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Geochronology and Geochemistry of the Magmatic Rocks from Zedong Ophiolite, Eastern Yarlung-Zangbo Suture Zone, Tibet

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1 Abstract

The Yarlung Zangbo suture zone extends more than 2000 km along southern Tibet and marks the boundary between the Indian subcontinent and Eurasia. The Zedong terrane has been not suggested to represent the vestige of such an intra-oceanic arc developed within the Neo-Tethys Ocean, as a result of the northward subduction of the Neo-Tethys Ocean during the Late Jurassic. In this study, we present detailed geochemical and geochronological data of various types of magmatic rocks widely exposed in the Zedong terrane to constrain the formation age and tectonic setting of the Zedong terrane. We found that the Zedong volcanic rocks belong to high K₂O calc-alkaline series, whereas the diabase and gabbro plotted in the low-K calcalkline. The basalt rocks are highly enriched in LREE and LILE, but strongly depleted in HFSE, indicating they were derived from a metasomatized mantle. Both gabbros and diabase have similar N-MORB geochemistry indicates that the cumulates were produced from MOR setting. Zircons from four samples, including the basalt rocks (158-161 Ma) are older than the gabbro (131 Ma), certificate the gabbro are as the vein intrude into the basalt rocks. This suggests that the volcanic eruption and plutonic emplacement were coevally developed in the Zedong terrane. Zircons from both the basalt and plagiogranite

have similar positive $\epsilon_{\text{Hf}}(t)$ values (+2.0 to +15.6) and (+8.6 to +18.4), indicating they were stemmed from similarly depleted mantle sources, same with the gabbro and granitic rocks from the Gangdese arc. Therefore, we proposed that the basalt rocks in the Zedong terrane were formed through partial melting of the mantle wedge metasomatized by slab-released fluids/melts. A part of hydrous basalts were underplated in the thickened lower crust beneath the Zedong terrane, which gave rise to the cumulate and granitic rocks. This suggests that the Zedong terrane represents a slice of the active continental margin developed on the southern margin of the Lhasa terrane as a result of the northward subduction of the Neo-Tethys Ocean during the Late Jurassic, although a possible intra-oceanic arc setting cannot be excluded.

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