International Journal of Applied Environmental Sciences
ISSN 0973-6077 Volume 11, Number 5 (2016), pp. 1317-1321

http://www.ripublication.com

Investigating the Feasibility of Applying the Discoveries of Vast Areas Variogram - Case Study

[1]Asghar Teymoorian and Hamid Reza Samadi

Hamedan Branch, Islamic Azad University, Hamedan, Iran.

Abstract

the method of mathematical method is widely used in research projects The methods are widely used statistical methods based on the variance of the selected sample based in the area and have acceptable results is carried out as well as this method provides high precision compared to conventional methods in the field of exploration this area is located in south-western Iran and is the region with potential prospects

Keywords: Variance ,south west,exploration

INTRODUCTION

The word fractal is derived from the Latin word 'fructus' which means an irregularly broken and ground rock. It was brought up in 1975 for the first time by Benoit B. Mandelbrot. In recent years, Mandelbrot's brownian fractional surfaces have attracted a lot of attention because of their noticeable similarity to topography (Mandelbrot, 1975, Good Child, 1980, 1982, Fournier, 1982). Observing shapes in the nature, it is concluded that Euclidean geometry is not able to state and
explain natural complex and apparently irregular shapes. In Euclidean geometry dimension is an integer such as one, two and three. As a consequence, Euclidean geometry is able to explain one, two, three and higher dimensional phenomena. The other observation is not to consider dimension of phenomena and events to be integer. In addition, we accept that dimension can be changed continuously from zero to one,

one to two, two to three etc. For example, if a line is of dimension one and a plate is of dimension two, a dimension between one and two can be attributed to a hundreds-of-times broken line in accordance with intensity of breaks in the figure produced.

(Variogram)

Variogram method is widely used to identify dimension of fractal. Taking a large sample of couples of points (with different positions and distances) along with a profile and calculating the difference among their values, fractal dimension is easily obtained by drawing completely logarithmic graph of variance with respect to distance growth and calculating graph slope. Using this method, optimal density of the area can be achieved .

IMPLEMENTATION THEORY OF THE METHOD IN THE AREA

Calculations on the data of complete bouguer anomaly of the studied area made by surface Variogram method are as follows. Firstly, a point in the area with identified longitude and latitude is considered as center and a circle, centered at this point with the largest possible radius to draw, is drawn to include data as much as possible. This maximum distance is divided to 30 equal groups. Then, variance of bouguer data difference for each group is calculated and its logarithm is drawn with respect to logarithm of each group differences (Aronson, 1984). After investigating the graph, points which are supported by Earth's rigid crust and show fractal feature are selected and then we fit the regression line of least squares with them. The slope of this straight line which satisfies the formula y=mx+b demonstrates fractal dimension of line,

$$\mathrm{E}\ \{(\mathrm{Z_P} - \mathrm{Z_q})^2\} = \mathrm{K}(\mathrm{d_{pq}})^{2\mathrm{H}} \qquad (1)$$

where Z_p and Z_q are surface values in the points q and p, d_{pq} horizontal difference among the points and H is equal to (3-D). Drawing logarithm of variance of differences caused by local complications of the surface with respect to logarithm of distance among the points results in a graph which the existence of a linear relation along the domain implies self-similarity along that domain ,and its fractal dimension is gained by slope b of a drawn line in domain point.D=3-b/2

