

N13°30'

- First and second class road
- Route markers : National
- Route markers : Provincial

EXPLAWTION

STRATIGRAPHY

QUATERNARY
Pleistocene
Early
Late
Pliocene
Early
Late
Miocene
Early
Middle
Late
Oligocene
Early
Late
Eocene
Paleocene
Late
Cretaceous
Late
PRE-LATE CRETACEOUS

- Qal** Terrace Gravel and Alluvial Deposits Generally Confined on River Floodplains.
- Qvp** Quaternary widespread pyroclastic agglomerate, volcanic breccia, tuff, pumice and volcanic debris deposited around the Quaternary volcanic cones and volcanic plains.
- Ql** Quaternary to Late Pliocene limestone generally coralline. Associated within layers of pyroclastic materials.
- Pis** Pleistocene to Pliocene laminated ashy shales with interbeds of cinder sandstone.
- Pms** Early Pliocene to Late Miocene widely exposed and extensive conglomerate, sandstone, calcareous siltstone and limestone.
- Pmet** Early Pliocene to Late Miocene Coralline, sandy and marly limestone, partly crystalline.
- Ms** Miocene clastics formation composed of conglomerate, sandstone, calcareous shale, limestone, volcanic wackes, tuff-breccias.
- Es** Late-Paleocene-Eocene conglomerate, arkosic sandstone, silty tuffaceous and calcareous shale and graywacke.
- Cs** Late-Cretaceous graywacke, chert, shale sequence with local intercalation of basalt and andesitic flows.
- Sch** Pre-Late Cretaceous Ophiolite: metamorphosed rock unit (schists): regionally metamorphosed high grade schist of amphibolite facies and low grade schist of the green schist and albite-epidote-amphibolite facies and quartzite.
- UL** Pre-Late Cretaceous Ophiolite: ultramafic complex Interlayered serpentinitized peridotite, dunite, pyroxenite, gabbro, epidiorite, chromite.
- Qv** Quaternary andesitic and dacitic volcanic deposit, occurring mainly as lava flows in volcanic centers.
- TQv** Late tertiary to Early Quaternary andesite and basalt flow intercalated with agglomerate.
- LMDi** Late Miocene Diorite occurs as stocks dikes and sills of quartz diorite and dacite porphyry associated with andesite and syenite.
- DI** Early Miocene to Late Eocene Diorite Occurs as stocks and dikes of granodiorite, hornblende and quartz diorite, andesite porphyry.
- Ea** Eocene limestone, locally recrystallized and fractured.
- Efo** Eocene flysch and olistostrome.
- Cs** Late-Cretaceous cherty and oolitic limestone.
- Cms** Late-Cretaceous metavolcanics.
- PLCs** Pre-Late Cretaceous Ophiolite: low grade metamorphosed volcanics and related sediments.

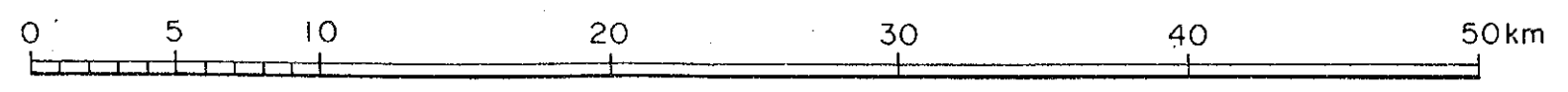
GEOLOGIC STRUCTURE



N13°

+

SIBUYAN SEA



N12°30'
E122°10'

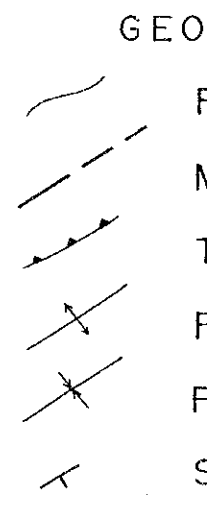
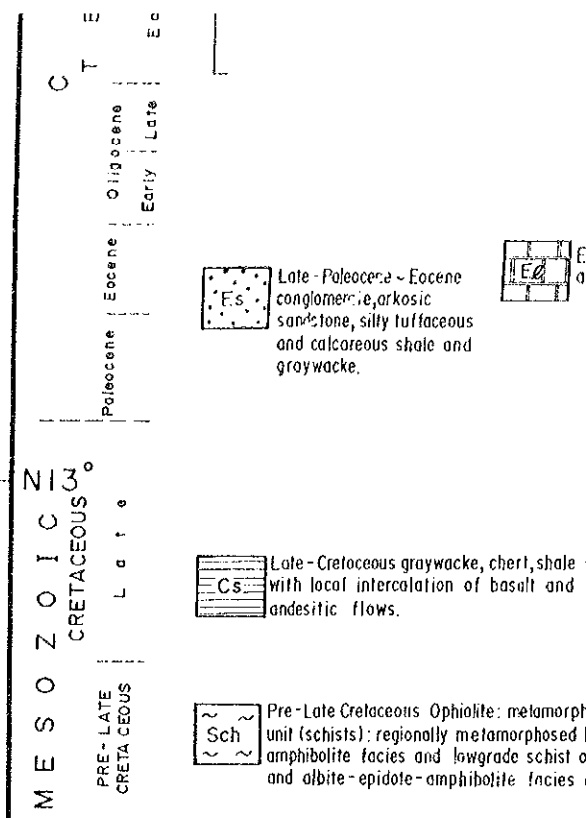
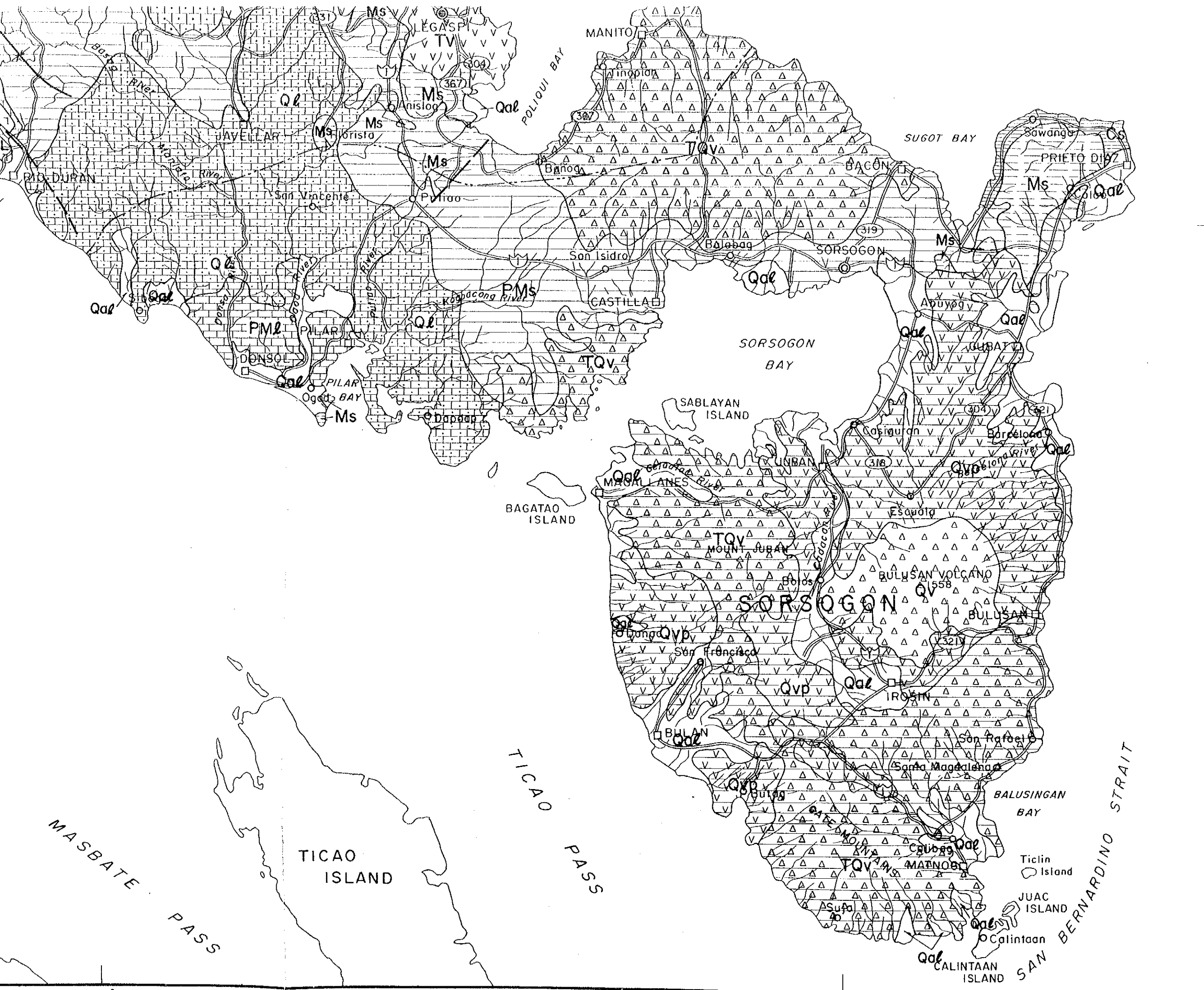
E122°30'

