

Using the box-counting method to analyze the disturbances of phosphate series of Sidi Chennane (Central Morocco)

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The phosphate series of Sidi Chennane is frequently disturbed by sterile bodies called “disturbances” or “derangements” dispersed without order of a very high hardness, an irregular geometrical form. These sterile bodies are masked by the Quaternary cover and they are not directly mapping from the surface. Consequently, The presence of the disturbance in the phosphate mines causes two major problems: (1) from an economical side, it is not easy to determine exactly the part of these bodies in the overall volume of the deposit and therefore we cannot correctly calculate the phosphate reserves; (2) from a technical viewpoint, when we come up against a "disturbance body", it is necessary to constrict the firing pattern and increase the number of holes in order to draw up the disturbances boundaries, and to boost the explosives power during the blasting operation.

Based on a database of 15,000 apparent resistivity data, the present contribution shows how going back fractal geometry may help to characterize the disturbances. The work is carried out on geoelectrical maps of a study area of 50 hectares in the northern part of Sidi Chennane deposit. Fractal geometry is thus seen to be a defining or a representative parameter used for examining the disturbances rate by using the box-counting method. A simple algorithm is presented that allows measuring the fractal dimension of the disturbance areas through the sample image to be calculated. It is an easier tool in calculation process and more effective to deal with the irregularity than the traditional geometric methods which is often time consuming.

This analysis may improve the way of phosphate exploration planning through the comprehensive understanding of the spatial character of disturbances. It describes how much space is filled by disturbances and therefore can help in the phosphate reserves estimation. The study is simple enough to be applied to phosphate deposits in Ouled Abdoun, as such opening a window of opportunity for the development of other automatic and quantitative tools to estimate the disturbances rate.