

Book of Abstracts

Wageningen Soil Conference 2015

'Soil Science in a Changing World'

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23 - 27 August 2015

Wageningen

The Netherlands

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Cover design: Vormgeverij Mol

ISBN: 978-946173-168-5

Printing: Wageningen UR, Communication Services, Wageningen, The Netherlands

USE OF RGB AERIAL PHOTOGRAPHS FOR ASSESSMENT OF SOIL ORGANIC CARBON DISTRIBUTION IN AGRICULTURAL FIELDS

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For quantitative estimation of soil properties by means of remote sensing, often hyperspectral data are used. But these data are scarce and expensive, which prohibits wider implementation of the developed techniques in agricultural management. For precision agriculture, observations at a high spatial resolution are required. Colour aerial photographs at this scale are widely available, or can be acquired at low costs for example by using Unmanned Aerial Vehicles. Therefore, we investigated whether available aerial photographs can be used to estimate levels of organic carbon and their spatial distribution.

We selected five study areas, including 15 fields, within the Netherlands and Belgium that cover a large variance in soil type (peat, sand, loam and clay). For the fields of interest, RGB aerial photographs with a spatial resolution of 40 cm were extracted from a publically available data provider or acquired using an Unmanned Aerial Vehicle. Since the images originate from different sources and are potentially acquired under unknown illumination conditions, the exact radiometric properties of the data are unknown. Therefore, we used spectral indices to emphasize the differences in reflectance and normalize for differences in radiometry.

Regression analysis between a number of soil properties and the derived indices shows that organic carbon is the major explanatory variable for differences in index values, but the achieved accuracy is variable and depends on the soil type. Found relations do not hold for large regions, indicating that local models will have to be used, which is an issue that is also still relevant for hyperspectral remote sensing data.

With this research, we show that low-cost aerial photographs can be a valuable tool for quantitative analysis of organic carbon. Since a lot of data are publically available or can easily be acquired, this offers great possibilities for implementing these techniques in agricultural management.