## Magnetic Susceptibility of Soils in Baton Rouge, Louisiana: A Proxy for the Anthropogenic Impact on the Environment

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## ABSTRACT

Magnetic susceptibility has been used as an effective tool for affordable, rapid, and highly sensitive measurements that provide information about the compositional changes of mineral materials in rocks and soils. It has been demonstrated that a relationship between heavy metal concentrations, pollution, and magnetic susceptibility exists. The objective of this study is to use magnetic susceptibility as a method for the detection of the anthropogenic impact on the environment within Baton Rouge, Louisiana. Based on preliminary results from a previous study, we investigated a 100 square mile area, covering a variety of environmental settings, including urban areas and industrialized parts of the inner city. At each site, 20 magnetic susceptibility readings were taken and discrete surface and subsurface samples were collected for subsequent laboratory analysis.

Contour maps and histograms of magnetic susceptibility values indicate a close correlation between environmental setting and the intensity of magnetic susceptibility. Magnetic susceptibly increases within urban and industrialized areas compared to rural areas within the area of investigation. Enhanced susceptibility was observed in the industrialized areas in all magnetic parameters, including susceptibility maps of field measurements, discrete samples, and isothermal remanent magnetization. The field susceptibility data display a stronger correlation compared to the discrete sample analysis because of the statistically significant amount of data collected at each site. There is no apparent correlation

between magnetic susceptibility and lithology/soil type in this area. Acquisition curves of the isothermal remnant magnetization indicate the presence of both high- and low coercivity minerals, probably magnetite with a small amount of hematite or goethite as the carriers of magnetic remanence.