

## PHILIPPINE GEOLOGY AND MINERALIZATION: AN OVERVIEW

The Philippines may be viewed as a collage of metamorphic terranes, magmatic arcs, ophiolitic complexes, sedimentary basins and continental block of Eurasian affinity subjected to tectonic processes such as subduction, collision and major strike slip faulting. The subduction zones are represented on the east by the west dipping Philippine Trench traversing the eastern seaboard of the Philippines from Mindanao up to a point in Luzon and the East Luzon Trough. East dipping subduction zones include the Manila Trench, Negros Trench and Cotabato Trench. The southern termination of the Manila Trench is characterized by the transformation of the subduction of the South China Sea Plate into an arc-continent collisional deformation within Mindoro Island.

The continental block is represented by northern Palawan, southern Mindoro, Romblon Island Group and Buruanga Peninsula in Panay Island, known collectively as the North Palawan Block. Rock suites in this block include schists that are characteristically rich in quartz and chert formations that have been dated Late Permian to Jurassic.

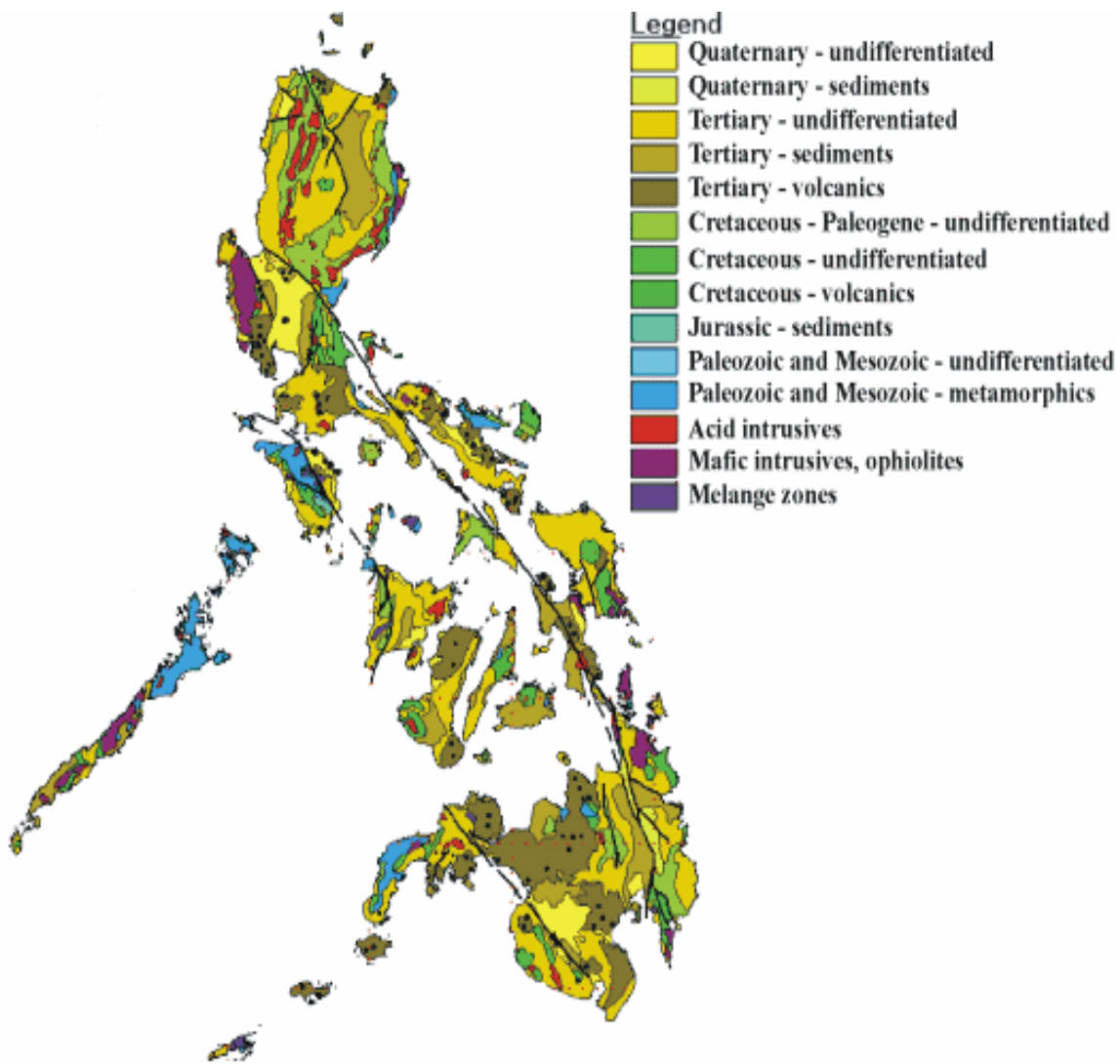
The rest of the archipelago is considered as the Philippine Mobile Belt. Approximately co-axial with the mobile belt is the Philippine Fault, a major strike slip fault that apparently developed partially in response to the kinematic forces from the subduction from the east and west of the mobile belt.

