



## Master's thesis opportunity

### Automated image analysis of mineral soil properties Can soil field survey be assisted by deep learning?

**Context:**

The demand for spatial soil information is large e.g. for regional planning, agricultural applications or planning of ecological infrastructure. Soil mapping is very laborious and costly, therefore in a study area of 1000 hectares in the vicinity of Bern new approaches are developed by the School of Agricultural, Forest and Food Sciences HAFL.

**Goals:**

This Master thesis focuses on field sampling with mechanical augering and automated image analysis. The augering system takes visible and near infrared images of a soil core down to 2 m depth (see figure above). The main goal is to develop a procedure, which can automatically detect soil properties through image analysis using machine learning and/or deep learning methods. After a thorough introduction the student will mechanically augering soil cores, photograph them and describe their properties. The images shall be tagged with the properties to feed subsequent the training of the soil property prediction system. A successfully implemented prototype will serve as basis to transfer the approach to productive application and hopefully facilitate future soil surveys.

**Knowledge and skill required:**

High motivation for soil mapping, field work and data analysis. Interest for interdisciplinary research spanning field pedology and classification, data science such as (geo)statistical methods or deep learning. The work language is German (and French). English is possible as well.

**Collaboration:**

Simon Tanner, Project leader; School of Agricultural, Forest and Food Sciences HAFL, Zollikofen

**Keywords:** soil mapping, image analysis, machine learning, deep learning.

**Working place:** Field work near Berne (Wohlen and Meikirch), office work remote or at HAFL Zollikofen

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