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Correlating different evaluation methods for SWC as support for soil processes modelling

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Soil erosion modelling has a large sensitivity to soil water content as it greatly affects soil erodibility. Knowing soil moisture and water content along a soil profile can help to understand the soil ability to absorb water before runoff occurs, then, to predict runoff and potential erosion.

This study presents a combined approach of direct and indirect methods to monitor soil moisture content on a slope, with the goal of using this data in the future for modelling water erosion processes in soils.

Generally, soil moisture data used for erosion models can be acquired through direct methods (e.g., gravimetric method, time or frequency domain reflectometry, moisture sensors) and/or indirect methods (meteorological data, remote sensing, electrical conductivity).

In this research project, an experiment was carried out with the aim of combining direct and indirect methods to maximize the information on the rate of change of soil moisture in a 9*9 m plot by exploring depths from 0 to 50 cm. We used the water content sensor, SoilVUE10 by Campbell, recently released on the market, and based on Time Domain Reflectometry (TDR) technology conjointly with the Electrical Resistivity Tomography (ERT). Moisture sensors are known to create a disturbance in the ground, while geophysical techniques such as ERT are indirect, non-destructive measurements. Furthermore, they have the great advantage of being able to investigate a significantly larger area than classic humidity sensors.

The conductivity varied in average between 0.02 and 0.08 S/m with a little more evident relationship between the values measured with the two methods in deeper layers than at soil surface (i.e., r=0.31 at -30cm).

Overall, further investigations will be conducted, the ERT system needs data acquisition integration, i.e., remote data acquisition so that much more data can be acquired (at least one data set per day). The moisture values acquired by the SoilVUE10 probe require further analysis and comparison, possibly with other TDR probes. Furthermore, it may be necessary to install a surface moisture sensor capable to improve data acquisition even for the first 10cm soil layer.