Many areas of this mobile belt are underlain by ophiolitic complexes. Usually occurring together with pre-Cenozoic schists and phyllites, the ophiolitic rocks represent basement on which magmatic arcs have developed. The ages of the ophiolitic complexes range from Jurassic to early Paleogene. One of the best studied complete ophiolite sequence is the Zambales Ophiolite where tectonized peridotites progress to layered and isotropic gabbro, sheeted dike complex, pillow basalts and finally pelagic sedimentary rocks. Other ophiolitic complexes include those in Isabela, Polillo Island, eastern Rizal, Camarines Norte, Caramoan Peninsula, Mindoro, southern Palawan, Panay Island, Bohol Island, Leyte Island, Samar Island, Dinagat Island Group, north-central Zamboanga, Mindanao Central Cordillera and Pujada Peninsula. Ultramafic rocks of these ophiolites are hosts to significant deposits of chromite and nickel. Laterites over these rocks also contain economic deposits of secondary nickel minerals. On the other hand, massive sulphide and manganese deposits are associated with the volcanic and sedimentary carapace of the ophiolite.

Ancient magmatic arcs in the mobile belt are characterized by thick volcanic flows intercalated with pyroclastic and sedimentary rocks and intrusions of diorite, quartz diorite and andesitic to dacitic rocks. Some intrusions, however, have a more alkalic character such as the syenites in Isabela and monzonites in Quirino and Nueva Vizcaya. The ages of the diorite intrusions vary, from late Early Cretaceous (Albian) in Cebu to Late Miocene-Pliocene (Black Mountain Quartz Diorite in Baguio District). Younger volcanic rocks, occurring as flows, intrusions and volcanic edifices disposed in linear belts are associated with active subduction processes. These are best exemplified by the Bataan volcanic belt and Bicol volcanic chain.

Sedimentary basins located between arcs include the Ilocos-Central Valley Basin, Cagayan Valley Basin, southeast Luzon Basin, Visayan Sea Basin, Agusan-Davao Basin and Cotabato Basin.

Gold and copper deposits in the Philippines tend to be clustered in certain areas such as Luzon Central Cordillera, Camarines Norte, Surigao and Davao, although large deposits may also be found elsewhere, as in Zambales (Dizon mine), Cebu (Atlas mine) and South Cotabato (Tampakan project). Many copper-gold deposits are associated with intrusions (mostly diorite and quartz diorite, but also monzonites and syenites) as well as Pliocene – Pleistocene volcanism (Lepanto mine at Mankayan, Benguet). Iron deposits are also associated with Neogene intrusions of diorite and quartz diorite.

