

## **Environmental study for pollution at Linfen and its change-magnetic monitoring of leaves and soil**

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**Abstract:** Linfen city (Shanxi Province, China) is one of the world's most polluted cities due to uncontrolled coal mining, tar refineries and metallurgical industries. In the past few years, the local government took enormous efforts to improve the environmental quality. However, large numbers of small-sized contaminants still remained in the soils and associated with adverse effects on human health.

In this study, we tested the efficiency of magnetic susceptibility (MS) measurements for the assessment of this important pollution "hot spot" where the environmental issues indicated the questions and existing methodical obstacles had to be mastered. We proceeded to survey the discrimination of MS results from soil and dust-loaded tree leaves, which were able to reflect the historical and present pollution, respectively. In addition, we compared leaf MS values for the two seasons based on 44 identical sampling sites attempting to interpret the temporal distribution variation in heavy contaminated areas.

Results indicated that: the magnetic particles of soil samples were dominated by low-coercivity magnetite yet also coexisting with hematite possibly. Compared with leaf samples, there was no evidence to show that pollution magnetic particles include hematite, which might prove hematite was coming from background soil. The grain-size of magnetic particles from both soil and leaf samples belonged to PSD range. From Day plot, it indicated that leaf samples were closer to the PSD+MD boundary, whereas soil samples were closer to PSD or PSD+SD behaviors.

Enrichment of heavy metal results for topsoil and leaf samples showed that concentrations of some metals, such as Fe, Cu, Zn and Pb, were clearly higher in the industrial area compared to the non-industrial area, however other metal not arising from anthropogenic source, such as Ti, was similar at all study areas. The distributions of heavy metals and MS values at high and low polluted sites indicated that the extra magnetic particles accumulated in the industrial areas were neither inherited from soil parent materials nor from pedogenic processes, but originated from anthropogenic activities.

**Keywords:** (Magnetic Susceptibility, Linfen Pollution, Magnetic Monitoring)