

Crustal growth along a triple plate junction: Tectonic processes and geochemical variation in the Philippine arc

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The present location of the Philippine archipelago along a complex boundary among three plates, Eurasian, Philippine, and Indo-Australian, makes it a natural laboratory for studying and understanding the early stages of continental growth. Prior to this present stage, the archipelago may have undergone previous histories of multiple arc and back-arc basin generation, crustal accretion, as well as tectonic displacements from a more southerly location. Crustal accretion along this convergent margin is accomplished by ocean floor and arc amalgamation and oceanic plateau collision along the eastern margins and micro-continent collision and ocean floor incorporation along the western margins. Oceanic plateau collision along the eastern border in Early Miocene not only led to subduction flipping but also crustal thickening along its eastern margins as evidenced by the occurrence of highly alkalic rocks. Crustal growth may have been dominated by arc magmatism since Late Miocene.

The geochemistry of igneous rocks in the Philippine arc is a microcosm of that found along the East Asian margins. This may reflect the tectonic processes from its birth to its present stage of development and indicate a record of the changing or evolving mantle source regions that accompanies the evolution of the arc. However, the presence of accreted crustal fragments may complicate this simple interpretation and, instead, the variation may reflect inherited geochemical signatures from different mantle domains brought together by previous history of crustal accretion.

キーワード: crustal growth, arc magmatism, Philippine arc, tectonic processes, triple plate junction, geochemistry

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