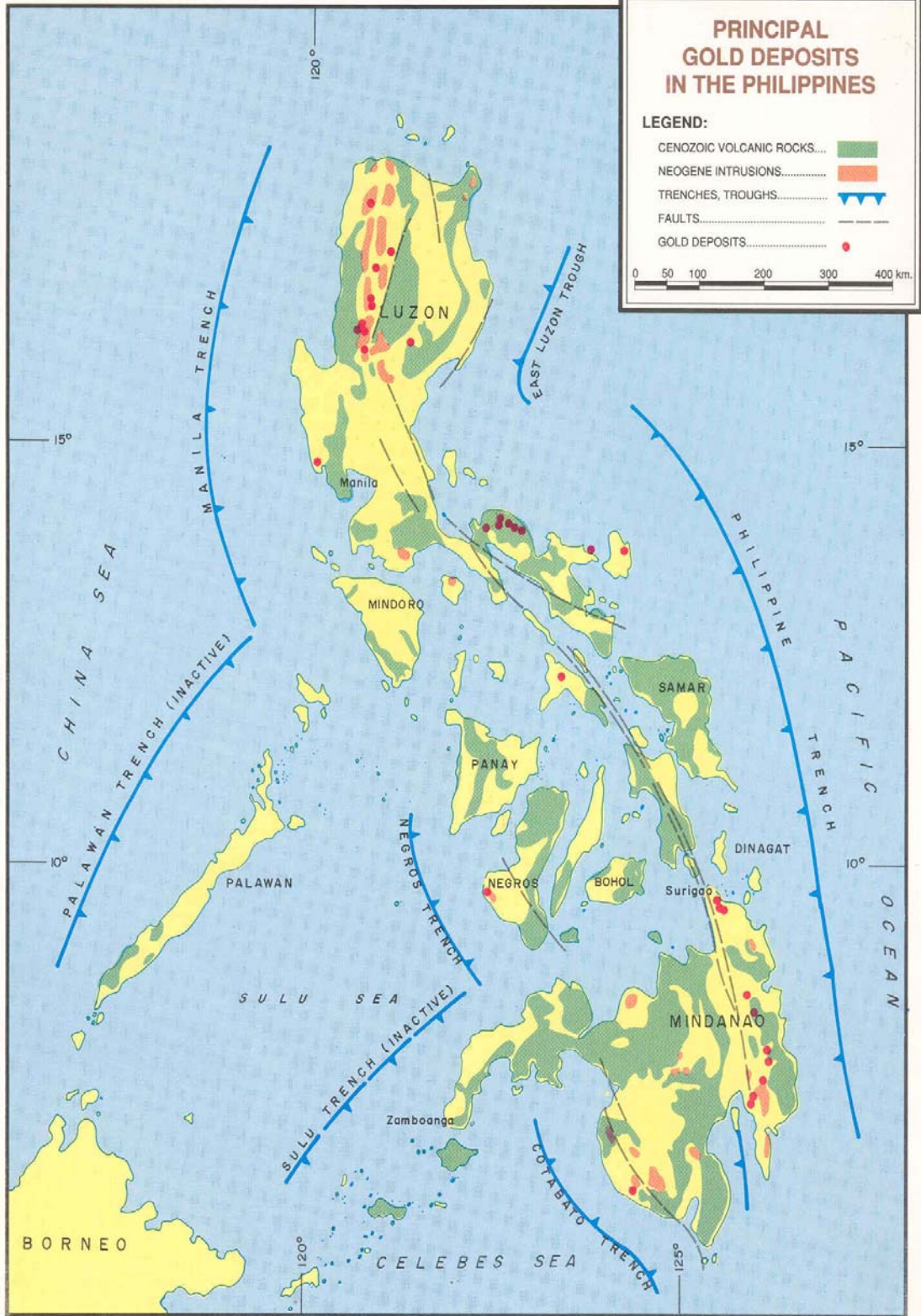


## PRINCIPAL GOLD DEPOSITS IN THE PHILIPPINES

**LEGEND:**

- CENOZOIC VOLCANIC ROCKS...
- NEOGENE INTRUSIONS...
- TRENCHES, TROUGHS...
- FAULTS...
- GOLD DEPOSITS...





0 50 100 200 300 400 km.





# PRINCIPAL NICKEL AND CHROMITE DEPOSITS IN THE PHILIPPINES

## LEGEND:

- ULTRAMAFIC ROCKS / BELTS..... 
- TRENCHES, TROUGHS..... 
- NICKEL DEPOSITS..... 
- CHROMITE DEPOSITS..... 



# PRINCIPAL COPPER DEPOSITS IN THE PHILIPPINES

## LEGEND:

- CENOZOIC VOLCANIC ROCKS..... ■
- NEOGENE INTRUSIONS..... ■
- TRENCHES, TROUGHS..... —
- FAULTS..... —
- COPPER DEPOSITS..... ●

