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Geochemical Characteristics and It's Geological Implications of Zenong Group Volcanic Rocks in Baingoin County of Tibet

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The Early Cretaceous volcanic rocks of the Zenong Group volcanic rocks are widespread distributed on the middle and northern parts of the Gangdese Belt. It is worth noting that the subduction polarity of the Bangongco–Nujiang ocean has been under considerable debating (Kapp et al., 2003; Pan et al., 2004; Mo et al., 2005; Zhu et al., 2006, 2009; Du et al., 2011). In this paper, major, REE element and rare element composition of Zenong group volcanic rocks in the Baingoin county have been reported. we discuss the geochemistry, genesis as well as implications on the tectonic setting of the Bangongco–Nujiang ocean.

The Zenong Group volcanic rocks sampled from Xinji town in Baingoin County in the middle Gangdese, south of the Bangongco–Nujiang suture. The volcanic rocks belong to the calc-alkaline and High-K calc-alkaline series. The major elements of the volcanic rocks are characterized by high Al_2O_3 (12.74 wt%~16.69 wt%), poor TiO_2 (0.46 wt%~0.79 wt%), poor MgO (0.91 wt%~3.08 wt%) with $\text{Na}_2\text{O} > \text{K}_2\text{O}$. In the TAS diagram (omitted), samples fall into dacite and rhyolite.

The Zenong Group volcanic rocks have high content of ΣREE , weak Eu anomaly ($\delta \text{Eu} = 0.49 \sim 0.89$, with a mean of 0.69). Chondrite-normalized REE diagrams show LREE-enriched patterns ($\text{LREE}/\text{HREE} = 6.1 \sim 12.57$, averaging 8.03). Trace elements are enriched in Rb, Th, U, K, Hf, Zr, La and Ce, depleted in Ba, Sr, Nb, P, Ta and Ti, which show essential characteristics of arc volcanic rocks (Condie, 2001). In the Th/Yb–Nb/Yb diagram (omitted), volcanic rocks fall into continental arcs, may be associated with the continental arc environment.

Present geochemical data indicate that the Zenong Group volcanic rocks in Baingoin, which are mainly composed of intermediate-acid rocks of calc-alkaline and high-K calc-alkaline series, are not consistent with traditional island-arc volcanic rocks but similar to volcanic rocks erupted in a

thick crust from Central Andes. Previous studies showed that the Zenong Group felsic rocks in middle Gangdese (Shiquanhe, Coqen and Xainza) are dominantly related to crustal remelting with the heat from the mantle basic magma with the participation of some mantle materials, however, fractional crystallization of mafic magma cannot be entirely ruled out (Zhu et al., 2006; Kang et al., 2010; Liu et al., 2010).

There are large-scale felsic volcanic rocks in middle Gangdese and the rocks are enriched in Th and LREE, which is the characteristics of crustal remelting. $\text{Mg}^\#$ of the Baingoin is lower, the average value is only 39.07, can't be made by partial melting of mantle rocks. The felsic volcanic rocks have weak Eu anomaly, indicate that the magma evolution did not experience significant plagioclase fractionation. The volcanic rocks have high content of Th (6.64~18.28 ppm, averaging 12.84 ppm), which are consistent with the middle crust ($\text{Th} = 6.5 \text{ ppm}$) and upper crust ($\text{Th} = 10.5 \text{ ppm}$) (Rudnick and Gao, 2003). All above characteristics indicate that Zenong Group volcanic rocks in Baingoin are most likely derived from the dehydration and remelting of the crustal materials caused mainly by the heat of the mantle basic magma with the participation of some mantle materials, which are consistent with the results of Shiquanhe, Coqen and Xainza Zenong Group volcanic rocks (Zhu et al., 2006; Liu et al., 2010).

The 1:25 000 regional geological survey results also show that the Jurassic and Cretaceous volcanic magmatic activity occurred mainly in the littoral, shallow sea, continental and paralic environment in middle middle Gangdese, which are important geological features of island arc belt. For spacing, the Zenong Group volcanic rocks distributed in the south of the Bangongco–Nujiang suture, supporting southward subduction of the Bangongco–Nujiang suture. Combined with the volcanic rocks and granite in the northern Lhasa terrane are related to the southward subduction of Bangongco–Nujiang ocean (Zhu et al., 2009; Fei et al., 2010a–b), it is held that the

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Jurassic Zenong Group volcanic rocks are most likely related to the southward subduction of Bangongco-Nujiang ocean.

Key words: volcanic rocks' geochemical characteristics southward subduction, Baingoin

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