Geochemical mapping in southeastern part of Hyogo prefecture, Japan

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Geochemical mapping of the southeastern part of Hyogo prefecture, Kinki district, Japan has been made to contribute to the environmental assessment at regional levels.

The area consists of Cretaceous granitoids; Cretaceous volcanic clasts of the Arima group; sandstone, mudstone, chert, limestone and basalts of the Jurassic accretionary complex of the Tamba belt; Permian sedimentary rocks of the Ultra-Tamba belt; basic rocks of the Yakuno complex in the Maizuru belt; sandstone, conglomerate, mudstone and tuffs of the Miocene Kobe Group; and Pliocene to Pleistocene sand, gravel and clays of the Osaka Group.

Some of the closed historical mines are located in the study area. Silver and copper deposit, namely, Tada mine and copper, zinc, lead, tin and tungsten deposit, namely, Ikuno-Akenobe mine are located at southeastern part and northwestern part of the area, respectively.

Stream sediment samples were collected using an 80-mesh (180 um) sieve in wet condition at each sampling site. Sampling method was referred to Tanaka et al. [1]. A total of 689 stream sediments over an approximately 4000 km^2 in southeastern part of Hyogo prefecture were analyzed for 25 elements including Al, As, Ba, Ca, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Nb, Ni, P, Pb, Rb, Si, Sr, Th, Ti, V, Y, Zn, Zr with X-ray fluorescence spectrometry (XRF) and loss-on-ignition.

The concentration of K, Al and Ba is high in the area of Cretaceous volcanic clasts of the Arima group because of its acidic rocks. Sr concentration is high in the area of Cretaceous granitoids. Fe, Ti, Mg and Ca concentrations are high in the Yakuno complex area because of its basic rocks. The Si concentration is high in the area of sedimentary rocks of the Tamba belt.

Distributions of the major elements including Si, K, Na, Ca, Mg, Ti, Fe, Mn, Al, P, and the minor elements of Sr and Ba are mainly controlled by the chemical composition of the country rocks. The concentration of Zr and Y is high in sediments of the basin area because of the heavy mineral (eg. zircon) sedimentation. Heavy metals including As, Cr, Cu, Ni, Pb, Zn give higher concentration spots in the regions of the closed mines.

Combining these geochemical map analyses, the distributions of the elements are mainly controlled by regional geology, geomorphology and ore deposits.

This research project has been undertaken by M. Okabe, K. Imamura, K. Okauchi, H. Shibata, H. Yamamura, Y. Kagawa, S. Osaki, M. Tanaka, Y. Togo, R. Syahputra, T. Isoi, M., Kakiuchi, N. Mori and A. Morii as graduation and master's research of Kwansei Gakuin University.

References

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