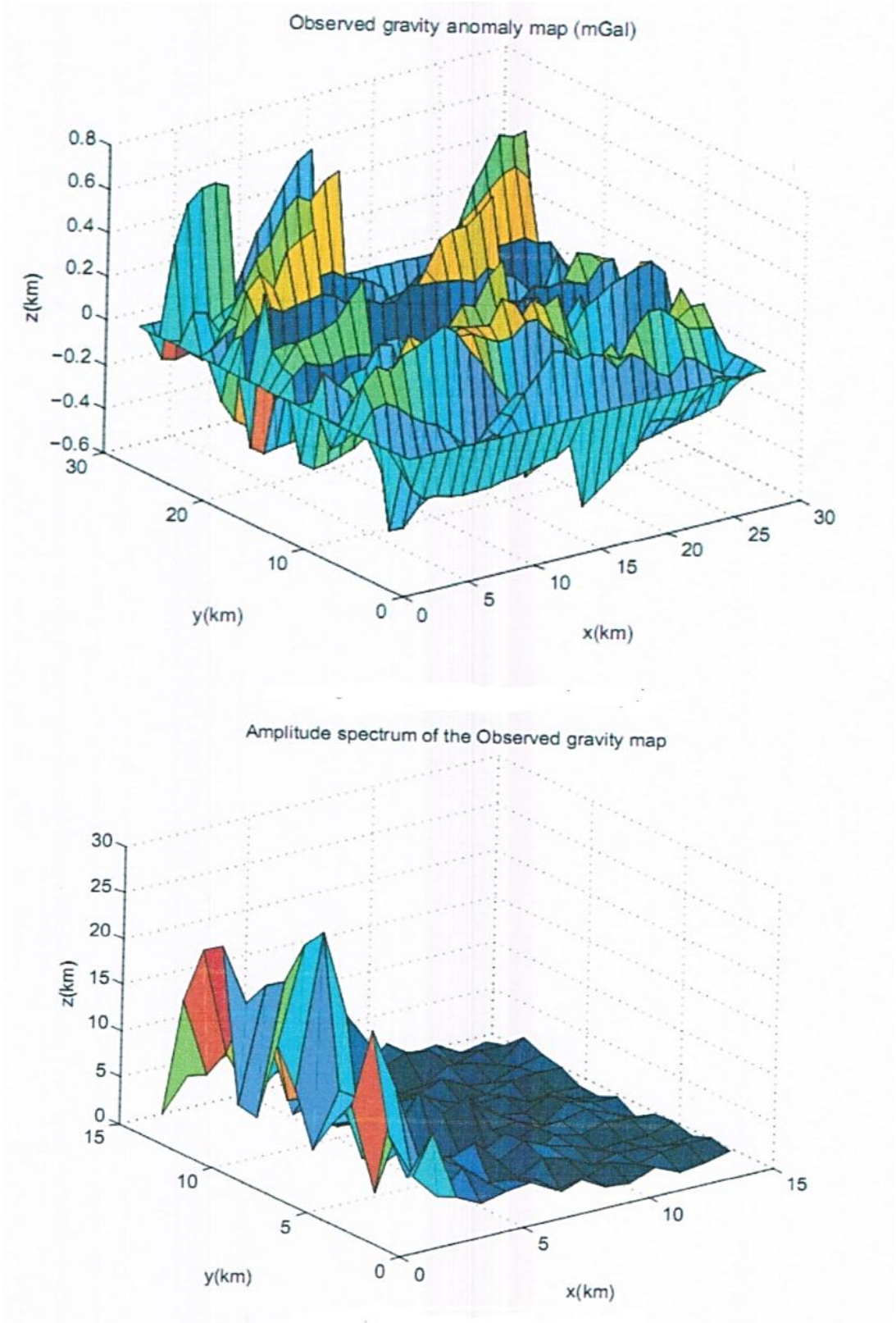

Figure (1): complete bouguer anomaly with density (2.52)g/cm^3

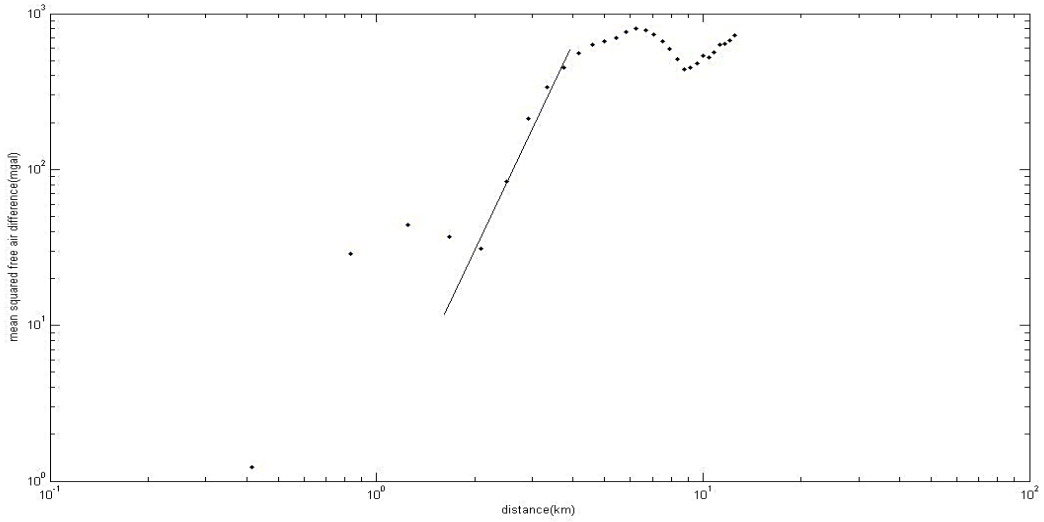

Figure (2): Complete regression line of bouguer anomaly of the area with fractal dimension (2.41)

