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Using Unmanned Aerial Vehicle to Obtain Digital Images and Estimating In-Situ Soil Water Content

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Soil water content (SWC) is a vital factor for soil sciences. Nowadays, there are many methods for estimating SWC, including the Time-domain reflectometry (TDR) and the Gravimetric method. Nevertheless, most of them may cause damages to soil structure and require a large workforce and resources. The optical method is a non-destructive and cost-efficient; therefore, recommended for SWC estimations.

This study analyses soil samples at the field site, as well as it uses aerial photo-shooting to obtain the digital image distribution of surface soil. Both soil samples and digital images were categorized into groups; 9 in total, depending on time parameters (one group equals one day). More specifically, the gravimetric method was selected for the SWC measurements in the laboratory, while the images were modified in such a way so to match the CIE 1931 XYZ color space resolution for further calculations. Then, comparing the CIE 1931 XYZ color space data with the Soil Water Content correlation of 9 groups by validation.

According to the findings, the sensitivity of CIE 1931 XYZ color space in SWC alternations is high. Additionally, it can be observed that the SWC result data of the model are similar to the SWC measurements; therefore, the CIE 1931 XYZ color space can be applied to agriculture and disaster prevention, and it is a cost-efficient method for SMC estimations, and it can provide several benefits.