Geochemical constraints on Shaxi porphyry Cu-Au deposit: A possible link to adakitic genesis?

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Introduction

The Shaxi porphyry Cu-Au deposit is located in the northwestern part of the Luzong volcanic basin, as one of important metallogenic belt in Yangtze valley. Tectonically, the Tan-Lu and Tongcheng-Fanshan faults cut and passes through the ore district. Former studies show that this deposit has a genetic link to the Yanshanian intrusive (c.a.130 Ma), consisting of quartz diorite porphyrite.

Experiment and Results

The total REE content of the Shaxi porphyry Cu-Au deposit ranges from 69.31×10^{-6} to 123.7×10^{-6}, the ratio of $\sum Ce/\sum Y$ is relatively high, ranging from 7.55 to 11.53, and the ratios of $(Ce/Yb)_N$ and $(La/Yb)_N$ range from 18 to 38, much higher than those of Shaxi, the ratios of $(La/Sm)_N$ and $(Gd/Lu)_N$ are all around 2 or so. The ralative low δEu anomaly was determined ranging from 0.8 to 0.95. The REE distribution pattern exhibits relatively large fractionation between LREE and HREE. The spider diagrams of trace elements elements such as Sc, Cr, Co and Ni and some transitional compatible elements such as Ti, V, Mn, Fe and Cu in the Shaxi Cu-Au porphyry deposit have have experienced strong fractionation as compared to the trace elements of crust rocks. The igeous rocks related to Cu-Au mineralization in this area have high concentarations of Al_2O_3 and Sr, low contents of Y, with very high ratios of Sr/Y and La/Yb. All these geochemical characteristics resemble the distinct adakitic genesis. This study presents the fact that the Shaxi porphyry Cu-Au depositis have possible link to the subduction of the Pacific Ocean to the east China continent edge from southeast to northwest in Mesozoic. This processing brought a large mount of oceanic crust to produce the adakitic rocks in Yangtze meallogenic region. During this oceanic-crustal collision and later magmatism, the Cu and Au and other uncompatiable elements enriched.

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Determination of SO_4^{2-} sources using stable S isotope for two karstic ground water systems, Guizhou Province, Southwest China

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The objects of this study were to understand the sources of sulphate ion and its geochemical cycling in the karstic surface and ground water of the two largest cities, Guiyang and Zunyi, in Guizhou Province, China. The sulphur isotopic compositions of sulphate ions in different water samples largely vary, with a large variation of $\delta^{34}S_{SO4}$ values from -20‰ to +30.5‰, as shown the table blow.

Sulphur isotope compositions of SO_4^{2-} of different water types in Guiyang and Zunyi ($\delta^{34}S_{SO4}$, ‰)

Study area	Ground water	Surface water	Sewage	Rain water
Guiyang	-20.4 ~ +20.9	-9.6 ~ +1.9	-8.0 ~ -4.3	-5.1 ~ -4.9
Zunyi	-12.9 ~ +30.5	-2.7 ~ +22.6	-	-

The sulphate ions in the studied surface and ground water are of multiple sources, mainly derived from the dissolution of mineral and rocks, from rain water and anthropogenic inputs. Combined use of sulphur, carbon and strontium isotopes as tracers of sources and geochemical processes leads to a better understanding of water/rock interaction, oxidation of sulfide minerals and sulphur-containing organic matter. Sulphate ions of anthropogenic and natural sources show different isotopic composition, which allows identification of different contributions of various sources. Ground water of from city zone has much higher concentrations of sulphate ion as compared to that from outskirts of the city, suggesting that karstic ground water system is subject to pollution by human activities. Sulphur isotopic signatures and chemical composition of water show that carbonate rock was dissolved by both of sulphuric and carbonic acid, which needs further studies considering global carbon cycling.

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