IDENTIFICATION SCHEME OF OPTIMAL DENSITY IN THE AREA

In this section, to reduce the dimension of surface roughness of bouguer anomaly, optimal density is determined, and to achieve this goal, firstly, complete data of bouguer anomaly of the area with different density should be calculated. Then, fractal dimension of each new obtained data series is calculated using mentioned method and draw the results with respect to their density (Thorarinsson, 1988). In the obtained graph, the minimum shown dimension has the best density which is (2/8g/cm^3) for the under-research area.

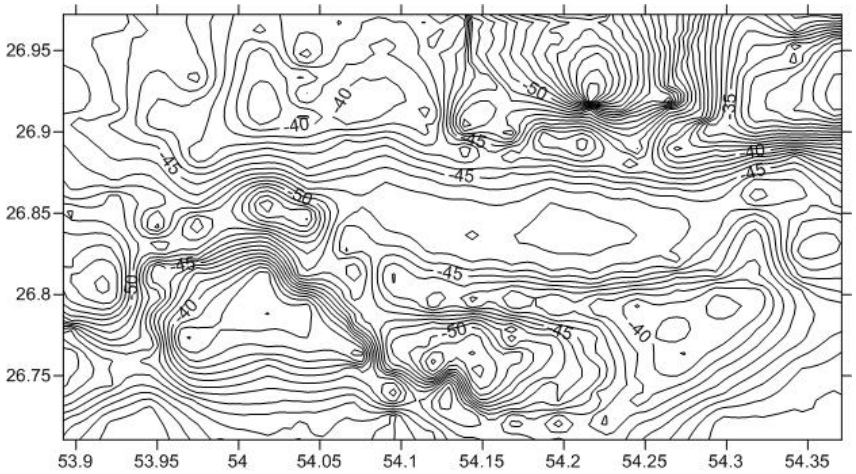

Figure (3): contour map. The complete Bouguer anomaly of the region with the density (2.8g/cm^3) and the balance distance 1 mm Gal; by using the Variogram's method

CONCLUSION

By Introducing statistical methods and application of diffraction-distance equation to determine Bouguer slab density in the south west area, the present study investigated the results of each section and just the most important ones are reported as follows:

Investigating fractal distribution of the gravity data aiming at evaluating Bouguer slab variation in the south west area, due to using similar quantities and focusing on self-similar features resulting from field measurement, makes it possible to estimate density, independent from structures ups and downs, enjoying accurate results based on the statistical parameters if compared Nettleton's correction pattern.

In this study, Bouguer slab variation of south west has been evaluated using classical statistics and fractal method separately and the results have been compared with the R2P values, which $0.4 \leq R2P \leq 0.5$, as a suitable choice has been proposed to select the average density of the region.

REFERENCES

[1] Aronson, peter B, Mark, David M. 1984, Scale - Dependent Fractal, dimensions of topographic surfaces: Math. Geol., 16, 671, 683

[2] Fournier A.,fussell d.,1982,computer bendering of stochastic models, comm. acm, 25,6,371-384

[3] Goodchild m.f.,1982,the fractional Brownian process as a terrain simulation model proceedings ,thirteenth annual pittsburg conference on modeling and simulation, vol. 13,1133-1137

[4] Mandelbrot,b.b.,1957,how long is the coast of biritain? statistical self similarity and fractional dimention:science,156,636-638

[5] Thorarinsson,f.,Magnusson,s,g.,1988,directional specteral analysis and filtering of geophysical maps,geophysics,53,1587-1591

[6] Tontini, F. Caratori, Graziano,F. Determining the optimal bouguer density for a gravity data set: implications for the isostatic setting of the Mediterranean sea, 2007, Geophysics.J.Int, 169, 380 – 388