CO_2-rich fluids in lode gold deposits at the Sarekoubu- Qiaxia area, southern Altaides, China

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Geological Setting

The Sarekoubu and Qiaxia lode gold deposits, located in the southern margin of Altaides, occur in metamorphic volcano clastic rocks of the lower Devonian Kangbutiebao Formation ($D_1k_2^2$) [1]. There are two groups of gold(copper)-bearing quartz veins(Fig.1): 1) lentoid or streaked quartz veins (QI) which are parallel to the foliated structure of the biotite-chlorite or garnet-chlorite schist; 2) sulfide quartz veins (QII) cutting across chlorite mica schist .

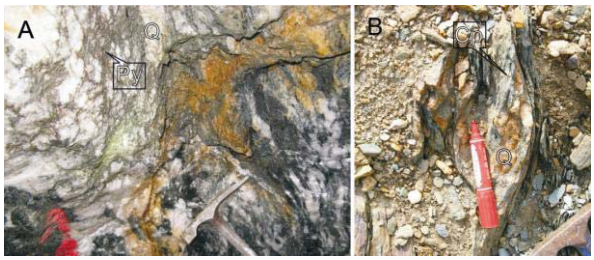

Figure 1: Au-Cu-quartz veins in the Sarekoubu and Qiaxia area

Fluid Inclusion Study

Carbonic fluid inclusions that are free of water are often found in the Sarekoubu deposit. They are of primary origin in QII veins, while a large number of these inclusions are of secondary origin in QI. There are two instances for $T_{m,CO2}$ and $T_{h,CO2}$: 1) $T_{m,CO2}$ = -60℃ ~-56.5℃ and $T_{h,CO2}$ =-23℃~+31℃; 2) $T_{m,CO2}$ <-57℃, to a minimum of -78.1℃, and $T_{h,CO2}$ =-33.7℃~-17.7℃. The $T_{h,TOT}$ of CO_2-H_2O fluid inclusions in vein quartz of the Sarekoubu deposit are 227~374 ℃(QI) and 205~370 ℃(QII). In this situation the lowest trapping pressures of CO_2–rich fluids can be estimated to be 110~ 300MPa based on CO_2 densities and CO_2 phase diagram at high *P-T* of Van den Kerkhof [2]. The ^{18}O delta values of fluid inclusions in quartz are 7.54~11.84‰ (QI) and 3.82~7.82‰ (QII), whereas the D delta values are -84.7~-98.2 ‰ (QI) and -75.8~-108.8 ‰ (QII) respectively.

CO_2-H_2O fluid inclusions composed of a liquid CO_2 phase and a H_2O phase are commomly observed in the Qiaxia deposit. The melting temperatures of frozen CO_2 ($T_{m,CO2}$) range from -63~ -56.6 ℃ for QI, and from -62.6~-58.6 ℃ for QII; the homogenization temperatures of CO_2 ($T_{h,CO2}$)= 19.6~28.9 ℃ for QI, and 25.2~27.9 ℃ for QII. The final homogenization temperatures ($T_{h,TOT}$) of these inclusions are mostly 180~380 ℃ (QI) and 180~360 ℃ (QII).

Conclusions

Gold and copper mineralization in the Sarekoubu and the Qiaxia area has a close relationship with CO_2-rich fluids and belongs to orogenic. The source of ore-forming fluids is related with regional metamorphism and associated magmatism.

[1] Xu *et al.* (2011) *Economic Geology* **106,** 145-158. [2] Van den Kerkhof & Thiéry (2001), *Lithos* **55,** 49-68.

Geochemical Characteristics of Heavy Metals in Water-Sediment Media in Panzhihua V-Ti-Magnetite Zone , China

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Sulphide mines have always been the concerns of people because of their various forms and the resultant environmental problems, whereas oxide mines are paid less attention and not studied much because they do not cause obvious environmental problems such as acid mining drainage（AMD）. However, the potential environmental problems caused by oxide mines can not be ignored.

The author chooses Panzhihua V-Ti-Magnetite, a famous oxide mine in China, as the subject of research. In this thesis, the geochemical characteristics of heavy metals in water-sediment environmental media in the zone during the process of mining are systematically studied by using those media as research carriers and employing the analyzing methods of ICP-MS and ICP-OES. The research results are shown below:

The research on the geochemical characteristics of heavy metals in the system of water-suspended solid-sediment in the mining zone show that: the contents of heavy metals in water are very low, while those in suspended solids and sediments are relatively higher; the contents of Cu, Zn, Co, Ni, Fe and As in suspended solids are higher than those in sediments; the contents of Pb, V, Ti and Cr in sediments are higher than those in suspended solids. The partition coefficients show that: Hg is most active, As and Ni are less active, and Ti is least active. The morphological analyzing results of sediments show that in the sediments in Panzhihua Mining Zone, Ti is most stable, V, Cu and Cr are relatively stable, and Zn, Mn, Co and Ni are more active. The index evaluation on potential ecological risk shows that most heavy metal elements in the sediments are contaminated, whether heavily or in a medium degree, in which Cu, Co, V and Ti are contaminated heavily or even more severely. The potential ecological risk index shows that all places are in light ecological risk and generally the potential ecological risk of heavy metals in the sediments are not high and they have limited influence on environment.