E123°



E123°

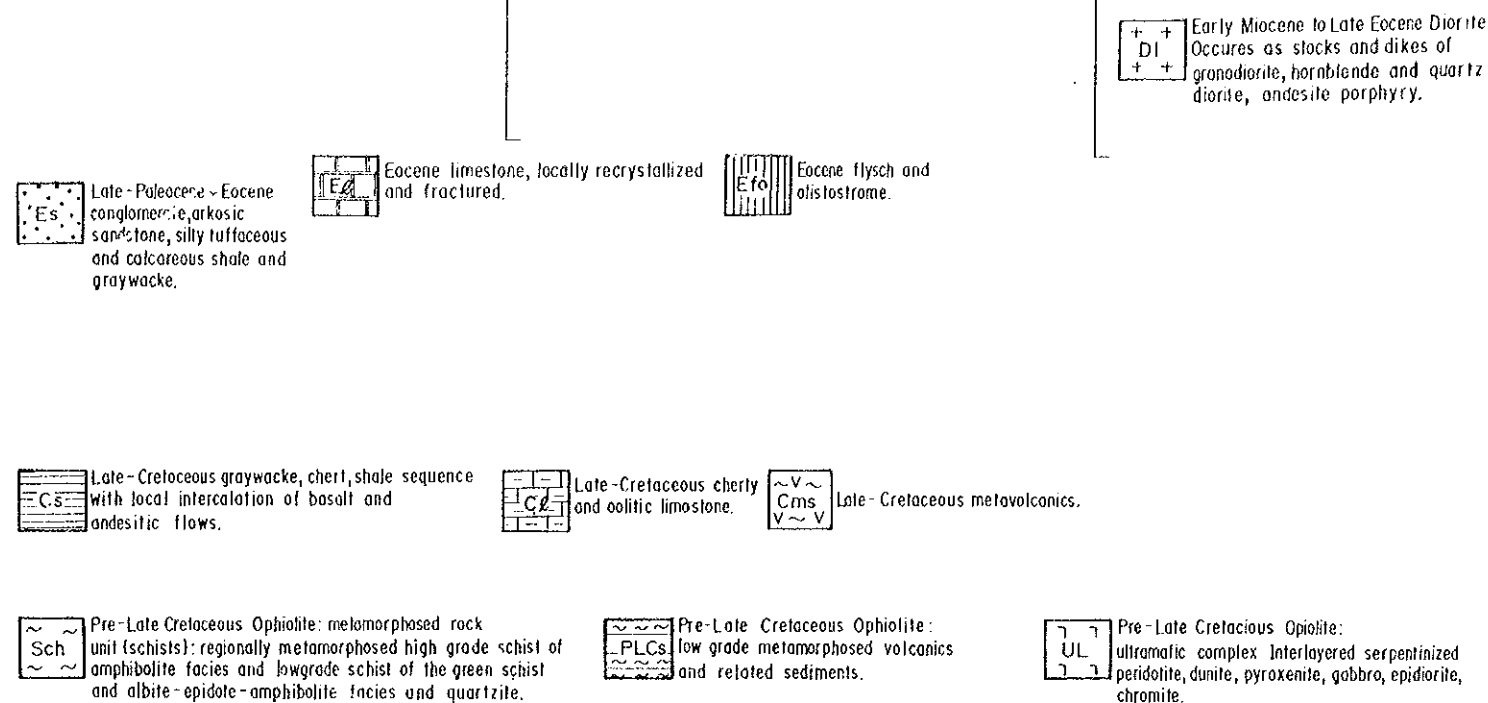
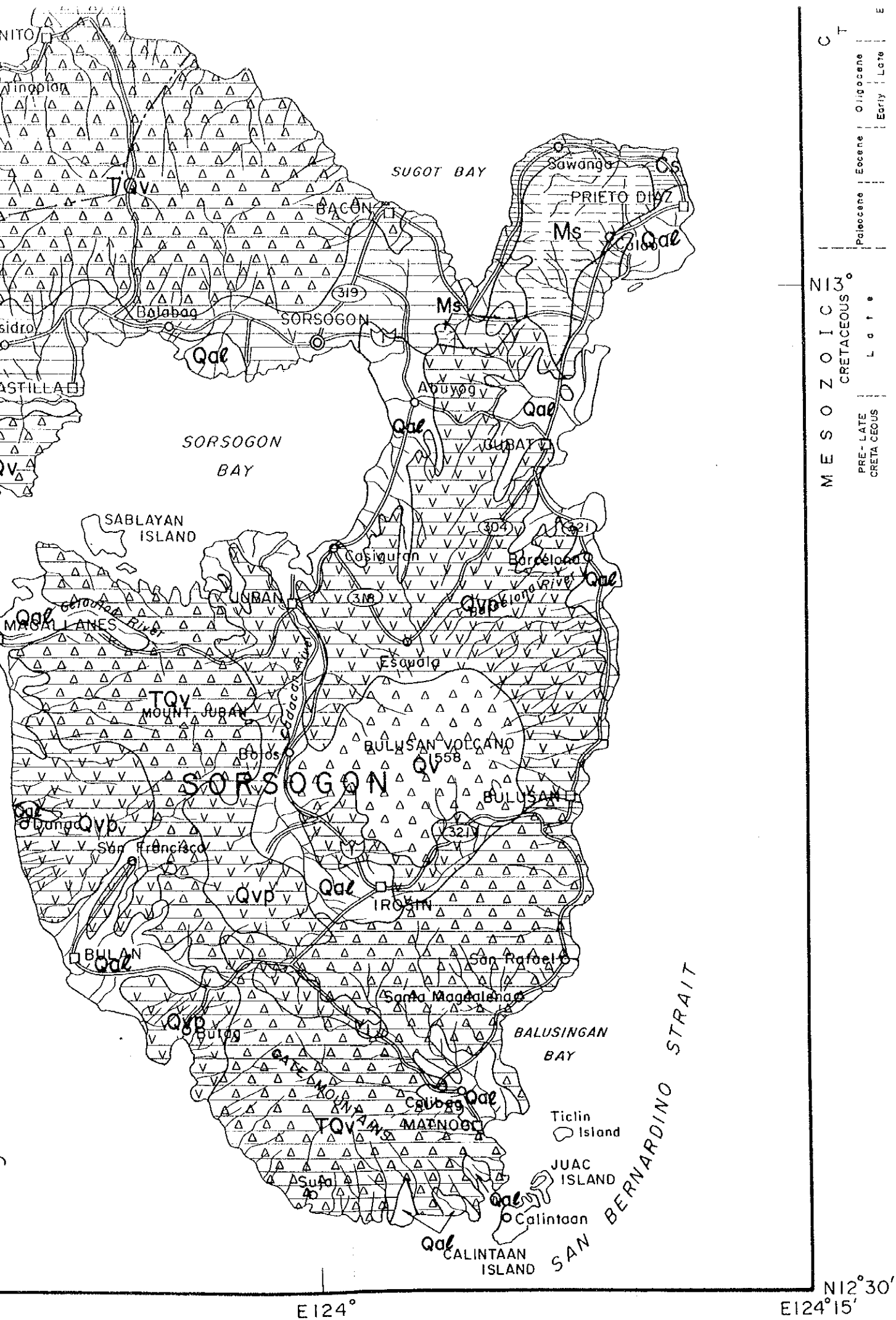
E123°30'



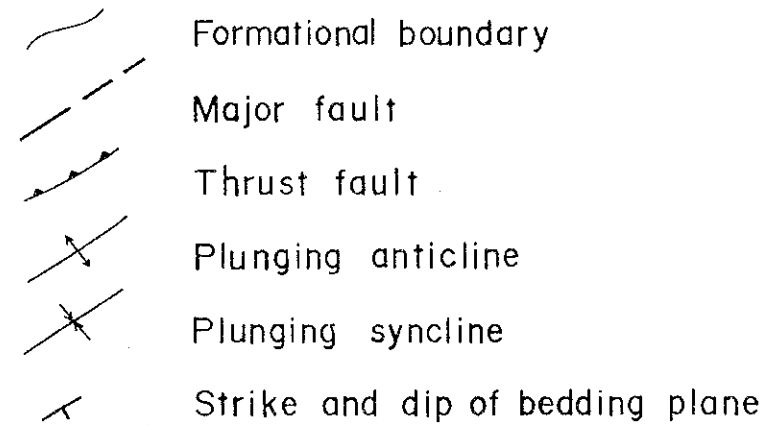
Compiled from:

- Geologic Map of Sorsogon
- Geological Survey of the Philippines, Sheet 35, 36
- Geologic and Mineral Resources of Catanduanes
- David S.D. Geochronology of Southeastern Luzon

