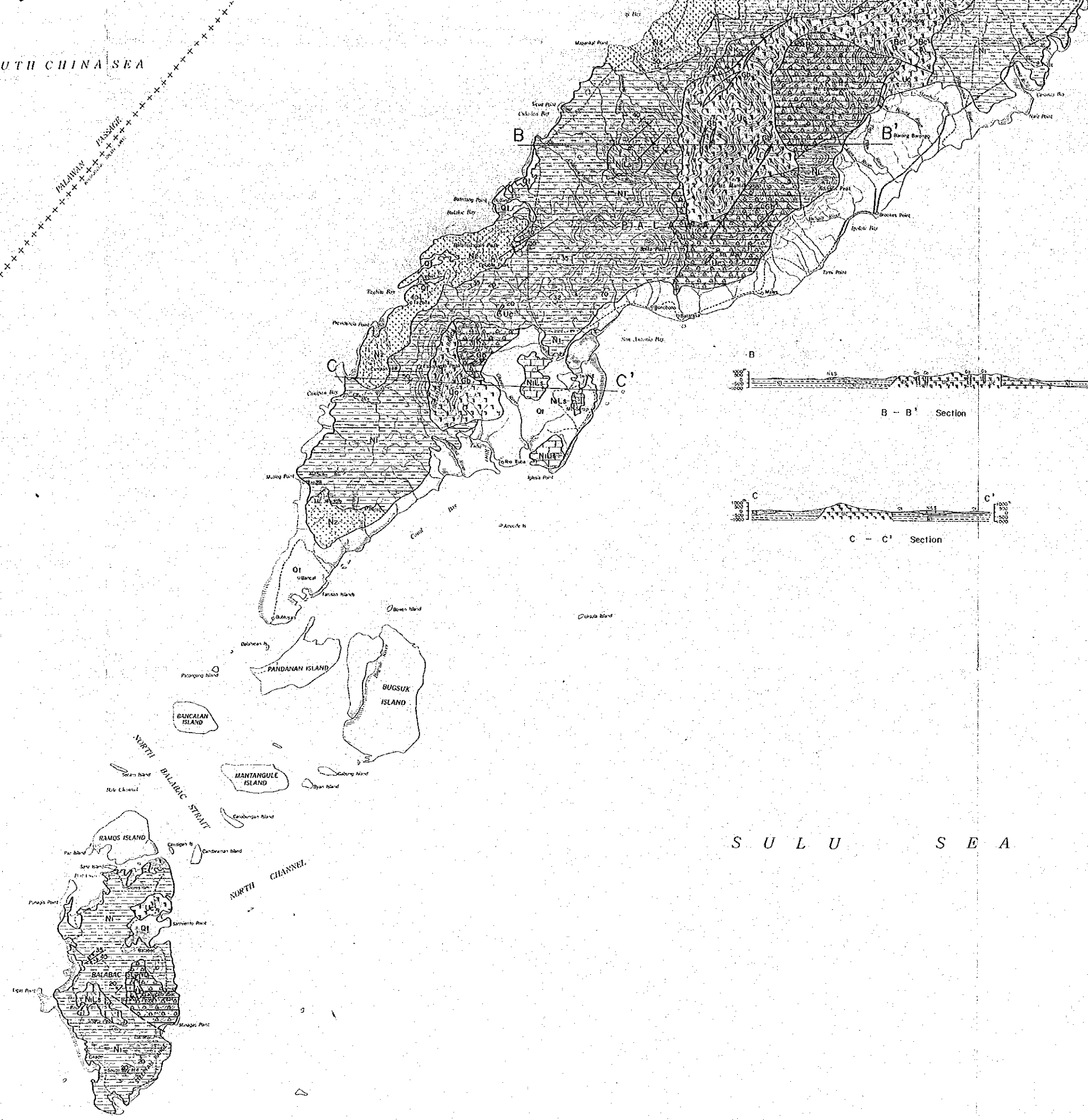


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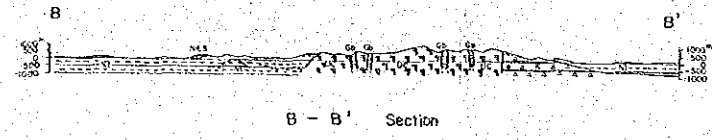
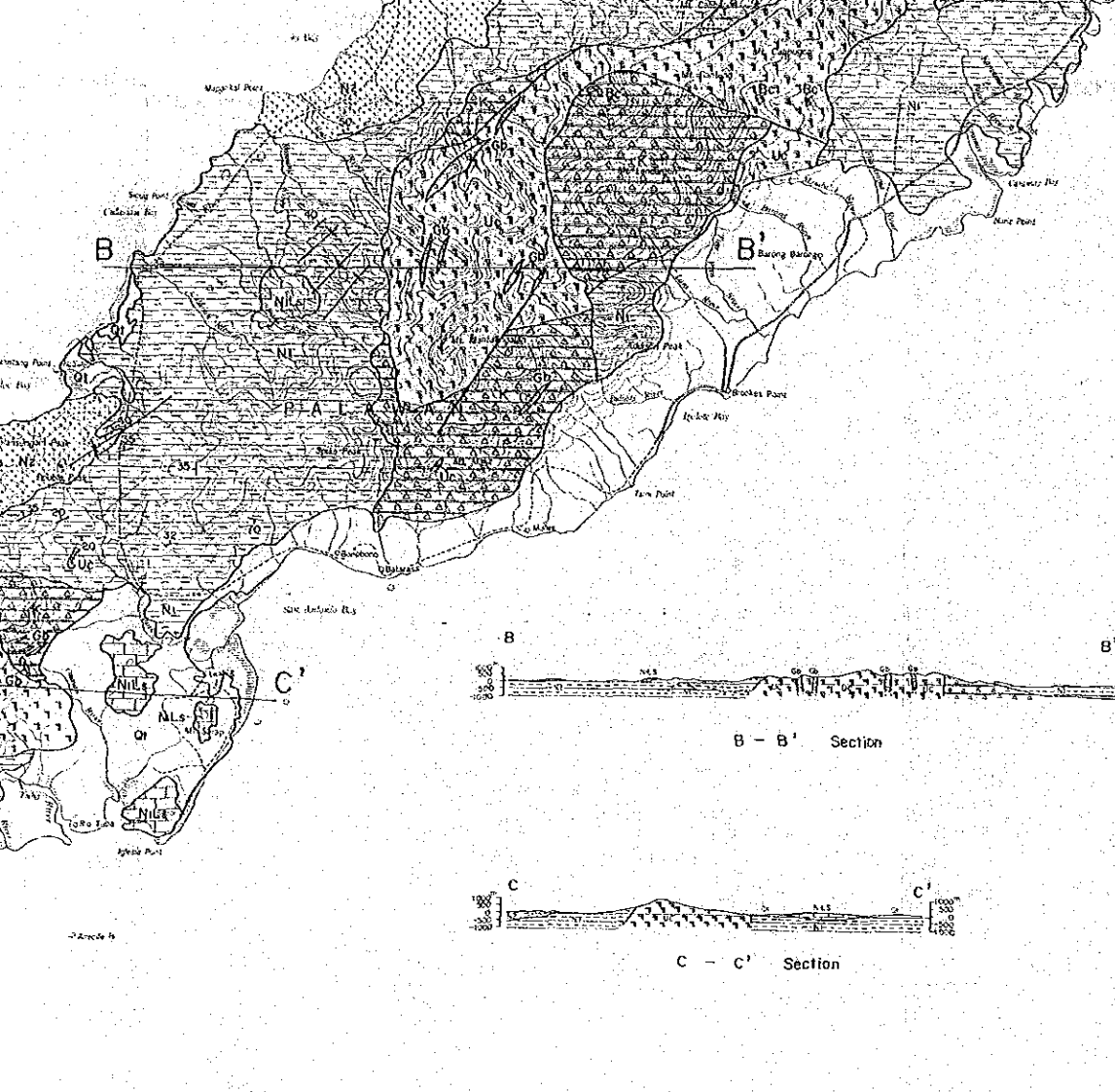
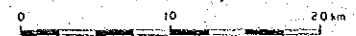
Quaternary	Q1	Alluvium		
Late Miocene	N2	Sandstone Mudstone		
Middle Miocene	N1.S	Limestone		
Early-Middle Miocene	N1	Sandstone Shale		
Cretaceous	K	Basic lava and tuff (bearing chert)		
Triassic	BC	Metamorphic rocks		
			<b>INTRUSIVE ROCKS</b>	
			UC	Ultrabasic rocks
			G	Gabbro

