Relationships Between Mineralizing Porphyry and VMS-Producing Hydrothermal Systems: A Case Study from the Yubileinoe Au-Cu Ore Field, Western Kazakhstan

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Based on results of combined mineralogical and geochemical mapping of hydrothermally altered rocks of the Yubileinoe Au-Cu ore field, the reconstruction of hydrothermal evolution is carried out. The study area contains the Yubileinoe mineralizing porphyry and Sheqarabulak VMS-producing hydrothermal systems. The Yubileinoe Au-Cu deposit is hosted in a 250 m diameter plagiogranite porphyry stock that intrudes mafic volcanics and volcanomictic sediments of Silurian and Devonian age. The latter embody VHMS Au-Cu mineralization of the Sheqarabulak occurrence situated 6 km to the northeast of the Yubileinoe deposit.

Surface and core samples were collected on an approximate 500m grid over a 10×10 km area surrounding the deposits, the sample mass ranging from 200 to 500 g. In areas of intense hydrothermal alteration , the grid size was reduced to 250×250m or even 100×100m. All 1083 samples were analyzed by emission spectrophotometry and for Au. Analyses were normalized by Clarke values and by lithology using petrographic and lithologic data from thee PC data set. Thin sections were examined in order to obtain quantitative petrographic information on the main alteration types from the study area using point counting and chord methods.

Such an approach made it possible to reconstruct the sequence of hydrothermal events within the Yubileinoe ore field and determine the geochemistry of alteration zones related both to the mineralized granitic stock and to pre-granitic volcanic and sedimentary units.