E123°30' E124° E124°15' N12°30'



GEOLOGIC STRUCTURE



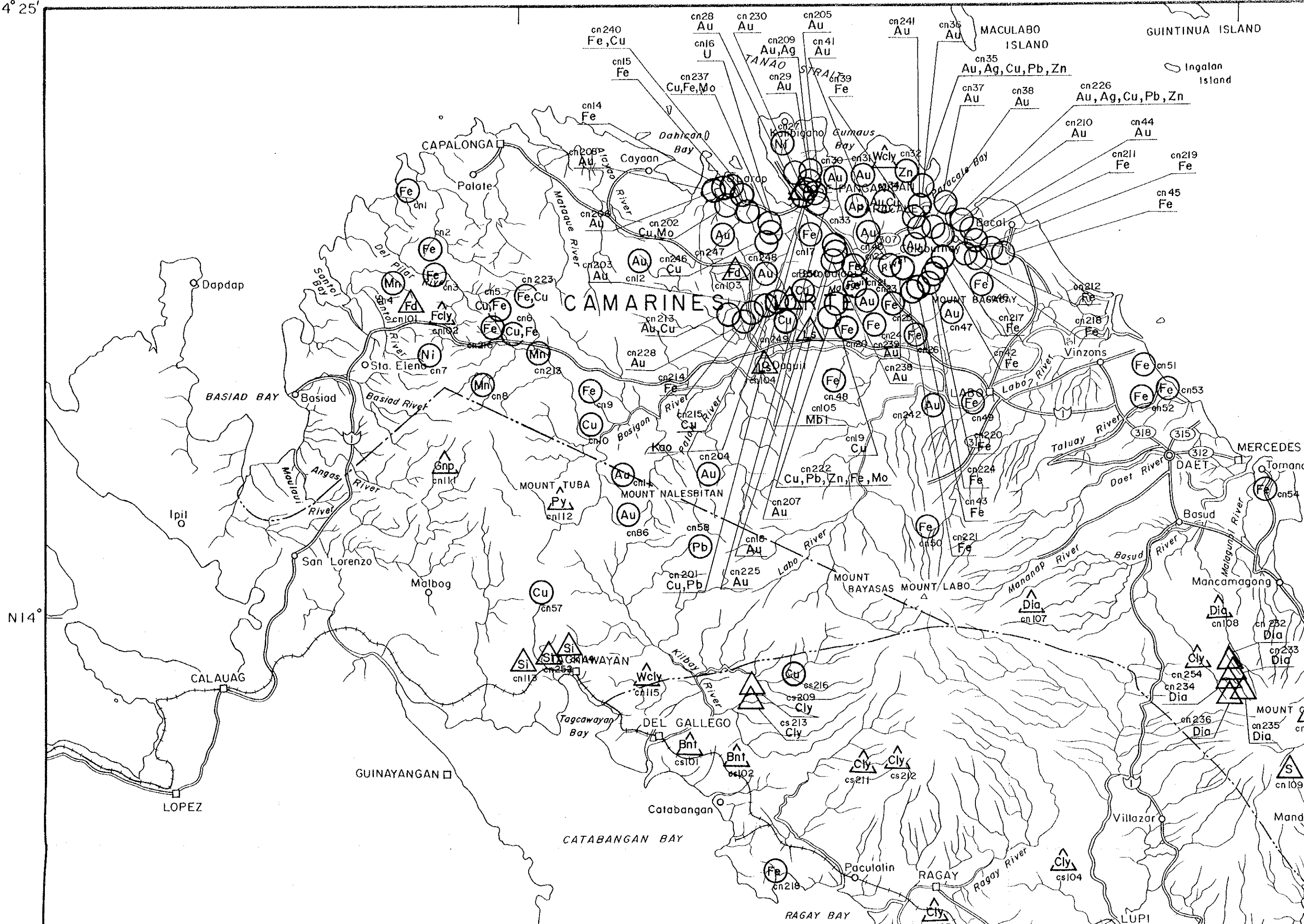
Compiled from:

- Geologic Map of Bicol Region (1:250,000) by BMG Regional Office
- Geological Map Quadrangles (1:50,000) of Sheet No.3462-I, II, 3560-I, 3561-I, II, III, IV, 3562-I, II, III, IV, 3563-II, III, 3659-I, II, 3661-I, II, III, IV, 3662-II, III, 3761-I, II, III, IV
- Geologic and Geochemical Interpretation Map of Catanduanes Island (1:125,000) / The Cooperative Mineral Exploration by JICA/MMAJ - MGB, 1993-1995
- David S.D. Jr., et al (1996): Geology, Geochemistry, Geochronology and Structures of the Ophiolites in Southeastern Luzon, Philippines. Jour. Soc. Geol. Phil. 1996.

E122°10'
N14°25'

E122°30'

E123°



E 123° 30'

[illegible]

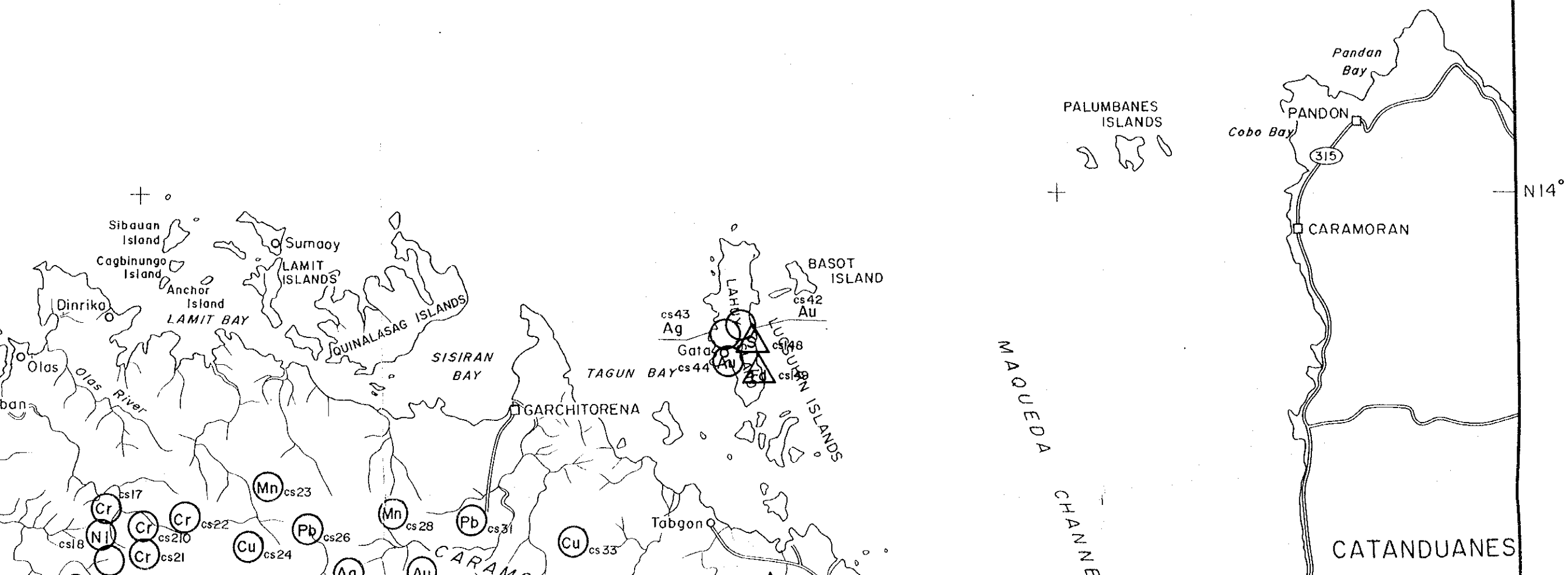
Map of Butuan Island showing sampling locations for various elements. The map includes geographical features like Butuanan Bay, Sapenitan Bay, Siruma Bay, and various islands (Sibuan, Cagbinungo, Anchor, Sumaay, Dinirika, Olas, Tinambac). Sampling locations are marked with circles containing element symbols (Mn, Fe, Cu, Ni, Cr, Pb, Ag, Au) and codes (cs1, cs2, cs3, etc.). Some locations are marked with triangles and labeled 'Wcly'. The map also shows rivers like the Tambang River and Olas River, and a road network.

