Mobile proximal soil sensors for the spatial characterization of soil contamination

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Introduction

One of the steps in performing a descriptive soil investigation is the three-dimensional (3D) delineation of the soil contamination. Traditionally, this delineation is based on a limited number of punctual observations obtained by well-monitoring and augering. In addition to the application of geostatistical interpolation methods, the use of proximal soil sensors can improve the spatial characterization of a contaminant plume. This is because proximal soil sensors provide information on the geophysical properties of the soil (e.g. conductivity) which can be influenced by the presence of a soil contamination. Combining proximal soil sensors in a mobile configuration with a GPS enables the acquisition of a large density of geophysical observations in a time and cost effective way. These virtually area-covering observations offer a conceivably important source of secondary information for delineating a soil contaminant plume. The aim of this PhD is to examine the potential of proximal soil sensors to optimize the 3D delineation of a soil contamination. For this, different types of proximal soil sensors, whether or not combined, will be applied to various contaminated terrains.

Research hypothesis

The use of proximal soil sensors in combination with geostatistical interpolation techniques can optimize the 3D delineation of a soil contamination plume.

Research questions

1. Under which conditions are proximal soil sensors suitable for detecting a soil contamination?
2. How and to which extent can proximal soil sensors improve the 3D delineation of a soil contaminant plume?
3. Can proximal soil sensors provide information that allows to improve the modeling of contaminant plume dynamics?