

The Study of Ore Formation Series by Factor and Logic Information Analysis

¹Gorelikova N.V. & ²Tchijova I.A.

¹Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry RAS; ²Central Research Institute of Prospecting for Base & Precious Metals, Moscow, Russia

Systematic study of ore formation series has been started by R.M.Konstantinov who established statistical correlation between mineral composition and geological formation conditions of deposits. Developing this idea, we conducted the comparative investigation of three types of stanniferous formations by factor and logic information analyses that permitted to classify ore deposits in formation and genetic groups and ore series. The main geochemical associations of mineral trace elements, characterizing every formation and genetic type of deposits, have been revealed by factor analysis. The main components (factors), corresponding values of which reflect the major information about differences of objects and contribution in total dispersion of observations, are considered as integral characteristics describing objects. Through the logic information analysis, the identification of ore objects is carried out derived on concept similarity reflected in their characteristics. For revealing signs describing specificity of classes, the function $\Delta P_{jk} = \Pi D_j(i, \delta_i) - \Pi D_j(i, \delta_n)$ is used, where D_j is the proportion of objects in the class A_i taking a value of a sign j equal δ_j ; ΔP_{jk} is a value the function of sign information content. On the strength of the performed mathematical analysis, two series of stanniferous formations, characterizing with the specific parameters, are established: 1) granites- pegmatites- greisens; 2) cassiterite-silicate and cassiterite-sulphide deposits. Tin deposits of the first series are connected with the leucogranite formation, and deposits of the second series correlate with rocks of monzonite-granosyenite row. The last deposits are of chief commercial importance in the world.