

DISTRIBUTION ANALYSIS OF CHEMICAL CONTENTS IN KUROKO DEPOSITS, NORTHERN JAPAN, FOR THREE-DIMENSIONAL MODELING OF ORE BODY

1 Koike, K., 1 Matsuda, S. and 2 Suzuki, T. 1 Fac. Eng., Kumamoto Univ., Kumamoto, Japan; 2 Metal Mining Agency of Japan, Akita, Japan.

The Hokuroku basin, extending over 30 km by 20 km in northern Japan, is known to be dominated by the deposits of Kuroko-type, one of massive sulfide deposit type accompanied by submarine volcanic activities. These deposits are embedded in the Miocene dacite. Because the Kuroko-type deposits are under exploration in several countries, it is significant to systematize the geological and geochemical data accumulated in the Hokuroku basin for estimating the three-dimensional structure of ore bodies. Thus, we collect content data of multiple chemical components from 1917 sample points at 143 borehole sites and concentrate on the data with relatively large amounts of SiO_2 , Al_2O_3 , and Fe_2O_3 as major elements and of Cu, Pb, and Zn as minor elements. Though these data can be approximated by lognormal distributions, spatial correlation structures cannot be found from the semivariograms of each component or the cross semivariograms between two components of the major and minor elements. This may result from the strong nonlinear behaviors of the ore grade distribution in the Kuroko deposits. To deal with such complexity, a modeling method of spatial distribution based on neural network is developed. The principle of this method is to produce local cumulative distribution function by transforming content data into indicators and training the network in terms of both spatial location and data value. The constructed ore-grade distribution model, geologic structure model, and geophysical data can be incorporated into GIS for generating a deposit potential map that is useful for mineral exploration in other areas.