SOUTH CHINA SEA

PALAWAN PASSAGE



S U L U S E A



B - B' Section



C - C' Section

LEGEND

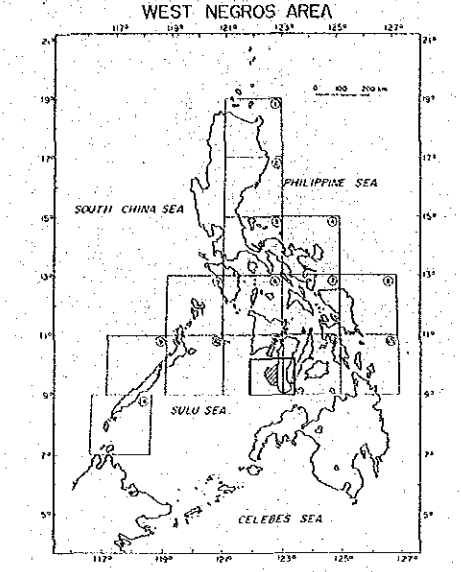
- Quaternary Alluvium
- Late Miocene Sandstone  
Mudstone
- Middle Miocene Limestone
- Early-Middle Miocene Sandstone  
Shale
- Cretaceous Basic lava and tuff  
(bearing chert)
- Triassic Metamorphic rocks

INTRUSIVE ROCKS

- Ultrabasic rocks
- Gabbro

S U L U            S E A

THE MINERAL EXPLORATION  
 - MINERAL DEPOSITS AND TECTONICS OF TWO  
 CONTRASTING GEOLOGIC ENVIRONMENTS -  
 IN  
 THE REPUBLIC OF THE PHILIPPINES  
 PHASE IV  
 GEOLOGICAL MAP AND SECTION