E123°30'

E124°

E124°15'
N14°25'

PHILIPPINE SEA



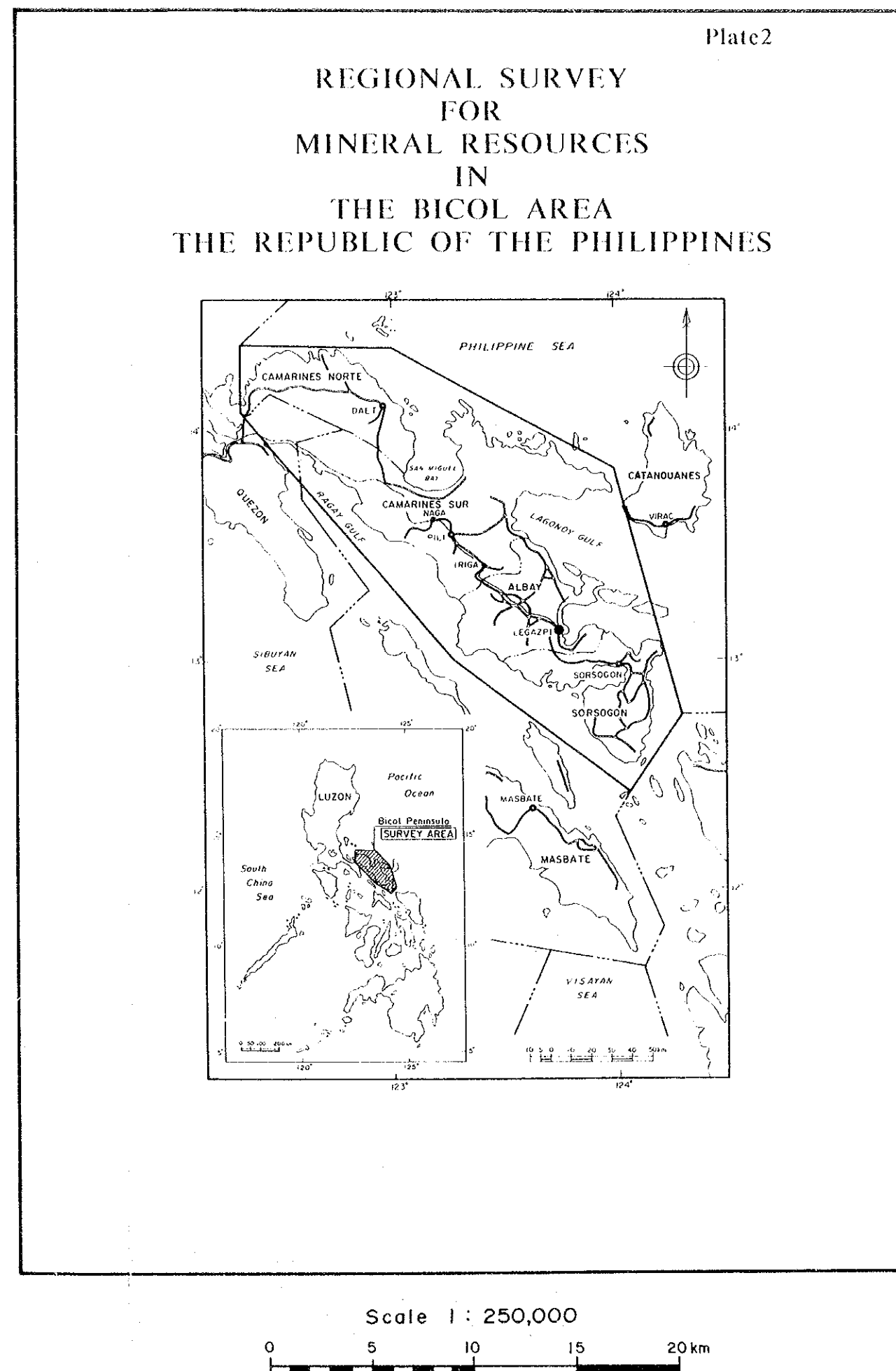
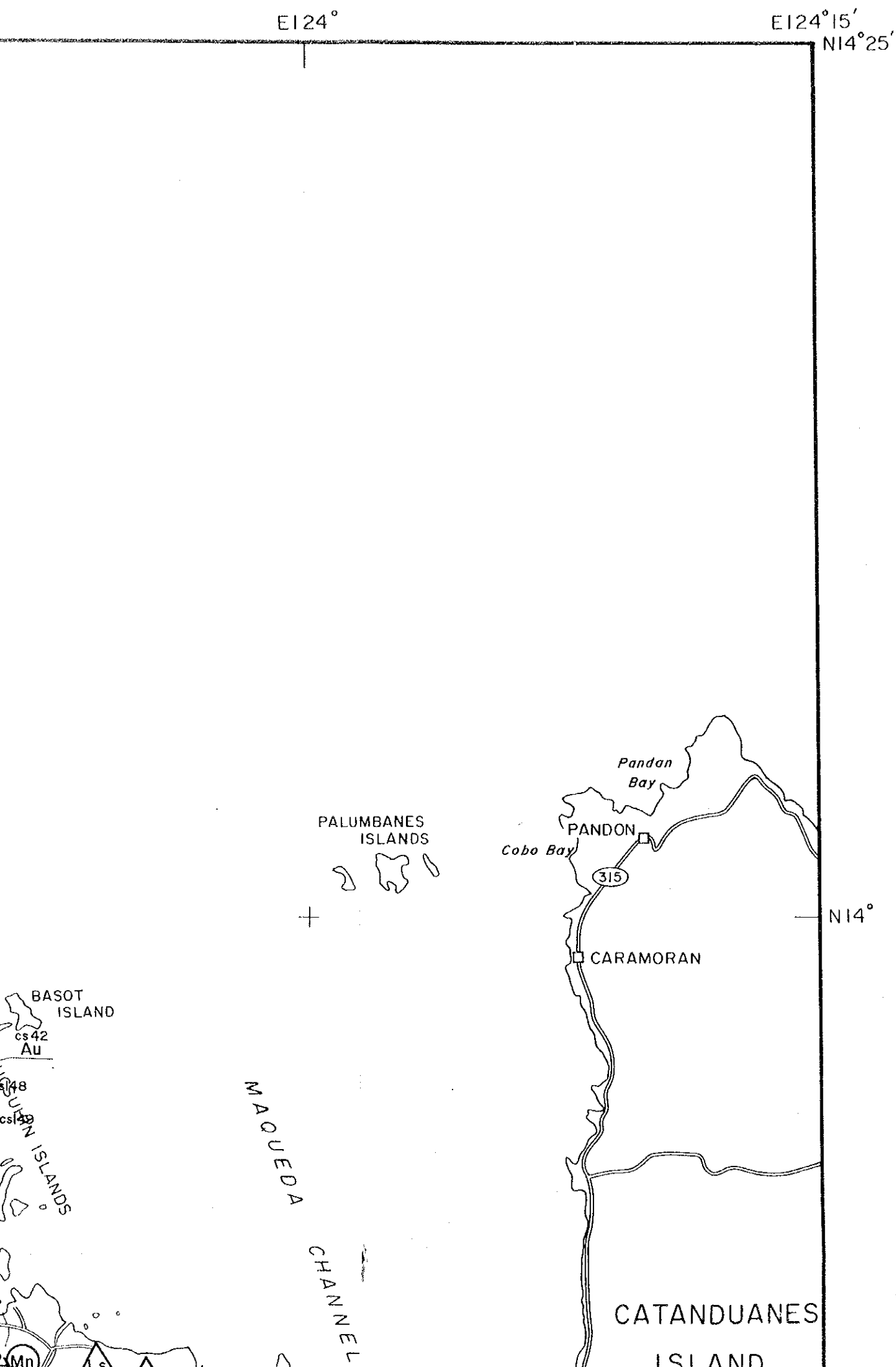
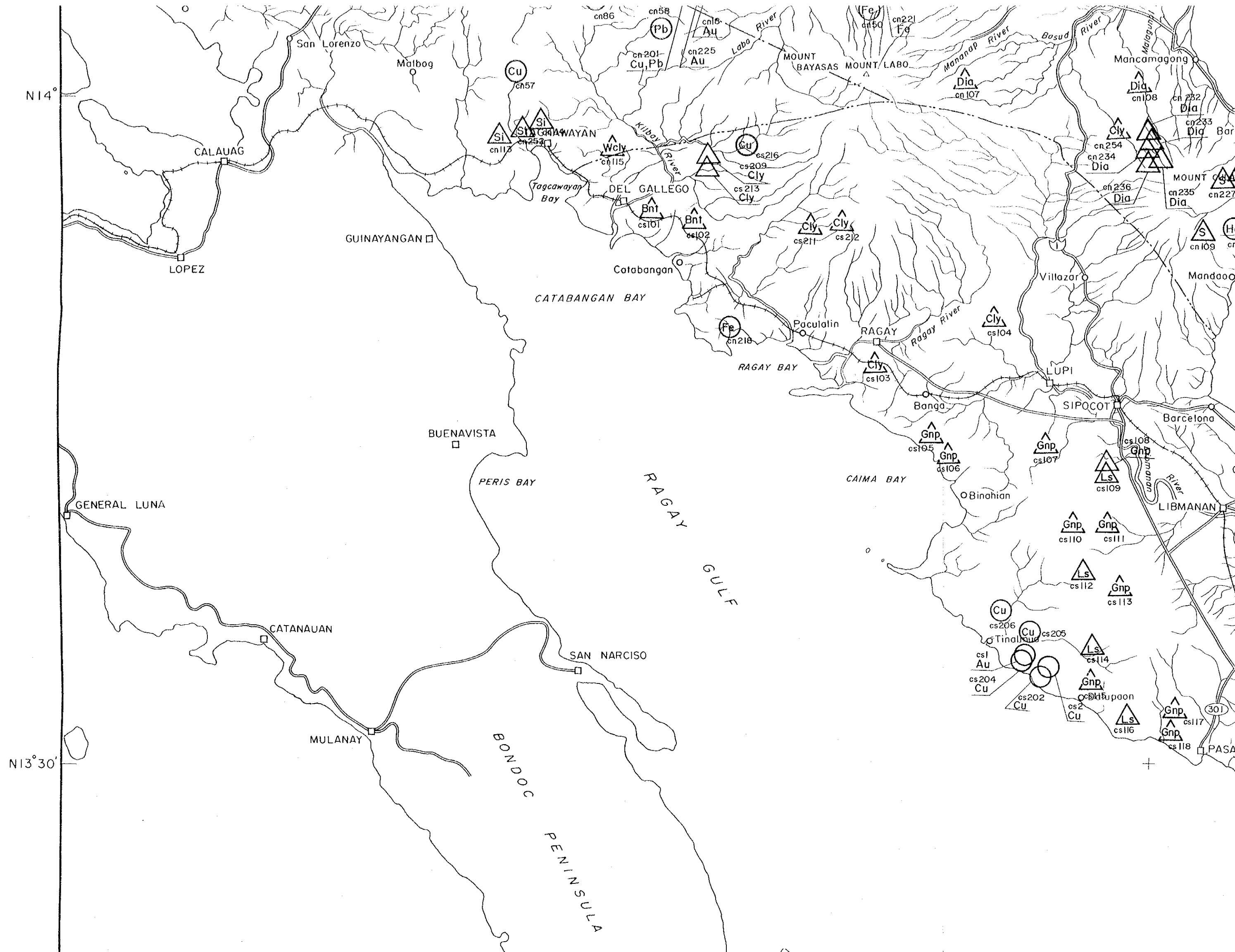
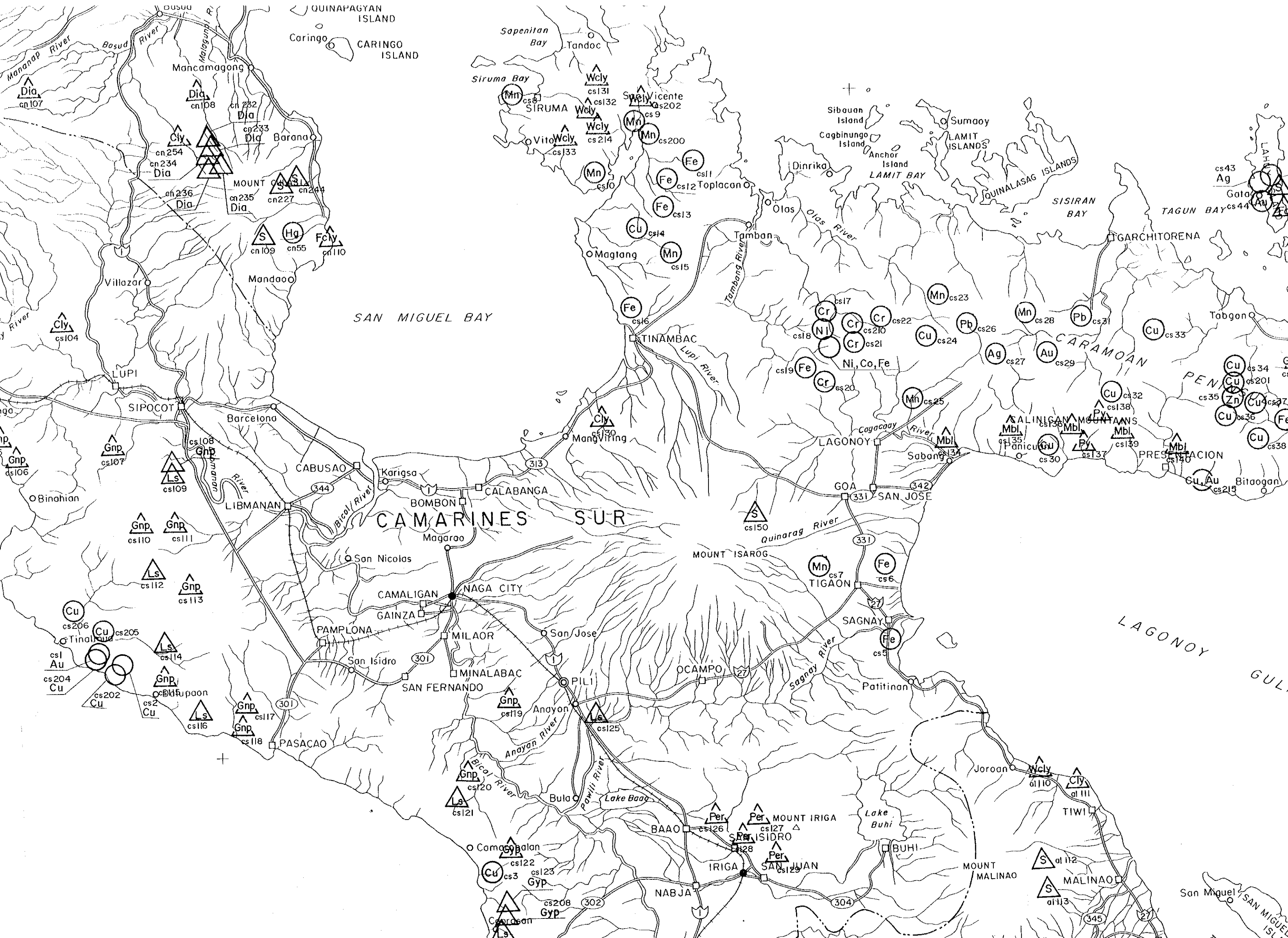


