

Neoproterozoic VMS Mineralization and Tectonic Evolution of northwestern Yangtze Block

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The understanding of Neoproterozoic magmatism and tectonic events of the northwestern Yangtze Block are controversial. Some studies show that the Neoproterozoic Bikou-Hannan-Micangshan magmatism along the northwestern margin of the Yangtze block represented a forearc-to-arc system, which was formed by the oceanic subduction-accretion. However, other researchers have concluded that the magmatism formed from intra-continental rifting within the supercontinent of Rodinia.

Many mineral deposits were formed from the Neoproterozoic tectonic and magmatic activities, which reflect the complex geologic evolution of the area. The Faziba copper-gold polymetallic deposit and Yangba copper-gold polymetallic deposit are hosted in rocks of the Mesoproterozoic Bikou Group. The Liujiaping copper-zinc deposit and Caozigou lead-zinc-copper polymetallic deposit are hosted in units of the Neoproterozoic Liujiaping Group. Previous studies indicated that these deposits formed as a part of a Neoproterozoic forearc and arc system.

The Faziba deposit is located at the intersection of the Qinling belt and Yangtze block. The deposit is hosted in the ~950-800 Ma Bikou Group, which is a volcano-sedimentary unit dominated by arc-related spilite, basalt, basaltic andesite, and lesser dacite. The mineralization is located in a magnetite (\pm hematite) quartz rock that formed by volcanic-related alteration of the sedimentary formation. There are three ore types in the Faziba deposit: copper-bearing magnetite (\pm hematite) with quartz, massive copper-pyrite, and copper-bearing chlorite schist. Gold is hosted in copper as native gold. The deposit is classified as a VMS (Volcanic Massive Sulfide) deposit and formed in an early arc setting. The wall rocks also indicate an oceanic setting for volcanism and mineralization. Some previous research indicated that the Bikou group represents the fore-arc basin in this magmatic arc setting.

The Liujiaping deposit contains mainly copper and zinc, and is located in the Longmenshan orogenic belt of the northwestern margin of Yangtze block. The deposit is hosted in the ~825 Ma Liujiaping volcanics and is a typical VMS deposit. The geology and geochemistry of the Liujiaping deposit and volcanic rocks indicate that the deposit was formed during subduction of the oceanic crust. The northwestern margin of the Yangtze block was in an arc setting at ~820 Ma rather than serving as an intra-continental rift. In addition, the volcanic rock types and metallic element suite indicate it was a mature arc and close to the continent.

The Neoproterozoic VMS deposits at Faziba and Liujiaping indicate that a subduction zone was probably present at the northern to western margins of the Yangtze block from ~950 Ma to ~820 Ma. The Bikou Group was formed in early arc setting (away from the Yangtze block) and the Liujiaping group was formed in a mature arc setting (near the Yangtze block), which also indicates the evolution of the subduction zone.

