1 Regional and Local Geological Setting

The Dashui gold deposit is situated in the "Golden Triangle" region of Sichuan-Shanxi-Gansu junction, its regional tectonic location belongs to south subzone of West Qinling (Han Chunming et al. 2004). Paleozoic Devonian, Carboniferous and Permian; Mesozoic Triassic, Jurassic and cretaceous; Cenozoic Quaternary are widely exposed in the mining district. Orebodies hosted mainly in limestone from Maresongduo Formation of Lower Triassic. The structures are well developed. The NWW-EW and NNE-NE faults that determine the distribution of gold mineralization are developed very well.

2 Wall Rock Alterations

At Dashui gold deposit, Wall-rock alteration is well developed, and is closely related to the gold mineralization. The wall rock alteration is strictly controlled by the fracture zone and is characterized with meso-low temperature types. Alteration styles commonly include carbonatization, silicification, hematization, limonitization, sericitization, chloritization, jarositization, kaolinization. Carbonatization, Silicification and hematization are the most important types of alteration, which are most associated with gold mineralizations.

3 Mass-balance Analysis

Mass-balance techniques have commonly been used in the analysis of hydrothermal alteration systems in gold deposits. (Wilkinson J. J. et al. 2011) Using equations presented by Gresens (1967) and Grant (1986) mass change can justifiably be calculated by using a component that remains relatively unchanged during the alteration process. Mass balance may be evaluated from Eq. 1 using TiO₂, as the unchanged (immobile) component for illustrative purposes (Grant, 1986):

\[ \Delta C = C^A \left( C_{i\,O} / C_{i\,A} \right) - C^O \]

Where: \( \Delta C \) is component migration of altered rocks relative to the unaltered rock; \( C^A \) and \( C^O \) are respectively unchanged components of altered rocks and unaltered rocks; \( C_{i\,A} \) and \( C_{i\,O} \) are components of altered rocks and unaltered rock.

The study selected 72 exploration line profile of 3645 middle (samples \( N = 5 \)), the results shown in Figure 1. In the figure, located above the slash is enrichment elements, located below the slash was leaching elements. Fig. 1 has shown that Au, Sb, Ba, SiO₂ significantly enriched; Fe₂O₃, FeO, Al₂O₃, K₂O, Cu, Co, Ni, Cr enriched in different degrees; CaO, CO₂, Sr, Pb significant lost; MgO, Na₂O, V, Rb, Ag lost in different degrees; indicating the strength of the material migration during alteration has good relationship with gold mineralization.

4 Discussion and Conclusions

From what has been discussed above, the following conclusions can be deduced we may draw the conclusion that:

Wall-rock alteration at Dashui gold deposit is well developed, and is closely related to the gold mineralization. The alteration intensity has a direct genetic association with structurally-controlled hydrothermal alteration.
The wall rock alteration is strictly controlled by the fracture zone and is characterized with meso-low temperature types. Carbonatization, Silicification and hematization are the most important types of alteration, which are most associated with gold mineralizations.

As suggested in Fig. 1, significantly enriched in SiO$_2$, Fe$_2$O$_3$ also enriched, with CaO and CO$_2$ obviously reduced indicating that the gold mineralization is closely related to silicification, carbonation, and hematitization. The intensity of Au mineralization has a positive correlation with Sb and Ba while has a negative correlation with Sr and Pb, that can be used as a direct indicator of gold prospecting. The scale and intensity of wall-rock alteration zone can be an indirect indicator of the scale and intensity of the gold mineralization, which has great significance in searching veins and forecasting concealed orebodies.

Evidence of a consistent composition for the ore fluids inferred by hydrothermal alteration reactions may indicate that the ore fluids may be rich in SiO$_2$, Sb, Ba, Cu, Co, Ni, and the ore-forming fluid temperature is not high. The metallogenic fluid may have deep source.

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**References**


