The geochemical 3D modelling for mineral exploration of Wulong gold deposit (China)

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The Wulong large gold deposit is located in Dandong district, Liaoning Provinces, China. It is famous for the special large quartz-vein type deposit with Craton destruction setting of the North China Craton in Mesozoic.

The main research aim is to quantitative analyse and identify the ore-bearing geological objects and the trend of orebodies in 3D space using geochemical dataset, the methodology is summarized as follows: (1) The chronology of U-Pb isotopic dating. The ages of the gneiss granite, the Sanguliu granite diorite, granite porphyry, and ophiolite are 162Ma, 130Ma, 129Ma and 125Ma respectively. (2) The analysis of rare earth spectra shows that four type intrusions in the study area are homologous features. (3) The analysis of major/trace element and the analysis of thermoelectric parameters of Au-bearing pyrites from four metallogenic stages, have homogenization temperatures compared the fluid inclusion analysis. (4) The 3D modelling of orebodies and ore-bearing quartz-vein using surface geological map, mining tunnels, and a borehole dataset. (5)The 3D modelling of thermoelectricity coefficients and estimated temperature from Au-bearing pyrites for exploration targeting using discrete smooth interpolation and concentration volume fractal modelling in 3D space. The results indicate that: (1) the Au-bearing pyrites from four metallogenic stages record gradually decreasing temperatures from the earliest to the latest stages, and the frequencies of occurrence of pyrite crystal combination forms and element components are closely correlated with P-type values of pyrites; (2) the main orebodies of quartz-vein at depth in the west of the study area are NW-trending with SW-trending dip; the main orebodies of the quartz-vein in the east and medium of the study area are NNE- trending distribution with SE-trending dip ; (3) The Sanguliu granite diorite in the south of the study area are associate with the NW- and SN- trending fine grained granite diorite veins in the deposit which are typical exploration criteria in the study area.