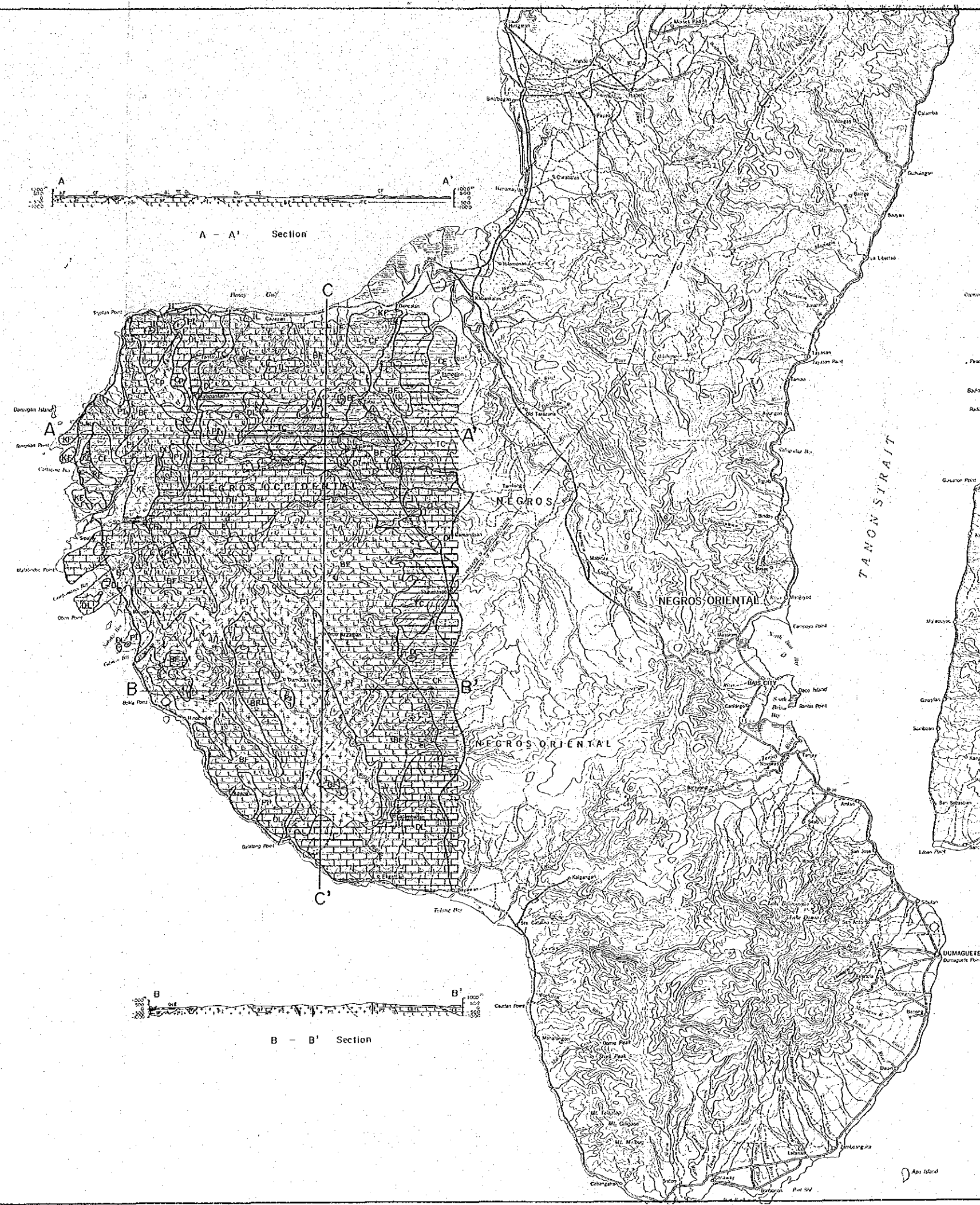


JAPAN INTERNATIONAL COOPERATION AGENCY  
 METAL MINING AGENCY OF JAPAN  
 Mar. 1988

Scale 1 : 250,000  
 0 10 20 km

LEGEND

SEDIMENTARY ROCKS		INTRUSIVE ROCKS	
Quaternary	Holocene	Ool	Alluvium
	Plistocene	C <sub>1</sub> A <sub>1</sub> A <sub>2</sub>	Andesitic Tuff and Lava
Neogene	Pliocene	KF	Sandstone, Limestone, Siltstone, Shale
	Late Miocene	CL	Tuffaceous Siltstone, Mudstone
Tertiary	Early Miocene	DL	Limestone
	Oligocene	IC	Sandstone, Siltstone, Shale
Paleogene	Eocene	IL	Limestone
	Mesozoic	Cretaceous	BF
			Diorite