Fig.I-3-7 Location map of ore deposits, mineral
showings and geochemical anomaly





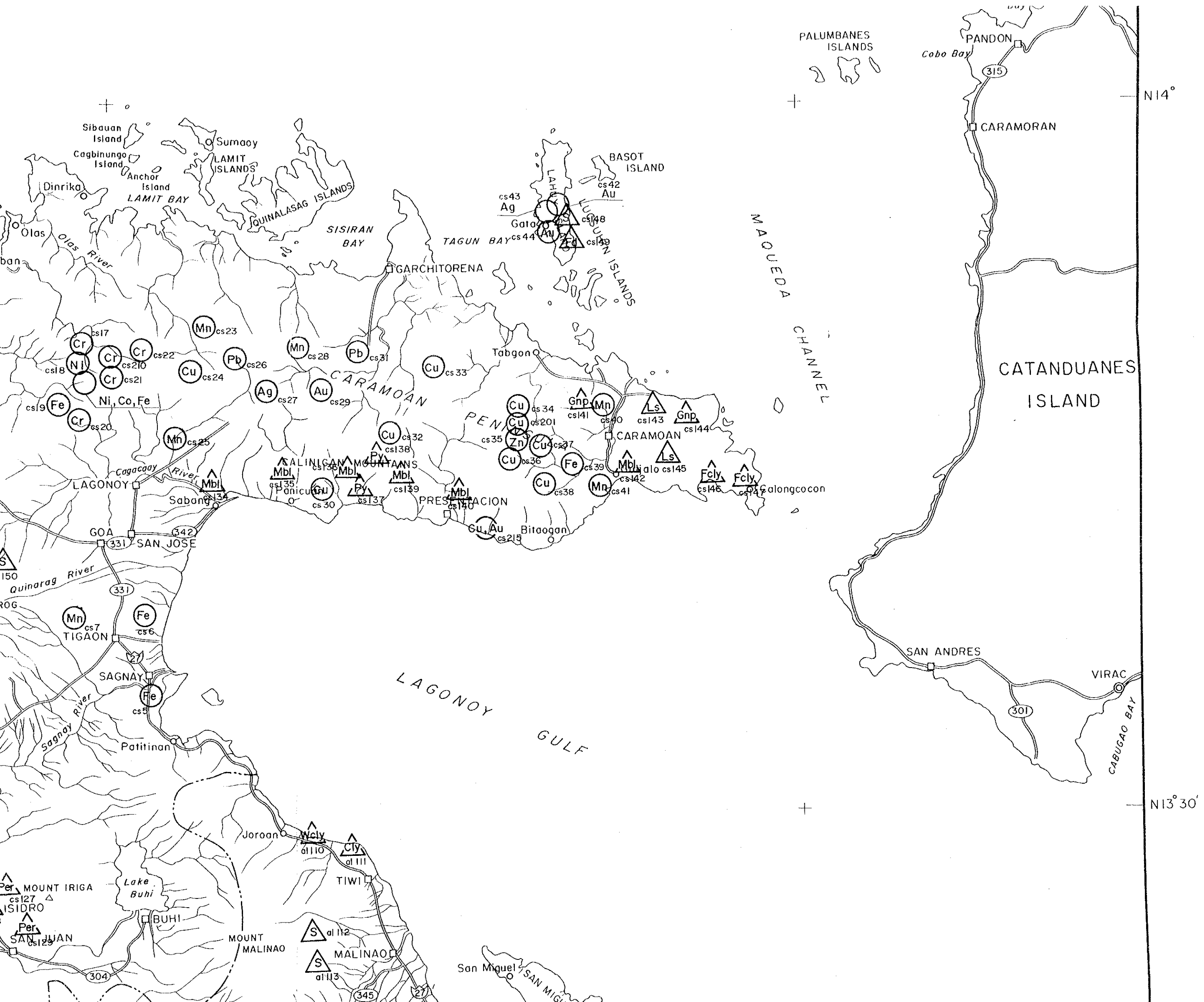


Fig. 1

- LE
- - ⊙
 - ⊖
 -
 -
 - ++++
 -
 - =====
 - U
 - (310)
- Keys
- prospects
- - △
- metallic res
- Ag
 - Al

