香港教育大學
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HEAVY METALS AND IRON IN THE COMPOSITION OF THE MAGNETIC PHASE AND NODULES IN SOILS OF THE MIDDLE CIS-URALS

PhD Thesis by Gorokhova Svetlana Mikhailovna

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GENERAL COMMENTS

As an environmental scientist, I am less familiar with the topic, so my comments are more general.

This study aims to compare the content and composition of the magnetic phase and soil nodules of natural and agricultural landscapes of the southern taiga of the Middle Urals, to evaluate their influences on iron and heavy metal concentrations.

The thesis is generally arranged logically, and the presentation is clear and adequate. The general background consisted of a literature review by citing relevant publications. The experiments are well-planned and executed professionally. Results are treated with statistical analyses properly and presented clearly in tables and figures to guide readers. The photographs are professionally prepared. The discussion is made by comparing data obtained with relevant published data. A conclusion is drawn based on significant findings derived from this study.

SPECIFIC COMMENTS

The thesis comprises four chapters:

A brief introduction at the beginning of the thesis outlined this environmental problem of the Middle Cis-Urals, highlighting the goals and objectives of the project. The scientific novelty, theoretical and practical significances, main findings, results reliability, research approbation, author's publications on the project, structure, volume of work, author's contribution, and acknowledgments were provided. I prefer to designate this part as Chapter 1: Introduction and a separate chapter on the conclusion based on the results obtained (i.e., Chapter 6: Conclusion).

Chapter 1 is a literature review under four sections: 1) Soil heavy metals of the taiga-forest zone of the Perm region, 2) Soil magnetic susceptibility and minerals of the soil magnetic phase, and 3) Mineralogical and elemental chemical compositions of ferruginous nodules. The background related to the research is provided by citing relevant and updated references to identify the data gap justifying the need for this study – special geochemical studies of magneto-mineralogical complexes of soils and IMN in the Middle Cis-Urals.

Chapter 2 describes the research objects and methods used for the study. Details of the study objects (soils from five soil regions of the Perm Region), including the soil names, morphological descriptions, locations, and the rationale for choosing them, are provided. The methods adopted include chemical analyses of statistical processing,

geostatistical analysis of metals, and ecological geochemical assessment of the elemental composition of the magnetic phase of soils and nodules. The original references related to various analyses are given.

Chapter 3 determines the mineralogical and bulk chemical compositions of particles of the soil magnetic phase under three subtopics: 1) Content and bulk chemical composition of the magnetic phase, 2) Magnetic susceptibility of soils and magnetic phase, and 3) Mineralogical composition of particles of magnetic phase, heavy metals, and iron in their composition. This basic information is essential for more detailed studies in the next chapter.

Chapter 4 investigates the mineralogical and bulk chemical compositions of nodules under the following two subtopics: 1) Content and bulk chemical composition of nodules, 2) Microstructure of nodules, heavy metals, and iron in their composition. The conclusion drawn according to the results obtained is given at the end of Chapter 4. However, I would prefer a separate Chapter on the conclusion of this PhD study and its prospects. Therefore, with the background placed as Chapter 1: Introduction mentioned earlier, there will be 6 chapters instead of 4.

MY ASSESSMENTS

The study generated some exciting results, filling the gap in understanding the accumulation of iron and heavy metals in soils affected by the magnetic phase and nodules. The thesis consisted of a substantial amount of work involving field surveys and laboratory analyses. The overall presentation is clear and adequate. The data obtained are significant, reflected by the important results and the fact that 22 papers have been generated. These included 3 published in peer review journals of the Higher Attestation Commission of the Russian Federation and 2 indexed by Scopus and Web of Science. In addition, results obtained from this study have been presented in various national and international scientific meetings.

RECOMMENDATION

The quantity and quality of this thesis are equivalent to PhD theses from various universities I examined: Australia, Bangladesh, China (including Hong Kong and Macao), India, Jamaica, Malaysia, UK, USA, etc. It is ready for further examination - presentation, and oral defense.

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