Age and correlation of basement geology of Aurora, Rizal and Zambales areas, Luzon, Philippines

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Basement geology of the Philippine Archipelago
Geology of the Aurora Area
(after Billedo et al. 1995)

Geological Map of the Baler Ophiolite
Baler Ophiolite

Port Aurora
Cumulate gabbro

Baler Ophiolite

Port Aurora
The boundary between the Gabbro and pyroxenite

Port Aurora
Pyroxenite with cumulate layer of dunite
Dibut Bay Meta-ophiolite

Dibayabay Bay

Amphibolite

Dibut Bay

Folded Amphibolite

Billedo et al. (1995) obtained an age of 92.0 ± 0.5 Ma (Late Cretaceous) from about 10 km south of Dibut Bay.

Amphibolite

Dibayabay Bay, Width of view 2.5 mm
Pre- to Syn-metamorphic Shear Zone

Thin garnet gneiss layer in amphibolite.

Foliations are slightly oblique to slip plane.

Garnet gneiss

Dibut Bay

Width of view 2.5mm.
Preferred oriented amphibole
Granoblastic plagioclase and quartz
Epidote and quartz ribbon

Syn-tectonic porphyroblast;
Internal foliation of garnet porphyroblast showing clockwise rotation.
Pre- to Syn-metamorphic Shear Zone

030501-8 Dibut Bay; Ep: epidote, Ac: actinolite
Lubingan Formation, Dalungan Schist
Mainly composed of basic schist with minor amount of siliceous schist.
Late Jurassic/Early Cretaceous radiolarian fossils are obtained from a siliceous phyllite by Ishida et al. (2011).
Cabog Formation
Middle Eocene non-metamorphosed turbidite

Massive graded sandstone (Coarse- to fine-grained)
Ripple laminated fine-grained sandstone
Parallel laminated mudstone including radiolarian fossils

Aurora area
Primitive island arc formation and associated regional metamorphism
Rizal Area

Cretaceous basalt of Montalban Ophiolite

Cretaceous deep sea limestone

Maybangain Formation
Thinly bedded turbidite with siliceous mudstone

Middle Eocene radiolarians in siliceous mudstone
(2.5mm in width)
Maybangain sandstone
pl: plagioclase
px: clinopyroxene

Maybangain Formation is correlated with the Cabog Formation on the basis of radiolarian dating and lithofacies.

Zambales Ophiolite
(after Yumul and Dauin, 1991)

Lithological distribution indicates that the Acoje Block and Coto Block are dipping to the east.
Zambales area

Ophiolite thrusted up on the Miocene marine conglomerate

The thrust plane is dipping to the west

Overlying serpentinite
N15° 42.8’
E119° 58.6’

Zone of fault brrecia
Late Jurassic/Early Cretaceous radiolarian fossils from the chert which may correspond to the uppermost part of the Zambales Ophiolite Complex.

The chert is not metamorphosed.

A tentative model of the development of the PMB

The PMB is developed by a westward accretion as proposed by Yumul (2007).

The Pacific side terrane is older and associated with regional metamorphism and later plutonic event.

The South China Sea side terrane is younger and thought to be accreted due to the Palawan Block collision.
SUMMARY

- On the basis of radiolarian dating, the ophiilitic basement of the PMB is Late Jurassic to Early Cretaceous in age.
- The primitive island arc of the PMB is composed of ophiolite and a regional metamorphism was associated during the formation (Late Cretaceous).
- The Cabog Formation and Maybangain Formation are deposits which were derived from the primitive island arc.
- The Zambales ophiolite is thought to be accreted due to the Palawan Block collision (Miocene to Pliocene?).