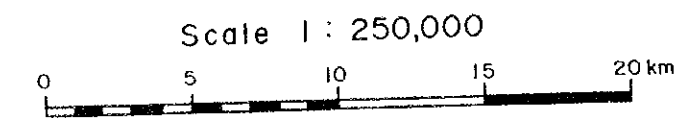
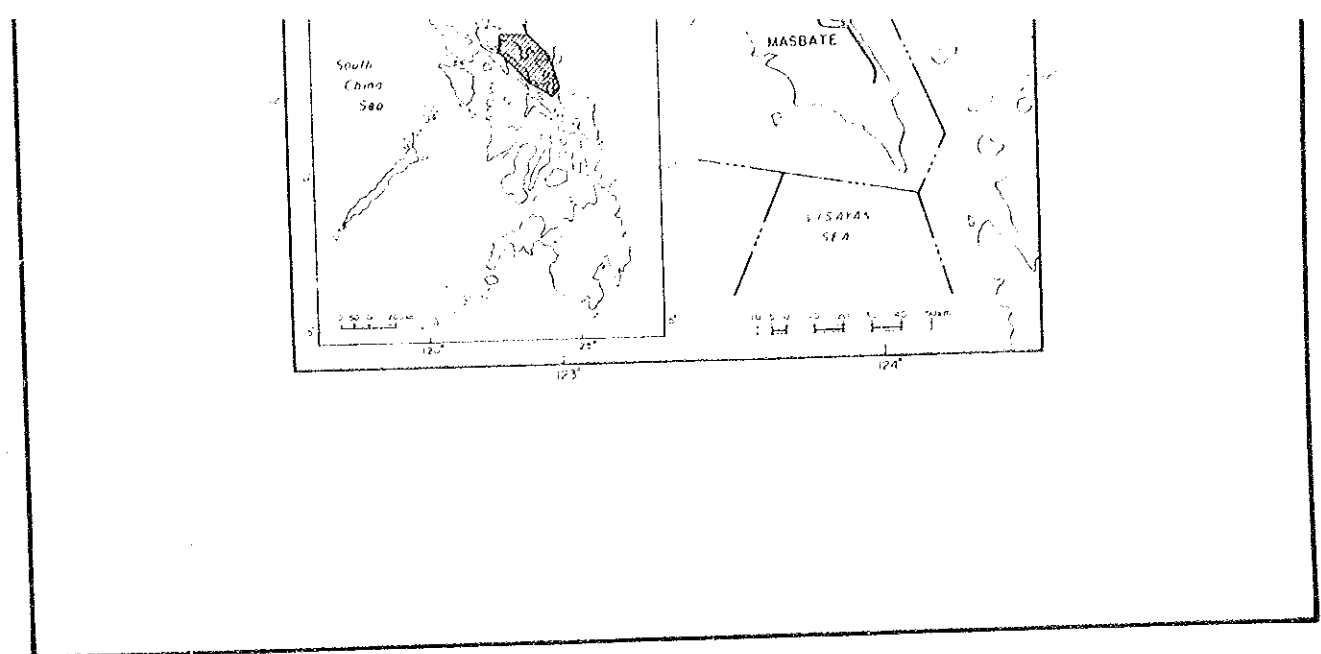
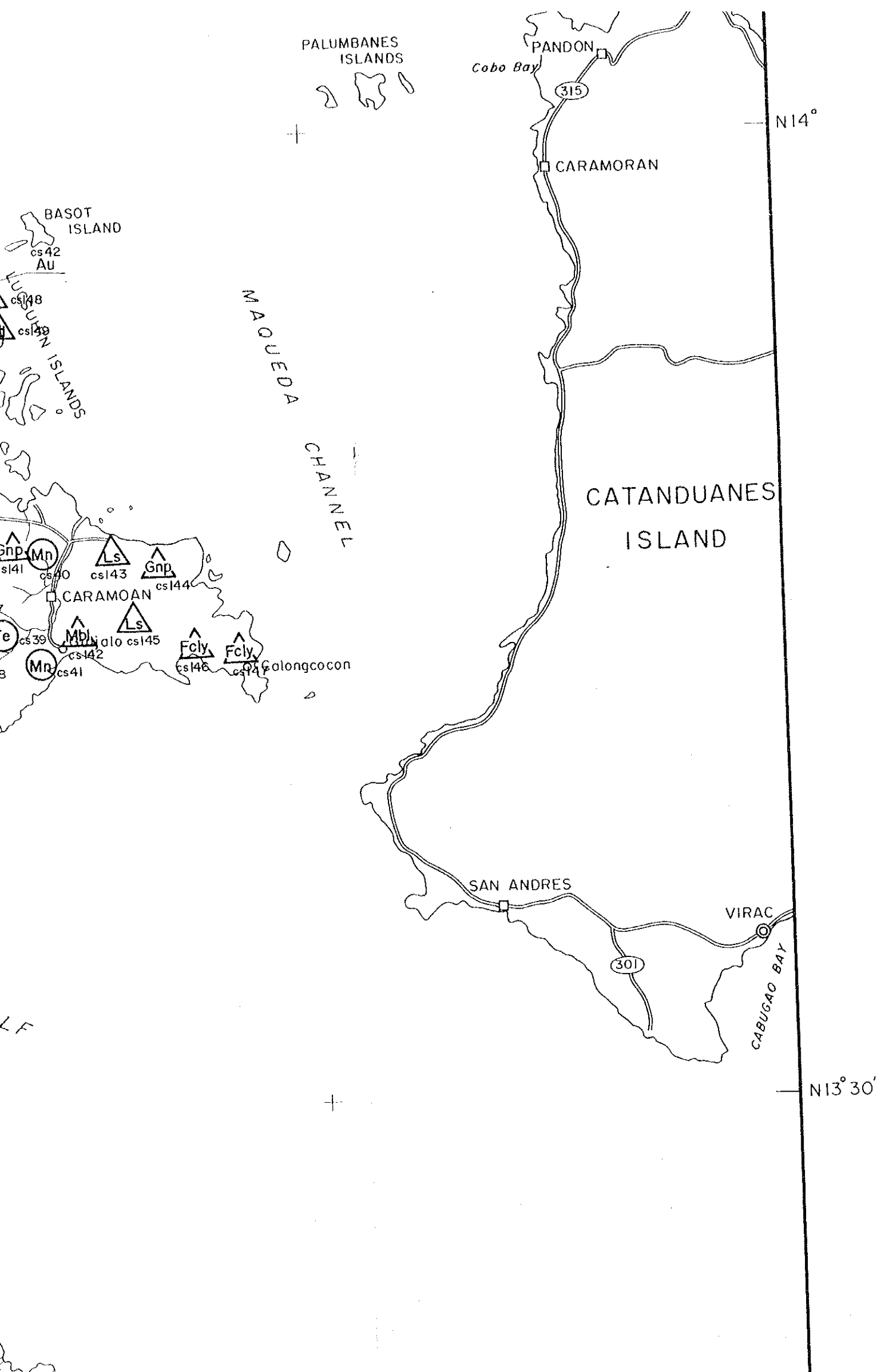


Fig.I-3-7 Location map of ore deposits, mineral showings, and geochemical anomaly in the Bicol Area

LEGEND

- Chartered city
- ⊙ City capital of province
- ⊙ Capital of province
- Municipality or municipal district
- Barangay
- ++++ Railroad
- Provincial boundary
- == First and second class road
- ① Route markers : National
- ③①① Route markers : Provincial

Keys

prospects

- Metallic Mineral Resources
- △ Non-Metallic Mineral Resources

metallic resources

- Ag Silver
- Al Aluminum
- Gold

N13°30'

