

The mixture of rhyolite and carbonate: deciphering the mystery of so-called “lamprophyre” dike in Xikuangshan, South China

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Xikuangshan is a world-class antimony deposit located in South China. The material source of the deposits has always been a big concern. The only existing dike in the region is considered as the supplier for hydrothermal activity of this deposit. The original study of this dike has classified it as a lamprophyre since 1980s. Samples collected from the same outcrops of the previous studies have been thoroughly studied. The detailed electron microprobe analysis (EPMA) and secondary electron microscope (SEM) results for the samples reveal a totally different petrological feature than the previous reported term – lamprophyre. The rock is composed of two petrological portions: Fe-dolomite and porphyritic rhyolite. The matrix of the porphyritic rhyolitic portion contains around 77 wt% SiO₂. The carbonate is mainly Fe-dolomite. Therefore, this dike is a rhyolite mixed with carbonate, indicating a felsic igneous activity existed in the region. The Ar-Ar age of biotite is 132 Ma. This age is matching with the Nanling tungsten mineralization age (133 Ma, Wang et al., 2017). Based on these observations, it is reasonable to propose that the antimony mineralization was correlated with the late Yanshan magmatic event. During the late Yanshan regional extension, the highly fractionated granitic magma generated the metal enriched hydrothermal fluid. The hydrothermal activity transferred the antimony through the extensional fault system, and finally deposited as quartz-carbonate-stibnite ore in the Devonian limestone.