

Source characteristics of the Luzon Sierra Madre basement rocks: Evidence for Indian Ocean-type mantle beneath Luzon since the Cretaceous?

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The Philippines is an assemblage of different tectonic fragments, owing to its location at the boundary of the Eurasian, Indo-Australian and Pacific plates. Recent plate reconstructions of Hall (2002) place Luzon part of the Eurasian plate, forming an Andean-type margin at the edge of the Western Pacific during the Cretaceous. Results of our geochemical study of the basement rocks in Northern (Isabela-Aurora) and Southern Sierra Madre (Angat) in Luzon, believed to be Cretaceous and Eocene in ages, respectively, do not support this setting. Instead, the Early Cretaceous Isabela-Aurora ophiolite possesses geochemical characteristics similar to those of N-MORB, whereas the Middle Eocene Angat ophiolite exhibits transitional MORB – IAT characteristics. Combined isotopic and chemical compositions of the Eocene basement rocks are akin to other western Pacific back-arc basins in having Indian Ocean-type signature. The Cretaceous ophiolitic basement of Northern Sierra Madre falls within the field of old (110-55 Ma) Indian Ocean MORB. The Indian Ocean-type isotopic signature for the Cretaceous crusts is consistent with the proposed southern origin for this terrane, possibly along the boundary between a Mesozoic Pacific marginal basin crust and the Indo-Australian margin (e.g., Cambray et al., 1995). However, we cannot rule out the possibility that such mantle may underlie the region not only during the Eocene but as early as the Cretaceous time.

References

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