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四川省白玉县呷村-有热矿区成矿流体地球化学

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摘要:

四川省白玉县呷村银多金属矿床是我国著名的VMS型矿床之一, 该矿床由西矿带热液流体补给通道相的脉状-网脉状矿化系统和东矿带的海底盆(洼)地卤水池喷气-化学沉积系统组成。有热矿床紧邻呷村矿床的南部, 实质上是呷村矿带(体)的自然南延部分, 具有相同的地质背景和成矿环境。本文分别对呷村西矿带、东矿带以及有热矿床进行了主成矿期石英的流体包裹体测试和氢、氧同位素分析以及硫化物的硫同位素分析。显微测温结果显示, 呷村矿床从西矿带到东矿带, 即由深部向浅部表现为成矿温度下降(258.0~209.8℃), 流体的盐度略变小(4.42%~4.18% NaCleqv), 而流体的密度增大(0.816~0.894g/cm<sup>3</sup>), 并且有热矿床成矿流体特征(平均成矿温度为244.3℃; 平均盐度为4.71% NaCleqv; 平均密度为0.841g/cm<sup>3</sup>)与呷村西矿带流体特征更类似。显微激光拉曼光谱分析显示流体包裹体的液相成分主要为H<sub>2</sub>O, 气相成分为H<sub>2</sub>O、CO<sub>2</sub>、N<sub>2</sub>以及CH<sub>4</sub>。氢、氧同位素研究显示, 成矿流体为海水和岩浆水的混合流体。硫同位素分析结果表明, 呷村西矿带( $\delta^{34}\text{S}$ 平均值为-3.65‰)与呷村东矿带的硫( $\delta^{34}\text{S}$ 平均值为-0.68‰)和有热矿床( $\delta^{34}\text{S}$ 平均值为-3.74‰)的硫都由深部岩浆提供, 并且有热矿床与呷村西矿带的硫同位素特征更类似。成矿流体物理化学特征和同位素示踪结果表明, 有热矿床目前已知矿体可与呷村西矿带对比, 暗示可能存在尚未发现的类似呷村东矿带的富矿体。呷村-有热矿区的成矿机制为: 在海水对流的成矿模式下, 由岩浆水和海水混合而成的成矿流体, 携带来自岩浆来源的成矿物质, 自下而上向上运移和循环, 在热液补给通道和海底发生淀积作用, 形成脉状-网脉状矿体和块状矿体。

英文摘要:

The Gacun silver polymetallic deposit in Baiyu County of Sichuan Province is one of the most famous VMS deposits in China. The deposit consists of two parts, namely west ore belt of vein-stockwork mineralization system belonging to hydrothermal fluid supply channel, and east ore belt of exhalative-chemical deposit system of submarine basin brine pond. The Youre deposit, which locates on the south of Gacun deposit, is the southern extension of Gacun ore body. Therefore, they share the same geological background and metallogenic environment. In this paper, we carried out fluid inclusions study, hydrogen and oxygen isotopic analysis of quartz belonging to the main metallogenic stage and sulfur isotope analysis of sulfide from both the belts of Gacun deposit and Youre deposit. The result of microthermometry indicates that from west ore belt to east ore belt (deep to shallow), metallogenic temperature drops (258.0~209.8℃), salinity of fluid slightly reduces (4.42%~4.18% NaCleqv). The density of fluid, however, increases (0.816~0.894g/cm<sup>3</sup>). Characteristics of ore-forming fluid in Youre (244.3℃ for average metallogenic temperature, 4.71% NaCleqv for the average salinity, 0.841g/cm<sup>3</sup> for the average density) are more similar to the west ore belt's of Gacun deposit. The Laser Raman data of the fluid inclusions show that it is rich of H<sub>2</sub>O in liquid phase, and H<sub>2</sub>O, CO<sub>2</sub>, N<sub>2</sub>, CH<sub>4</sub> in gas phase. Hydrogen and oxygen isotopic study shows that metallogenic fluid is a mixture of seawater and magmatic water. The result of sulfur isotope analysis indicates that the sulfur of east ore belt (-0.68‰ for the average of  $\delta^{34}\text{S}$ ) and west ore belt (-3.65‰ for the average  $\delta^{34}\text{S}$ ) of Gacun deposit and Youre deposit (-3.74‰ for the average  $\delta^{34}\text{S}$ ) provided by magma. The characteristics of sulfur isotopes of Youre deposit are more similar to the west ore belt of Gacun deposit. The physical and chemical characteristics and the isotopic tracing result of ore-forming fluid indicate that the known ore body of Youre deposit can compare with the west ore belt of Gacun deposit, and we can infer the existence of east ore belt. The metallogenic mechanism of Gacun-Youre ore district are here: under the metallogenic model of

seawater convection, the ore-forming fluid that consist of a mix of magmatic water and seawater with metallogenic material that from magmatic origin, migrates from bottom to top and deposits in hydrothermal supply channels and submarine, forming vein-stockwork ore body and massive ore body.

关键词: [流体包裹体](#) [稳定同位素地球化学](#) [成矿流体](#) [VMS型矿床](#) [呷村-有热矿区](#)

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