New genetic model for porphyry copper deposit

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Large amount of reduced-sulfur is necessary for the formation of porphyry copper deposit. At shallow crustal depths, the magma fluids will be partitioning in two phases: liquid and vapor[1].Sulfur tends to get into vapor phase, while copper tends to get into liquid along with chlorine[2]. Therefore, it is very important how the two fluids mix and make the copper to precipitate as sulfides.

Xifanping porphyry copper deposit is located in the Kangdian porphyry belt, Southwest China. The ore bodies of the deposit are hosted in the two porphyries. The inner hornblend monzonite, outcropped, is earlier than the outer biotite-quartz monzonite buried 300 meters deep. Four stages of alteration assemblages are recognized: stage I, magnetite+ biotite + quartz; stage II, k-feldspar(I) + actinlite(I); stage III, actinlite (II) + quartz + chalcopyrite + pyrite + chlorite; stage IV, albitite + serisite + pyrite. Types I and II are associated with the earlier hornblend monzonite and deep biotite-quartz monzonite, respectively. Significant Cu mineralization is associated with stage III. The veins of actinlite (II) + quartz + chalcopyrite + pyrite cut the earlies alteration assemblages.The temperatures of stage I is 600°C, and the daughter crystals of salt and sylvite were identified in quartz inclusions. The temperatures for stage II are 500 ~ 300 °C and a lot of chalcopyrite and salt daughter crystals were found in the quartz fluid inclusions.

Above evidence demonstrates the earlier fluids from magma hydrothermal fluids is rich in Na-K and the ore-forming fluids rich in Na and Cu is the mixture of two fluids from biotite-quartz monzonite and hornblend monzonite. Both of them secreted fluids during their ascending and cooling. The vapor from the earlier fluid escaped from intrusion into air, while its liquid stayed in the intrusion because of volconism. When the later deep fluids rich in S (not escaped as buried deeper) superimposed on the earlier one, it provide reduced-sulfur and intensive mineralization occurred.

References

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Microbiological variation regulations of iron, manganese and sulfate in sediments of Lake Aha and Lake Hongfeng seasonally

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Fe-Mn-S cycling in Lakes can influence water quality, degrading of organic matter and variation of heavy mentals. In the article, seasonal variations and microbe mechanisms of iron, manganese and sulfate in sediments of Lake Aha and Lake Hongfeng was studied. Sediment cores were collected at Lake Aha and Lake Hongfeng, which located in Yunnan-Guizhou Plateau, Southwest China. The later one has higher contents of iron, manganese and sulfate because more than 100 small coal mines around it.

Variations of iron, manganese and sulfate in sediment pore waters of Lake Aha and Lake Hongfeng in winter and spring shows that content of iron is relative low in several centimeters of upper layer sediments in winter and spring, however content of manganese is relative high then decrease to a lower content. They have change regulations differently that is affected by microbes and variation of sulfate. Content of sulfate in sediment pore waters is much lower in Lake Hongfeng than in Lake Aha, thus with different distributions and change regulations. However, a commonly change regulation is that content of sulfate decreases rapidly or keeps relative low one in several centimeters of upper layer sediments which is relative to distributions of SRB.

Molecular biological studies indicate that upper layer sediments among 7cm are main distribution locations of SRB. *Desulfobacter* and *Desulfovibrio- Desulfomicrobium* are main SRB groups. Distributions of all SRB groups are uneven, shown the difference and predominance. Due to activities of SRB, content of sulfate decreases rapidly, that S^{2-} produced combine with Fe^{2+} to precipitation results in different vertical variations of iron and manganese. Microbe culture experiments give the evidence of that iron and sulfate reduction are mainly microbe processes, but manganese reduction is not. The experimental results are in the follows. Two sediment cores are utilized to microbial culture experiments. They all keep the original state but microbes are killed in one sediment core. After keep anaerobic conditions, content of dissolve oxygen decreases. After 124 hours, the sediment cores are keep oxygen again. Iron, manganese, sulfate, DO and pH are determined in the processes.