Review of "Identification of magnetic anomalies based on ground magnetic data analysis using multifractal modeling: a case study in Qoja-Kandi, East Azerbaijan Province, Iran",

by E. Mansouri, F. Feizi, and A. A. Karbalaei Ramezanali.

RELEVANCE

Separation of background and anomalies is a fundamental issue in exploration geochemistry. For the past years, the traditional statistical methods assumed that the concentration of chemical elements in the crust follows a normal or log-normal distribution. It is well known that geochemical data are characterized by their spatial positions, which means that the elemental concentration varies spatially.

Fractal theory has been applied to mineral resources prediction since the 1980s. Turcotte (1986) proposed a fractal relation between average grade and cumulative ore reserves. Meng and Zhao (1991) concluded that fractal structures exist in geological data. Cheng et al. (1994) start to using fractal geometry for determination of different geochemical populations specially anomalies. Based on this, Cheng et al. is innovation concentration-area (C-A) model in 1994.

This paper may be of the journal interest, after a moderate revision that is necessary in order to better explain the model (with some other equations) to the reader. Specific recommendations are given below.

RECOMMENDATIONS

The review of the paper is positive, but the following two suggestions seem necessary for the acceptance and publication of the manuscript:

1. The authors say: "where $A(\rho)$ denotes the area with concentration values greater than the contour value ρ; ν represents the threshold; and a1 and a2 are characteristic exponents." (page 1139, lines 25-26);

    it is necessary to insert a new table (see i.e. the below Table 1 by Cheng et al., 1994) with results obtained by using the power law method; al and a2 are the exponents of the power-law relation for concentration values less and greater than the threshold value (ν), respectively;

    and it is necesary to show in figure 5 of the manuscript the relative five equations (see i.e. eqs. 12-15 and Fig.6 by Afzal et. al., *Journal of Geochemical Exploration*, **108** (2011) 220-232, Delineation of mineralization zones in porphyry Cu deposits by fractal concentration–volume modeling).

Table 1

Results obtained by using the power law method and weights of evidence procedure; α_1 and α_2 are the exponents of the power-law relation for concentration values less and greater than the threshold value (ν), respectively

Elements and oxides	Power law			W. of E.
	ν	α_1	α_2	ν
Au (ppb)	200	0.137	0.879	200
Ag (ppm)	75	0.127	0.820	75
As (ppm)	40	0.064	0.700	40
Sb (ppm)	7	0.061	0.606	7
Zn (ppm)	200	0.059	0.910	200
Pb (ppm)	15	0.026	0.775	15
Cu (ppm)	400	0.092	0.725	400
Mo (ppm)	90	0.478	2.234	90
Fe (ppm)	3.5	0.068	2.898	6.5
Th (ppm)	2.5	0.043	2.030	3.5
Sr (ppm)	225	0.018	2.325	225
Sm (ppm)	7	0.048	3.158	7
W (ppm)	3.5	0.317	3.069	3.5
F (ppm)	150	0.018	1.324	150
Cr (ppm)	15	0.071	0.950	2.5
V (ppm)	125	0.044	4.446	7.5
Ce (ppm)	17.5	0.049	1.935	17.5
Co (ppm)	13.5	0.117	3.545	13.5
Nb (ppm)	12.5	0.314	3.911	6.5
Tb (ppm)	0.225	0.097	1.194	0.325
La (ppm)	15	0.024	2.931	15
SiO_2 (%)	55	0.011	17.179	62.74
TiO_2 (%)	0.475	0.052	4.262	0.55
Al_2O_3 (%)	13.5	0.067	17.862	13.5
MnO (%)	2.5	0.135	10.771	0.5
Fe_2O_3 (%)	4.5	0.011	2.386	3.5
CaO (%)	5	0.394	3.985	2
S (%)	1.5	0.232	1.397	1.5

2. The authors say: "Statistical results reveal that RTP-MA mean value is 48 441 nT, as depicted in Fig. 4, and the RTP-MA domain shows a wide range." (page 1143, lines 8-9);

in Fig. 4 it is necessary to explain the role of histogram and of Gaussian curve, because in the text this role is not clearly described. In particular I strongly suggest to insert (a) for histogram and (b) for Gaussian curve in Fig. 4 caption.

Below more specific comments regarding scientific quality and presentation of the paper.

§ 2 **The concentration-area fractal method**
page 1139, line 24:
insert exact symbol of proportional ($\propto$) in eq. (1) $A(\rho \leq v) \propto \rho^{-a1}$; $A(\rho > v) \propto \rho{-}a2,$

§ 2 **The concentration-area fractal method**
page 1140, line 14:
"The study area and geological setting" is the title of § 3 and not a sentence of § 2,
so we have:

§ 3 **The study area and geological setting**
…

§ 4 **Ground magnetic data analysis**

… and so on for all following paragraphs and subparagraphs.

Reviewer #2