C, H, and O isotope characteristics of the Shuangwang gold deposit, West China

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The Shuangwang gold deposit in the western Qinling orogenic belt, central China, is localized between the Shangdan and Lixian-Shanyang regional faults and 1-5km far from the Xiba intrusion. Two mineralization stages can be recognized in the Shuangwang gold deposit in the light of different assemblage of minerals and their cut through relations, i.e. albite-ankerite-pyrite stage (stage I), and the pyrite-quartz-calcite vein stage (stage II).

The $\delta^{13}C$ values of the ankerite mainly range from -5.6 to -7.8 per mil and are close to the estimated value (-7‰) of the mantle material defined by Faure (1986). The $\delta^{13}C$ values of calcite are of -1.8 – -4.9 per mil, which are lower than those of marine carbonate (0.5‰±1.56‰), and higher than those of mantle carbonate (-5.1‰±1.4‰). Both of the two group values also approximate or partly overlap the range -4.7‰±1.2‰ of kimberlitic, and -6‰±2‰ of initial mantle reservoir. These results may suggest that the carbon in the ores of the Shuangwang deposit was mainly mantle-derived.

The δD values vary from -60 to -76 per mil for ankerite of stage I, and from -60 to -74 per mil for calcite and from -65 to –70 per mil for quartz of sage II, respectively. The corresponding calculated $\delta^{18}O_{fluid}$ values vary from +7.3 to +11.8 per mil, -1.0 to 1.5 per mil, and from +1.4 to +9.0 per mil, respectively. The scope of ankerite almost overlaps the range of +5.5 – +9.5 per mil for magmatic water suggested by Ohmoto (1986) and Sheppard (1986), with a slight shift to metamorphic water. As to that of the quartz, most of values are exactly plotted into the range of +5.5 – +9.5 per mil. That of calcite displays a characteristic of meteoric water. The magmatic water comprised the dominantly ore-forming fluids with some metamorphic water mixed into the ore-forming process during the main mineralization stage, and some amount of meteoric water were involved in the later ore-forming system in the Shuangwang gold deposit.

References

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Isotopic constraints on the timing and source characteristics of Late Mesozoic mafic volcanism in the Da Hinggan Mountians, NE China

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Late Mesozoic calc-alkaline volcanic rocks are extensively spread and constitutes major part of Da Hinggan Mountains (DHAM), which is situated adjacent to the border of NE China, Mongolia and Russia. The volcanism is dominated by high-K calc-alkaline series, It has been proposed that DHAM could be the magmatic response either to the subduction of paleo-Pacific Plate or to the closure of the paleo-Asia and/or Mongolia-Okhotsk Oceans.

To clarify the timing of volcanism and the role of underlain lithosphere in magma genesis, a systematic geochronological and geochemical study has been taken, The results show that he peak volcanism is within a period of Early Cretaceous, not scattered in Late Jurassic to Early Cretaceous, as commonly believed before. The Sr-Nd-Pb isotope surveying indicates that (1) A distinctive and contrasting pattern of isotope signatures across the southern boundary has been observed. A remarked EM 1 signature feature the isotope system of basaltic rocks on the side of the North China Craton, whereas the primitive to slightly depleted signature dominates that of basaltic rocks on the side of southern DHAM, (2) No pattern difference of isotope signatures between northern and southern sections of DHAM, which is divided by a Paleozoic suture zone in between. Both show the primitive to slightly depleted signature in Nd isotopes and slightly enriched feature in Sr isotopes, which are concordant with its arc signature as evidenced by the spider diagram. This study presents a positive argument showing that the magma sources of volcanic rocks have been highly influenced by the underlain lithosphere. It strongly suggests that the juvenile isotopic signature of most of the DHAM magma source is consistent with the hypothesis of reactivation of Paleozoic subducted zone (Zhou et al., 2001). It also provides further geochemical support to the significant growth of continental crust in Phanerazoic in central-eastern Asia (Jahn et al., 2002).