MULANAY

BONDOC

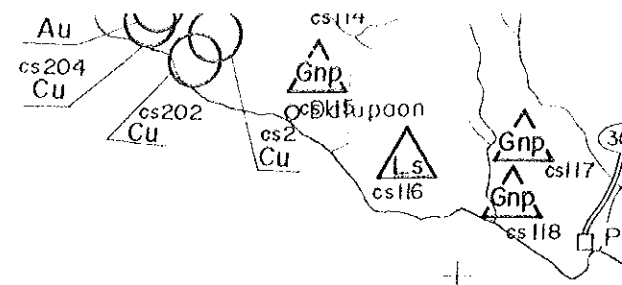
PENINSULA

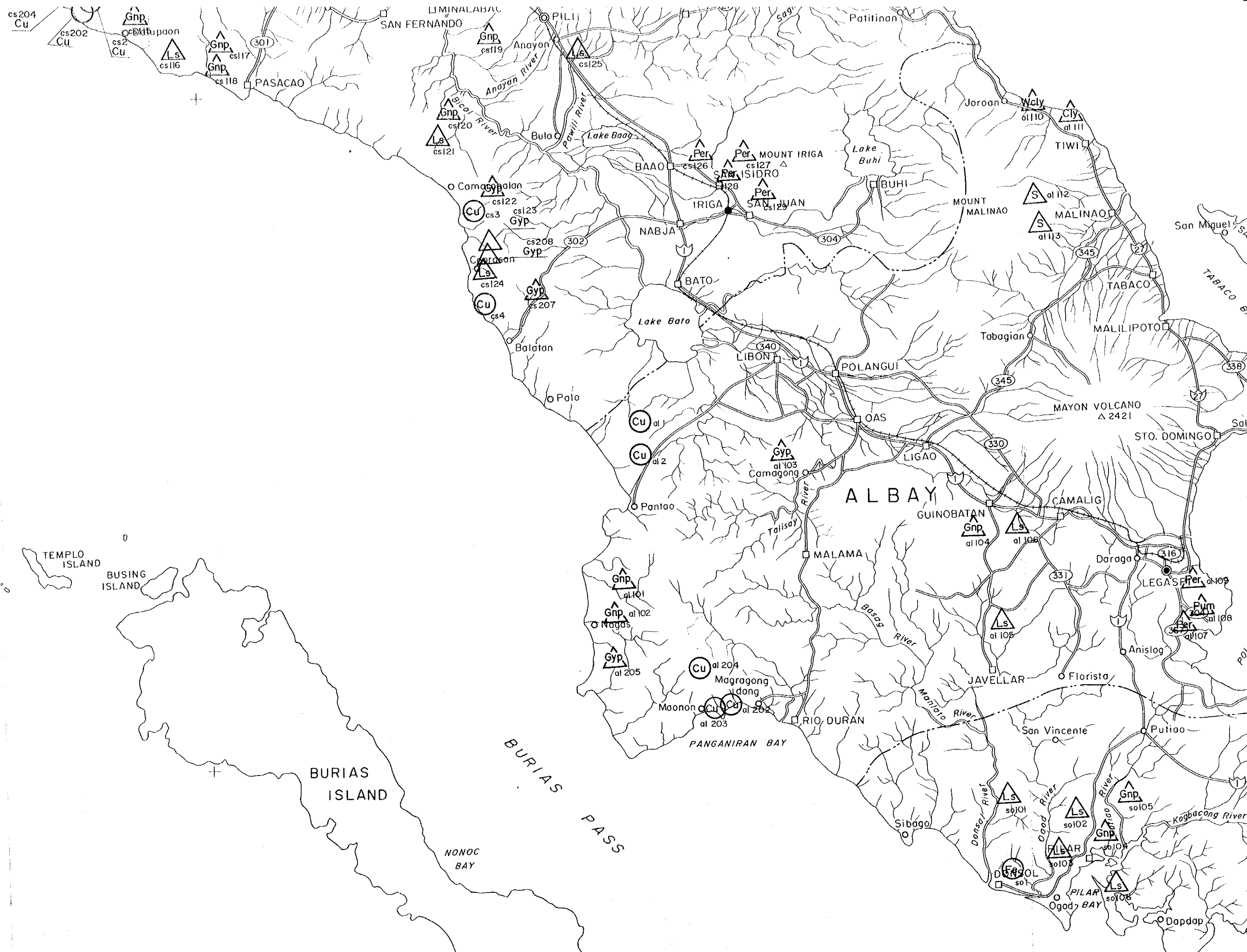
SAN ANDRES

ALIBIJABAN
ISLAND

TEMPLO
ISLAND

BUSING
ISLAND







Route 1



Route 310

Keys

prospects



Metallic



Non-metallic

metallic resources

- | | |
|----|------------|
| Ag | Silver |
| Al | Aluminum |
| Au | Gold |
| Co | Cobalt |
| Cr | Chromium |
| Cu | Copper |
| Fe | Iron |
| Hg | Mercury |
| Mn | Manganese |
| Mo | Molybdenum |
| Ni | Nickel |
| Pz | Lead |
| U | Uranium |
| Zn | Zinc |

non-metallic resources

- | | |
|------|------------|
| Bnt | Bentonite |
| Ccly | China Clay |
| Cly | Clay |
| Coal | Coal |
| Dia | Diatomite |
| Fcly | Flint Clay |
| Fd | Feldspar |
| Gnp | Guano |
| Gyp | Gypsum |
| Kao | Kaolin |
| Ls | Limestone |
| Mbl | Marble |
| Per | Perlite |
| Pum | Pumice |
| Py | Pyrite |
| S | Sulfur |
| Si | Silica |
| Wcly | White Clay |



N13°

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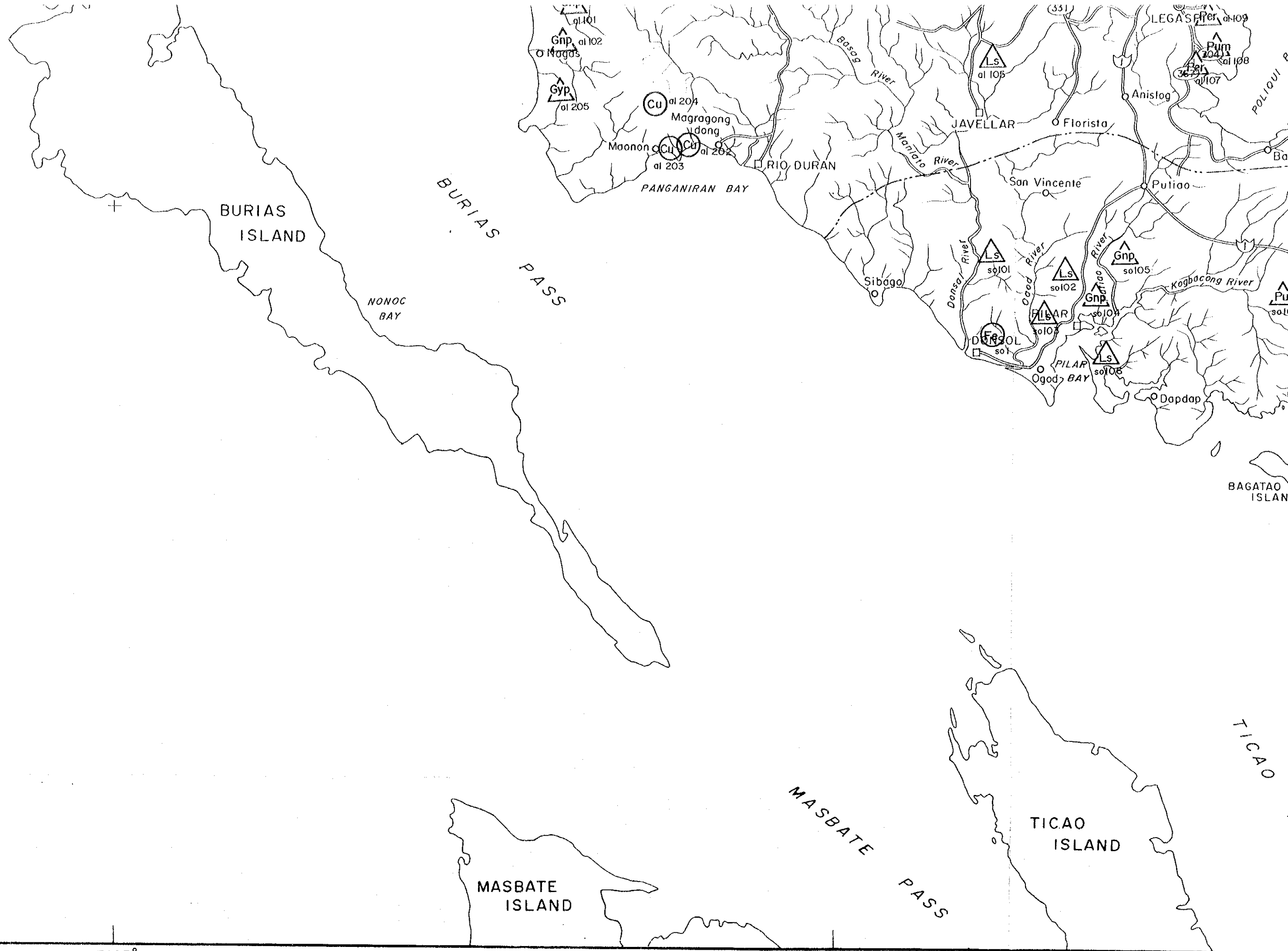
SIBUYAN SEA