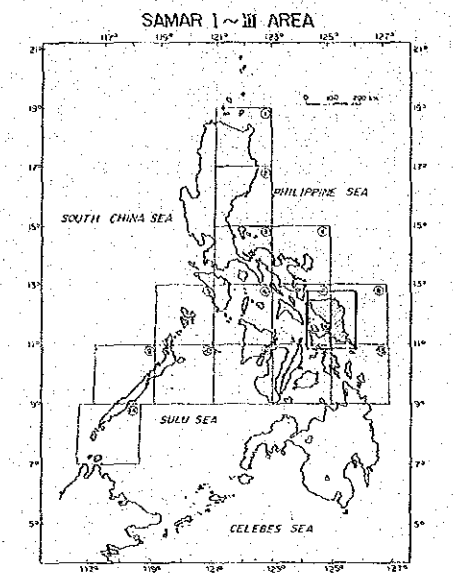


A - A' Section

B - B' Section

C - C' Section

THE MINERAL EXPLORATION  
 - MINERAL DEPOSITS AND TECTONICS OF TWO  
 CONTRASTING GEOLOGIC ENVIRONMENTS -  
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 PHASE IV  
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JAPAN INTERNATIONAL COOPERATION AGENCY  
 METAL MINING AGENCY OF JAPAN  
 Mar. 1988

Scale 1 : 250,000  
 0 10 20 km

LEGEND

- |  |                      |  |
|--|----------------------|--|
|  | Recent               | Alluvium   |
|  | Quaternary           | Raised coral reef Emission with some interbedded sand, gravel and calcareous clay  |
|  | Upper Miocene        | Composed of tuffaceous sandstone and shale with thinbeds of limestone  |
|  | Middle-Upper Miocene | Composed of hard fine to coarse grained tuffaceous sandstone and graywackes with interbedded thick limestone and shale   |
|  | Cretaceous-Paleogene | Spaltic basic and intermediate flows interbedded with metamorphosed graywacke, shale and minor red cherty sediment   |
|  | Basement             | Undifferentiated amphibolite and quartzite-felspathic schists and epithermal actinolite-albite schist associated with mobile exposed along narrow zone of close folding broken by upthrust |

- IGNEOUS ROCKS INTRUSIVES**
- |  |            |  |
|--|------------|--|
|  | Cretaceous | Undifferentiated ultramafics and plutonic rocks predominantly septentrional gabbro and late gabbro generally thrust and up-faulted |
|--|------------|--|

- EXTRUSIVES**
- |  |            |   |
|--|------------|---|
|  | Quaternary | Non-active volcanic cones generally pyroclastic and/or andesite plugs |
|--|------------|---|

- GEOLOGIC SYMBOLS**
- |  |   |
|--|---|
|  | Geologic contact  |
|  | High angle fault. Dashed where inferred, arrow indicate slick-slip movement |
|  | Thrust fault. Dashed where inferred, saw-teeth on overriding side           |
|  | Normal fault. Hachures on downthrown side                                   |
|  | Anticlinal axis   |



PHILIPPINES



LEGEND

- R** Recent Alluvium
- Q** Quaternary Rises coral reef limestone with some interbeds of sand, gravel and calcareous clay
- Ni** Upper Miocene Composed of tuffaceous sandstone and shale with thinbeds of limestone
- NI** Middle-Upper Miocene Composed of hard fine to coarse grained tuffaceous sandstone and graywackes with interbedded thick limestone and shale
- Kpg** Cretaceous-Paleogene Spilitic basic and intermediate flows interbedded with metamorphosed graywacke, shale and minor red cherty sediments
- BC** Basement Undifferentiated amphibolite and quartz-feldspathic schist and gneiss of oligoclase-albite schist associated with marble exposed along narrow zone of close folding broken by upthrust
- IGNEOUS ROCKS INTRUSIVES**
- UC** Cretaceous Undifferentiated ultramafic and plutonic rocks predominantly serpentinized peridotite and tole gabbro generally thrust and up-faulted
- EXTRUSIVES**
- Ov** Quaternary Non-active volcanic cones generally pyroclastic andesite, also dacite and/or andesite plugs

GEOLOGIC SYMBOLS

- Geologic contact
- High angle fault. Dashed where inferred, arrow indicate strike slip movement
- Thrust fault. Dashed where inferred, saw-tooth on overriding side
- Normal fault. Notches on downthrown side
- Anticlinal axis
- Synclinal axis
- A-A' Section line