



Czech University of Life Sciences Prague

**Faculty of Agrobiography,
Food and Natural Resources**

Study programme: **Exploitation and Protection of Natural Resources**

Department of: **Soil Science and Soil Protection**

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Topic: Evaluation of the potential of the spaceborne superspectral and hyperspectral imagers to estimate soil contamination

Hypotheses:

Generally, spaceborne sensors can be used for a reliable indication of soil contamination.

The effects of acquisition parameters and sensors on soil spectra can be recognized, controlled, and corrected.

Modeling soil contamination can be improved using soil spectral libraries.

Hyper- and superspectral spaceborne missions are major steps towards global soil attributes mapping, including contamination, from space.

Summary:

This thesis deals with implementing quantitative spectroscopy methods to monitor soil contamination from reflectance information of orbital sensors. This will be done by developing and adjusting the methodology to extract spatial/spectral information from a distance in order to map soil contaminants. The main goal is to develop the means to do so from spaceborne hyper- and superspectral domains, which are already in orbit. The thesis will focus on Potentially Toxic Elements (PTEs) driven by human activity. Point and image spectrometers will be used to check the potential of both domains to map soil contamination using the orbital sensor spectral configuration. Accordingly, as the recently-operated superspectral Sentinel-2 is now in orbit and actual hyperspectral data of EnMAP will be also available soon, accuracies for the retrieval of soil contaminants using actual data from Sentinel-2 and EnMAP imager will be estimated. The effects of acquisition sensors on soil spectra will be assessed and correction procedures for the merging of Soil Spectral Libraries (SSLs) will be developed. As a result, the spectral models employed from the superspectral orbital sensors will be used to generate contamination-degradation-related thematic maps. Such maps can assist decision-makers, environmentalists, or planners and farmers to preserve the soil.

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