P-T conditions of the Bengge syenites in the Zhongdian porphyry Cu belt, eastern Tibet: Implications for metallogenesis

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Porphyry Cu deposits are typically associated with calc-alkaline, intermediate to felsic porphyry intrusions in arc settings, and some mafic magmas, such as potassic magmas, can also be observed in spatial and temporal linkage with these deposits[1, 2]. However, the origin and evolution of these mafic magmas still remain unclear. Recently some contemporaneous syenites (221-210Ma) have been reported in the Bengge region, south of the Late Triassic Zhongdian porphyry Cu belt (i.e. Pulang, Xuejiping, Songnuo), eastern Tibet. Previous studies show the syenites were derived from metasomatized mantle wedge and have the similar geochemistry composition with the potassic magma occurred in Pulang porphyry Cu deposit[2]. Thus, the Bengge syenite can used to reconstruct the P-T condition of mafic magma chamber. Here, we emply clinopyroxene-liquid and biotite composition thermobarometers for estimating crystallization and storage pressures and temperatures of the syenites. The results show that the clinopyroxene crystallized at pressures of 5.2-8.5 kbar (corresponding to paleodepths of 19.3-31 km) with temperatures of 1023-1235℃, whereas the biotites at pressures of 0.3-0.7 kbar (depth=1.1-2.7 km) with temperatures of 708-745℃. Preservation of a down-temperature of hot clinopyroxene with colder biotite in syenites suggests biotite formed later than clinopyroxene, which is consistent with magmatic crysllization sequence. This study suggest the mafic magma is from a deep mid- to lower- crust chamber, as recharge of magma injection into a shallow felsic reservoir that caused magma mixing events to form the fertile magma in the Zhongdian porphyry Cu belt.

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