Evaluation of fractal dimension in regional geochemical investigation, shear zone gold mineralization zone

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The Controller factors of fractal dimension

Interpretation of fractal dimensions in regional geochemical investigation needs high precision [1]. Average effect and dilution of the concentration and the existence of a few samples with high concentrations could cause separate fractal dimension. The symmetric grid net estimation for the concentration could increase the number of high value samples and introduce a specific fractal dimension [2].

The results of fractal analysis for a regional geochemical investigation based on the stream sediment samples in shear zone gold mineralized area-Iran was illustrated in Fig. 1[2, 3]. High fractal dimension trend is related to high Au-values, which were estimated based on a few samples. The out-layer data was corrected before the grid net estimation. The mineralized centre could be identified by fractal dimension, but the geochemical haloes of the probable blind mineralization that might be in a deeper depth were not detected.

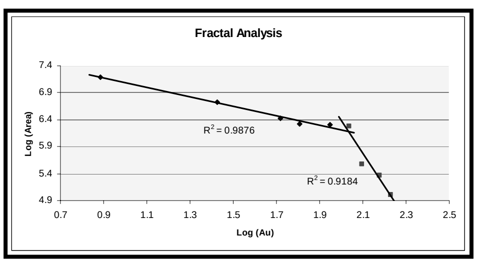

Figure 1: Area versus concentration fractal diagram of Au

Conclusion

The combination of distribution and probability diagrams of the variable with fractal analysis in regional exploration scale were led to high accuracy in interpretation.

[1] Bolviken *et al*. (1992) *J Geoch Expl*, **43**, 91-109, [2] Seyedra himi-Nayragh, (2008) MSc thesis,148 p. [3] Haydari (2004) MSc thesis, 150 p.

Silicate mineral impacts on arsenic accumulation in rice

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Arsenic contamination of ground waters is causing the largest mass-poisoning in human history—more than 140 million people are drinking water with hazardous levels of arsenic. Exacerbating the threat of As from drinking water is the use of As-contaminated groundwater for rice (*Oryza sativa* L.) irrigation during the dry season, with concomitant food-chain transfer of As from soil and/or groundwater to humans through the ingestion of contaminated rice products (e.g. rice grains, rice milk). It has recently been shown that As(III), the dominant form of arsenic in flooded paddy soil, is transported across rice root cells similarly to silicic acid. Silicic acid resulting from mineral dissolution within rice paddy soils may decrease arsenic uptake into edible rice grains. Thus, variation in soil mineralogy, and specifically the solubilty of the silicate minerals present, may have a pronounced influence on arsenic accumulation within rice. We investigated the impact of several silica-based minerals, which vary in silica solubility, on arsenic uptake and accumulation in rice.

Three varieties of rice were grown to maturity in an initially low-silica soil that was amended with either quartz, diatamatious earth, or silica gel and had total arsenic pore-water concentrations of 250 µg/L, typical of irrigation water in Southeastern Asia. Throughout the experiment, pore-water chemistry was monitored using mini-Rhizon tension lysimeters. Total arsenic in plant fractions (i.e. roots, straw, husk, grain) were determined on digested samples using conventional methods (e.g. HG-ICP). In addition, we utlized a host of advanced (micro)spectroscopic techniques to quantify and speciate arsenic forms within various plant fractions.

Similarly to previous work, most of the arsenic was stored in the roots and was least in the grain. Our data indicate that as dissolved silica increased, the amount of arsenic accumulated by rice decreased, but the extent varied with plant variety. The ratio of plant-available silica to arsenite concentrations in pore-water may prove useful to predict arsenic accumulation potential in paddy rice, and alteration of this ratio *may* be used to reduce arsenite uptake by rice.