Epithermal Gold-Silver Deposit Prognostication (Northeast Russia): from Statistical Regularities to Computer Expert System

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Okhotsk-Chuckchee volcanic belt (OCVB) represents world class gold-silver province, being a well-studied part of the Circum-Pacific Rim. Extensive research, preceding the system compilation, included collection of various data on major gold-silver, silver-lead-zinc, and tin-silver ore fields (with some data on minor gold-quartz, gold-sulfide, and gold-raremetal subjects). The database consists of 122 ore fields of the OCVB and comprises 433 geological, mineralogical, geochemical, and geophysical signs. Using the original pattern recognition programs (accounting the frequencies and/or character of correlation of the signs), the most informative signs were chosen, their weights (both positive and negative) were identified, and the scenario of the expert system ("solution tree") was compiled. The verbal computer system is intended to be an assistance to an expert in the ore field potential evaluation. The scenario includes several blocks of questions with a goal to estimate the geochemical type and size of the analyzed ore field. The questions have an indirect character, so they could be answered by an expert at the early stages of the exploration (before drilling). The level of recognition of sizes of the ore subjects in the control populations is 95% and higher. The aim of the expert system is to re-estimate a large amount of the known occurrences in the relatively brief period of time with the aid of the personal computer. The revealed regulations could be used in other parts of the Circum-Pacific belt.