Study on data statistic principles and methods for regional ecogeochemical assessments

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How to establish a relation equation of various chemically partitioned component concentrations for elements in soils and their total concentrations or other soil parameters according to the statistical results of certain numbers of representative samples is one of the problems that need urgent solution in regional ecogeochemical assessments [1,2]. This article suggests that we should adhere to the dominant principle, concise principle, direct principle, best fitting, recognizable principle and principle of theory uniformity in the establishment of such regressions, i.e. selecting dominate factors, using concise regression models, taking factors that is directly linked to the results as independent variables, best fitting and using the uniform theory. The validity of the equations must also be tested by selecting the validation dataset and determining the prediction intervals [3-5]. Examples are given in this article by performing a statistical analysis of toxic and nutrient elements in soils in the Chengdu economic region according to the aforesaid principles (an example graph showed below), and the regression relations of the concentrations of various species of elements, especially those of the available species, and the total concentration of elements or other important soil properties. These equations provide a basis for regional ecogeochemical assessments of areal survey data.

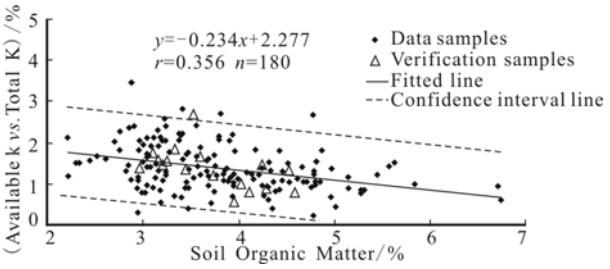

Figure1: Fitted lines for available K vs. total K with SOM.

[1] Yang *et al. (*2005) *Regional Geology of China* **24**, 687-693. [2] Yang *et al*. (2005) *Quaternary Sciences* **25**, 275-284. [3] Wang (2002) *Econometrics*, 189-197. [4] Harvey (1981) The economic analysis of time series. [5] Jia *et al*. (2000) *Statistics*, 242-243.

Geochemistry of tertiary period basalt from the Middle Tanlu Fault (Eastern China) and its relation with formation of corundum megaphenocryst

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There are massive mafic and minor ultramafic basalts distributed at Lingju, Changle, Anqiu and Yishui areas, middle of the Tanlu Fault, eastern China. These mafic magmatism were formed in Miocene (11-16Ma) and formed two groups: the early Niushan Group, consists of homogeneous vesicle and massive alkaline olivine-basalts with thickness ranging from 73m at Gaodingzi to 290m at Longshan, and the later Yaoshan Group iddingsite alkaline olivine-basalts with thickness from 13m at Gaodingzi to 38m at Longshan. Geochemical data suggest that they are high-K series basalts with Rittman index of 3.39 to 4.76. The Niushan Group has higher rare earth elements contents (total REE = 27 ~ 120ppm) and positive Eu* anomalous (Eu* = 1.23 ~ 1.55) than that of Yaoshan Group (total REE = 23 ~ 120ppm, mostly less than 70ppm, Eu* = 0.86-0.93). Their geochemical data suggest that they were generated from same magma source, but the early Niushan Group magma experienced fractional crystallization of plagioclase and made the residual magma to form negative Eu anomalous.

There is abundant corundum megaphenocryst in these basalts. This study suggests that these megaphenocrysts were formed by fractional crystallization from primary alkaline basaltic magma in deep or under high pressure, with little re-reaction with residue melts. They were brought out by fast magma eruption [1].

[1] Zhao H.L. (1990) Publication House of China University of Geosciences, Wuhan.