

Possible relationship between magnetic properties and heavy metal (HVs) pollution induced by the Pb-Zn mining at Boucaid, Tissemsilt, Algeria.

Boualem Bayou¹, Lynda Attoucheik² and Abdelhak Boutaleb³.

¹ CRAAG, Algeria

² Université de Hassiba Ben Bouali, Chlef, Algeria

³ Laboratoire de Métallogénie et Magmatisme de l'Algérie, FSTGAT-USTHB, Algeria

Corresponding author: Boualem.Bayou@gmail.com

Abstract: In environmental magnetism, the properties of magnetic minerals are used as proxy parameters for many purposes such as provenance of sediments studies, studies of anthropogenic induced pollution, etc. The underlying causal relations between observed mineral-magnetic properties and the processes that led to those properties are increasingly becoming better understood. These properties provide a rapid means for detecting and outlining regions with possible higher heavy metal (HVs) contamination caused by multi-anthropogenic pollution sources.

For this reason, we performed a study to outline the anthropogenic Zn-Pb pollution, induced by the mining at Boucaid, Algeria, by using the magnetic properties. We tried to derive an empirical relationship between the magnetic properties and the geochemical analysis. On the other hand, we attempted to explain this possible relation in order to give an interpretation of the anthropogenic impact on the environment.

Results, firstly, show the same trend of the spatial distribution of the magnetic susceptibility in low or high frequency, the remnant magnetization, and the quantitative geochemical analyses. In addition, this distribution seems to be controlled by the major direction of the wind and the surface water transport, in agreement with the map relief. However, the empirical relation between Pb-Zn concentration and magnetic parameters appears to be moderate with a correlation coefficient $R^2 \sim 0.65$ to 0.70.

In conclusion, this study reveals that magnetic methods can be a useful and practical application to detect and map pollution around modern industrial sites.

Keywords: Environmental magnetism; magnetic susceptibility, HVs metal