



Estimation of within field variation of SOM using UAV based RGB and elevation data

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The spatial variation in soil properties is an important factor for agricultural management. Unmanned airborne vehicles (UAV's) equipped with a multitude of camera's may provide these data. However, to widely apply this technique, camera's and platforms need to be affordable and analysis should be straightforward. The most low-cost option is mounting a customer RGB camera on a multi rotor platform. Therefore, we investigated if the within field spatial variation in organic matter can be determined accurately using a simple RGB camera system.

We acquired a set of RGB images over a test field in the south of the Netherlands, where we collected 20 soil samples, which were analyzed for organic matter (OM) content. The RGB images were used to create a digital elevation model using structure from motion techniques and an RGB orthophoto of the test area. Next, RGB and elevation values were extracted for the different sampling locations, and a stepwise multiple regression model was fitted to a) the raw RGB and elevation data and b) a number of indices calculated on the RGB data and the elevation data.

The regression outputs show that the largest part of variation in soil organic matter can be explained by the RGB based indices (adjusted $R^2= 0.58$). When applied to the image, the spatial patterns in surface soil organic matter content show up clearly, providing a useful input for the farmer to adapt his management.