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Babu (SW China)-Cao Bang (NE Vietnam) Ophiolite Complex: Implications for Tectonic Evolution between South China and the Indochina Block

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Abstract

The convergence process between South China and the Indochina Block is still controversial. A large number of igneous rocks scattered along the current China-Vietnam border provide a good opportunity to investigate the tectonic evolution. Babu ophiolites, cropping out in the southeastern Yunnan province (SW China), consist primarily of metaperidotite, serpentinite, pillow basalt (metabasalt), gabbro, metadiabase. Most of them are fault contacted and strongly sheared, especially between metaperidotite/serpentinite and metabasalt. U-Pb zircon analyses yield an Early Permian formation age of ~278 Ma. Basalts and metagabbros show light rare earth elements (LREEs)-depleted and heavy rare earth elements (HREEs)-flat REE patterns, and large ion lithophile elements (LILEs)-depleted primitive-normalized spider diagrams without Nb-Ta anomalies, which is similar to N-MORB. Metaperidotites have low initial $^{187}\text{Os}/^{188}\text{Os}$ (0.122-0.126) and γ_{Os} values, and indicate that they were derived from a depleted

mantle source. Relative low $(^{87}\text{Sr}/^{86}\text{Sr})_i$ and high $\epsilon_{\text{Nd}}(t)$ values of basalts and metagabbros also support their DMM origin. The petrological, geochemical and isotope characteristics suggest that Babu ophiolites were N-MORB-type and represent remnants of an Early Permian oceanic crust. Mafic-ultramafic rocks exposed in Cao Bang area (NE Vietnam) have recently been considered as dismembered Paleotethyan ophiolites instead of were genetically linked to the Emeishan Large Igneous Province. U-Pb zircon analyses suggest an Early-Middle Permian age (274 ± 18 Ma) for the formation of ultramafic rocks. Both whole rock geochemistry and Cr-spinel mineral chemistry show MORB-like characteristics. Field observations suggest that Babu and Cao Bang ophiolite complex structurally overlies Middle-Triassic deposits, and form a tectonic mélange zone. It developed from the subduction of a Paleotethyan subsidiary ocean basin between the South China and Indochina blocks until their collision..

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