N12° 30'
E122° 10'

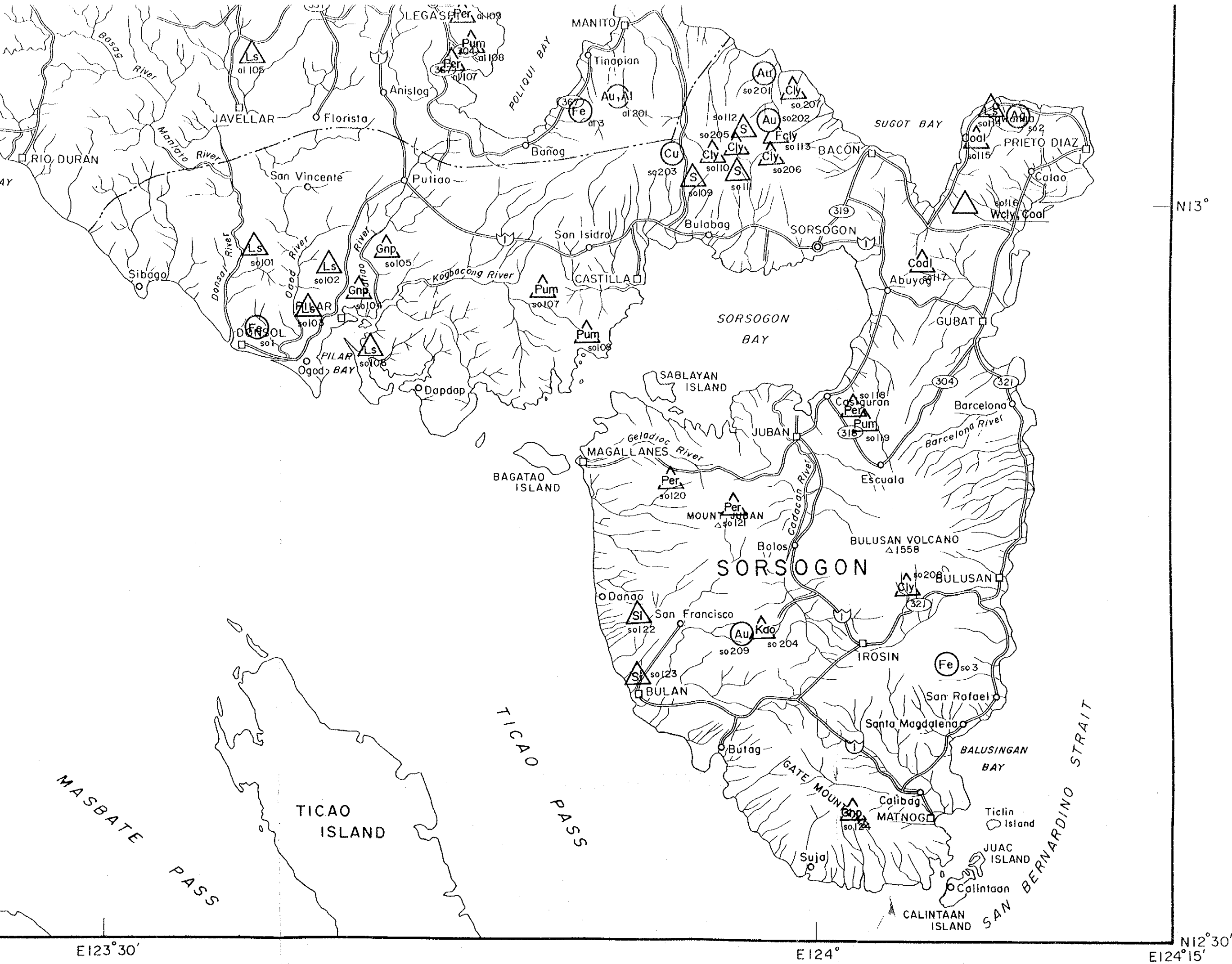
E122° 30'

E123°

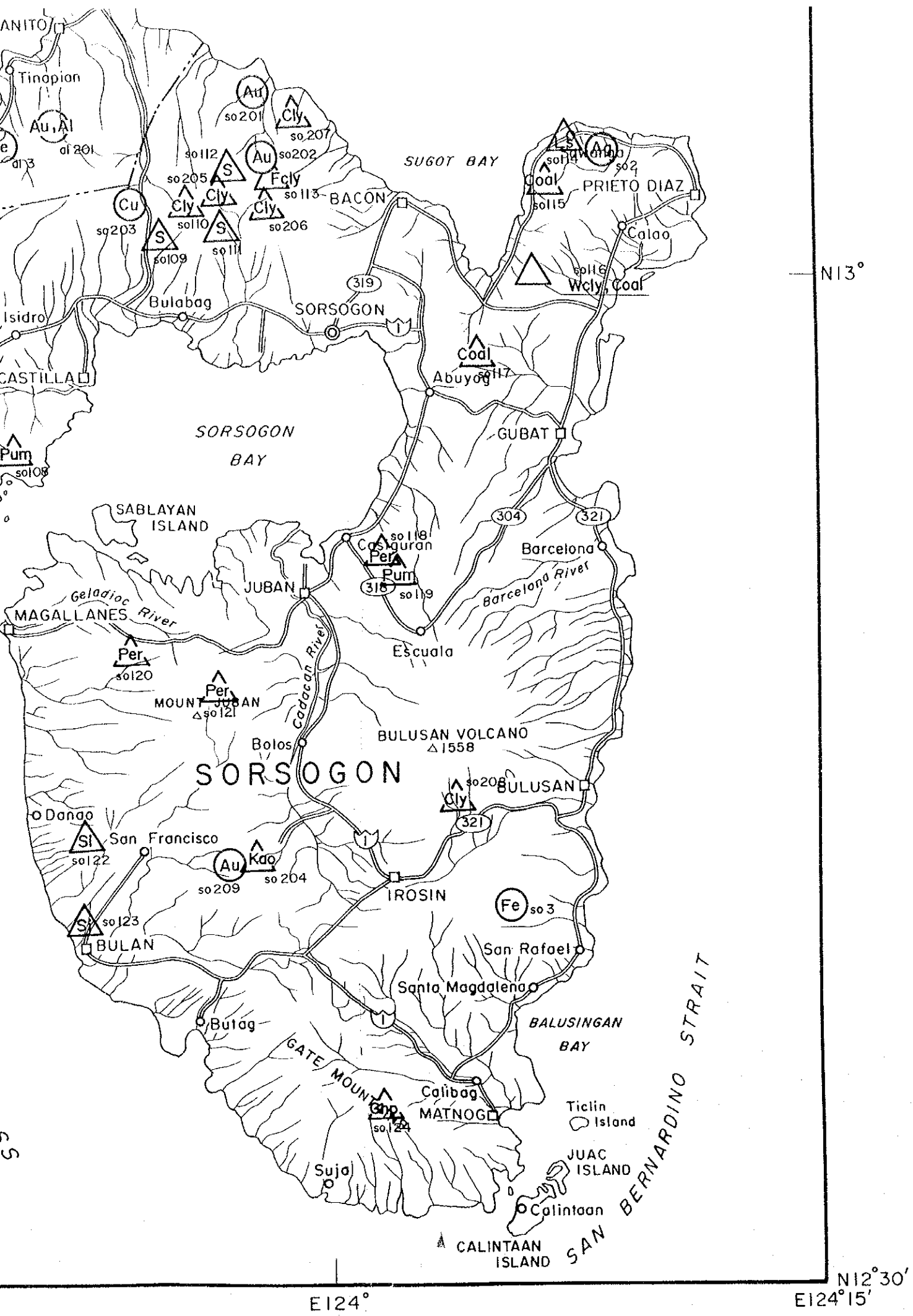


E123°

E123°30'



- Cly
- Coal
- Dia
- Fcly
- Fd
- Gnp
- Gyp
- Kao
- Ls
- Mbl
- Per
- Pum
- Py
- S
- Si
- Wcly



Coal	Coal
Dia	Diatomaceous Earth
Fcly	Flint Clay
Fd	Feldsper
Gnp	Guano - Phosphate
Gyp	Gypsum
Kao	Kaoline
Ls	Limestone
Mbl	Marble
Per	Perlite
Pum	Pumice
Py	Pyrite
S	Sulfur
Si	Silica
Wcly	White Clay

JICA