



Estimation of soil parameters using VIS-NIR spectroscopy – Challenges and Chances

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Recently VIS-NIR spectroscopy has become a popular method for the prediction and mapping of soil parameters. It is a rapid, cost and time effective method to measure quantities like soil organic carbon (SOC), clay content or pH which are important information for e.g. precision agriculture or digital soil mapping. However, there is a need to calibrate measured field spectra against laboratory determined soil properties. In this regard, it is common to use data mining algorithms for calibration, statistical tools that discover empirically the relation between spectra and soil properties. However, each time a site-specific calibration model is required, which clearly limits the operational application of VIS-NIR calibration methods. Therefore, the incorporation of physical understanding regarding the relationship is desirable.

So far three field campaigns have been conducted in Germany in order to collect soil data and connected spectral information. VIS-NIR data were measured using a mobile VIS-NIR spectrometer (Veris Technologies). Furthermore at each field campaign the geophysical methods Electromagnetic Induction and Gamma Ray Spectroscopy have been used to gather additional soil related information. The soil samples were analyzed in the laboratory for SOC, texture and pH. Using common calibration methods like partial least square regression and site specific calibration models the specific soil parameters have been spatially mapped.

This work will present results of the field campaigns and resulting recommendations. Additionally a conceptual framework will be presented how physical knowledge can be incorporated into the VIS-NIR calibration process.