FRACTAL ANALYSIS OF GOLD GRADE IN CANGSHANG GOLD DEPOSIT, NORTHWESTERN JIAODONG, CHINA. Z. S. Yang, H. Y. Li, Z. M. Gao, Z. J. Ding, and T. Y. Luo, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550002, China (zjding@ms.gyig.ac.an).

The concept of fractals has provided a means of quantifying the scale invariant processes or phenomena in geosciences such as the distribution of ore grade, topographic relief, fracture strength of rocks, earthquake magnitude etc. [1-4]. Studies on the gold grade in the Cangshang gold deposit show that the distribution of gold grade is a multifractal.

The Cangshang gold deposit, located in the northwestern part of Jiaodong Peninsula, Shandong Province, China, is the wall-rock alteration type of gold deposits. The orebodies are controlled by the fracture zone of a NE strike fault named the Sanshandao-Cangshang Fault with the Neo-Archean Jiaodong Group as the hanging wall in the southeast and the Linglong Monzonitic Granite as the lying wall in the northwest. The extensive hydrothermal alteration can be divided into K-feldsparization, phyllic alteration, and silicification zones from the wall rock to the ore-body. A large number of veinlets with different mineral assemblages which can be divided into five stages were superimposed on the silicification zone and parts of the phyllic alteration zone in the ore-body during mineralization period [5].

The data on gold grade were collected from thirteen exploration lines in the –50 m level and eleven exploration lines in the –80 m level. If the number of samples N with a grade greater than T is related to T by $N \sim T^{-D}$, the distribution of gold grade is a fractal, and D is the fractal dimension. In the log (N)-log (T) plots for different levels and exploration lines, linear relation was always obtained within two scale ranges. This indicates that the distribution of gold grade is a multifractal, and suggests that gold concentration occurs in two processes—silicification with disseminated pyrite and veinlet mineralization.

The fractal dimensions of the –50 m level are 0.225 and 1.690 within the scale ranges of 0.01×10^{-6} ~2.57×10^{-6} and 2.57×10^{-6}~50.00×10^{-6}, respectively, while those of the –80 m level are 0.326 (0.01×10^{-6}~4.47×10^{-6}) and 2.308 (4.47×10^{-6} ~50.00×10^{-6}). The low values of the fractal dimensions indicate the distribution of gold grade is relatively uniform [6] in the low-grade range. This implies that gold is dispersed into the altered rock by intensive silicification, especially in the –50 m level. The high values of the fractal dimensions show that the distribution of gold grade is close to the dendritic distribution (D=1.5) [7] or more complex. This suggests that gold is largely concentrated in the veinlets by crevasse filling, and implies that the period of veinlet development is the main period of mineralization.

The fractal dimensions of each exploration line vary between 0.045 and 0.388 within the low scale range, and between 0.848 and 3.110 within the high scale range. This variety indicates that the spatial distribution of gold grade is extremely complex, and also suggests that the intensity of alteration, the pattern of veinlets, and the density of fissures are variance in the different part of the ore-body).

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