



Česká zemědělská univerzita v Praze

Fakulta agrobiologie,  
potravinových a přírodních zdrojů

DOKTORSKÝ STUDIJNÍ PROGRAM

## NÁVRH TÉMATU/PROPOSAL OF THEME

Studijní program/*Study Program*: **Special Agricultural Science/Exploitation and Protection of Natural Resources**

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

Školitel (včetně titulů), email/*Supervisor*, email: Prof. Ing. Radka Kodešová, CSc., [kodesova@af.czu.cz](mailto:kodesova@af.czu.cz)

Konzultant (včetně titulů)/*Co-supervisor*: MSc. Asa Gholizadeh, Ph.D.

Forma studia/*Form of Study*: **Full\_time**

Typ tématu/*Type of Theme*: **Framework**

**Téma/Theme**: Soil assessment using Earth observation-powered system

### Hypotézy/*Hypotheses*:

There exists quantifiable relationship between remote sensing data and selected soil properties.

Models for reliable spatial prediction of soil properties assessment and soil monitoring can be developed based on remote sensing data using advanced computational techniques.

**Anotace/Annotation**: The emersion of remote sensing (RS) technologies is now recognized as an alternative and efficient method for mapping and monitoring of various soil properties. Airborne and satellite-based sensors have been expanded and launched, with more sensors being under development for the near future deployment, which will generate large data streams for land monitoring. These have the potential to improve considerably the related information to soil properties estimation and environmental monitoring over larger spatial areas. Thus, an extension of soil evaluation process from the local to the regional or continental scale will be enabled. Clearly, the use of high spectral resolution aerial and orbital images along with a vast data stream and short revisit time to monitor soil attributes in a rapid, environmentally friendly, and cost-effective way provides many advantages over traditional techniques including speed, wide dynamic range of elemental quantification, little need for sample preparation, and simplicity, and therefore is in high demand. Hence, studies on further exploration of remote sensing capability for better exploitation of the technique in soil and environmental monitoring is required. The study will include: 1) RS image acquisition and processing; 2) Analysis of the relationship between RS image spectral information and soil properties (e.g. soil organic carbon content, soil texture, potentially toxic element content); 3) Building models for spatial prediction of soil properties from RS data, using advanced artificial intelligence (AI) algorithms (e.g. machine learning, deep learning); 4) Evaluation for model performance, uncertainty assessment; 5) Application of the models on larger scales.

**Zdroj financování/Source of**: WorldSoils project (ESA)  
EJP SOIL (project STEROPES)

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Podpis/*Signature*: